PTO-1390 (01-18)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A SUBMISSION UNDER 35 U.S.C. 371

Attorney Docket No.	
RENA3002-2/TL	
U.S. Application No. (if known, see 37 CFR 1.5)	

International Application No.	International Filing Date	Priority Date Claimed
PCT/EP2018/086537	December 21, 2018	December 29, 2017

Title of Invention
METHOD AND SYSTEM FOR MAKING FUNCTIONAL DEVICES AVAILABLE TO PARTICIPANTS OF MEETINGS

First Named Inventor
Gauthier RENARD

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information.

1. ☒ This is an express request to begin national examination procedures (35 U.S.C. 371(f)). NOTE: The express request under 35 U.S.C. 371(f) will not be effective unless the requirements under 35 U.S.C. 371(c)(1), (2), and (4) for payment of the basic national fee, copy of the International Application and English translation thereof (if required), and the oath or declaration of the inventor(s) have been received.
2. ☒ A copy of the International Application (35 U.S.C. 371(c)(2)) is attached hereto (not required if the International Application was previously communicated by the International Bureau or was filed in the United States Receiving Office (RO/US)).
3. An English language translation of the International Application (35 U.S.C. 371(c)(2))
   a. ☐ is attached hereto.
   b. ☐ has been previously submitted under 35 U.S.C. 154(d)(4).
4. An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4))
   a. ☒ is attached.
   b. ☒ was previously filed in the international phase under PCT Rule 4.17(iv).

Items 5 to 8 below concern amendments made in the international phase.

PCT Article 19 and 34 amendments

5. ☐ Amendments to the claims under PCT Article 19 are attached (not required if communicated by the International Bureau) (35 U.S.C. 371(c)(3)).
6. ☐ English translation of the PCT Article 19 amendment is attached (35 U.S.C. 371(c)(3)).
7. ☐ English translation of annexes (Article 19 and/or 34 amendments only) of the International Preliminary Examination Report is attached (35 U.S.C. 371(c)(5)).

Cancellation of amendments made in the international phase

8a. ☒ Do not enter the amendment made in the international phase under PCT Article 19.

8b. ☒ Do not enter the amendment made in the international phase under PCT Article 34.

NOTE: A proper amendment made in English under Article 19 or 34 will be entered in the U.S. national phase application absent a clear instruction from applicant not to enter the amendment(s).

The following items 9 to 17 concern a document(s) or information included.

9. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
10. ☒ A preliminary amendment.
11. ☒ An Application Data Sheet under 37 CFR 1.76.
12. ☐ A substitute specification. NOTE: A substitute specification cannot include claims. See 37 CFR 1.125(b).
13. ☒ A power of attorney and/or change of address letter.
14. ☐ A computer-readable form of the sequence listing in accordance with PCT Rule 13*ter*.3 and 37 CFR 1.821-1.825 (not required if sequence listing in text format was indicated on the PCT Request as part of the International Application and the sequence listing was published as part of the international application).
15. ☐ Assignment papers *(cover sheet and document(s))*. Name of Assignee: _____
16. ☐ 37 CFR 3.73(c) Statement *(when there is an Assignee)*.

This collection of information is required by 37 CFR 1.414 and 1.491-1.492. The information is required to obtain or retain a benefit by the public, which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 15 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Mail Stop PCT, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

YEALINK EX. 1004

U.S. APPLN. No. (if known – see 37 CFR 1.5)	INTERNATIONAL APPLICATION No.	ATTORNEY DOCKET No.
	PCT/EP2018/086537	RENA3002-2/TL

17. ☐ Other items or information:

The following fees have been submitted.	CALCULATIONS
18. ■ Basic national fee (37 CFR 1.492(a)) **$300**	$ 300.00
19. ■ Examination fee (37 CFR 1.492(c)) • If the written opinion prepared by ISA/US or the international preliminary examination report prepared by IPEA/US indicates all claims satisfy provisions of PCT Article 33(1)-(4)..... **$0** • All other situations **$760**	$ 760.00
20. ■ Search fee (37 CFR 1.492(b)) • If the written opinion prepared by ISA/US or the international preliminary examination report prepared by IPEA/US indicates all claims satisfy provisions of PCT Article 33(1)-(4)..... **$0** • Search fee (37 CFR 1.445(a)(2)) has been paid on the international application to the USPTO as an International Searching Authority ..... **$140** • International Search Report prepared by an ISA other than the US and provided to the Office or previously communicated to the US by the IB..... **$520** • All other situations **$660**	520.00 $
TOTAL OF 18, 19, and 20 =	$ 1580.00

☐ Additional fee for specification and drawings filed in paper over 100 sheets (excluding sequence listing in compliance with 37 CFR 1.821(c) or (e) in an electronic medium or computer program listing in an electronic medium) (37 CFR 1.492(j)).

Fee for each additional 50 sheets of paper or fraction thereof **$400**

Total Sheets	Extra Sheets	Number of each additional 50 or fraction thereof (round **up** to a whole number)	RATE
65 - 100 =	/ 50 =		x **$400**

$

Surcharge for furnishing any of the search fee, examination fee, or the oath or declaration after the date of commencement of the national stage (37 CFR 1.492(h))..... **$140**	$

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE	
Total claims	22 - 20 =	2	x **$100**	$ 200
Independent claims	3 - 3 =	0	x **$460**	$
MULTIPLE DEPENDENT CLAIM(S) (if applicable)			**+ $820**	$

Fee for submission of Sequence Listing text file of 300 MB to 800 MB (37 CFR 1.21(o)(1))..... **$1,000**	$
Fee for submission of Sequence Listing text file of more than 800 MB (37 CFR 1.21(o)(2))..... **$10,000**	$
Processing fee for furnishing the English translation later than 30 months from the earliest claimed priority date (37 CFR 1.492(i))..... **$140 +**	$
TOTAL OF ABOVE CALCULATIONS =	$ 1780
☐ **Applicant asserts small entity status.** See 37 CFR 1.27. Fees above are reduced by ½.	
☐ **Applicant certifies micro entity status.** See 37 CFR 1.29. Fees above are reduced by ¾. Applicant must attach form PTO/SB/15A or B or equivalent.	
TOTAL NATIONAL FEE =	$ 1780
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31)..... **$50.00** per property **+**	$
TOTAL FEES ENCLOSED =	$ 1780

a. ☐ A check in the amount of $_____ to cover the above fees is enclosed.

b. ☐ Please charge my Deposit Account No. _____ in the amount of $_____ to cover the above fees.

c. ☒ The Director is hereby authorized to charge additional fees which may be required, or credit any overpayment, to Deposit Account No. 020200 as follows:

i. ☐ any required fee.

ii. ☒ any required fee except for excess claims fees required under 37 CFR 1.492(d) and (e) and multiple dependent claim fee required under 37 CFR 1.492(f).

d. ☐ Fees are to be charged to a credit card. **WARNING:** Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038. The PTO-2038 should only be mailed or faxed to the USPTO. However, when paying the basic national fee, the PTO-2038 may NOT be faxed to the USPTO.

ADVISORY: If filing by EFS-Web, do **NOT** attach the PTO-2038 form as a PDF along with your EFS-Web submission. Please be advised that this is **not** recommended and by doing so your **credit card information may be displayed via PAIR**. To protect your information, it is recommended to pay fees online by using the electronic payment method.

NOTE: Where an appropriate time limit under 37 CFR 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the International Application to pending status.

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013, and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.

NOTE 1: By providing this statement under 37 CFR 1.55 or 1.78, **this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA**.

NOTE 2: A U.S. national stage application may not claim priority to the international application of which it is the national phase. The filing date of a U.S. national stage application is the international filing date. See 35 U.S.C. 363.

Correspondence Address

☒ The address associated with Customer Number: 23364 **OR** ☐ Correspondence address below

Name					
Address					
City		State		Zip Code	
Country		Telephone			
Email					

Signature	/Thomas Lee/	Date	June 9, 2020
Name (Print/Type)	THOMAS LEE	Registration No. (Attorney/Agent)	66396

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	RENA3002-2/TL
	Application Number	
Title of Invention	METHOD AND SYSTEM FOR MAKING FUNCTIONAL DEVICES AVAILABLE TO PARTICIPANTS OF MEETINGS	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2:

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Gauthier		RENARD	

Residence Information (Select One) US Residency ● Non US Residency Active US Military Service

City	Kuurne	Country of Residence [i]	BE

Mailing Address of Inventor:

Address 1	Watertorenstraat 21		
Address 2			
City	Kuurne	**State/Province**	
Postal Code	B-8520	**Country** [i]	BE

Inventor 2 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Johan	Peter Frans	DEGRAEF	

Residence Information (Select One) US Residency ◉ Non US Residency Active US Military Service

City	Gent	Country of Residence [i]	BE

Mailing Address of Inventor:

Address 1	Twaalfkameren 45		
Address 2			
City	Gent	**State/Province**	
Postal Code	9000	**Country** [i]	BE

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

PTO/AIA/14 (02-18)
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	RENA3002-2/TL
	Application Number	
Title of Invention	METHOD AND SYSTEM FOR MAKING FUNCTIONAL DEVICES AVAILABLE TO PARTICIPANTS OF MEETINGS	

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	23364		
Email Address	mail@baconthomas.com	Add Email	Remove Email

Application Information:

Title of the Invention	METHOD AND SYSTEM FOR MAKING FUNCTIONAL DEVICES AVAILABLE TO PARTICIPANTS OF MEETINGS		
Attorney Docket Number	RENA3002-2/TL	**Small Entity Status Claimed**	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	19	**Suggested Figure for Publication (if any)**	

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	● Customer Number	US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	23364		

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	RENA3002-2/TL
	Application Number	
Title of Invention	METHOD AND SYSTEM FOR MAKING FUNCTIONAL DEVICES AVAILABLE TO PARTICIPANTS OF MEETINGS	

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
	a 371 of international	PCT/EP2018/086537	2018-12-21
Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
PCT/EP2018/086537	Continuation in part of	15858668	2017-12-29

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button. Add

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)[i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Remove

Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[i] (if applicable)

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button. Add

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	RENA3002-2/TL
	Application Number	
Title of Invention	METHOD AND SYSTEM FOR MAKING FUNCTIONAL DEVICES AVAILABLE TO PARTICIPANTS OF MEETINGS	

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	RENA3002-2/TL
	Application Number	
Title of Invention	METHOD AND SYSTEM FOR MAKING FUNCTIONAL DEVICES AVAILABLE TO PARTICIPANTS OF MEETINGS	

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1 — Remove

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

● Assignee	Legal Representative under 35 U.S.C. 117	Joint Inventor
Person to whom the inventor is obligated to assign.	Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor:

If the Applicant is an Organization check here. ☒

Organization Name	BARCO N.V.		
Mailing Address Information For Applicant:			
Address 1	President Kennedypark 35		
Address 2			
City	Kortrijk	**State/Province**	
Country	BE	Postal Code	B-8500
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button. Add

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

PTO/AIA/14 (02-18)
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	RENA3002-2/TL
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Title of Invention	METHOD AND SYSTEM FOR MAKING FUNCTIONAL DEVICES AVAILABLE TO PARTICIPANTS OF MEETINGS	

Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

Remove

If the Assignee or Non-Applicant Assignee is an Organization check here. ☒

Organization Name	BARCO N.V.

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1	President Kennedypark 35		
Address 2			
City	Kortrijk	**State/Province**	
Country i	BE	Postal Code	B-8500
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button. Add

Signature:

Remove

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). **However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).**

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/Thomas Lee/			Date (YYYY-MM-DD)	2020-06-09
First Name	THOMAS	Last Name	LEE	Registration Number	66396

Additional Signature may be generated within this form by selecting the Add button. Add

PTO/AIA/14 (02-18)
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	RENA3002-2/TL
	Application Number	
Title of Invention	METHOD AND SYSTEM FOR MAKING FUNCTIONAL DEVICES AVAILABLE TO PARTICIPANTS OF MEETINGS	

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This power revokes any previous powers of attorney given in the above-identified patent application.

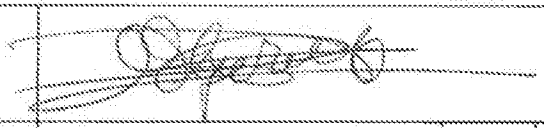
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I (we) am/are the Applicant Assignee or Person to Whom the Inventor is Under an Obligation to Assign. This revocation and appointment to the above-identified Practitioners is to the exclusion of the inventor(s).

Signature of Applicant for Patent

Signature			
Name	Peter Geerts	Date	13/12/2017.
Title and Company	BARCO NV, VP Technology		

REMARKS

Examination of the application as amended is respectfully requested.

Respectfully submitted,
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Dated: June 9, 2020

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LIST OF CURRENT CLAIMS

1-35. (Cancelled)

36. (New) A system for connecting a processing device to a functional device connected to or in a base unit of a communications network, the processing device having a memory, a display and an operating system, the system comprising:

a first peripheral device being adapted to be coupled to the processing device via a generic communications protocol, the base unit having a transmitter and the first peripheral device having a receiver and at least one fixed or a configurable endpoint of the functional device exposed on the first peripheral device;

the base unit and the first peripheral device being adapted to transmit and receive data respectively over the communications network from the functional device to the processing device via the at least one fixed or configurable endpoint using the generic communications protocol for communication between the processing device and the first peripheral device.

37. (New) The system according to claim 36, wherein data that is transmitted or received, optionally streaming data carrying images, audio, or similar can be in a raw or unaltered format.

38. (New) The system according to claim 36, wherein the functional device is selected from the following or any combination thereof:

the functional device being connected to or in a base unit of a wireless communications network,

the functional device is able to be run with a vendor specific driver alone,

the functional device is any one or more of a microphone, a speakerphone, a speaker, a display, a touchscreen, a projector, a camera, a video camera, and a webcamera,

the functional device is presented to a unified communication between two or more processing devices by the first peripheral device,

the functional device is a second peripheral device

the functional device is a data capturing device.

39. (New) The system according to claim 36, wherein exposure is implemented with descriptor fields.

40. (New) The system according to claim 36, wherein the system is adapted to transmit the data from the functional device to at least two processing devices using at least two first peripheral devices.

41. (New) The system according to claim 36, wherein two endpoints are combined and exposed to the processing device as one endpoint, or

wherein the at least one fixed or a configurable endpoint of the functional device exposed on the first peripheral device is one of a human interface device, a mass storage device, a composite device, a microphone, a speakerphone, a speaker, a display, a touchscreen, a projector, a camera, a video camera, or a webcamera, or

wherein the same type of functional device is exposed to the processing device as is connected to the Base Unit further comprising at least one driver for the functional device installed on the processing device.

42. (New) The system according to claim 36, further comprising means for encoding, optionally encrypting the data.

43. (New) The system according to claim 36, wherein the processing device is adapted to host a unified communication between two or more further processing devices.

44. (New) A method for connecting a processing device to a functional device connected to or in a base unit of a communications network, the processing device having a memory, a display and an operating system, the base unit having a transmitter and a first peripheral device having a receiver, the method comprising:

coupling a first peripheral device to the processing device via a generic communications protocol;

providing at least one fixed or a configurable endpoint of the functional device exposed on the first peripheral device;

transmitting data from the base unit; and

receiving the data at the first peripheral device over the communications network from the functional device to the processing device via the at least one fixed or configurable endpoint using the generic communications protocol for communication between the processing device and the first peripheral device.

45. (New) The method according to claim 44, wherein data that is transmitted or received, being streaming data carrying images, audio, can be in a raw or unaltered format.

46. (New) The method according to claim 44, the functional device being selected from or any combination thereof:

the functional device being connected to or in a base unit of a wireless communications network,

the functional device is run with the vendor specific driver alone,

the functional device provides any one or more of a microphone, a speakerphone, a speaker, a display, a touchscreen, a projector, a camera, a video camera, and a webcamera,

the functional device is presented to a unified communication between two or more processing devices by the first peripheral device

47. (New) The method according to claim 44, wherein exposure can be implemented with descriptor fields.

48. (New) The method according to claim 44, comprising transmitting the data from the functional device to at least two processing devices using at least two first peripheral devices.

49. (New) The method according to claim 44, comprising exposing two endpoints which have been combined to the processing device as one endpoint,
or exposing the same type of functional device to the processing device as is connected to the Base Unit and using at least one driver for the functional device installed on the processing device.

50. (New) The method according to claim 44, further comprising presenting the at least one fixed or a configurable endpoint of the functional device exposed on the first peripheral device as one of a human interface device, a mass storage device, a composite device, a microphone, a speakerphone, a speaker, a display, a touchscreen, a projector, a camera, a video camera, or a webcamera.

51. (New) The method according to claim 44, further comprising encoding, and/or optionally

encrypting the data.

52. (New) The method according to claim 44, further comprising hosting a unified communication between two or more further processing devices on the processing device.

53. (New) A peripheral device adapted to be coupled to a processing device via a generic communications protocol, the peripheral device comprising:

a receiver and

at least one fixed or a configurable endpoint of a functional device exposed on the peripheral device,

the receiver of the peripheral device being adapted to receive data over a communications network from the functional device and for sending the data to the processing device via the at least one fixed or configurable endpoint using the generic communications protocol for communication between the processing device and the peripheral device.

54. (New) The peripheral device according to claim 53, wherein the communications network is a wireless communications network.

55. (New) The peripheral device according to claim 53, wherein data that is transmitted or received, or streaming data carrying images or audio can be in a raw or unaltered format.

56. (New) The peripheral device according to claim 53, wherein the at least one fixed or a configurable endpoint of the functional device exposed on the first peripheral device is one of a human interface device, a mass storage device, a composite device, a microphone, a speakerphone, a speaker, a display, a touchscreen, a projector, a camera, a video camera, or a webcamera.

57. (New) A non-transitory signal storage means storing a computer program product for carrying out the method steps of claim 44 when executed on a processor.

AMENDMENTS TO THE SPECIFICATION

Please amend the heading on page 16, line 8 as shown below:

Detailed Description of ~~the preferred embodiments~~ the Invention

AMENDMENTS TO THE ABSTRACT

Amend the abstract, as seen in the following marked-up abstract, a clean copy of which is provided on the following page:

A system and method ~~are described~~ for connecting a processing device to a functional device connected to or in a base unit of a communications network, the base unit having a transmitter and the processing device having a memory, a display and an operating system. A first peripheral device is adapted to be coupled to the processing device via a generic communications protocol, the first peripheral device having a receiver and at least one fixed or configurable endpoint of the functional device exposed on the first peripheral device. The base unit and the first peripheral device is adapted to transmit and receive data respectively over the communications network from the functional device to the processing device via the at least one fixed or configurable endpoint using the generic communications protocol for communication between the processing device and the first peripheral device.

ABSTRACT

A system and method for connecting a processing device to a functional device connected to or in a base unit of a communications network, the base unit having a transmitter and the processing device having a memory, a display and an operating system. A first peripheral device is adapted to be coupled to the processing device via a generic communications protocol, the first peripheral device having a receiver and at least one fixed or configurable endpoint of the functional device exposed on the first peripheral device. The base unit and the first peripheral device is adapted to transmit and receive data respectively over the communications network from the functional device to the processing device via the at least one fixed or configurable endpoint using the generic communications protocol for communication between the processing device and the first peripheral device.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

International Patent Application No. PCT/EP2018/086537

International Filing Date: December 21, 2018

Attorney Docket: RENA3002-2/TL

Inventors: Gauthier RENARD et al.

For: METHOD AND SYSTEM FOR MAKING FUNCTIONAL DEVICES AVAILABLE TO PARTICIPANTS OF MEETINGS

PRELIMINARY AMENDMENT BEFORE EXAMINATION

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

INTRODUCTORY COMMENTS

This paper accompanies documents submitted to initiate national stage processing of the above-identified international patent application.

Before calculating the filing fee and before formal examination of the application on the merits, it is desired to amend the application in accordance with the following particulars.

AMENDMENTS

AMENDMENTS TO THE ABSTRACT

The abstract is amended as shown on a following page under the heading "AMENDMENTS TO THE ABSTRACT".

AMENDMENTS TO THE SPECIFICATION

The specification is amended as shown on a following page under the heading "AMENDMENTS TO THE SPECIFICATION".

AMENDMENTS TO THE CLAIMS

The claims are amended as shown in the following pages under the heading "LIST OF CURRENT CLAIMS". This listing of claims supersedes all prior listing of claims presented

in this application, shows currently proposed amendments and shows the current status of all claims in the application.

The amendments to the claims of this application, which originated in a foreign country, are submitted before examination on the merits and are not intended to have a narrowing effect for the purpose of patentability, but rather are made for one or more of the following reasons: (i) to remove drawing reference numerals unnecessary under U.S. practice; (ii) to remove or reduce multiple dependent claims to reduce the filing fee; (iii) to revise the original language originating in a foreign country to better conform to customary English usage and style for U.S. patent claiming; (iv) to revise original non-U.S. claim terminology into more appropriate English claim terms having a scope of meaning consistent with the original intended language in preparation for U.S. examination; (v) to remove limitations having an effect in a foreign country which is different and unintended under U.S. practice (i.e., changing "consisting of" to "comprising"); (vi) to remove or amend original claim language that could be regarded as alternative expressions that are acceptable under foreign patent practice but possibly subject to objection under U.S. practice, typically having a broadening or neutral effect in the amended claim; and/or (vii) to improve the clarity or meaning of the original language.

In the case of amendments effectively changing an original claim element expressed as a "means plus function" that could raise a presumption of claim expression under 35 U.S.C. 112, 6th paragraph to a structural expression or to an expression removing the presumption of a "means-plus-function" statement, it is not intended to narrow the claim so amended for purposes of patentability, but rather to place the claim in a form considered to be intended by the applicant from a foreign country where claim limitations described in terms of means-plus-function do not have the same effect as under U.S. practice. Thus, such amendments are intended to establish a full range of equivalents to the claim elements so amended under the U.S. doctrine of equivalents and beyond the range associated with "means-plus-function" expressions according to 35 U.S.C. 112, 6th paragraph, just as if the claim so amended was presented originally in its amended form.

All rights are reserved to the original disclosed and claimed subject matter and any cancellation of claims is made without prejudice or disclaimer.

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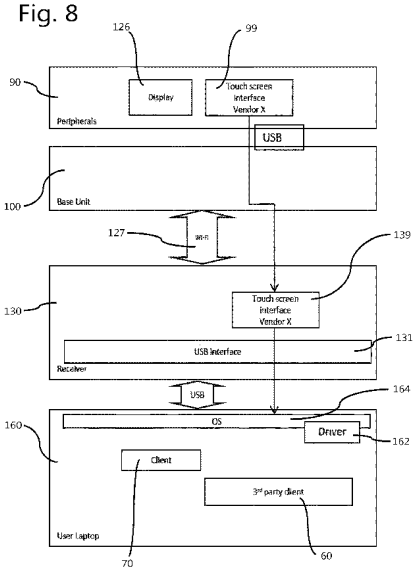
Declarations under Rule 4.17:
— *of inventorship (Rule 4.17(iv))*

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(54) **Title:** METHOD AND SYSTEM FOR MAKING FUNCTIONAL DEVICES AVAILALBLE TO PARTICIPANTS OF MEETINGS

(57) **Abstract:** A system and method are described for connecting a processing device to a functional device connected to or in a base unit of a communications network, the base unit having a transmitter and the processing device having a memory, a display and an operating system. A first peripheral device is adapted to be coupled to the processing device via a generic communications protocol, the first peripheral device having a receiver and at least one fixed or configurable endpoint of the functional device exposed on the first peripheral device. The base unit and the first peripheral device is adapted to transmit and receive data respectively over the communications network from the functional device to the processing device via the at least one fixed or configurable endpoint using the generic communications protocol for communication between the processing device and the first peripheral device.

Fig. 8



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Method and System for making functional devices available to participants of meetings

The present invention relates to methods, devices and systems for making functional devices available to participants of meetings, as well as software for carrying out such methods.

Background

Allowing ad hoc groups of persons to communicate with each other is one of the fundamental aspects of collaboration, problem solving, negotiation, teaching and education, etc. To assist in communication, there has been an explosion of electronic communication tools such as electronic conferencing tools, e.g. synchronous and asynchronous conferencing, online chat, Instant Messaging, audio conferencing, videoconferencing, data conferencing, application sharing, remote desktop sharing, electronic meeting systems, collaborative management (coordination) tools, project management systems, knowledge management systems, and social software systems.

One classic approach is the lecture or seminar often involving a presentation using presentation software. To a large extent the traditional single person presentation or lecture has been maintained with the audience being in a rather passive mode as far as determining, constructing, augmenting or modifying the information to be presented is concerned.

As with other business processes, meetings are going digital. Increasingly, people are using computer technology alone and in conjunction with broadband networks to support their meeting objectives prior to and during an actual meeting. For example, e- mail is used to pass around files for people to read prior to a meeting.

However, certain functionalities such as microphones and load speakers tend to have a low quality if these are provided by portable devices such as laptops and mobile phones. As meetings get larger in size there is a need for high quality audio as well as visual signals to be made available to participants at a meeting.

Summary of the Invention.

Embodiments of the present invention relate to methods, devices and systems for making functional devices available to participants of meetings, as well as software for carrying out such methods.

Embodiments of the present invention provide a system for connecting a processing device to a functional device connected to or in a base unit of a communications network, the processing device having a memory, a display and an operating system, the system comprising :

a first peripheral device being adapted to be coupled to the processing device via a generic communications protocol, the base unit having a transmitter and the first peripheral device having a receiver and at least one fixed or configurable endpoint of the functional device exposed on the first peripheral device;
the base unit and the first peripheral device being adapted to transmit and receive data respectively over the communications network from the functional device to the processing device via the at least one fixed or configurable endpoint using the generic communications protocol for communication between the processing device and the first peripheral device.

The communications network is preferably a wireless network. This enables the **sharing or combining** of at least a selection of functionalities/endpoints of the secondary peripheral devices, i.e. the one-to-many scenario.

The data that is transmitted or received, i.e. streaming data carrying images, audio, etc. can be in a raw or unaltered format.

There can be more than one first peripheral device. For example, the data can be transmitted from the functional device to at least two processing devices using at least two first peripheral devices.

A functional device can be run with a vendor specific driver alone.

The functional device can be a data generating device such as any one or more of a

microphone, a speakerphone, a speaker, a display, a touchscreen, a projector, a camera, a video camera, a webcamera.

The at least one fixed or configurable endpoint of the functional device exposed on the first peripheral device can be a human interface device.

The processing device can be adapted to communicate with the at least one fixed or configurable endpoint with the pre-installed generic driver being a human interface device driver.

The at least one fixed or configurable endpoint of the functional device exposed on the first peripheral device can be a mass storage device.

The processing device can be adapted to communicate with the at least one fixed or configurable endpoint with a pre-installed generic driver being a mass storage device driver.

The at least one fixed or a configurable endpoint of the functional device exposed on the first peripheral device can be a composite device.

The processing device can be adapted to communicate with the at least one fixed or configurable endpoint with a pre-installed generic driver being a composite device driver.

Embodiments of the present invention include the combining of endpoints: the present invention includes a system wherein two endpoints are combined and exposed to the processing device as one endpoint.

An **exposure** or **enumeration** feature determines which endpoints the first peripheral (e.g. button) sees. With respect to **exposure** this can be done with **descriptor fields.** A specific device can expose a peripheral device or other device. This means that the specific device configures one or more endpoints with specific descriptor fields or **descriptive field**. An endpoint is defined by a number of descriptive fields.

A basic form of descriptive fields can be “USB over IP”, and the actual transfer of the

unaltered data can be done with tunneling.

The exposure can be implemented with **descriptor fields**. The Endpoints are the **capabilities/functionalities** of the **physical devices** (second peripherals, or functional device), e.g. a telephone device is a second peripheral while it can have several endpoints, e.g. a microphone or a loudspeaker or an IP connection, etc.

The **differentiation** between endpoints and second peripherals/functional devices defines endpoints.

Embodiments of the present invention provide a system that enables the use of the original vendor's driver for each functional device (and related endpoint), e.g. in the context of mirroring. Hence the functional devices can be run with the vendor specific driver alone.

The system can comprise means for encoding, optionally encrypting the data. Hence the system may comprise an encoder for encoding, optionally encrypting the data.

The processing device can be adapted to host a unified communication between two or more processing devices. The unified communication can be a Skype™ call or a Skype™ for Business call. The first peripheral device can be adapted to present the functional device to the unified communication between two or more processing devices. For example, the functional device can be a speaker phone, a microphone, a speaker, a videocamera, a webcam, a camera, or other audio source.

The system can be adapted to share data from other processing devices in a meeting in the call. A manual action can be used to activate this sharing to be performed by the person sharing or the host via local view window.

The system can be adapted to select of a camera, e.g. via a manual action in UC clients. The system can be adapted to synchronize the sharing state of the first peripheral device with the sharing state of the UC client.

Sharing of functionalities/endpoints can be sharing of a room display. Combining of resources can be using two room loudspeakers (e.g. to increase quality) but the user only

sees "one room loudspeaker". The latter case would also comprise the combining feature if there are more than one participant/user in the room. Sharing is also envisioned as a selection of functionalities/endpoints of a certain functional device.

Embodiments of the present invention can use multiple endpoints, at least one fixed or configurable endpoint and the sharing can be to multiple processing devices, i.e. the use of **multiple first peripherals** (e.g. buttons) is also supported.

The system can be adapted to provide a multiuser wireless speakerphone. The speakerphone can be made accessible to every processing device in a meeting with a first peripheral device connected to each of the processing devices. There is no moderation or need to perform an action to get access to this device.

The system can be adapted to provide separate controls, e.g. on the peripheral device to control a volume of an audio output of the Base Unit and to mute a room microphone. When muted, a microphone can also be muted for all other first peripheral devices connected to processing devices in a meeting.

Audio signals should be picked up by a microphone or the Base Unit can be adapted to have to inject audio signals in any audio feed such as in a microphone signal to a first peripheral device connected to a processing device.

The system can be adapted to expose the same type of functional device to the user as is connected to the Base Unit so that a user can use drivers provided by a vendor of the functional device installed on the processing device.
The system can be adapted such that for a plurality of processing devices communicating with the Base Unit, a functional device connected to the base unit will be exposed to all the plurality of processing devices. The functional device can be exposed natively.

Exposure can be implemented with **descriptor fields**.

The system can be adapted to allow any processing device connected to the communications network through the first peripheral device the ability to view any audiovisual content that is displayed, provided or projected in the meeting room on that

processing device called “local view”.

A processing device which is a receiver of the local view can have, but is not limited to, following functionality:

- The ability to open a window and view the meeting room content in there.
- The ability to zoom into the content.
- The local view can allow the user to start and/or participate in a blackboard or annotation session from his/her own processing device

The system can be adapted provide alternative methods and systems if there are too few first peripheral devices in a certain meeting room.

The system can be adapted to provide a warning if a first peripheral device is attempting to connect to the wrong base unit.

In another aspect the present invention provides a method for connecting a processing device to a functional device connected to or in a base unit of a communications network, the processing device having a memory, a display and an operating system, the base unit having a transmitter and the first peripheral device having a receiver the method comprising :

coupling a first peripheral device being to the processing device via a generic communications protocol, providing at least one fixed or a configurable endpoint of the functional device exposed on the first peripheral device;

transmitting data from the base unit and receiving the data at the first peripheral device over the communications network from the functional device to the processing device via the at least one fixed or configurable endpoint using the generic communications protocol for communication between the processing device and the first peripheral device.

The communications network is preferably a wireless network. This enables the **sharing or combining** of at least a selection of functionalities/endpoints of the secondary peripheral devices, i.e. the one-to-many scenario.

The data that is transmitted or received, i.e. streaming data carrying images, audio, etc. can be in a raw or unaltered format.

There can be more than one first peripheral device. The data can be transmitted from the functional device to at least two processing devices using at least two first peripheral devices.

A functional device can be run with a vendor specific driver alone.

The functional device can provide any one or more of a microphone, a speakerphone, a speaker, a display, a touchscreen, a projector, a camera, a video camera, a webcamera.

The method can include presenting the at least one fixed or a configurable endpoint of the functional device exposed on the first peripheral device as one of a human interface device, a mass storage device, a composite device, a microphone, a speakerphone, a speaker, a display, a touchscreen, a projector, a camera, a video camera, or a webcamera.

The data can be encoded, and/or optionally encrypted.

A unified communication between two or more further processing devices can be hosted on the processing device.

The first peripheral device can present a functional device to the unified communication between two or more processing devices.

The method can include exposing the same type of functional device to the processing device as is connected to the Base Unit and using at least one driver for the functional device installed on the processing device.

Exposure can be implemented with **descriptor fields**.

In another aspect a peripheral device adapted to be coupled to a processing device via a generic communications protocol is provided, the peripheral device having a receiver and at least one fixed or a configurable endpoint of a functional device exposed on the first peripheral device;
the receiver of the first peripheral device being adapted to receive data over the

communications network from the functional device and for sending the data to the processing device via the at least one fixed or configurable endpoint using the generic communications protocol for communication between the processing device and the peripheral device.

The communications network is preferably a wireless network. This enables the **sharing or combining** of at least a selection of functionalities/endpoints of the secondary peripheral devices, i.e. the one-to-many scenario.

The at least one fixed or a configurable endpoint of the functional device exposed on the first peripheral device can be one of a human interface device, a mass storage device, a composite device, a microphone, a speakerphone, a speaker, a display, a touchscreen, a projector, a camera, a video camera, or a webcamera. The exposure can be implemented with **descriptor fields**.

A functional device can be run with a vendor specific driver alone.

In another aspect, a computer program product is provided for carrying out any of the method steps of claim 10 when executed on a processor. A non-transitory signal storage means can be used to store the computer program. The non-transitory signal storage means can be an optical disk such as a CD-ROM or a DVD-ROM, a magnetic disk such as a hard disk, a solid state memory such as a flash memory, a magnetic tape or similar.

Brief Description of the drawings

Figure 1 shows in Figures 1A to C an embodiment of the present invention.

Figures 2 and 3 show message flows of how a peripheral device is connected to a processing device in embodiments of the present invention.

Figure 4 shows an arrangement of components that can be used in embodiments of the present invention. This figure is Figure 11 of WO 2013/037980 entitled “Electronic tools and methods with audio for meetings” which is incorporated herein by reference with respect to Figure 11 thereof and also in its entirety.

Figure 5 shows an arrangement of processing devices as used in a meeting with a unified communication in progress according to an embodiment of the present invention.

Figures 6 to 11 show embodiments of the present invention where a peripheral device is coupled to a processing device.

Figures 12 to 14 show embodiments of the present invention where a peripheral device is not coupled to a processing device.

Figure 15 shows a message flow for use with any of the embodiments 1 to 11 and 17 according to an embodiment of the present invention.

Figure 16 shows a message flow for use with any of the embodiments 12 to 14 according to an embodiment of the present invention.

Figure 17 shows a further embodiment of the present invention.

Definitions

"**Plug and play**" is a term used to describe the characteristic of a computer bus, or device specification, which facilitates the discovery of a hardware component in a system, without the need for physical device configuration, or user intervention in resolving resource conflicts. Plug and play devices can be added to a bus of a computing system (while running or when shut down), and the newly added device and possibly the rest of the computing system is automatically configured to make the newly added device work, both from hardware and from software perspective.

Plug and play interfaces include for example (not an exhaustive list): Firewire (IEEE-1394), PCI, Mini PCI, PCI Express, Mini PCI Express, PCMCIA, PC Card, Universal Serial Bus (USB), SDIO cards, HDMI, DisplayPort, Bluetooth etc.

"**Auto-configuration**" is the automatic configuration of devices without manual intervention, without setting any switches or jumpers, and without any need for software configuration. An example of auto-configuring devices: USB devices. Examples of auto-

configuring protocols: DHCP, Zeroconf, Bonjour.

A plug and play device has auto-configuration software by default to make it plug and play. Example: USB devices are made to be plug and play by including the correct auto-configuration software (e.g. host driver, host stack, application software). Autoconfiguration can also refer to a software alone and is not restricted to a physical device.

"**Hot swapping and hot plugging**" are terms used to describe the functions of replacing computer system components without shutting down the system. More specifically, hot swapping describes replacing components without significant interruption to the system, while hot plugging describes the addition of components that would expand the system without significant interruption to the operation of the system. A well-known example of this functionality is the Universal Serial Bus (USB) that allows users to add or remove peripheral components such as a mouse, keyboard, or printer. Other examples are eSATA, PCIe, FireWire, for example.

A "**portable application**" (portable app), sometimes also called standalone, is a computer software program designed to run without installation on the target machine. This type of application is stored on a removable storage device such as a CD, USB flash drive, flash card, or floppy disk—storing its program files, configuration information and data on the storage medium alone. It is a program that can be stored on an electronic device such as a USB flash drive, iPod, memory card, portable hard drive or other portable electronic device and runs on a computer or other processing device coupled to the electronic device without making permanent configuration changes to the host computer. All such programs have a zero-footprint, meaning all temporary files, registry entries, and any other changes to the machine exist only while the program is running.

To be considered a portable application, for purpose of this invention, a software program must:

Not require any kind of formal installation onto a computer's permanent storage device to be executed, and can be stored on a removable storage device such as USB flash drive, iPod, memory card, portable hard drive or other portable electronic storage device thus

enabling it to be used on multiple computers.

Settings are stored with, and can be preferably carried around with, the software (i.e., they are written to the electronic device such as a USB drive). Settings are not stored to the registry or any other central system database of the computer.

Leaves a zero (or near-zero) "footprint" on any PC it is run on after being used. i.e., all temporary files/registry settings should be either avoided or at least removed once the program has exited, and files created by the user can be saved directly to the same removable media as the application is stored on.

A portable application does not leave its files or settings on the host computer on which it runs. For example, the application does not write to the Windows registry or store its configuration files (such as an INI file) in the user's profile; instead, it stores its configuration files in the program's directory. Another requirement, since file paths will often differ on changing computers due to variation in Windows drive letter assignments, is the need for applications to store them in a relative format. Preferably, such a program does not require a launcher program to copy necessary settings and files to the host computer when the application starts and move them back to the application's directory when it closes as this may leave a residue on the hard drive in case of power failure.

"**Electronic meeting systems**" (EMS) need to be distinguished on the one hand from classic groupware, on the other from web conferencing systems. In reality, there is some overlap between minor features of products of the named categories. The main difference from groupware is the intensity of collaboration. EMS should be distinguished from systems with which it is possible to show the contents of an individual computer screen on a remote display with multiple users at the same time.

"**Groupware**" supports collaboration within groups where the individual contributions remain identifiable. In contrast, EMS enables the group to cooperatively produce a result for which the group is responsible as a whole. In a business process, groupware and electronic meeting systems complement each other: Groupware supports teams when researching and creating documents in the run up to an EMS session or when implementing the results of such a session.

"**Web conferencing systems**" and "electronic meeting systems" complement each other in the online meeting or workshop: EMS extends the web conferencing system by providing interactive tools for producing and documenting group results. On the other hand, "web conferencing systems" complement EMS with the screen sharing and voice conferencing functionality required in synchronous online meetings and not present in EMS.

"**Data conferencing**" refers to a communication session among two or more participants sharing computer data in real time. Interaction and presentation devices such as a screen, keyboard, mouse, camera, etc. can be shared. It is a term used to distinguish from video conferencing and audio conferencing. The data can include screen, documents, graphics, drawings and applications that can be seen by the participants of the meeting.

"**Application sharing**" is an element of remote access, falling under the collaborative software umbrella, that enables two or more users to access a shared application or document from their respective computers simultaneously in real time. Generally, the shared application or document will be running on a host computer, and remote access to the shared content will be provided to other users by the host user. Application sharing should be distinguished from systems in which collaboration on the applications between different users is not possible, but the contents of individual computer screens can be projected onto a remote display with multiple users at the same time.

The term "**arbitrary media content**" refers to the fact that a user may generate, create or select any media content that is appropriate to display. This differs from client voting on or selecting of media content that is displayed by another in a meeting or presentation. This term refers to client oriented, distributed rights and privileges for the display of content rather than a central presenter providing content which is presented to the members of the meeting.

"**Unified Communications system or tools**" refers to audio or audio visual communications such as provided by "Skype™" or "Skype™ for business". Such software can take over audio and/or visual data provided from a host processing device. Unified communication tool can be described as a collection of tools to do VOIP, (web) conferencing, shared whiteboarding, message exchange (e.g. chat), file transfer, or presence. Unified Communications system or tools can make use of a protocol- or standard

defined or specific communication session or interaction, such as Voice-Over-Internet-Protocol ("VoIP), text or instant messaging (e.g., AIM, Blauk, eBuddy, Gadu-Gadu, IBM Lotus Sametime, ICQ, iMessage, IMVU, Lync, MXit, Paltalk, Skype, Tencent QQ, Windows Live Messenger™ or MSN Messenger™, Wireclub, Xfire, and Yahoo! Messenger™ email, Twitter (e.g., tweeting), Digital Service Protocol (DSP), and the like. Unified Communications system or tools can make use of video conferencing cloud service including a video conferencing node to allow one or more users located at the first video conferencing endpoint to communicate with one or more users located at the second video conferencing endpoint in a video conference.

"**Screen scraping**" in the sense of the present invention refers to reading the video frame buffers and processing them, rather than just rendering them on a display. Screen scraping for presentations is described in US2002/0196378 to Slobodin et al which is included herein by reference.

"**Auto composition**" or "**auto layout**" refers to the automatic nature in which multiple graphics/video sources are rendered on a central display, without user intervention and in a way that a user would intuitively expect it to happen.

"**Wireless**" and "**wireless communication network**" can be any network that does not use cable links between nodes, e.g. uses RF, optical or InfraRed for communication purposes, such as IrDA, diffuse infra-red, WLAN, WiMax, WiFi, WiFi Direct, LiFi, ultrasound, ZigBee, or Bluetooth or any other wireless communication network known to the person skilled in the art. Any communications network disclosed below can be and preferably is a wireless network. This enables the **sharing or combining** of at least a selection of functionalities/endpoints of the secondary peripheral devices, i.e. the one-to-many scenario.

"**Computer**" generally refers to a processing device, i.e. having a processing engine capable of various types of digital processing, such as rendering graphics images for display. A computer can be in the form of a work station, a personal computer, a laptop, a palm top, a PDA, a smartphone, a tablet etc. Generally, a computer has memory such as volatile RAM. Non-volatile memory such as a hard disc, optical disk or solid state memory can be included in the computer or can be a peripheral device. Currently most computers are electronic, but the term "computer" also includes optics based computing devices.

The term "**pre-installed generic driver**" is intended to mean a driver which is installed on a processing device such as a computer as a standard driver, e.g. is installed with the installation of the operating system. Such a driver is standard for the operating system and can drive a standard class of peripheral devices coupled to or connected to the processing device. The installation of a specific driver for such a peripheral device is not required. Such a generic driver can be a human interface driver (HID) or a mass storage device driver, which has predetermined software components configured for driving mass storage, a CD-ROM, a keyboard etc. or combinations of these. Such devices can be readable and writable computer peripheral memory devices such as USB memory sticks, flash memories, external hard drives, or more.

"Host device" is a processing device that wants to share using a first peripheral device or dongle.

"**Functional device**" is a second peripheral device connected in some way to a base unit. The system has the ability to expose second peripheral devices connected to the Base Unit to the first peripheral device transparently as if it were attached to the processing device to which the first peripheral device is connected. The exposure can be implemented with **descriptor fields**. A functional device can be run with a vendor specific driver alone.

"Endpoints" can be described as data sources or sinks and are defined for USB Devices which can be physical devices or virtual devices. In the present invention endpoints should be interpreted broadly as data sources or sinks. Hence data can be stored at an endpoint or emitted. An endpoint can act as a kind of buffer can be defined for physical devices or virtual devices. The data stored at an endpoint may either be received from or waiting for being sent to the host such as a USB Host. An endpoint is defined by a number of descriptive fields. For example, an endpoint can be configured to support different transfer types such as four transfer types. These transfers can be as defined in the USB specification, e.g. Control Transfers, Interrupt Transfers, Isochronous Transfers, and Bulk Transfers. The skilled person can use these transfer types as required in the present invention. Within the limits of the hardware, endpoints can be configured using middleware, e.g. USB Middleware. An endpoint can be limited to a certain transfer type. A USB Host's client may send data to an Endpoint 1 for example. Coming from the USB

Host, the data will be sent to the OUT Endpoint 1. The software running will then read the data as soon as it is ready to do so. Returning data has to be written to the IN Endpoint 1, as the software cannot access the USB bus freely as the USB bus is controlled by the USB Host. The data in IN Endpoint 1 stays there until the host sends an IN packet to Endpoint 1 requesting the data.

A limit can be placed on the number of endpoints. Each endpoint can have one transfer direction. A specific endpoint can be defined, for example, for control transfers only and cannot be assigned to any other function.

Control Transfers can be bi-directional transfers reserved for the host to send and request configuration information to and from a device using a specific IN and OUT Endpoint.

Each Control Transfer can comprise a number of transactions. Control Transfers can have several stages:

1. The **SETUP** stage carries a Setup packet, defining the request, and specifying how many data should be transferred in the DATA stage.
2. The **DATA** stage is optional. If present, it always starts with a transaction containing a DATA1 packet. Then, the transaction type alternates between DATA0 and DATA1 until all required data have been transferred.
3. The **STATUS** stage is a transaction containing a zero-length DATA1 packet. If the DATA stage was IN, then the STATUS stage is OUT, and vice-versa.

Interrupt Transfers have a limited latency to or from a device. In USB, an Interrupt Transfer, or Interrupt Pipe, has a defined polling rate. Typically, Interrupt Transfer data consists of event notifications, characters, or coordinates from a pointing device.

Isochronous Transfers are used for transmitting real-time information such as audio and video data, can be sent at a constant rate. USB isochronous data streams are allocated a dedicated portion of USB bandwidth to ensure that data can be delivered at the desired rate. An Isochronous pipe sends a new data packet in every frame, regardless of the success or failure of the last packet. Isochronous Transfers need not have error detection. Any error in electrical transmission is not corrected.

Bulk Transfers are used for data which are not of the type Control, Interrupt, or

Isochronous. Reliable exchange of data is ensured at the hardware level using error detection.

Bulk Transfers take up all the bandwidth that is available after the other transfers have finished. If the bus is very busy, then a Bulk Transfer may be delayed.

"**A specific device exposes a peripheral device or other device**" means that the specific device configures one or more endpoints with specific descriptor fields.

Description of the preferred embodiments

Embodiments of the present invention allow a wireless connection between a user processing device such as a laptop, computer, PDA, smartphone etc. and a base unit of a wireless network. The wireless connection may be made by an integrated wireless transceiver in the user processing device such as the laptop, the computer, the PDA, or the smartphone etc. Alternatively, in some embodiments of the present invention the wireless connection is made via a first peripheral device plugged into, coupled, connected or attached in some way to the user processing device or is provided by other hardware or software.

Embodiments of the present invention allow users, e.g. participants in a meeting room, to make use of at least one functional device, some functional devices or all functional equipment attached to the base unit whereby the at least one functional device has an electronic output such as a digital electronic output and can co-operate with other devices plugged into, coupled, connected or attached in some way to the base unit or is provided by other hardware or software. The at least one functional device can be provided by either plugging in a second peripheral device e.g. a dongle or by a wireless connected second peripheral device or by connecting to the at least one functional device with some software which can be downloaded or pre-installed. The at least one functional device can have an electronic output such as provided by a touch screen, a microphone, a speakerphone, a camera and can function with devices which have an electronic input such as a display or a speaker. Embodiments of the present invention provide the functional device for shared use by participants in a classroom or meeting room.

The at least one functional device coupled or connected or attached to the base unit, e.g. via a serial connection such as a serial plug-and-play connection e.g. USB or via a wireless connection such as a Near Field Communication (NFC) connection, e.g. a Bluetooth connection, an IR connection etc. is made accessible and usable to one or more users in the meeting room or classroom. Preferably this is done in a transparent and standard way. In different cases, the system can behave as a wireless (e.g. USB) hub, in another case, the first peripheral device or other hardware or software exposes a virtual device that has the same functionality or more as the combined functionalities of the functional devices e.g. second peripherals which are coupled or connected or attached to the base unit.

Embodiments of the present invention make use of a base unit, the base unit comprising at least a transmitting function and usually a transmitting and receiving function such as a transceiver function. The base unit is a base unit of a network such as a wireless network and hence can have a transmitter, a receiver or a transceiver. The base unit can be a hardware box comprising a digital processing engine such as an FPGA, a CPU, a GPU etc. as well as memory and input/output ports and which is adapted for connection to e.g. by plugging it in, any functional device such as one or more second peripheral devices that can be used in a meeting room or classroom with or without visual or audio capabilities. Functional devices, such as the one or more second peripheral devices, for use with the base unit can include one, some or all of a television or other video provider e.g. providing images such as video over an HDMI, DVI, USB or other connection, an image capturing device such as a camera, e.g. for providing captured images like video over a USB or HDMI or other connection, audio devices such as speakerphones providing audio such as speech or music over a USB connection or other connection, or speakers over a USB connection, making use for example of a 3.5mm audio jack, SPDIF or other connection, or one or more microphones making use for example of a 3.5mm jack, USB or other connection, display devices such as touchscreens making use for example of a USB or other connection, all-in-ones over a USB connection and any other functional device or first peripheral device that can be connected to e.g. plugged into the first device such as the base unit and which have, for example, an electronic output such as a digital electronic output.

Embodiments of the present invention comprise a device such as a first peripheral device comprising at least a receiving function and usually a transmitting and receiving function such as a transceiver function. The first peripheral device (being at least a receiver device)

can be hardware e.g. having a wireless or wired connection capability, software or a combination of both that can be connected to the base unit over a wireless connection such as a Wi-Fi, Bluetooth, Wi-Gig, Li-Fi, NFC or similar connection, or a wired link e.g. a USB, Ethernet, etc. connection. This allows the base unit to expose and make available any functional device such as a second peripheral device that is connected to the base unit, to one or more first peripheral devices (e.g. receiver devices) such as to expose and make available simultaneously with a plurality of first peripheral device (e.g. receiver devices) in one of following ways:

1. By exposing the or each functional device (such as the or each second peripheral device) connected to the base unit in a one-on-one manner or in a one to more of the first peripheral devices or user processing devices manner, e.g. to one or more first peripheral devices or user processing devices, preferably without interpretation or processing the electronic signals from each functional device e.g. the second peripheral device e.g. by tunneling the packets from the base unit to the endpoints of the one to more of the first peripheral devices or user processing devices.
2. By interpreting, processing and translating the electronic signal coming from the at least one functional device, e.g. the second peripheral device and, for example mimicking the at least one functional device, e.g. the second peripheral device at the first peripherals' end (e.g. receiver devices' end), either in software or hardware or both. With mimicking is meant that the same device is exposed in the endpoints as the second peripheral device connected with the base unit although the communication is not simply being tunneled as in the first and second methods described above.
3. By combining one or more functional devices, e.g. second peripheral devices or part of a second peripheral device and exposing it to the one or more first peripheral devices, e.g. receiver devices through a custom device in hardware, software or both.
4. By combining one or more functional devices e.g. second peripheral device(s) or part of a second peripheral device and exposing its functionality to the end user through proprietary software.
5. By combining any of the above methods to provide the function of the functional device e.g. the second peripheral device to the one or more first peripheral devices such as receiver devices.

When a functional device, e.g. a second peripheral device is exposed natively or as a mimic of such a device in hardware, use can be made of endpoints such as USB endpoints on the first peripheral device or the user processing device which can expose the corresponding second peripheral devices such as USB devices connected to or plugged into the base unit (as is done in a hub), so no proprietary software or drivers need to be installed to support this.

When exposing custom devices, i.e. specifically developed to work with the present invention use is made of these same endpoints of the first peripheral devices such as the receiver's hardware or it can be done in software with a driver.

A first peripheral device can be used to set up a connection such as a wireless or wired connection between a first peripheral device and base unit, e.g. by acting as a hub such as a wireless hub of which a wireless USB-hub is one example. Whatever second peripheral device is connected to or plug into the base unit e.g. a second peripheral device selected from the non-exhaustive list given above of a TV, video device, audio device, speakerphone, camera, display …, is exposed to the first peripheral device in any of the 5 ways described above.

Advantages of embodiments of the present invention can be one, some or all of the following:

- In one implementation, all second peripheral devices, which can be USB devices, are mirrored one on one, needing no additional drivers or software to be installed on the users' processing devices other than the second peripheral's vendor's drivers. The second peripheral devices can be exposed to the user's processing device either by the hardware of the first peripheral device directly, or by using a software virtual hub on the first peripheral device or on the user's processing device.
- In another implementation, different second peripheral devices (e.g. speakers, microphones, e.g. with electronic outputs and/or inputs) can be combined and connected to the same base unit. Additional functionality such as echo cancellation, translation, encoding/decoding, etc) can be provided in the base unit. Only one second peripheral needs to be exposed through the first peripheral device to the user's processing device.

- A combination of previous two methods can be provided for one or a combination of devices or functions. Different approaches can be used within one final solution, depending on if the device or function needs to be available to multiple users at once, the technical feasibility of simply mirroring of the device etc.
- By adding some software to the client software running on the user processing device, configuration for these devices can be made easier (e.g. set as default devices) and some custom controls (mute, pan/tilt/zoom,…) can be added.
    - Some controls can be added to the first peripheral device
    - Some processing can be done on the base unit to make such controls obsolete (e.g. automatic gain control on an audio signal, framing of participants to remove the need for PTZ)
- Multiple users can use the functional devices in contrast to regular hub, with which only one person can plug in only one cable. Each user processing device to which a first peripheral device is plugged in can use these functional devices and the base unit will make sure all streams are correctly captured, played, processed, combined and/or enhanced.
- Different streams can be given different priority (speed, throughput,…) to adjust to the unpredictable nature of the wireless communication channel. E.g. to prioritize audio streams over video streams to enhance the call experience.
- When having a VOIP call such as a Skype™ call in a meeting, the first peripheral device is connected to, e.g. plugged into a user processing device and all the functional devices connected to the base unit can be used, e.g. a better camera that gives a wide a room view, a better microphone and better speakers). This is especially beneficial when there are multiple people in the room that want to attend the conference call such as a VOIP or skype™ call.

With reference to Figure 1 group 90 is a microprocessor or FPGA based device comprising one or more peripheral devices 91-93 which can be connected to, e.g. plugged into a base unit 100. The peripheral devices 91-93 may be connected to the base unit100 by means of standard connections such as serial connection of which Firewire (IEEE-1394), PCI, Mini PCI, PCI Express, Mini PCI Express, PCMCIA, PC Card, Universal Serial Bus (USB), SDIO cards, HDMI, DisplayPort, Bluetooth etc.

Group 90 can be used to expose for example the peripheral devices

- A webcam 91
- A speakerphone 92
- A number of HID endpoints 93

The Base Unit 100 has an electronic digital processor such as a microprocessor or FPGA based device and comprises for example:

- A Web interface 110 which is an interface for the base unit 100 in which one can configure the system
- One or more drivers 111, e.g. two specific drivers for webcam 91 and speakerphone 92 running on the base unit 100 to receive or send data from/to the group 90 and USB peripherals 91-93.
- Additional processing is done in blocks 112, 114, 115 for both audio and webcam encoding, mixing, (de)multiplexing and other processing.
- Data can be encrypted or decrypted in decrypters/encryptors 113, 116 before being sent to the first peripheral device 130 over a wireless link 127.
- The control modules 117 in base unit 100, and 37 in the first peripheral device 130 use a control channel 128 between the base unit 100 and the first peripheral device 130 to perform various functions such as keep alive, identification, crypto key exchange etc.
- Unified protocol block 118 is a functional block abstracting primary functions of the system: screen sharing and other non-media streaming (e.g. mouse pointer)
- Encryption and decryption modules 119, 120 are provided for the main communication with the first peripheral device 130 and other applications.
- An encoder such as H264 encoder 121 provides and local view block 123 (which is a functional device or functional devices as it/they emit a signal from the base unit 100 towards the user processing device 160) are provided to capture the rendered image on the main display 126, encode it and send it back to the first peripheral device130 and other clients
- Audio processing blocks 124 are provided for audio content.
- Video decoder 125 is provided to decode and render the screen content to the display 126.

First peripheral device 130 is a microprocessor or FPGA based device comprising for example

- Webcam video coming from webcam 91 of base unit 100 is decrypted in block 30 and exposed to processing device 160 through a USB video endpoint via USB video and drivers such as H264 drivers 31.
- Audio signals from speakerphone 92 connected to the base unit 100 are decrypted in block 32, processed and exposed as microphone signal from the USB speakerphone endpoint 92.
- Audio signals from processing device 160 coming through a Speakerphone USB endpoint is encrypted in block 35 and sent to the Base Unit 100 via wireless connection 127.
- Control HID (Human Interface Device) 51 is a mirror of additional HID USB endpoints that the Group 90 and the second peripheral devices 91-93 have exposed to the Base Unit 100.
- A vendor specific HID endpoint indicated as datapump 42 is used for a channel 52 which can be a high bandwidth data channel between vendor specific software such as software 70 running on processing device 160 and the Base Unit 100 over the first peripheral device 130. Screen video and audio signals for display 126 can be sent over this channel 52. This is preferred compared with doing this over a control HID endpoint in the first peripheral device 130. Also the screen input of display 126 which is captured (block 123) and encoded (block 121) in the Base Unit 100, is sent to the vendor specific software running on the processing device 160 to allow other users such as a plurality of users or participants in a meeting each of which has got a processing device 160 and optionally a first peripheral device 130 plugged in, to view what is on the display 126 on a display (not shown) on their own processing device 160.
- A number of basic components such as the operating system (OS) and the drivers to control optical indicators such as an LED ring on the first peripheral device 130, bandwidth measurement module and other the wi-fi modules, update/upgrade modules e.g. over wireless, secure boot module, secure key storage, debug and test module, etc. are provided in blocks 45 to 50.
- The audio capture module 43 exposes speakers' endpoint to the processing device 160. The module 43 captures this audio and sends it back to the vendor software 70 running on the processing device 160 where it can be timestamped (block 69) and

aligned with the video data and then sent, for example, to the Base Unit 100 through the datapump 42. This allows better timestamping and lipsync.

- In a less preferred embodiment the audio can be captured and processed on the first peripheral device 130 and sent immediately to the Base Unit 100.

A microprocessor or FPGA processing device 160 such as a computer, laptop, smart phone, personal assistant (PDA) etc. runs proprietary software 60, 70 including for example 3rd party software (e.g. Skype) 60.

- 3rd party software 60 is running on processing device 160 (e.g. communications software such as Skype™) which uses the video endpoint from the at least one functional device 91-93 (e.g. the webcam 91 that was attached to the Base Unit 100) and/or the speakerphone endpoints (both speakerphone microphone and speakerphone speakers)
- Block 70 comprises software developed and dedicated to the present invention to:
  - Decrypt (61) and decode (62) a pipeline which will then show the screen data of display 126 from the Base Unit 100 in a window of the software. The data following the arrow 71 going out of the last stage (local view 63) is captured by the communications software such as Skype™ client software 60.
  - The unified protocol block 64 is a module that handles the control layer and controls the media paths, the connection to the first peripheral device 130 and (indirectly) the connection to the Base Unit 100.
  - Pipeline 65-67 is for screen capture (67), encoding (66) and encryption (65) for the screen sharing to the Base Unit 100.
  - Pipeline 68, 69 receives the speaker's audio signals (block 68) back from the first peripheral device 130, does processing (e.g. timestamping, block 69) and sends it out through the HID endpoint (the "datapump" 52).
- Endpoints not used by the software in this case are the control HID from the second peripheral devices. If some software were running from the vendor of a second peripheral device, this software can communicate with the relevant second peripheral device over these HID endpoints (e.g. camera pan/tilt/zoom).
- Speakers endpoint (the content audio arrow 53) is used by the operating system (OS) of the processing device 160 to send all (non-speakerphone) sounds/audio signals.

Connecting a first peripheral device to a user processing device

A first peripheral device 130 can be connected to a user processing device 160 by a method 300 as indicated in Figure 2. The connection can be a serial connection such as a USB connection for example, such as USB 1, 2, 3 or -C etc. and the peripheral device 130 is connected to, e.g. plugged into a plug-and-play serial port such as provided for a USB connection. The first peripheral device 130 may include a user input device, e.g. an actuator. The first peripheral device 130 can be configured as a connection unit and can be a physical device in the form of a connector for a plug and play interface of a user processing device. It can have a base and a flexible data and power connection attached to the base. The base can have the actuator, e.g. a button configured to be an input device which can be activated by a user.

The flexible data and power connection should be adapted so that the base lies flat on the meeting table independent of the orientation of the connector needed to insert the connector into the plug and play interface. The base preferably includes electronics and optionally has permanent storage for storing an application such as a portable application. Network configuration parameters for the WiFi connection to the base unit 100 can also be stored in a memory. The first peripheral unit may have a processing engine (e.g. CPU, GPU, FPGA), a wireless transmitter/receiver such as for WiFi or LiFi, a plug and play interface such as a USB interface, a light ring such as an LED ring or strip as visual indicator. The portable application can be stored on the first peripheral device 160, i.e. in the base or it can be downloaded, obtained from on another pluggable device like a flash drive, be downloaded from the base unit 100 etc. The visual indicator is for allowing user feedback from the connection unit of the status of any activity.

Some examples for activation of the actuator which can be used with any of the embodiments of the present invention: Sound activated (hand clap, voice recognition, computer sound, music, ...) Remote controlled via wireless connected device (IR, Bluetooth, WiFi, LiFi...), Light activated, Pressure activated, e.g. depression with a finger or hand, Touch activated, Proximity ('near-touch' on the actuator or bringing the actuator close to some object, Biometric reader such as Fingerprint reader, Iris scanner, DNA analyser, Keypad, e.g. for entering Keycode e.g. a password.

The method 300 comprises in step 301 connecting the first peripheral device 130 to a processing device 160, e.g. by plugging in. This results in a kernel boot step 302 and exchange of initialization scripts in step 303. The first peripheral device 130 is discovered to be a USB device in step 306 and the USB protocol stack is loaded in step 304 followed by loading the wireless connection protocol stack in step 305. The parameters for the wireless connection are input e.g. from a memory on the first peripheral device 130 or by the user and the wireless connection association completed in step 307. Any client software that needs to be loaded onto the processing device 160 is now loaded and launched in step 308, e.g. by user action. The first peripheral device 130 is now ready in step 310 to share data with a display screen 126 attached to the base unit 100.

As show in Figure 3 if a launcher program is available e.g. stored on the first peripheral device 130 or stored on the processing device 160, or retrievable from a remote location such as a URL on the Internet, or form a LAN server, this can launch the client software in step 328 automatically. Steps 321 to 327 and 329 and 330 are the same as steps 301 to 307 and 309 and 310 of Figure 2.

For example, the client software can be the software 70 of Figure 1 running on processing device 160. Other software such as communications software 60 e.g. Skype™ can be pre-installed on processing device 160. Client software 70 can be for the processing of video data from the processing device 160, and this client software is executed on the processing device 160 e.g. using a processing engine such as a CPU, GPU or FPGA. The client software 60 can be screen scraping software that screen scrapes the screen of the processing device 160. This client software 60 can be stored as a software program in memory such as mass storage on the first peripheral device 130. This software program is executed such as loaded onto the processing device 160 when it is coupled thereto, either automatically or by user action as described above. When the software 60 is running on the processing device 160 it is preferred that it leaves zero footprint on termination. The software 60 when executed on the processing device 160 captures the video data that is available on the processing device 160, e.g. from a presentation or video that is running on the processing device 160. For example, the software 70 when executed on the processing device 160, is adapted to screen scrape, e.g. to read one or more video frame buffers from a graphics card in the processing device 160. Generally, the processing device 160 will have its own display

and hence will have a graphics card or something equivalent with a buffer for storing video data. This read video information can be time stamped (in block 69) with a clock time, to be able to later synchronize the captured video signal with a related audio signal. The video signal is then encoded in a video encoder (block 66), for transport (arrow 53) over the plug and play interface using a generic driver, such as over a USB interface using generic pre-installed drivers, e.g. a generic pre-installed Human Interface Driver (HID). The data is transmitted to the wireless communications network 127 such as a WiFi or LiFi network and routed over the communications network 127 to the base unit 100, inserted into a suitable composition such as an OpenGL based composition in a compositor for display on the display device 126.

Sending data from the processing device to the base unit

With reference to Figure 4 the audio data on the processing device 160 such as a computer, laptop, smartphone, PDA, tablet, etc, the audio is sent over a port using generic drivers such as over a USB port 8 using the standard built- in generic audio driver such as UAC driver 7. On the first peripheral device 130, the audio packets are read from the generic port, e.g. USB port 11 by a dedicated audio device 14. These packets are then processed by any of a mixer a rate converter, an echo canceller, noise canceller or similar. Any of the mixing, rate conversion, echo cancelling, noise cancelling can be executed using an ALSA driver 18. The ALSA driver offers the packets to a dummy audio device 16 such as an audio scraper. In this audio device 16 the audio packets can be time stamped from the clock 15 that can be synchronized with clock 9 of the processing device 31. This information is then encoded in an encoder 17 and packetized in a packetizer 19 before being transferred to the communications network between the first peripheral device 130 and the base unit 100. The network can be a wireless network such as a WiFi or LiFi network. For this purpose, a suitable transmitter 21 is provided in the first peripheral device 130. On the base unit 100 the audio information stream is recovered at a suitable communications interface such as the WiFi access point 22. The audio is then unpacked in an unpacker 23, decoded in a decoder 24 before being before being offered to an audio mixer 28. In order to synchronise the audio and video streams these are both sent to a synchronizer 27 in which the two streams are synchronized and thus keep lip synchronization.

Sending data from the processing device to the base unit

Embodiments of the present invention can capture data such as visual or audio signals and bring these to one or more processing devices 160 so that this captured data can be shared with other participants. These visual or audio signals are captured from, provided by, obtained from functional devices such as a webcam 91 a speakerphone 92, but also captured from display 126. For example, a functional device could be a microphone which located at an appropriate position in a meeting to give good reception of audio data. This can be used with a central speaker system which can be of higher quality than is provided in the processing devices 160 of meeting participants. Such a speaker system could be a quadrophonic surround speaker system for example. This can also avoid the difficulties with multiple microphones and speakers which can result in annoying positive feedback.

Embodiments of the present invention can include the features discussed with respect to Figures 1 to 4 to provide additional functionality which can be shared, for example, by all participants of a meeting who have a processing device 160 optionally with a plug-in first peripheral device 130. In embodiments of the present invention, fixed USB endpoints on the first peripheral device 130 are provided for the basic functionality. These are fixed and are a combination of vendor specific endpoints and a number of standard endpoints and can be interpreted or understood as a custom Driver, a default OS driver and/or a host application as has been described with reference to Figure 4 do screen sharing and audio.

The configurable USB endpoints are configured either when pairing a first peripheral device 130 device with a base unit 100 or over the wireless connection 127 between the processing device 130 and the base unit 100. Once configured, the USB endpoints will expose second peripherals devices 91-93 which can be interpreted as custom drivers, vendor specific drivers or default OS drivers. These can be used by either a host application or third party applications. These endpoints can be an exact copy of the ones of the second peripheral device 91-93 connected to the Base Unit 100 or can be dedicated specified endpoints.

Communication of these USB endpoints with the processing device 160 can be done through standard enumeration of the USB endpoints when connecting, such as plugging in, the first peripheral device 130 to the processing device 160. All information on how to

communicate with the Base Unit 100 and which endpoints to expose can be stored on the first peripheral device 130 and can be set up by firmware of the first peripheral device 130.

The decision of which endpoints the first peripheral device 130 should expose can be determined by the Base Unit 100, which can be adapted to analyze which second peripheral devices are connected to the Base Unit 100 (which connection can be through a USB connection or other) and create a configuration for the relevant USB endpoint on the first peripheral device 130.

As indicated above, for embodiments of the present invention, during operations, data can flow in both directions, i.e. to or from the processing device 160:

1. Data from a second peripheral device connected to the Base Unit 100 can flow into the Base Unit 100 or can be captured in the base unit 100 such as data for display 126. Any such data can be interpreted and possibly processed, enhanced, encoded and/or encrypted using firmware of the base unit 100 to generate processed data. In some embodiments this processed data will then be sent to the first peripheral device 130 device through a wireless link 127. This first peripheral device 130 will, if necessary, decode, decrypt, process and/or interpret the data and make it available through one or more of the USB endpoints of this first peripheral device 130 (e.g. either the fixed or the configured ones). This data will then be captured by the operating system of the processing device 160 and will be made available through a custom or standard driver to either the host application or a 3rd party application running on the processing device 160 or to other processing devices 160 of other participants of the meeting.
2. Data, which might be coming from the host application and/or one or more 3rd party applications running on the processing device 160 can be sent through a handle which is made available by the system. The data will then be sent to the appropriate USB endpoint of the first peripheral device 130 through the system (standard generic) drivers and the USB port. The first peripheral device 130 will then receive this data via firmware of the first peripheral device 130, where it will process, enhance, encode and/or encrypt the data and send it through the wireless link 127 to the Base Unit 100. The Base Unit 100 will receive the data via firmware on the base unit 100, will decrypt, process, decode and/or enhance the data and forward it

to the appropriate first peripheral device, which can be connected or attached to the Base Unit 100 through a serial connection such as USB, HDMI or other interface.

Such a meeting of multiple participants is shown schematically in Figure 6 with four processing devices 160 (160-1, 160-2, 160-3, 160-4) which can be laptops. Three of the processing devices (160-1, 160-2, 160-3) each are connected to a first peripheral device 130, e.g. by inserting in a USB connection. One processing device 160-4 can be the host of a Unified Communication (UC) call such as a Skype call or a Skype for Business call. The first peripheral devices of two of the processing devices (160-1, 160-2) have completed connection to a WiFi connection with a base unit 100 and are sharing media to the main screen 126.The processing devices 160-3 and 160-4 are sharing the Unified Communication (UC) call such as the Skype call or a Skype for Business call.

Connected to the Base Unit 100 is or are any of the following:

- Webcam 91
- A 4K touch screen 94
- A camera 95, connected through USB or HDMI
- A USB speakerphone 92
- USB microphone 96 and a speaker set 97 (connected through an audio jack, s/pdif, USB, HDMI, etc.)

The host processing device 160-4 has pre-installed UC client software. This software interacts with USB endpoints on the first peripheral device 130 connected to e.g. plugged into the host. This type of client software will use speakerphone USB endpoints as a default audio device (e.g. microphone plus speaker). Embodiments of the present invention are in control of all audio or visual signals emitted from and injected in the processing device 160.

The speakerphone 92 can be used by any of the users at least with a first peripheral device 130 connected and functioning. There is no need to perform an action to get access to this device. Separate controls can be made available on a first peripheral device for example to control the volume of the audio output of the Base Unit 100 and to mute the room microphone 96 if necessary. When muted, the microphone 96 is also muted for all other Buttons or apps using this device.

The UC client software 60 running on the host processing device 160-4 does not inject the audio content. The microphone 96 can pick up this signal, or the Base Unit 100 can inject it in the microphone signal to the first peripheral device 130 connected to the host 160-4. There is no need for lip-sync with the content video (even if sharing) as the latency is low.

The same type of second peripheral device is exposed to a user as is plugged in into the Base Unit 100 so that the user can use the drivers provided by the vendor.
If one of the processing devices 130 is sharing in the room, the content audio is shared in the room too.

A processing device with functioning first peripheral device can access the room camera 96 wirelessly. All other devices connected to the Base Unit 100 (e.g. HID control devices 93) will be exposed natively.

Any user connected to the system e.g. through a first peripheral device has the ability to view the content that is projected in the meeting room on a display of the user's processing device, i.e. "local view". The receiver of the local view can have, but is not limited to, one some or all of the following functionality:

The ability to open a window and view the meeting room content in that window independently of whether it is the stream itself, the annotation or a blackboard session.

The ability to zoom into the content.

Additional measures to assure the picture quality when zooming in can be added to the feature

The local view could allow the user to start and/or participate in a blackboard or annotation session from his/her own device

The ability to take screenshots and/or pause the local view.

Figures 6 to 15 and 17 show ways of making various functions available to participants in a room, e.g. a meeting. There are four basic methods each of which is an embodiment of the present invention:

a) to use a generic driver of the OS 164 of the host processing device 160 and endpoints

like mass storage or HID endpoints to allow transfer of data using client software running on the host processing device 160 without the host processing device 160 being aware that the final device is a functional device like a camera, touchscreen, microphone, loudspeaker, speakerphone etc. which is connected in or with the base unit 100.

b) to have an endpoint on the first peripheral device of a functional device connected with or in the base unit 100 which means that the host processing device 160 detects that it is connected to the functional device and interacts with it as if it were such a device.

c) to have an endpoint on the first peripheral device of a functional device connected with or in the base unit 100 which means that the host processing device 160 detects that it is connected to the functional device but client software needs to have the vendor specific drivers to be able to interact with the functional device.

d) to have an endpoint on the first peripheral device of a functional device connected with or in the base unit 100 which means that the host processing device 160 detects that it is connected to the functional device but pre-processing is made on the base unit 100 so that the processing device 160 can interact with the functional device. One method is to make a common endpoint on the first peripheral device so that the processing device can work with any functional device for which preprocessing exists in the base unit 100.

Figure 6 shows the processing device 160 in communication with a first peripheral device 130 connected thereto, base unit 100 in wireless communication 127 with the first peripheral device 130. Various functional devices such as a display 126, a speakerphone 92 (or microphone and speaker set 96, 97) and a videocam 91 (or other camera 95) are connected to the base unit 100.

A generic driver allows the client software 70 to transfer data to and receive data from a mass storage device 132 on the first peripheral device 130 via a USB interface 131. The client software 70 also has a USB endpoint 134 which can be a USB HID endpoint and if necessary, a vendor specific endpoint. This endpoint 134 is the endpoint for the client software 70 for transmitting the data for the display 126 to the base unit 100 where the data can be image processed (blocks 124, 125 of Figure 1) before being transmitted to the group 90 e.g. via an HDMI connection or similar. Thus, the HID endpoint 134 makes the HDMI display 126 and its audiovisual signals available to any processing device 160 with a first peripheral device attached thereto, when in a meeting room. However, the display 126 is not exposed on the processing device 160, i.e. it is not presented as a display but as an HID

endpoint. The videocam 91 can be exposed on the first peripheral device 130 as an endpoint (in a way as described for Figure 1), the video data being encoded e.g. in block 122 of Figure 1. Alternatively, as shown in Figure 6, the video data is encoded in the base unit 100 and is sent via the first peripheral device 130 to a driver 162 of the operating system 164 of the processing device 60 which exposes the encoded data from the videocam 91 on the processing device 160 and makes the video data available to the UC call, e.g. Skype™.

Data from the speakerphone 92 can be processed on the base unit 100 and/or on the first peripheral device 130 and can be mimicked to the processing device 160. The microphone of the speakerphone 92 generates a signal that is transmitted to the processing device 160 via a USB speakerphone endpoint 136 on the first peripheral device whereby any noise reduction or echo cancellation can be carried out in the base unit 100 as described with respect to Figure 1 (block 115). The microphone data is made available to the UC call as the speakerphone endpoint 136 is recognized by the processing device 160 as a speakerphone as if the speakerphone were plugged into the processing device 160. Also, the microphone data is made available to all other users who have a processing device 10 with a connected first peripheral device. In this embodiment the speaker of the speakerphone has its USB endpoint 136 on the first peripheral device 130.

Figure 7 shows a similar configuration to that of Figure 6 except there are two USB endpoints 136 and 138 for a speakerphone and a speaker respectively. As previously, the HID endpoint 134 makes the HDMI display 126 available to any processing device 160 with a first peripheral device 130 attached thereto when in a meeting room for providing audiovisual signals to the display 16. However, the display 126 is not exposed on the processing device 160, i.e. it is not presented as a display but as a HID endpoint.

The two endpoints 136, 138 receive audio signals from two different sources. The sound from the UC call can be dealt with as described for Figure 6 via the speakerphone endpoint 136 and processing on the base unit. But if there is additional audio data which is not part of the UC call, this data is sent via the speaker endpoint 138. As there is no second peripheral device in the group 90 which is a standalone speaker, the base unit 100 mixes the audio signals for the speakerphone and the speaker before sending all audio data to the speaker of the speakerphone 92. If there were a separate speaker 97 in group 90, then the base unit 100 could send this audio data to the speaker. The result is that a virtual speaker

has been exposed on the processing device 160.

Figures 8 to 11 and 17 describe various embodiments of the present invention with the example of how a touchscreen 99 is made available in a meeting room. When a touchscreen is touched it generates a signal related to the co-ordinates of the touch position. This needs to be conveyed to processing devices 160 in a meeting whereby the actual signals must be interpreted if they are to be applied to a different screen on the processing device 160. If there is a meeting with a variety of processing devices being used by participants, then a method needs to be found of presenting the touch co-ordinates to all the different processing devices. Figures 8 to 11 disclose the four basic methods mentioned above.

In the embodiment of Figure 8, there is a group 90, base unit 100, first peripheral device 130 and processing device 160. There are two functional devices connected to or in the base unit 100, namely a display 126 and a touchscreen 99. The touch screen 99 has a touchscreen endpoint 139 in the first peripheral device 130. The processing device 160 recognises this endpoint and can interact with it if the OS 164 has the relevant driver 162. This driver can be downloaded if required. This embodiment requires that each processing device 160 in a meeting downloads or has installed the relevant driver 162.

In the embodiment of Figure 9, there is a group 90, base unit 100, first peripheral device 130 and processing device 160. There are two functional devices connected to or in the base unit 100, namely a display 126 and a touchscreen 99. The touch screen 99 has a touchscreen endpoint 139 in the first peripheral device 130. The processing device 160 recognises this endpoint and can interact with it if the base unit 100 is adapted to translate the co-ordinates of the touch to ones that can be used by the processing device 160, i.e. the OS 164 has the relevant driver 162. This driver can be downloaded if required. This embodiment requires that each processing device 160 in a meeting downloads or has installed the relevant driver 162 but the translation function of the base unit 100 can reduce the number of different drivers that might be required.

In the embodiment of Figure 10, there is a group 90, base unit 100, first peripheral device 130 and processing device 160. There are two functional devices connected to or in the base unit 100, namely a display 126 and a touchscreen 99. The touch screen 99 has a touchscreen endpoint 139 in the first peripheral device 130. The processing device 160

recognises this endpoint and can interact with it if the base unit 100 is adapted to translate the co-ordinates of the touch to ones that can be used by the processing device 160, i.e. the OS 164 has the relevant driver 162. This driver is a standard driver which can be distributed, e.g. this driver can be downloaded if required. This embodiment requires that each processing device 160 in a meeting downloads or has installed the relevant driver 162 but the translation function of the base unit 100 can reduce the number of different drivers that might be required even more than with the previous embodiment of Figure 9.

In the embodiment of Figure 11, there is a group 90, base unit 100, first peripheral device 130 and processing device 160. There are two functional devices connected to or in the base unit 100, namely a display 126 and a touchscreen 99. The touch screen 99 is now dealt with by the client software 70 as has been described previously, namely that the client software running on the first peripheral device 130 is adapted to interact with the touchscreen 99 through the USB interface 131 and to interact with the OS164 of the processing device 160. This means that the touchscreen 99 is not exposed to the processing device 160. The client software 70 is adapted to simulate a touch event and to provide the correct co-ordinates to the OS164 of the processing device 160. This is therefore a proprietary solution which requires the client software 70 to be adapted to interact with each type of touchscreen 99 through a USB interface 131.

Figures 12 to 14 relate to embodiments of the present invention in which there are multiple users. First of all, each participant in a meeting can make use of any of the embodiments described in Figures 8 to 11. Thus, the present invention provides multiuser solutions.

In Figure 12 the processing device 60' has no first peripheral device 130, e.g. none is available. In such a case client software 70' can be adapted to interact directly with base unit 100 over a wireless connection 127' and the client software 70' is adapted to provide any simulations, or translations as required to present the display device 126 to the processing unit 160' and to allow interaction therewith. The client software 70' can be adapted to simulate any of the embodiments described with respect to Figures 1 to 11 without however using a first peripheral device 130. The client software 70' can simulate for example a UB interface of the type used in any of the embodiments of Figures 1 to 11. For the processing device 160, the methods described with respect to any of Figures 1 to 11 can be used.

In Figure 13 the processing device 60' has no first peripheral device 130, e.g. none is available. In such a case client software 70' can be adapted to interact directly with base unit 100 over a wireless connection 127' and the client software 70' is adapted to provide any simulations, or translations as required to present the display device 126 to the processing unit 160' and to allow interaction therewith exactly as described with respect to Figure 12. However, group 90 has a microphone and speaker combination such as a speakerphone 92 or a microphone and speaker combination 96, 97. Processing device 160 can make use of any of the embodiments of Figures 1 to 11. The client software 70' of processing device 160' can be adapted to provide video data directly to the base unit 100 where it is processed, e.g. decoded and composited and provided to display 126 over a suitable connection such as an HDMI connection.

For the processing device 160' the client software 70' and a driver 162' can present a simulated speakerphone 92 to the OS 164' thus creating a virtual microphone and a virtual speaker. The third party software 60' for the Unified Communication such as the Skype™ call will be presented with these virtual devices which it then uses for the call.

In Figure 14 the processing device 60' has no first peripheral device 130, e.g. none is available. In such a case client software 70' can be adapted to interact directly with base unit 100 over a wireless connection 127' and the client software 70' is adapted to provide any simulations, or translations as required to present the display device 126 to the processing unit 160' and to allow interaction therewith exactly as described with respect to Figure 13. However, group 90 has a videocam 91 connected e.g. via a USB connection to the base unit 100. Processing device 160 can make use of any of the embodiments of Figures 1 to 11. The client software 70' of processing device 160' can be adapted to receive video data directly from the base unit 100.

For the processing device 160' the client software 70' and a driver 162' can present a simulated videocam 91 to the OS 164' thus creating a virtual videocam device. The third party software 60' for the Unified Communication such as the Skype™ call will be presented with all of the virtual devices which it then uses for the call.

Figure 15 shows a messaging flow diagram applicable to any of the embodiments described

with respect to figures 1 to 11.

Figure 16 shows a messaging flow applicable to any of the embodiments described with respect to figures 12 to 14 where no first peripheral device is used.

Figure 17 shows a further embodiment of the present invention comprising a processing device 160 with a processor and memory and executing and optionally storing a client software 70 comprising also a host application as well as a third party application 60 which can be adapted to execute a unified communications call such as a Skype™ call or a Skype™ for business call. The processing device 130 has a serial port such as a USB port and generic or custom drivers for communicating across the port with a first peripheral device 130. The peripheral device 130 has a processor and memory and executes and optionally stores firmware which provides a wireless link 127 to a base unit 100 as well as providing at least one configurable or fixed endpoint of a functional device 90 which is connected to or is connected in the base unit 100. The base unit has a processor and a memory for executing and optionally storing firmware for providing a connection to the wireless link 127 and also to provide a port to the functional device 90. The functional device 90 has a processor and memory and executes and optionally stores firmware for providing the link and interface to the base unit 100 and for providing data to be sent to the at least one configurable or fixed endpoints on the peripheral device 130.

Methods according to the present invention can be performed by a computer system. The present invention can use a processing engine to carry out functions. The processing engine preferably has digital processing capability such as provided by one or more microprocessors, FPGA's, or a central processing unit (CPU) and/or a Graphics Processing Unit (GPU), and which is adapted to carry out the respective functions by being programmed with software, i.e. one or more computer programs. References to software can encompass any type of programs in any language executable directly or indirectly by a processor, either via a compiled or interpretative language. The implementation of any of the methods of the present invention can be performed by logic circuits, electronic hardware, processors or circuitry which can encompass any kind of logic or analog circuitry, integrated to any degree, and not limited to general purpose processors, digital signal processors, ASICs, FPGAs, discrete components or transistor logic gates and similar.

A processing device may have memory (such as non-transitory computer readable medium, RAM and/or ROM), an operating system, optionally a display such as a fixed format display, ports for data entry devices such as a keyboard, a pointer device such as a "mouse", serial or parallel ports to communicate other devices, network cards and connections to connect to any of the networks.

The software can be embodied in a computer program product adapted to carry out the functions of any of the methods of the present invention, e.g. as itemised below when the software is loaded onto a computer and executed on one or more processing engines such as microprocessors, ASIC's, FPGA's etc. Hence any of the embodiments of the present invention can incorporate a computer system capable of running one or more computer applications in the form of computer software.

The methods described with respect to embodiments of the present invention above can be performed by one or more computer application programs running on the computer system by being loaded into a memory and run on or in association with an operating system such as WindowsTM supplied by Microsoft Corp, USA, Linux, Android or similar. The computer system can include a main memory, preferably random access memory (RAM), and may also include a non-transitory hard disk drive and/or a removable non-transitory memory, and/or a non-transitory solid state memory. Non-transitory removable memory can be an optical disk such as a compact disc (CD-ROM or DVD-ROM), a magnetic tape, which is read by and written to by a suitable reader. The removable non-transitory memory can be a computer readable medium having stored therein computer software and/or data. The non-volatile storage memory can be used to store persistent information that should not be lost if the computer system is powered down. The application programs may use and store information in the non-volatile memory.

The software embodied in the computer program product is adapted to carry out the following functions when the software is loaded onto the respective device or devices and executed on one or more processing engines such as microprocessors, ASIC's, FPGA's etc.:

connecting a processing device to a functional device connected to or in a base unit of a communications network, the processing device having a memory, a display and an operating system, the base unit having a transmitter and the first peripheral device having a receiver;

coupling a first peripheral device to the processing device via a generic communications protocol, providing at least one fixed or a configurable endpoint of the functional device exposed on the first peripheral device;

transmitting data from the base unit and receiving the data at the first peripheral device over the communications network from the functional device to the processing device via the at least one fixed or configurable endpoint using the generic communications protocol for communication between the processing device and the first peripheral device.

The software embodied in the computer program product is adapted to carry out the following functions when the software is loaded onto the respective device or devices and executed on one or more processing engines such as microprocessors, ASIC's, FPGA's etc.:

Transmitting or receiving data, i.e. streaming data carrying images, audio, etc. in a raw or unaltered format;

Connecting the functional device to or in a base unit of a wireless communications network;

Running the functional device with the vendor specific driver alone.

The software embodied in the computer program product is adapted to carry out the following functions when the software is loaded onto the respective device or devices and executed on one or more processing engines such as microprocessors, ASIC's, FPGA's etc.:

exposure implemented with **descriptor fields**;

transmitting the data from the functional device to at least two processing devices using at least two first peripheral devices;

combining and exposing two endpoints to the processing device as one endpoint.

The software embodied in the computer program product is adapted to carry out the following functions when the software is loaded onto the respective device or devices and executed on one or more processing engines such as microprocessors, ASIC's, FPGA's etc.:

the functional device enables one or more of a microphone, a speakerphone, a speaker, a display, a touchscreen, a projector, a camera, a video camera, a webcamera;

presenting the at least one fixed or a configurable endpoint of the functional device exposed on the first peripheral device as one of a human interface device, a mass storage device, a composite device, a microphone, a speakerphone, a speaker, a display, a touchscreen, a projector, a camera, a video camera, or a webcamera.

The software embodied in the computer program product is adapted to carry out the following functions when the software is loaded onto the respective device or devices and executed on one or more processing engines such as microprocessors, ASIC's, FPGA's etc.:

encoding, and/or optionally encrypting the data;

hosting a unified communication between two or more further processing devices on the processing device;

the first peripheral device presenting a functional device to the unified communication between two or more processing devices; or

exposing the same type of functional device to the processing device as is connected to the Base Unit and using at least one driver for the functional device installed on the processing

device.

Any of the above software may be implemented as a computer program product which has been compiled for a processing engine in any of the servers or nodes of the network. The computer program product may be stored on a non-transitory signal storage medium such as an optical disk (CD-ROM or DVD-ROM), a digital magnetic tape, a magnetic disk, a solid state memory such as a USB flash memory, a ROM, etc.

Claims:

1. A system for connecting a processing device to a functional device connected to or in a base unit of a communications network, the processing device having a memory, a display and an operating system, the system comprising :

a first peripheral device being adapted to be coupled to the processing device via a generic communications protocol, the base unit having a transmitter and the first peripheral device having a receiver and at least one fixed or a configurable endpoint of the functional device exposed on the first peripheral device;
the base unit and the first peripheral device being adapted to transmit and receive data respectively over the communications network from the functional device to the processing device via the at least one fixed or configurable endpoint using the generic communications protocol for communication between the processing device and the first peripheral device.

2. The system according to claim 1, wherein data that is transmitted or received, optionally streaming data carrying images, audio, or similar can be in a raw or unaltered format.

3. The system according to claim 1 or 2, wherein the functional device is connected to or in a base unit of a wireless communications network.

4. The system according to any previous claim, wherein exposure is implemented with descriptor fields.

5. The system according to any previous claim, wherein the functional device can be run with the vendor specific driver alone.

6. The system according to any previous claim adapted to transmit the data from the functional device to at least two processing devices using at least two first peripheral devices.

7. The system according to any previous claim, wherein two endpoints are combined and exposed to the processing device as one endpoint.

8. The system according to any previous claim, wherein the functional device is any one or more of a microphone, a speakerphone, a speaker, a display, a touchscreen, a projector, a camera, a video camera, a webcamera.

9. The system according to any previous claim, wherein the at least one fixed or a configurable endpoint of the functional device exposed on the first peripheral device is one of a human interface device, a mass storage device, a composite device, a microphone, a speakerphone, a speaker, a display, a touchscreen, a projector, a camera, a video camera, or a webcamera.

10. The system according to any previous claim, further comprising means for encoding, optionally encrypting the data.

11. The system according to any previous claim, wherein the processing device is adapted to host a unified communication between two or more further processing devices.

12. The system according to claim 11, wherein the first peripheral device is adapted to present a functional device to the unified communication between two or more processing devices.

13. The system according to any previous claim adapted to expose the same type of functional device to the processing device as is connected to the Base Unit further comprising at least one driver for the functional device installed on the processing device.

14. The system according to any previous claim, wherein the functional device is a second peripheral device.

15. The system according to any previous claim, wherein the functional device is a data capturing device.

16. A method for connecting a processing device to a functional device connected to or in a base unit of a communications network, the processing device having a memory, a display and an operating system, the base unit having a transmitter and the first peripheral device having a receiver the method comprising :

coupling a first peripheral device to the processing device via a generic communications protocol, providing at least one fixed or a configurable endpoint of the functional device exposed on the first peripheral device;

transmitting data from the base unit and receiving the data at the first peripheral device over the communications network from the functional device to the processing device via the at least one fixed or configurable endpoint using the generic communications protocol for communication between the processing device and the first peripheral device.

17. The method according to claim 16, wherein data that is transmitted or received, i.e. streaming data carrying images, audio, etc. can be in a raw or unaltered format.

18. The method according to claim 16 or 17, wherein the functional device being connected to or in a base unit of a wireless communications network.

19. The method according to any of the claims 16 to 18, wherein the functional devices are run with the vendor specific driver alone.

20. The method according to any of the claims 16 to 19, wherein exposure can be implemented with descriptor fields.

21. The method according to any of the claims 16 to 20, comprising transmitting the data from the functional device to at least two processing devices using at least two first peripheral devices.

22. The method according to any of the claims 16 to 21, wherein two endpoints are combined and exposed to the processing device as one endpoint.

23. The method according to any of the claims 16 to 22, wherein the functional device provides any one or more of a microphone, a speakerphone, a speaker, a display, a touchscreen, a projector, a camera, a video camera, a webcamera.

24. The method according to any of the claims 16 to 23, further comprising presenting the at least one fixed or a configurable endpoint of the functional device exposed on the first

peripheral device as one of a human interface device, a mass storage device, a composite device, a microphone, a speakerphone, a speaker, a display, a touchscreen, a projector, a camera, a video camera, or a webcamera.

25. The method according to any of the claims 16 to 24, further comprising encoding, and/or optionally encrypting the data.

26. The method according to any of the claims 16 to 25, further comprising hosting a unified communication between two or more further processing devices on the processing device.

27. The method according to claim 26, further comprising the first peripheral device presenting a functional device to the unified communication between two or more processing devices.

28. The method according to any of the claims 16 to 27, comprising exposing the same type of functional device to the processing device as is connected to the Base Unit and using at least one driver for the functional device installed on the processing device.

29. A peripheral device adapted to be coupled to a processing device via a generic communications protocol, the peripheral device having a receiver and at least one fixed or a configurable endpoint of a functional device exposed on the first peripheral device; the receiver of the first peripheral device being adapted to receive data over a communications network from the functional device and for sending the data to the processing device via the at least one fixed or configurable endpoint using the generic communications protocol for communication between the processing device and the peripheral device.

30. The peripheral device according to claim 29, wherein the communications network is a wireless communications network

31. The peripheral device according to claim 29 or 30, wherein data that is transmitted or received, i.e. streaming data carrying images, audio, etc. can be in a raw or unaltered format.

32. The peripheral device according to any of the claims 29 to 31, wherein the functional

device can be run with the vendor specific driver alone.

33. The peripheral device according to any of the claims 29 to 32, wherein the at least one fixed or a configurable endpoint of the functional device exposed on the first peripheral device is one of a human interface device, a mass storage device, a composite device, a microphone, a speakerphone, a speaker, a display, a touchscreen, a projector, a camera, a video camera, or a webcamera.

34. A computer program product for carrying out any of the method steps of any of the claims 16 to 28 when executed on a processor.

35. A non-transitory signal storage means storing the computer program product of claim 34.

Fig. 1A (Fig.1)

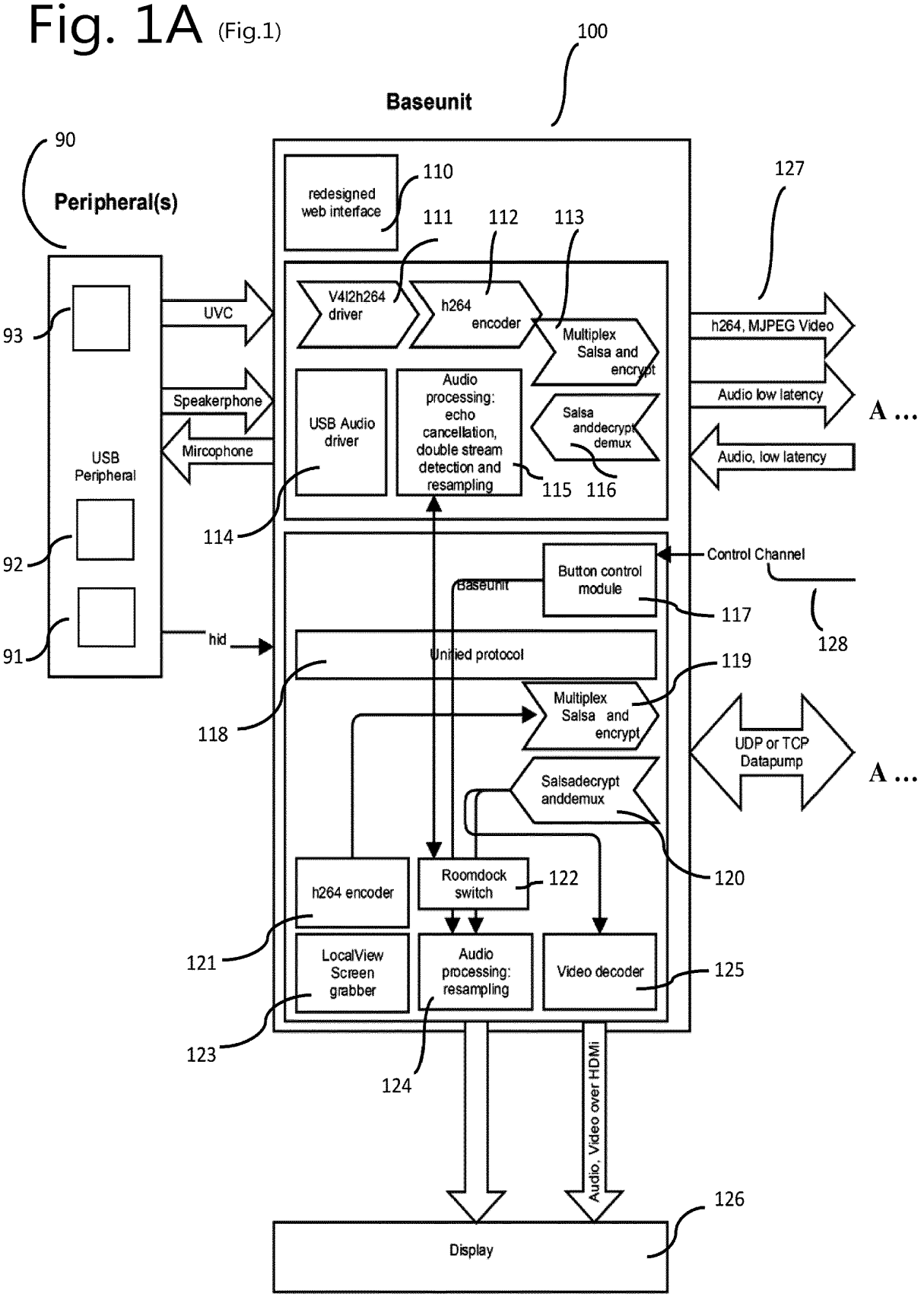

100
Baseunit
90
Peripheral(s)
redesigned web interface
110
111
112
113
127
V4l2h264 driver
h264 encoder
Multiplex Salsa and encrypt
h264, MJPEG Video
93
UVC
Speakerphone
Mircophone
USB Peripheral
USB Audio driver
Audio processing: echo cancellation, double stream detection and resampling
Salsa anddecrypt demux
Audio low latency
Audio, low latency
A ...
114
115
116
92
91
hid
Control Channel
Button control module
Baseunit
117
128
Unified protocol
119
118
Multiplex Salsa and encrypt
UDP or TCP Datapump
A ...
Salsadecrypt anddemux
120
h264 encoder
Roomdock switch
122
121
LocalView Screen grabber
Audio processing: resampling
Video decoder
125
123
124
Audio, Video over HDMi
126
Display

Fig. 1B
(Fig.1 continued)

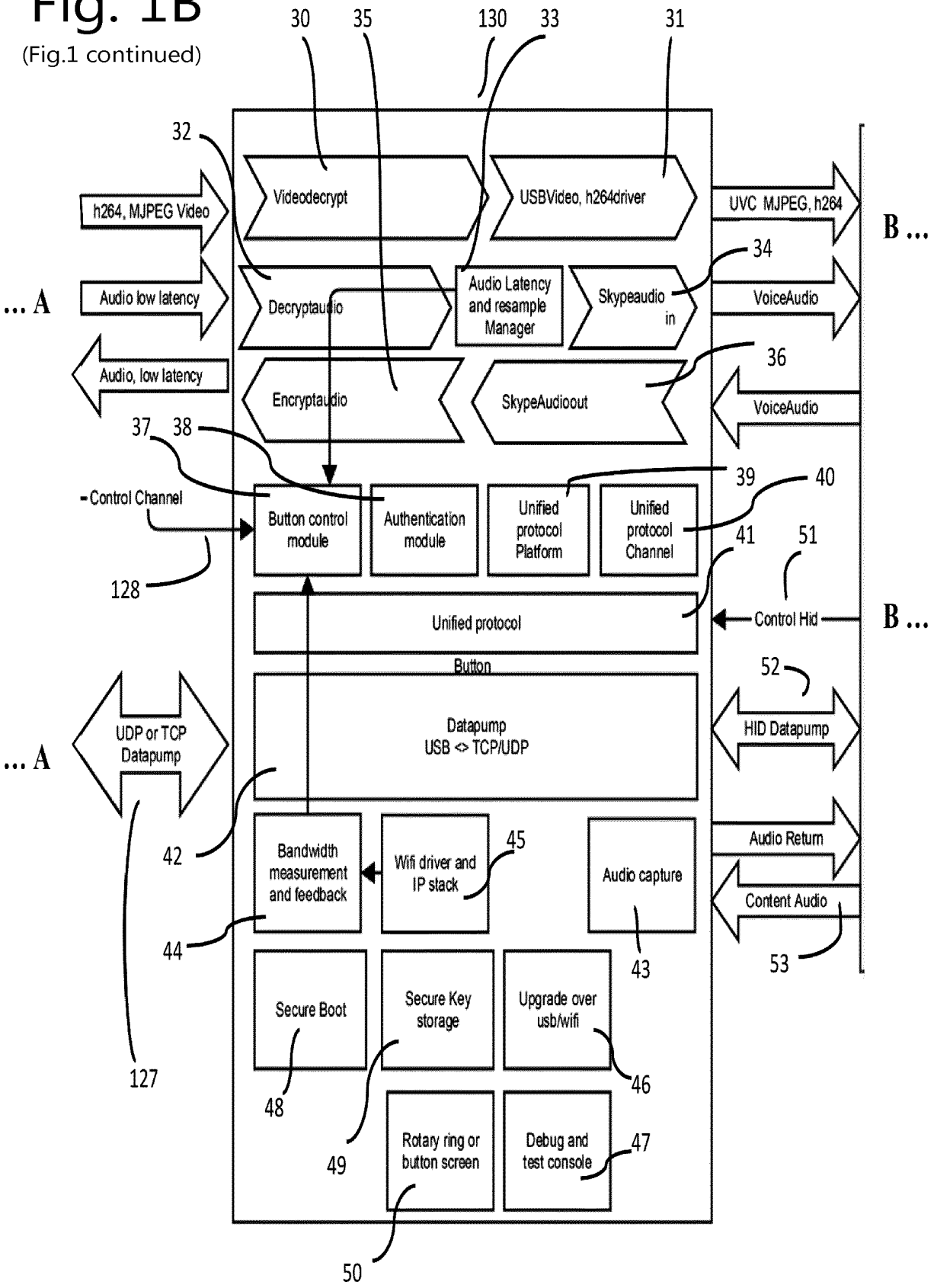
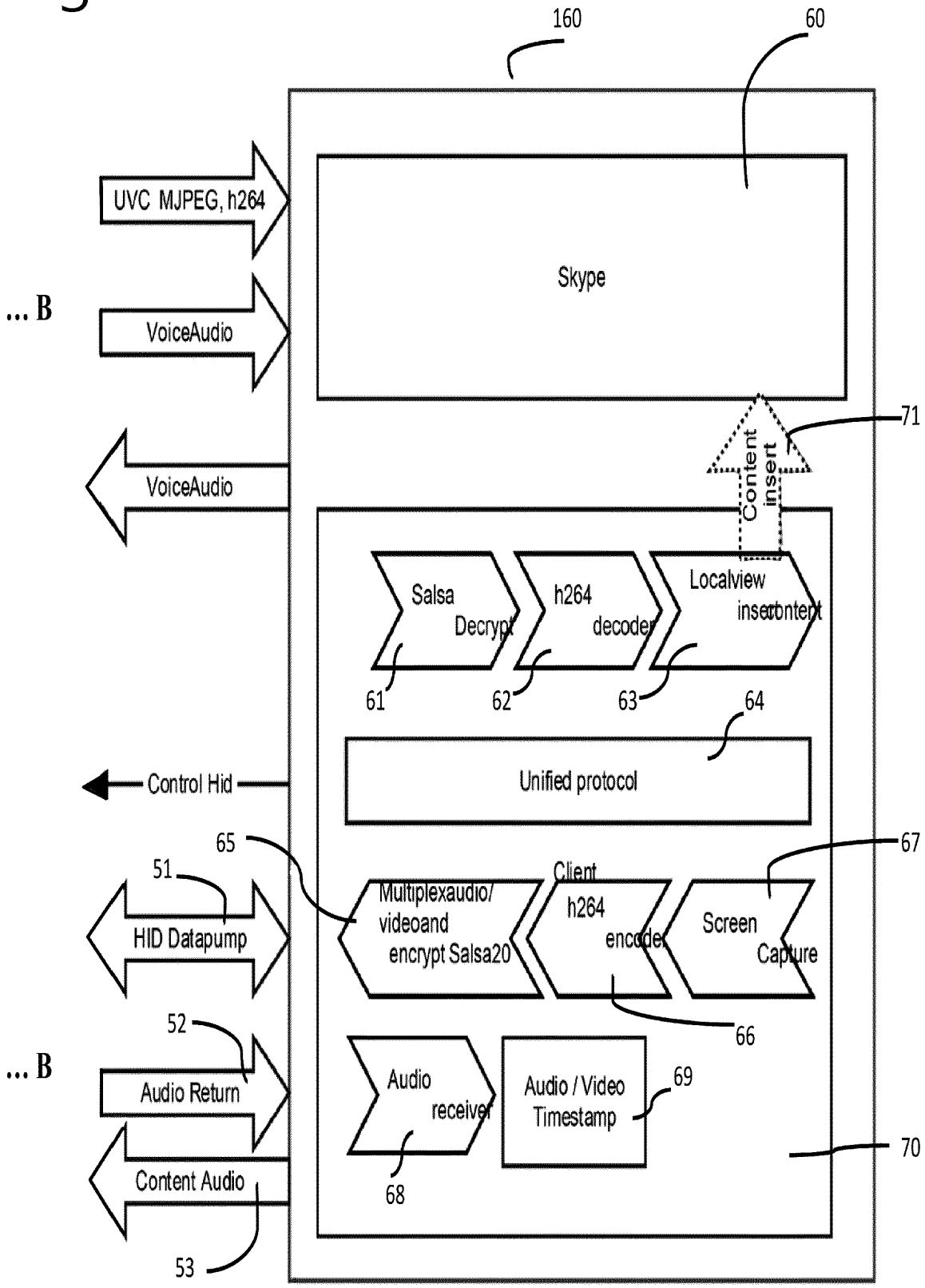


Fig. 1C (Fig.1 continued)



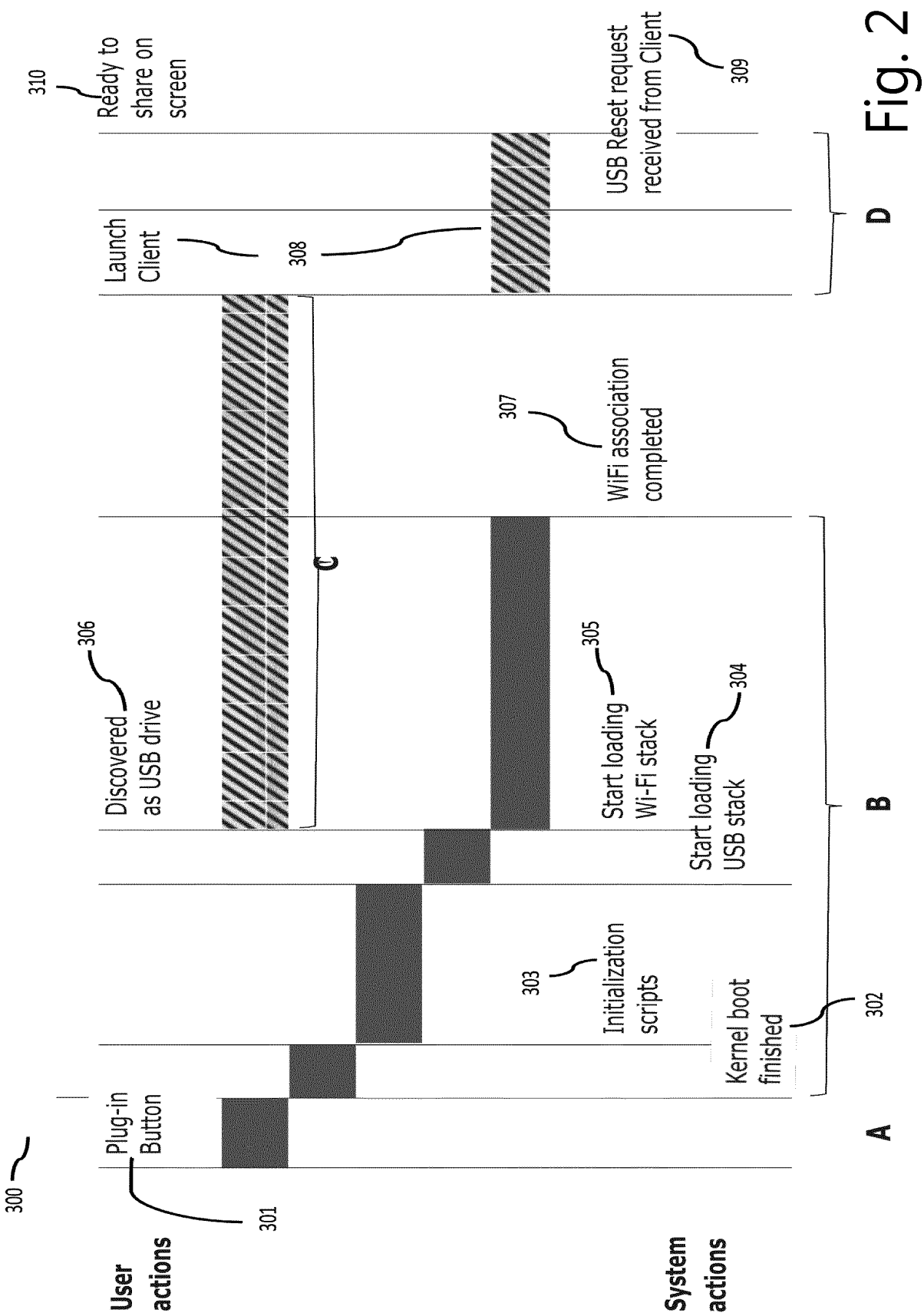

300
User actions
System actions
Plug-in Button
301
Kernel boot finished
302
Initialization scripts
303
Start loading USB stack
304
Start loading Wi-Fi stack
305
Discovered as USB drive
306
WiFi association completed
307
Launch Client
308
USB Reset request received from Client
309
Ready to share on screen
310
A
B
C
D

Fig. 2

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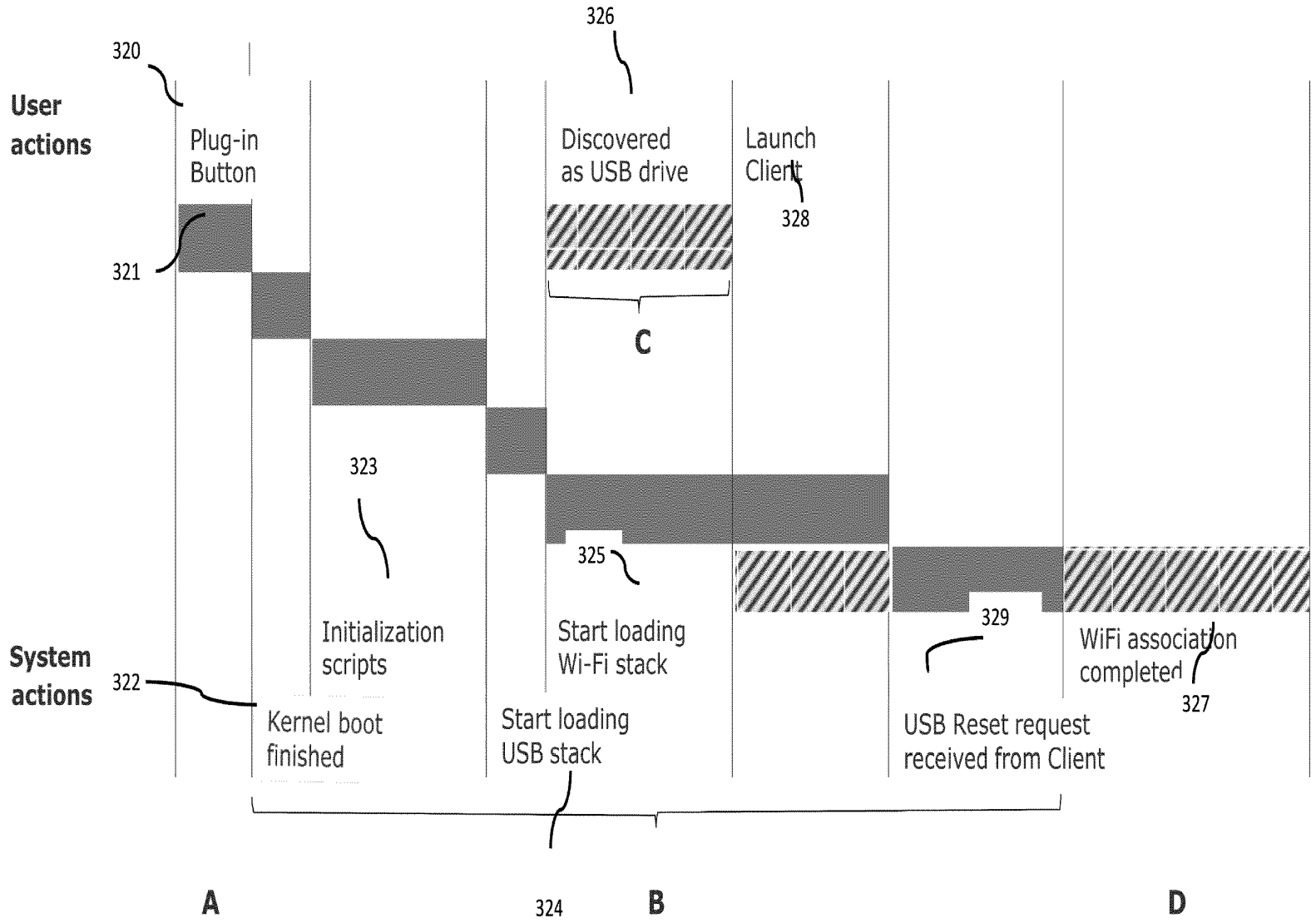
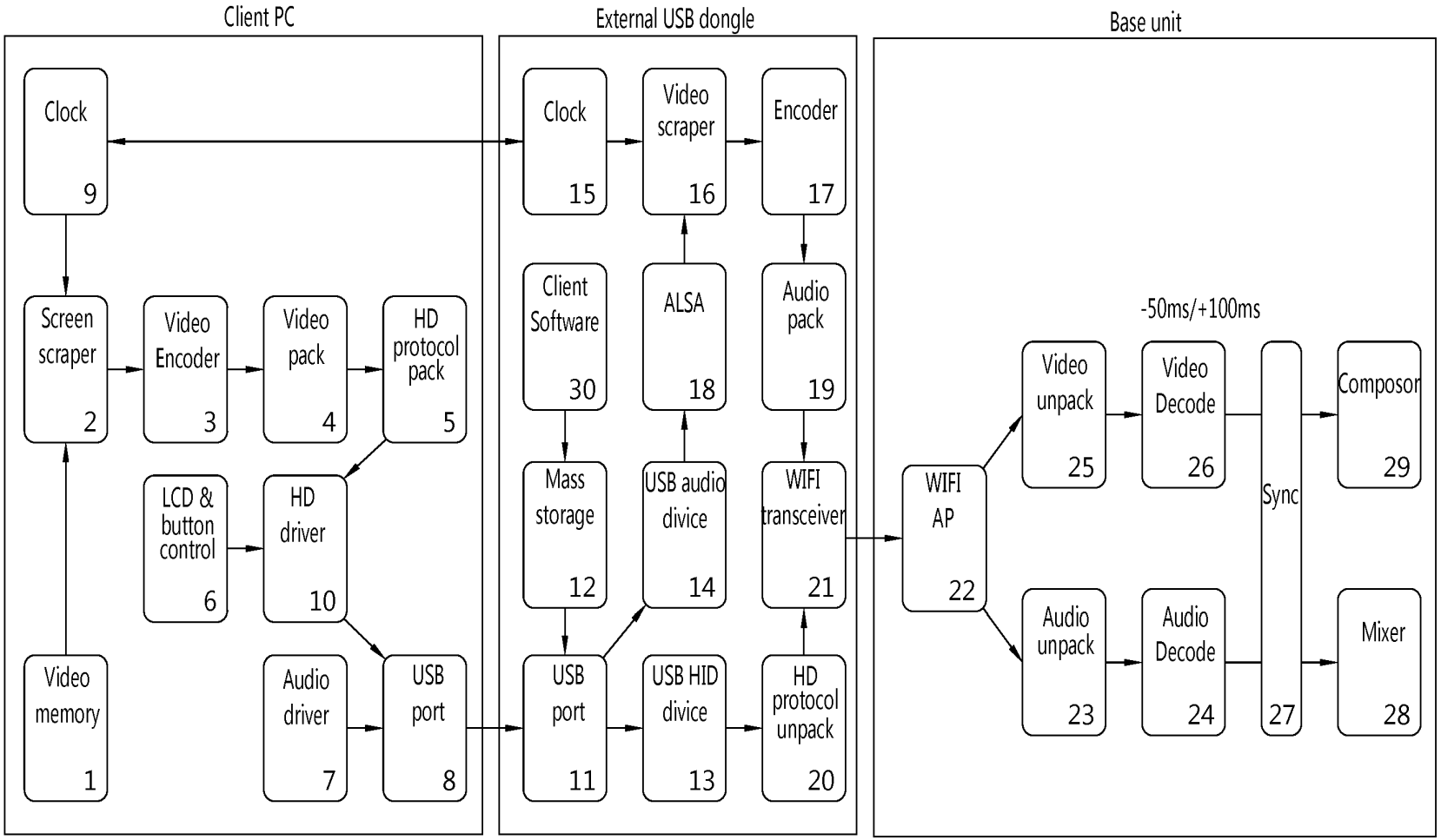


Fig. 3

Fig. 4



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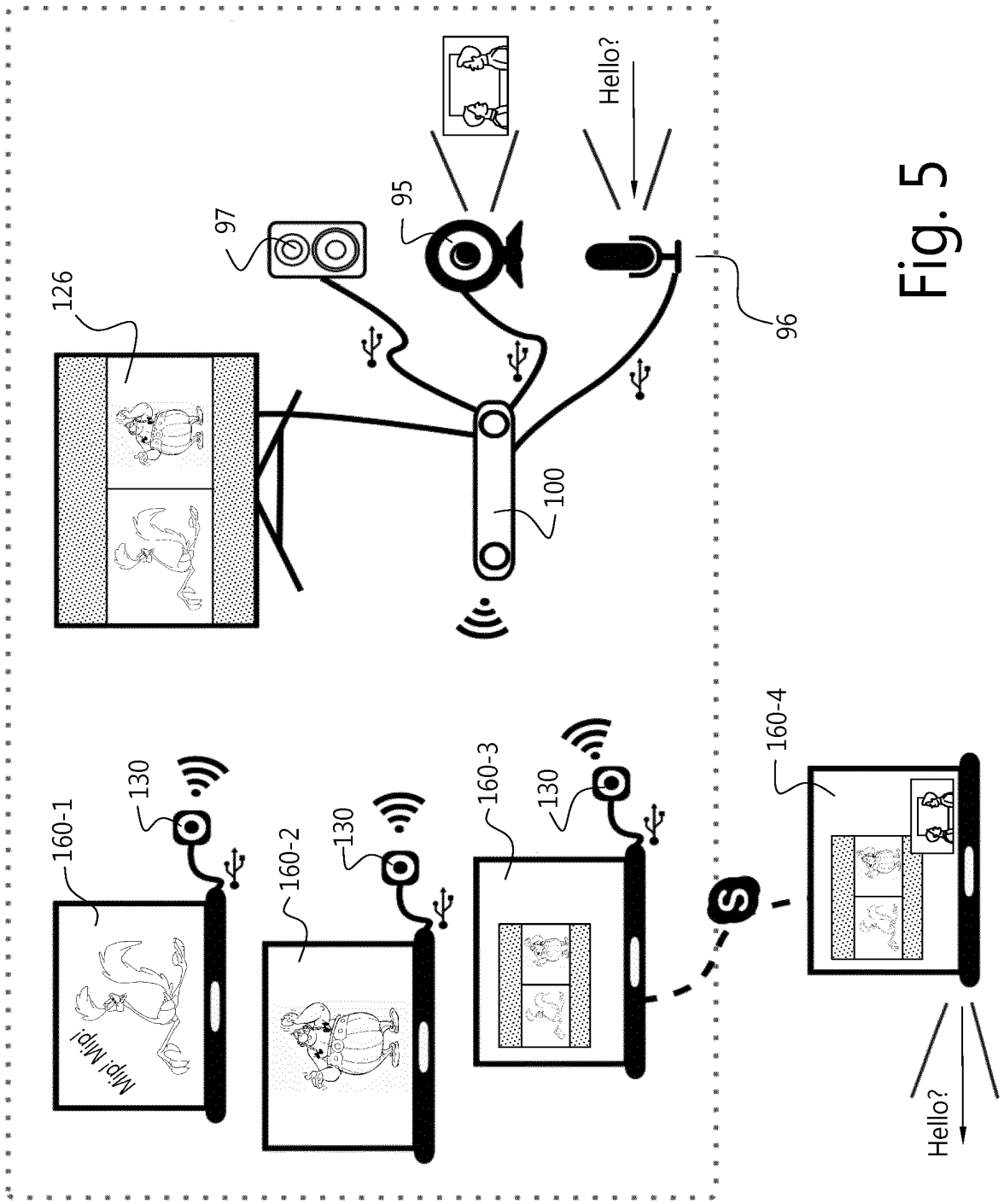

126
97
95
Hello?
96
100
160-1
130
Mip! Mip!
160-2
130
160-3
130
160-4
Hello?

Fig. 5

Fig. 6

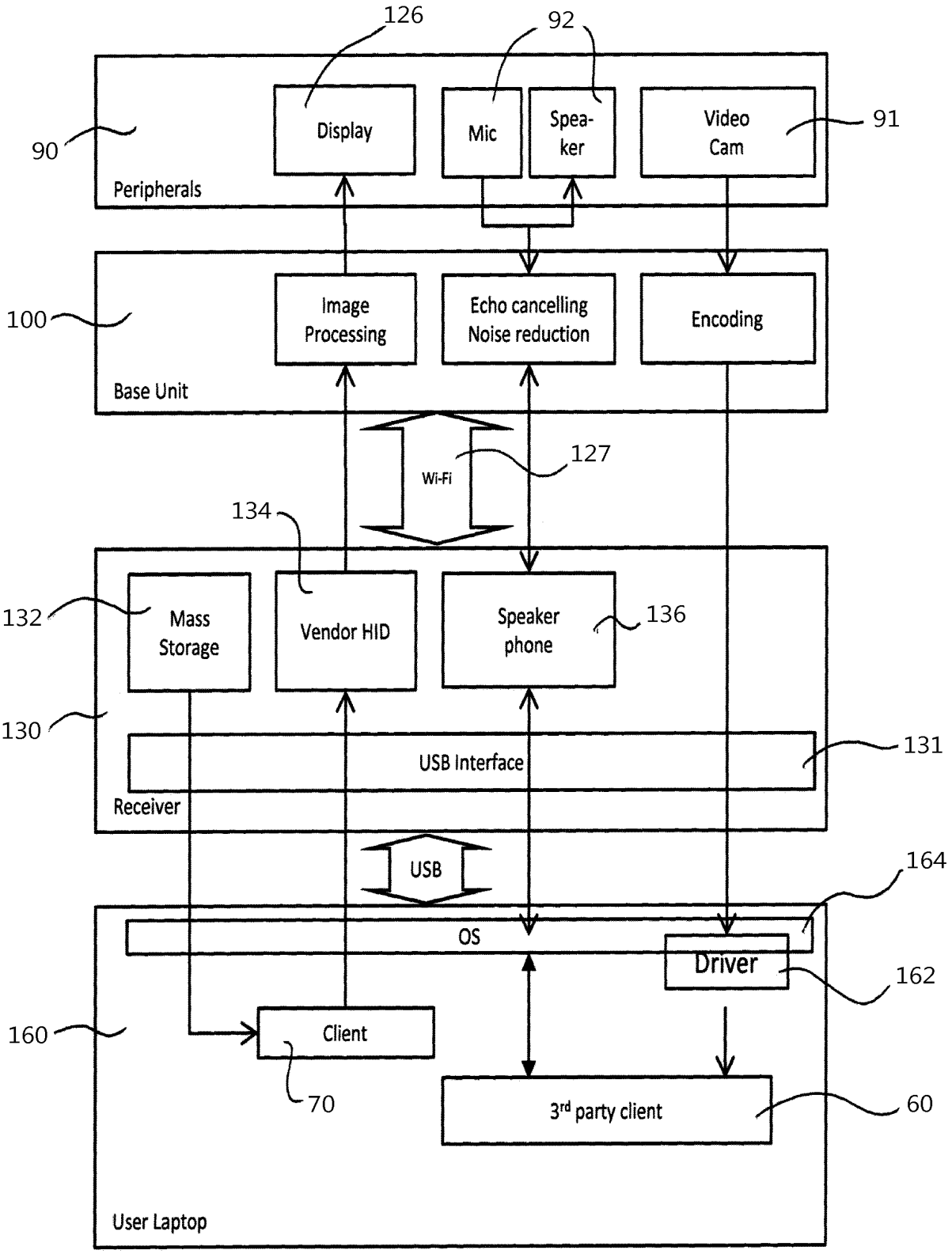

126
92
Display
Mic
Spea-
ker
Video
Cam
91
90
Peripherals
Image
Processing
Echo cancelling
Noise reduction
Encoding
100
Base Unit
Wi-Fi
127
134
132
Mass
Storage
Vendor HID
Speaker
phone
136
130
USB Interface
131
Receiver
USB
164
OS
Driver
162
160
Client
70
3rd party client
60
User Laptop

Fig. 7

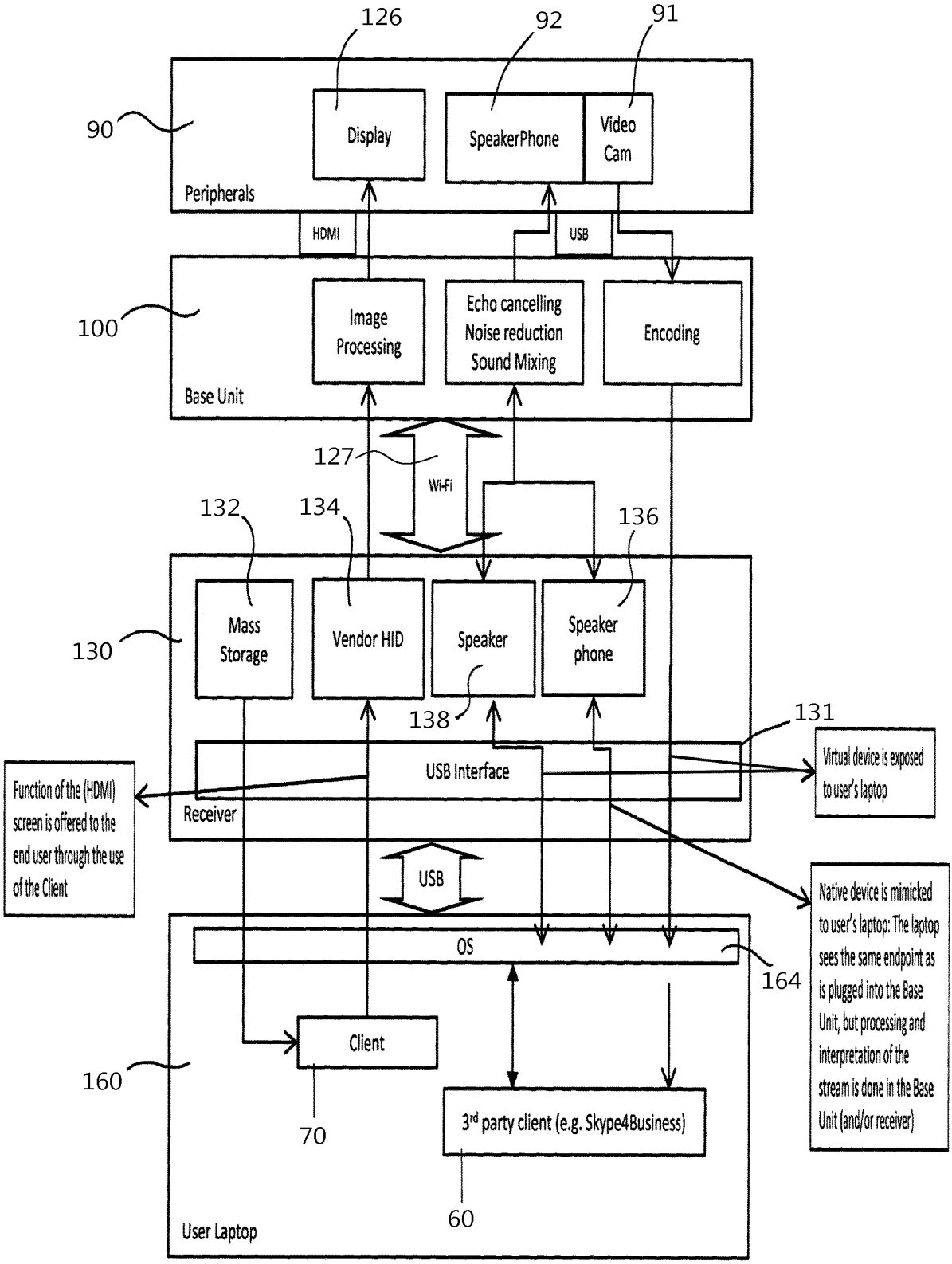

126
92
91
90
Display
SpeakerPhone
Video Cam
Peripherals
HDMI
USB
100
Image Processing
Echo cancelling
Noise reduction
Sound Mixing
Encoding
Base Unit
127
Wi-Fi
132
134
136
130
Mass Storage
Vendor HID
Speaker
Speaker phone
138
131
Virtual device is exposed to user's laptop
USB Interface
Function of the (HDMI) screen is offered to the end user through the use of the Client
Receiver
USB
Native device is mimicked to user's laptop: The laptop sees the same endpoint as is plugged into the Base Unit, but processing and interpretation of the stream is done in the Base Unit (and/or receiver)
OS
164
Client
160
70
3rd party client (e.g. Skype4Business)
60
User Laptop

Fig. 8

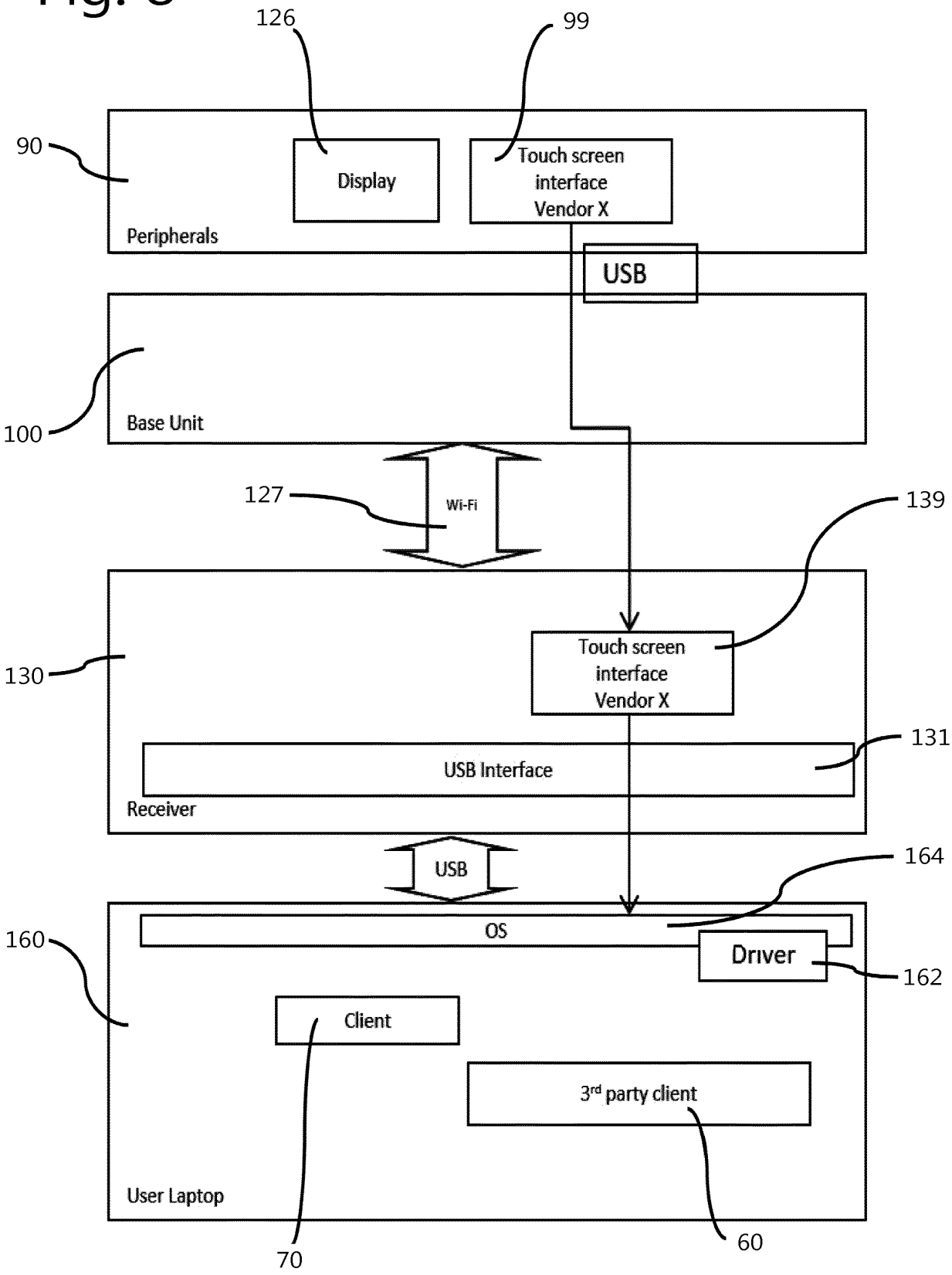

126
99
90
Display
Touch screen interface Vendor X
Peripherals
USB
100
Base Unit
127
Wi-Fi
139
130
Touch screen interface Vendor X
131
USB Interface
Receiver
USB
164
160
OS
Driver
162
Client
3rd party client
User Laptop
70
60

Fig. 9

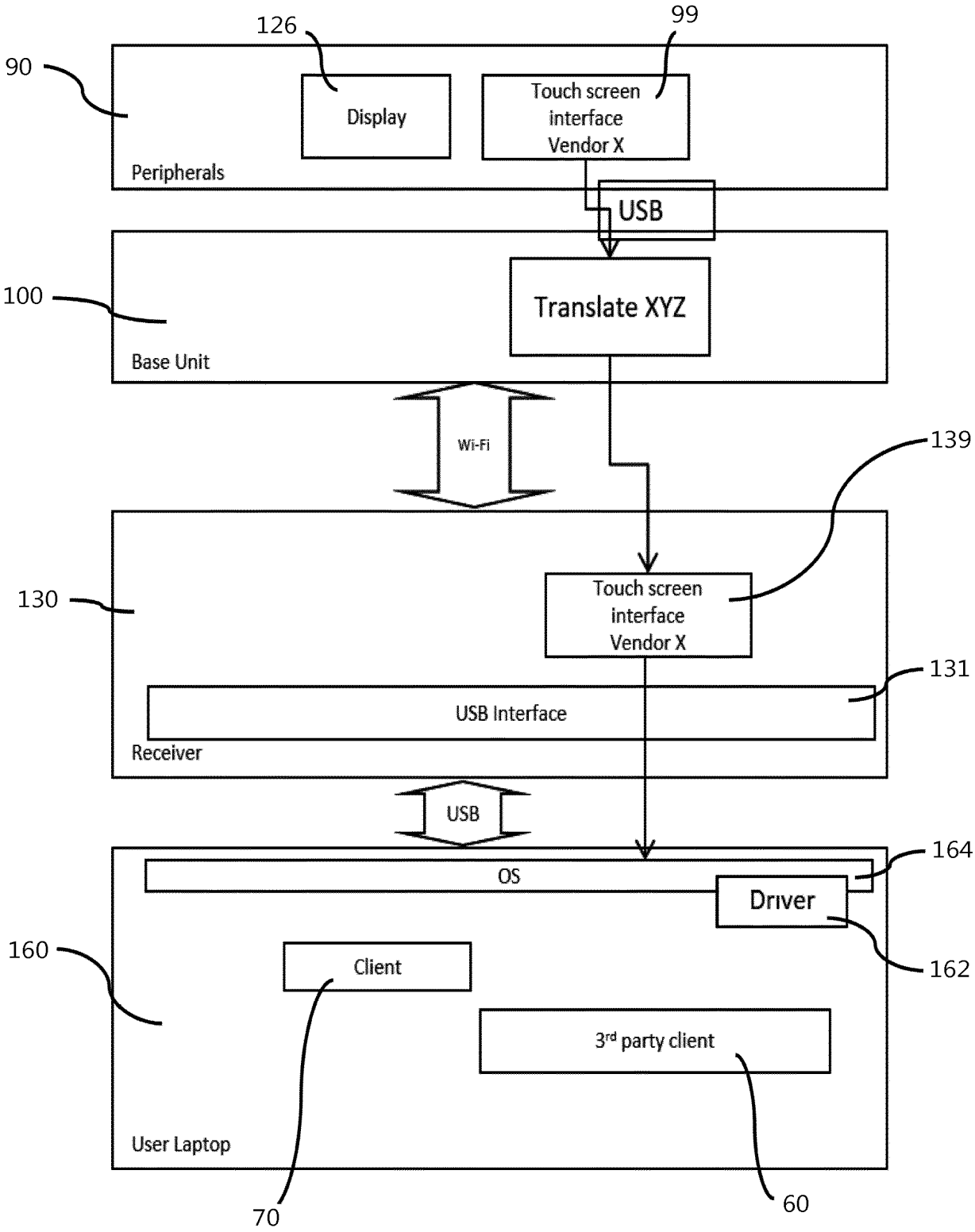

126
99
90
Display
Touch screen interface Vendor X
Peripherals
USB
100
Translate XYZ
Base Unit
Wi-Fi
139
130
Touch screen interface Vendor X
131
USB Interface
Receiver
USB
164
OS
Driver
160
162
Client
3rd party client
User Laptop
70
60

Fig. 10

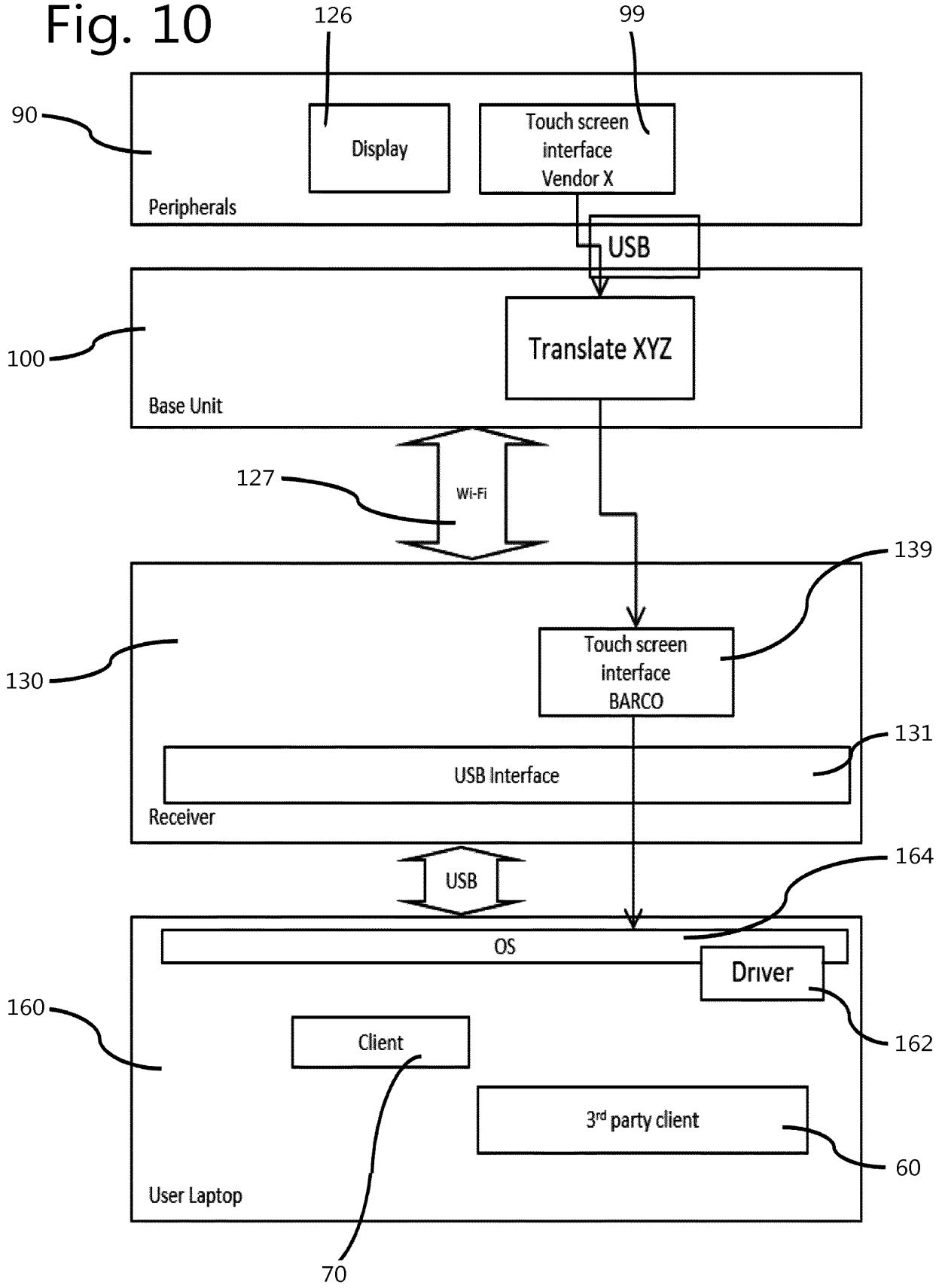

126
99
90
Display
Touch screen interface Vendor X
Peripherals
USB
Translate XYZ
100
Base Unit
127
Wi-Fi
139
Touch screen interface BARCO
130
131
USB Interface
Receiver
USB
164
OS
Driver
160
162
Client
3rd party client
60
User Laptop
70

Fig. 11

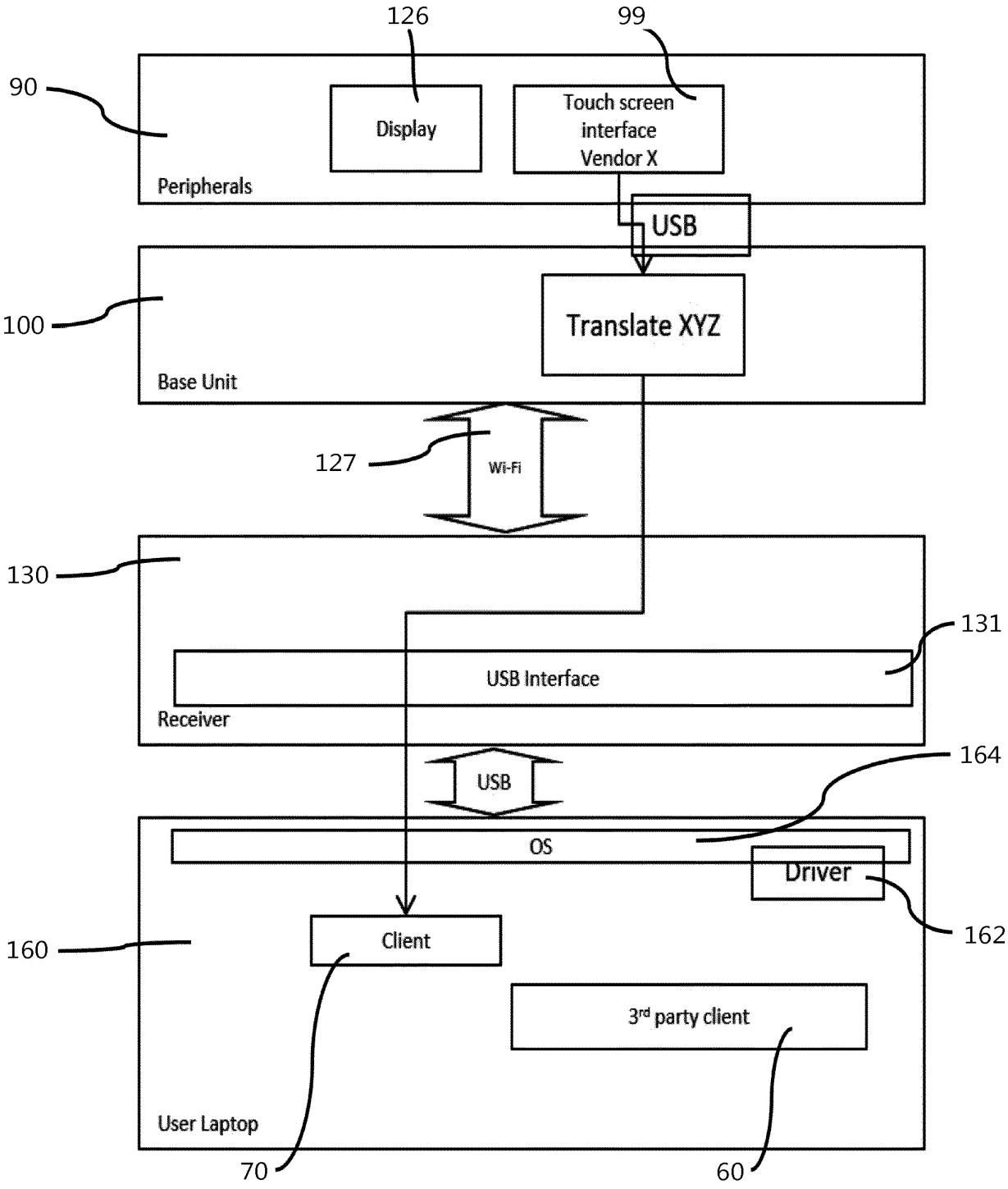
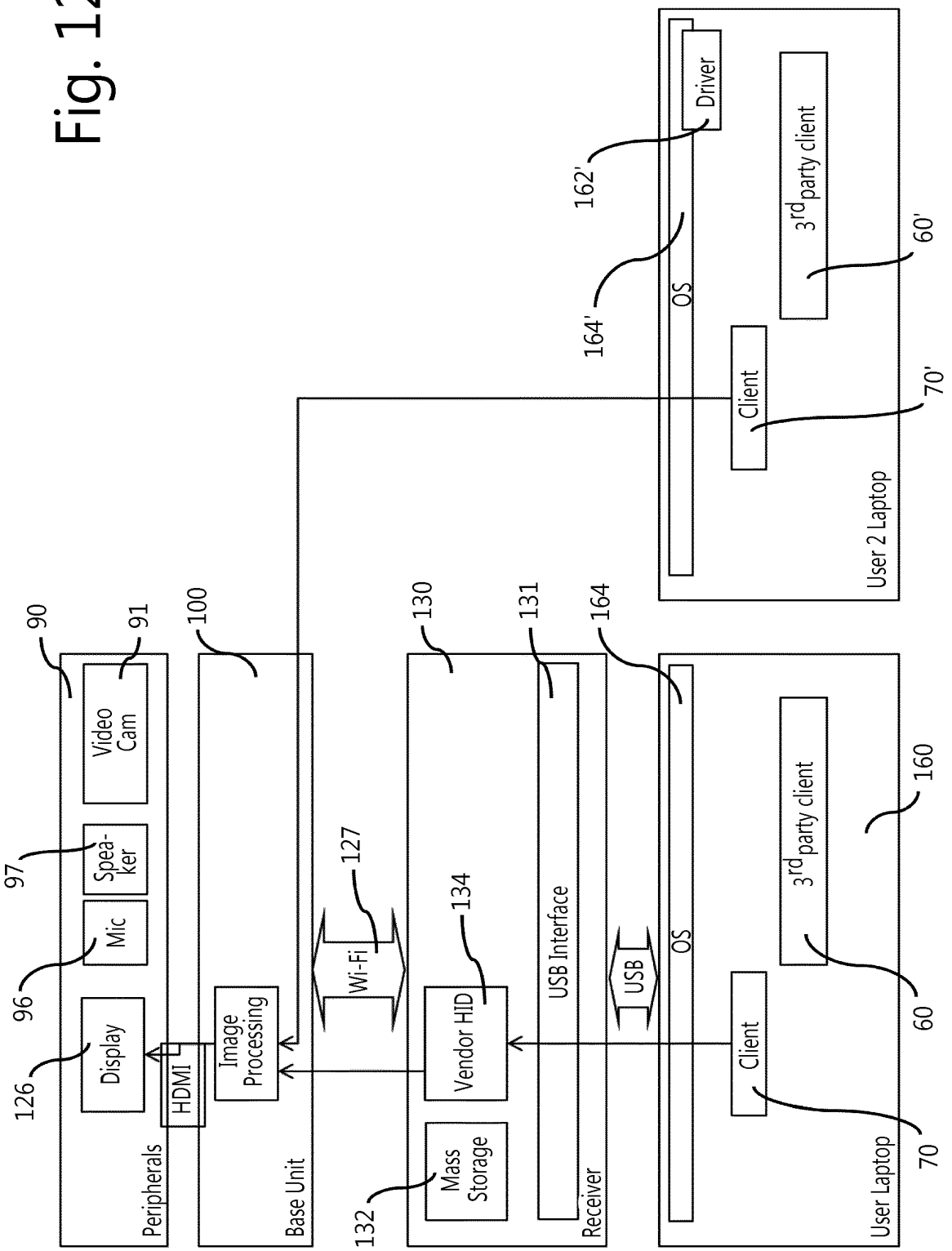
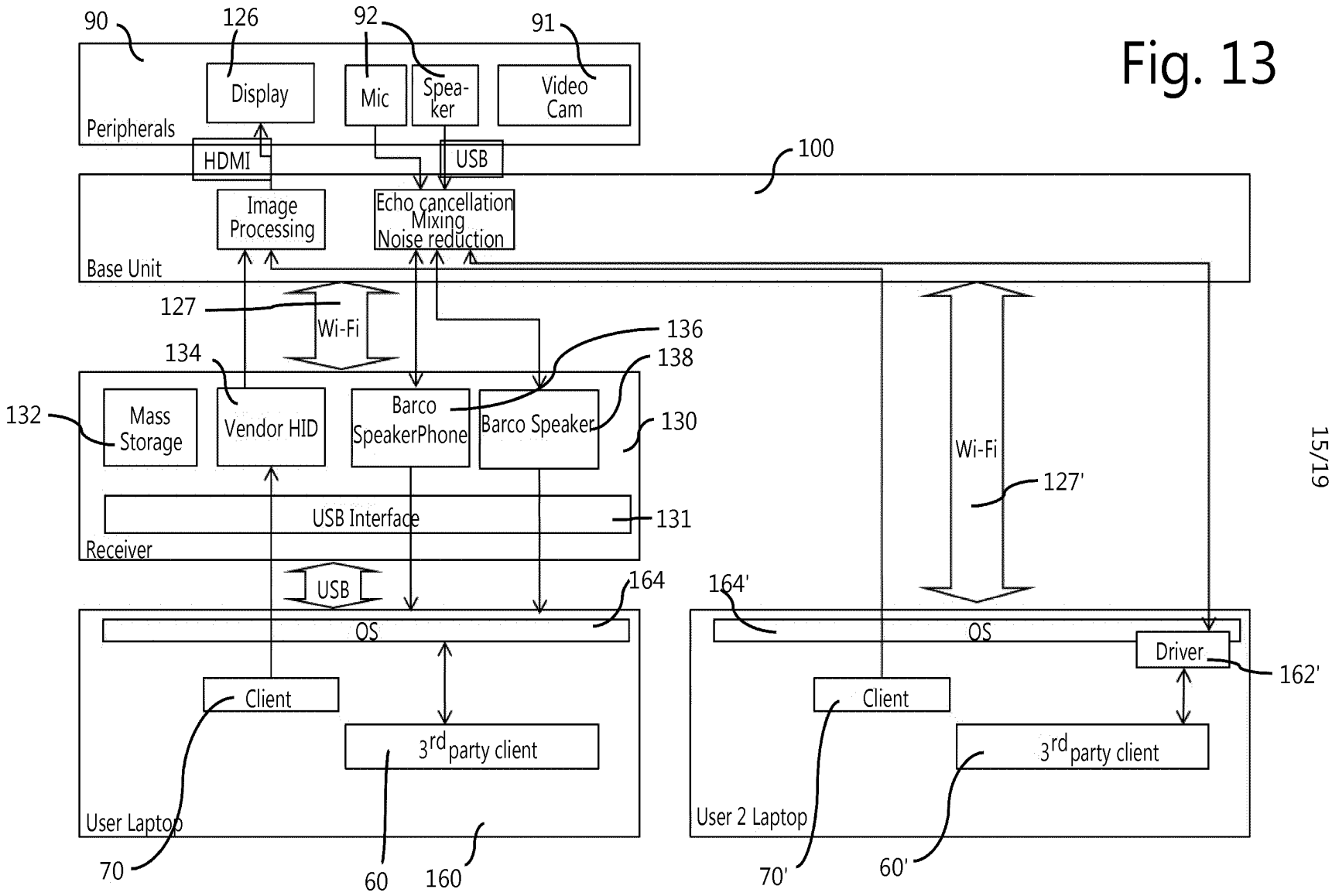

126
99
90
Display
Touch screen interface Vendor X
Peripherals
USB
100
Translate XYZ
Base Unit
127
Wi-Fi
130
131
USB Interface
Receiver
USB
164
OS
Driver
162
160
Client
3rd party client
User Laptop
70
60

Fig. 12


Peripherals
Display
Mic
Spea-ker
Video Cam
HDMI
Base Unit
Image Processing
Wi-Fi
Receiver
Vendor HID
USB Interface
Mass Storage
USB
OS
Client
3rd party client
User Laptop
Driver
User 2 Laptop
90
91
96
97
100
126
127
130
131
132
134
160
162'
164
164'
60
60'
70
70'

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Fig. 13



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Fig. 14

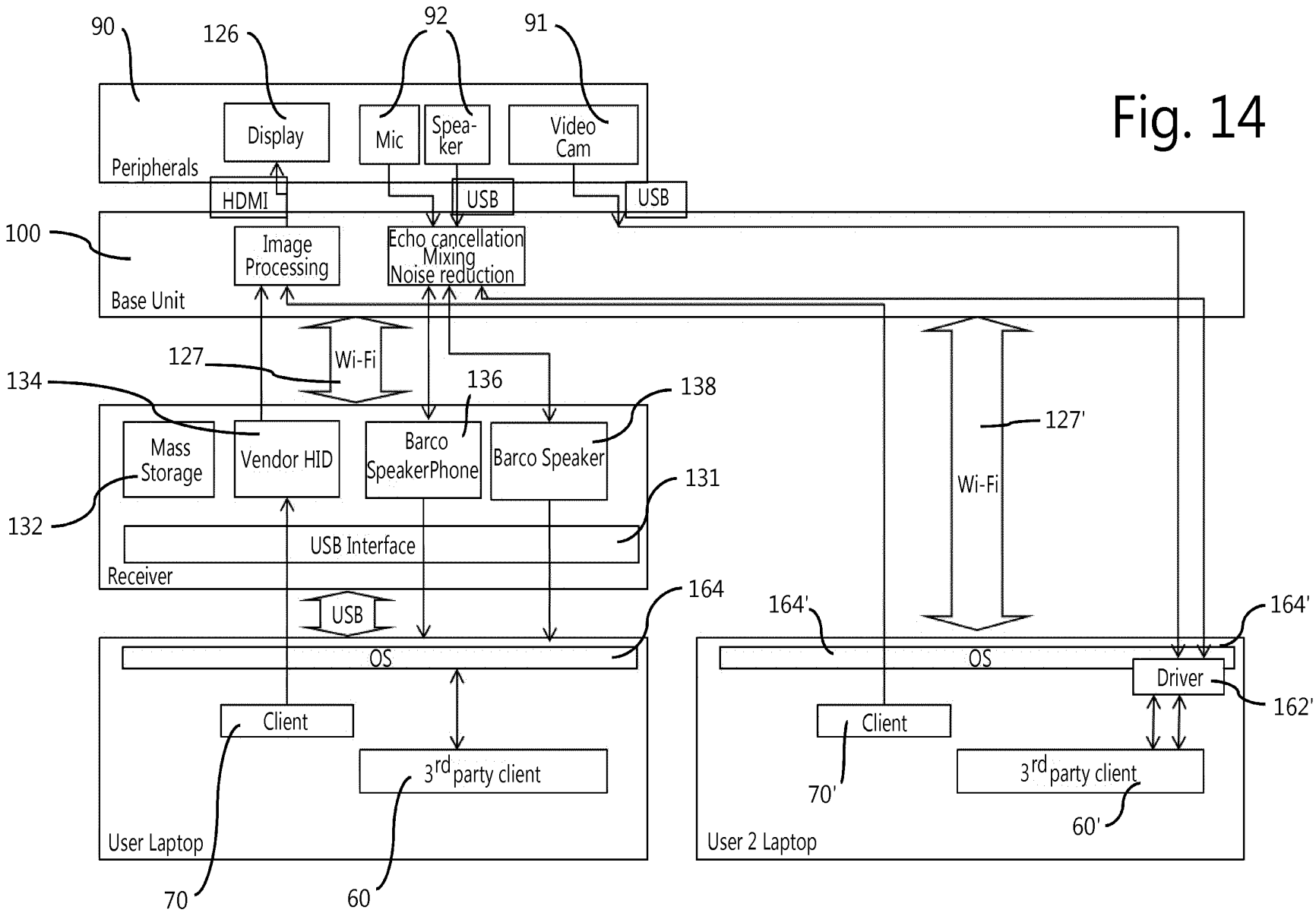


Fig. 15

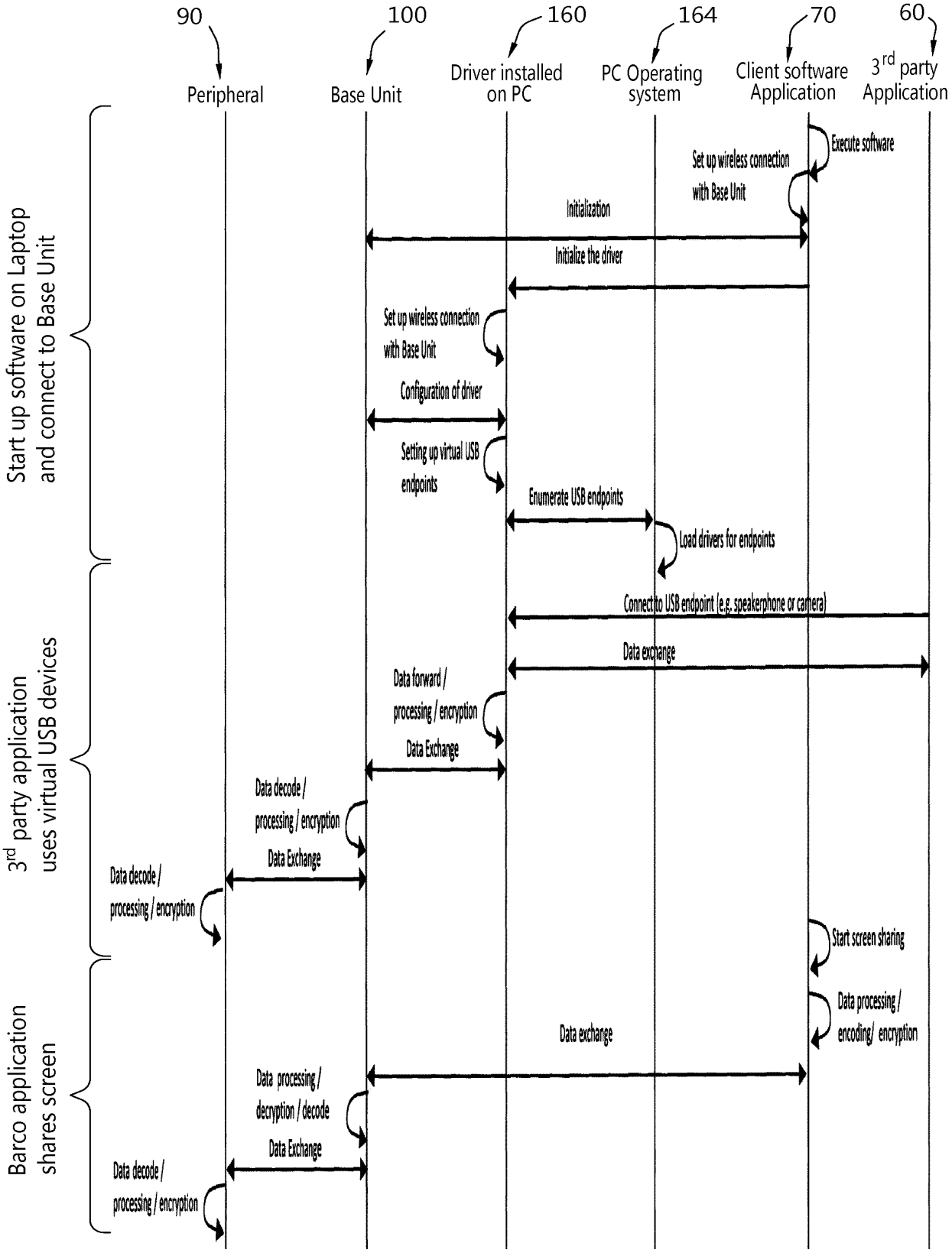

90
100
160
164
70
60
Peripheral
Base Unit
Driver installed on PC
PC Operating system
Client software Application
3rd party Application
Start up software on Laptop and connect to Base Unit
3rd party application uses virtual USB devices
Barco application shares screen
Execute software
Set up wireless connection with Base Unit
Initialization
Initialize the driver
Set up wireless connection with Base Unit
Configuration of driver
Setting up virtual USB endpoints
Enumerate USB endpoints
Load drivers for endpoints
Connect to USB endpoint (e.g. speakerphone or camera)
Data exchange
Data forward / processing / encryption
Data Exchange
Data decode / processing / encryption
Data Exchange
Data decode / processing / encryption
Start screen sharing
Data processing / encoding/ encryption
Data exchange
Data processing / decryption / decode
Data Exchange
Data decode / processing / encryption

Fig. 16

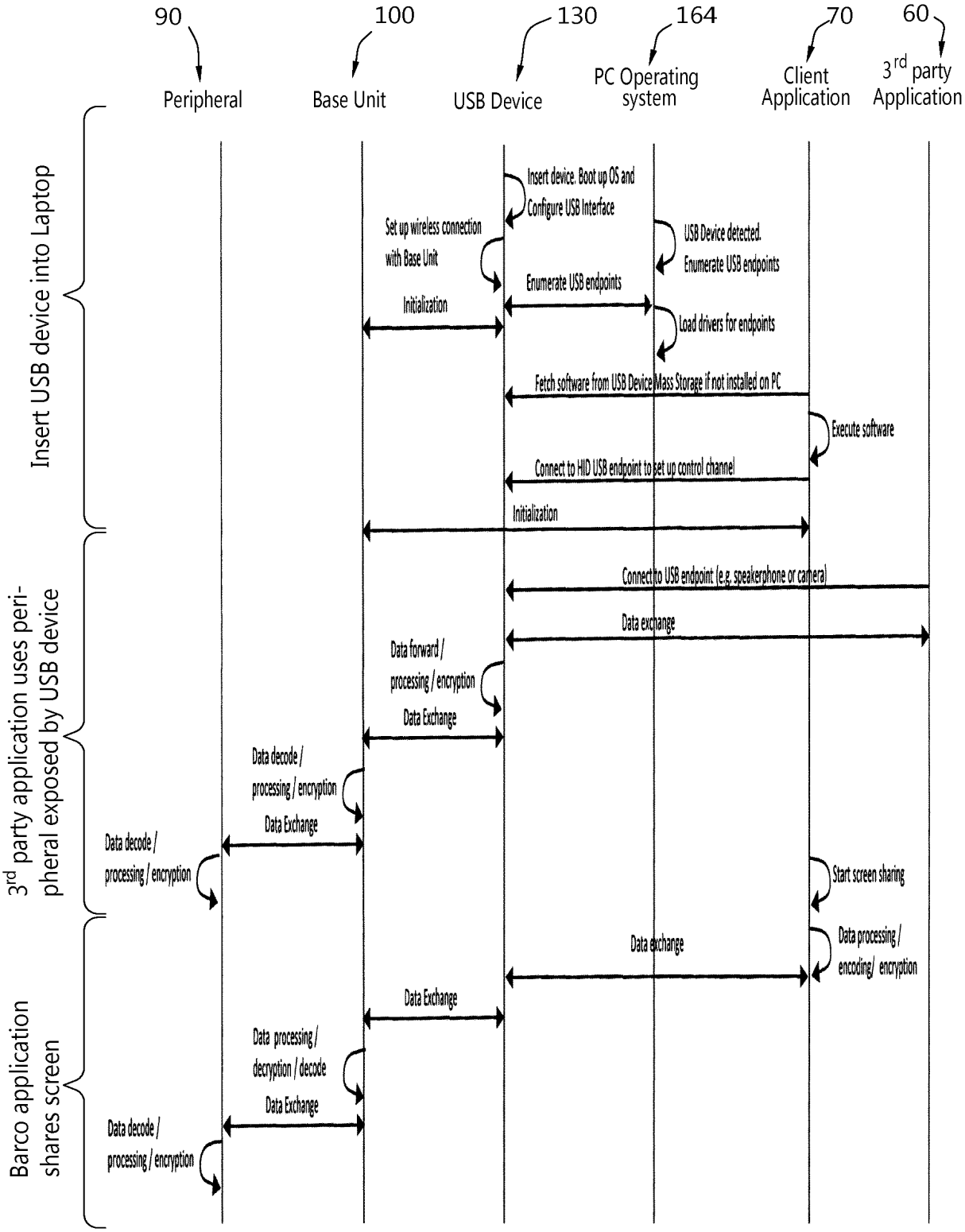
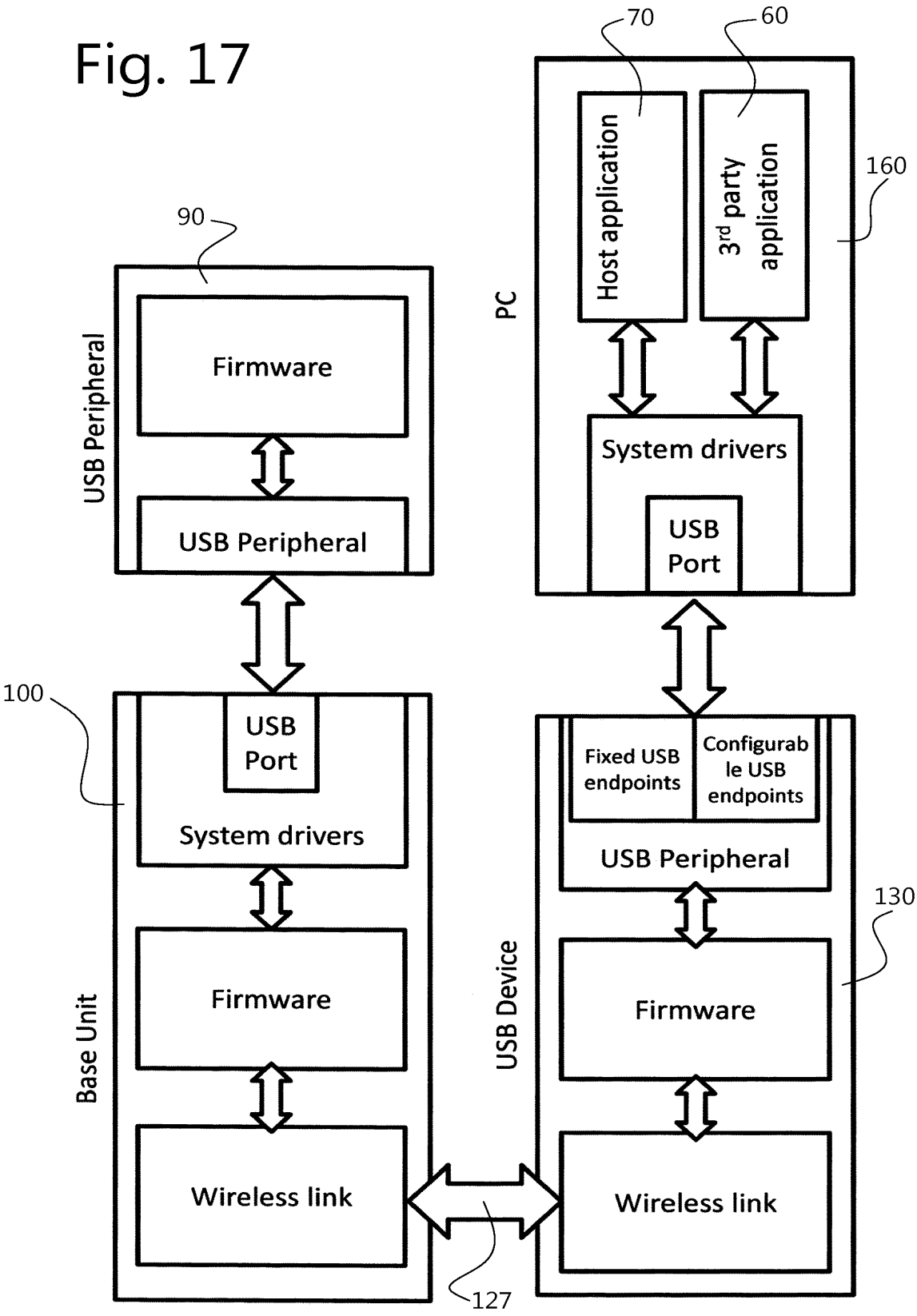

90
100
130
164
70
60
Peripheral
Base Unit
USB Device
PC Operating system
Client Application
3rd party Application
Insert USB device into Laptop
3rd party application uses peri-pheral exposed by USB device
Barco application shares screen
Insert device. Boot up OS and Configure USB Interface
Set up wireless connection with Base Unit
USB Device detected. Enumerate USB endpoints
Enumerate USB endpoints
Initialization
Load drivers for endpoints
Fetch software from USB Device Mass Storage if not installed on PC
Execute software
Connect to HID USB endpoint to set up control channel
Initialization
Connect to USB endpoint (e.g. speakerphone or camera)
Data exchange
Data forward / processing / encryption
Data Exchange
Data decode / processing / encryption
Data Exchange
Data decode / processing / encryption
Start screen sharing
Data exchange
Data processing / encoding/ encryption
Data Exchange
Data processing / decryption / decode
Data Exchange
Data decode / processing / encryption

Fig. 17


70
60
160
Host application
3rd party application
PC
90
USB Peripheral
Firmware
USB Peripheral
System drivers
USB Port
100
USB Port
System drivers
Fixed USB endpoints
Configurable USB endpoints
USB Peripheral
130
Firmware
Base Unit
USB Device
Firmware
Wireless link
Wireless link
127

PTO/SB/08a (02-18)
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Application Number	
Filing Date	2020-06-09
First Named Inventor	Gauthier RENARD
Art Unit	TBD
Examiner Name	TBD
Attorney Docket Number	RENA3002-2/TL

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	2	7617342		2009-11-10	Rofougaran	
	3	9183164		2015-11-10	Brabenac	
	4	9201826		2015-12-01	Huang	
	5	9804977		2017-10-31	Ghosh	
	6	9934168		2018-04-03	Griffin	
	7	9722986		2017-08-01	Brands	
	8	9538138		2017-01-03	Leete	

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	Filing Date	2020-06-09
	First Named Inventor	Gauthier RENARD
	Art Unit	TBD
	Examiner Name	TBD
	Attorney Docket Number	RENA3002-2/TL

	9	9083769		2015-07-14	Beel	
	10	8896656		2014-11-25	Epstein	
	11	8756348		2014-06-17	Beel	
	12	8316138		2012-11-20	Chang	

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	1	20020196378	A1	2002-12-26	Slobodin et al.	Cited in Specification.
	2	20060075100	A1	2006-04-06	Stirbu	Cited in ISR.
	3	20140148152	A1	2014-05-29	Periyalwar et al.	Cited in ISR.
	4	20160092153		2016-03-31	Demik	
	5	20140362161		2014-12-11	Leete	

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	Filing Date	2020-06-09
	First Named Inventor	Gauthier RENARD
	Art Unit	TBD
	Examiner Name	TBD
	Attorney Docket Number	RENA3002-2/TL

	6	20100302130		2010-12-02	Kikuchi	
	7	20100115145		2010-05-06	Banerjee	
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	1	1879143	EP	A2	2008-01-16	Bally Gaming Inc.	Cited in ISR.	
	2	3099009	EP	A1	2016-11-30	Barco N.V.	Cited in ISR, Written Opinion and IPRP.	
	3	2013037980	WO	A2	2013-03-21	Barco N.V.	Cited in Specification.	

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	1	International Search Report in corresponding PCT/EP2018/086537 dated April 10, 2019.	

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	Application Number	
	Filing Date	2020-06-09
	First Named Inventor	Gauthier RENARD
	Art Unit	TBD
	Examiner Name	TBD
	Attorney Docket Number	RENA3002-2/TL

	2	Written Opinion in corresponding PCT/EP2018/086537 dated April 10, 2019.
	3	International Preliminary Report on Patentability in corresponding PCT/EP2018/086537 dated November 21, 2019.
	4	Barco - Clickshare Brochure, November 2018 (20 pages).

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	Application Number	
	Filing Date	2020-06-09
	First Named Inventor	Gauthier RENARD
	Art Unit	TBD
	Examiner Name	TBD
	Attorney Docket Number	RENA3002-2/TL

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OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

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Signature	/Thomas Lee/	Date (YYYY-MM-DD)	2020-06-09
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(54) Universal game monitoring unit and system

(57) An embedded user interface incorporated into a gaming device, the gaming device including a gaming presentation of a base game and a gaming processor for controlling the base game. The embedded user interface includes: a player tracking interface and an embedded processor. The player tracking interface includes (or is associated with) a display screen and enables display of a system game to a user, presentation of information to the user, and reception of information from the user. The embedded processor employs an internal operating system and communicates with the gaming processor, enables control of the system game, control of player tracking information, and control of non-gaming information. In one embodiment, the embedded user interface enables control of a system game of which at least a portion of the system game is presented physically external to the embedded user interface. In another embodiment, the embedded user interface enables control of a system gaming indicator that is physically external to the embedded user interface. In still another embodiment, communication between a game processor and an embedded user interface is only enabled through the gaming network and is not direct enabled via a direct connection.

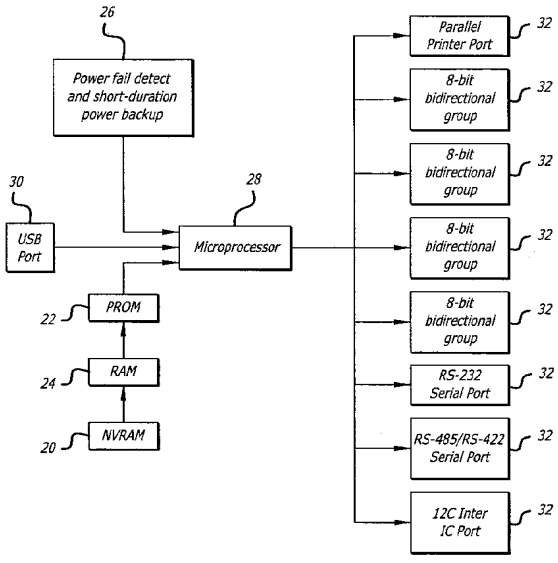


FIG. 1

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Description

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CROSS-REFERENCE TO RELATED APPLICATIONS

[0002] This application is a continuation-in-part of U.S. Patent Application Serial No. 10/943,771 filed September 16, 2004, entitled USER INTERFACE SYSTEM AND METHOD FOR A GAMING MACHINE, which is hereby incorporated herein by reference. This application is also a continuation-in-part of U.S. Patent Application Serial No. 09/746,854 filed December 22, 2000, entitled GENERIC DEVICE CONTROLLER UNIT AND METHOD, which is hereby incorporated herein by reference. This application claims priority to U.S. Provisional Patent Application Serial No. 60/714,754 filed September 7, 2005, entitled SYSTEM GAMING APPARATUS AND METHOD, which is hereby incorporated herein by reference.

FIELD OF THE INVENTION

[0003] This invention relates generally to a gaming system, and more particularly, to a system and methodology that integrates an embedded user interface into a gaming machine.

BACKGROUND OF THE INVENTION

[0004] For some time now, there has been a growing need to be able to inexpensively and easily connect a number of arbitrary devices to a computer running a standard operating system such as Microsoft® WINDOWS®. However, connecting devices to a computer running such a complicated operating system presents at least two vexing problems to the system designer.

[0005] The first problem involves the matter of physical interconnection, that is, some type of custom device is to be plugged into the computer. General purpose "IBM-compatible" computers have become more and more powerful and less and less expensive with every passing month, but that market is driven by a handful of more or less universal needs, such as a printer, a monitor, a keyboard, a mouse, a modem, and a hard disk. The modem hardware platform is optimized for accommodating these elements.

[0006] Meanwhile, the addition of custom equipment generally has meant either building an expansion board designed to specifically interface to that equipment, or buying a general purpose board that could be adapted to that purpose. The least expensive of these options is to add an expansion board by building or buying an industry-standard architecture (ISA) board. However, as time goes on, modem central processing unit (CPU) boards are being built with fewer and fewer ISA slots. Many central processing unit boards these days have only one ISA slot. This forces designers to have to develop much more complicated and expensive Peripheral Component Interface (PCI) boards. A PCI bus provides a high-bandwidth data channel between system board components, such as the CPU, and devices, such as hard disks and video adapters. Another problem experienced today is that most central processing unit boards have a limited number of com ports. This creates a limitation in the number of devices that can be utilized.

[0007] The second problem facing the system designer that wants to incorporate custom hardware into a WINDOWS® environment is the issue of software development. Operating systems, by definition, are in charge of resource management. To that end, operating systems regard any and all hardware attached to the system as belonging to the operating system. As a result, user access to that hardware is supposed to be mediated by the operating system.

[0008] WINDOWS® NT, for example, being a secure operating system environment, rigorously enforces that rule. Accordingly, the result of user access to hardware being mediated by the NT operating system is that any effort by an application to access hardware directly is intercepted and disabled by the operating system. Hence, access to hardware can only be achieved through device drivers which are assumed to be trustworthy because they are loaded into the operating system at boot time.

[0009] Moreover, device driver programming is one of the most difficult software development paradigms in existence. Programming mistakes tend to make the computer crash, often without any indication of what went wrong. Debugging tools are primitive and difficult to use, and are limited in the information they convey. Each compile load-test cycle requires that the target machine be shut down and rebooted, which can take several minutes. Thus, the debugging process is often slow and discouraging work. In addition, many designers avoid performing WINDOWS® driver development. As

a result, it is desirable to remove the need for developers to have to perform such work.

[0010] Another major problem experienced when connecting a number of arbitrary devices to a computer running a standard operating system, again, such as Microsoft® WINDOWS®, is the issue of real time device control. Essentially, true real time depends upon the application. A standard WINDOWS® environment, such as WINDOWS® 98 or WINDOWS® 2000, does not actually have true real time device control requirements for resource management by the operating system. The operating system simply performs the ordered functions as soon as it is able, which is usually in a sub-200 millisecond time frame. This time frame is small enough that most people equate this response time to be "real time," but in actuality it is not "true real time."

[0011] However, many peripheral devices actually have true real time device control requirements that are more precise than the above-stated time interval. For example, loaves of bread may be traveling down a conveyer belt at a given number of miles per hour. These loaves of bread have to be sprayed by a butter sprayer at precise time intervals as the loaves of bread pass the sprayer. If these true real time device control requirements are not maintained, the butter sprayer will miss the loaves of bread as they pass by the sprayer. Unfortunately, previous attempts to make the standard WINDOWS® operating systems function with true real time device control (such as with layered real time systems or real time kernels), have proved to be undesirably expensive, complicated, and inflexible, requiring more com ports to be added. Further, these ports are slow (typically 9600 baud) and do not address the need to mix high speed data (video) and low speed data (mouse clicks) communications.

[0012] Traditionally, gaming machines have been designed for gaming purposes only. In this regard, gaming machines have been constructed only to include gaming functionality. Recently, however, casino owners have become aware that by adding additional features to gaming machines, they may be able to maintain a player's attention to the gaming machines for longer periods of time. This, in turn, leads to the player wagering at the gaming machine for longer periods of time, thereby increasing casino profits.

[0013] One technique that has been employed to maintain a player's attention at the gaming machine has been to provide players with access to gambling-related information. By attaching a small electronic display to the gaming device, gambling-related information, as well as news and advertisements can be sent to the player. The gambling-related information may include, for example, information on sports betting and betting options for those sporting events. Additionally, the gambling-related information may also include information such as horse racing and off-track betting. News and advertisements can also maintain a player's attention by providing the player with access to information ranging from show times, to restaurant and hotel specials, and to world events, thus reducing the need and/or desire for the player to leave the gaming machine.

[0014] Moreover, it would be desirable to provide the player with interactive access to the above information. This type of interactivity would allow players significantly more flexibility to make use of the above-described information. The gambling-related information could also be utilized by the player in a much more efficient manner. In this regard, greater levels of flexibility and access are likely to make a player remain and gamble at the gaming machine for significantly longer periods of time. Unfortunately, the system components that are currently utilized for displaying and accessing this type of information, such as external keypads and display modules, are extremely limited in the functionality and capabilities that they provide, thus limiting the success of their ability to maintain a player's attention.

[0015] As stated above, attempts to distribute gaming-related information and advertisements to players, has typically required additional system components to be attached to the gaming devices separately and apart from the construction of the gaming machine itself. Specifically, these components for accessing and displaying information from gaming machines have been extremely limited in their usefulness because of the lack of capabilities inherent in these components. Such components have generally included a keypad, card reader, and display equipment, such as a 2-line LED display. It would be desirable for these components to be integrated into the gaming device itself, in a more unified fashion to provide substantially greater functionality than that which has been previously available.

[0016] Furthermore, the collection data of gaming-related information and the playing habits of individual players can be of significant marketing value to the operators of the gaming devices. This information enables gaming operators to more effectively focus their marketing efforts on customers, through direct mail, contact in the gaming premise, organization of special events targeting better customers, and an array of techniques that are well known to individuals who practice the marketing craft in gaming environments.

[0017] Marketing experts typically like to have a wide range of information available regarding the aggregate play habits of customers, as well as the specific habits of each customer. The types of data desired for such marketing purposes include the frequency of play, the duration of play, the amount of money wagered, the amount won, and the types of games played. The collection of such data is accomplished most commonly by the use of "player tracking systems." These computer systems typically identify players through the use of a magnetic stripe card (i.e., a player tracking card) that a player inserts into a card reader attached to the gaming device before beginning play. In such a system, gaming devices are typically fitted with player tracking components that include a magnetic stripe card reader, a display device, and generally several buttons that provide players with at least some ability to communicate with the player tracking system.

[0018] In some systems, a microprocessor (or computer) is located in the gaming device that controls the player tracking devices. An additional responsibility of this microprocessor is to communicate with the gaming machine itself to monitor the play that is occurring. In this manner, the player tracking system identifies the player who is playing by reading the player's magnetically encoded card. The player tracking system is also aware of the game play activity on the gaming machine that the player is playing. The player tracking system computer typically collects all game play data from a network of gaming machines and accumulates it into a large data store in a database system. The accumulation of game play data in the database enables many types of analysis, as well as the formulation of marketing and sales strategies to improve the business operation of the gaming operator.

[0019] An occurrence that assists data collection is that several common communication protocols have emerged that enable ready communication between gaming devices and player tracking systems. Many protocols are well known and are used by a variety of player tracking system suppliers. These protocols are typically available in gaming devices that are installed in gaming venues, especially traditional domestic casinos, and make implementation of player tracking systems a reasonably straight-forward process.

[0020] Sometimes however, problems occur in gaming devices that are not produced primarily for traditional domestic casino use. This may happen for any of a wide variety of reasons. One example of such a potentially problematic system is a "video lottery." A video lottery system is a network that interconnects machines in a variety of physical locations. The controlling computer system collects accounting data from gaming machines in the network and has various other control and monitoring functions. Generally, in such a system, the gaming devices are interconnected to a wide area network and use different software structures and communication mechanisms than those found in mainstream casino based systems. They are often not configured to support communications to traditional player tracking systems. In particular, they may not support or be configured with appropriate protocols. Furthermore, they may not be approved by the appropriate regulatory bodies.

[0021] In this regard, the diversity of games and manufacturers, as well as the cost of regulatory approvals, makes the addition of player tracking capabilities a very time-consuming and expensive process. It is further complicated by the need to coordinate software and installation among what may be a large diversity of manufacturers, each potentially having differing priorities, capabilities, and motivations. Indeed, the costs associated with such player tracking systems can offset the benefits of installing a player tracking system. The problem extends past video lotteries to many types of non-traditional systems, including Bingo-based games (Indian Gaming Regulatory Act Class 2), European "street machines" (also known as Amusement With Prizes), and various types of international systems.

[0022] Player tracking systems have also long been relegated to small displays and fairly generic sound capabilities. Additionally, a wider variety of output (and potentially input) devices are also desirable. Furthermore, promotional and/or system-based games are new and have thus far been limited to video presentations on fairly small screens.

[0023] Accordingly, those skilled in the art have recognized the need for a device controller that has overcome the previous difficulties associated with physical interconnections between hardware, software, and operating systems; software development issues; and promotional game and system game device control.

SUMMARY OF THE INVENTION

[0024] In accordance with embodiment, an embedded user interface system associated with a gaming machine, wherein the gaming machine includes a gaming screen and a gaming processor. More particularly, the embedded user interface system includes a web content capable display screen, an embedded processor, and a dictionary extension. The web content capable display screen presents information to a user via the display screen. The embedded processor utilizes an internal operating system. The dictionary extension receives an incoming text string, parses the text string to identify a navigation command and pull a uniform resource locator from the text string, loads the uniform resource locator pulled from the text string into a variable, and indirectly navigates the web content capable display screen to the uniform resource locator in the variable. In this manner, the web content capable display screen increases user excitement by providing a richer gaming experience.

[0025] In accordance with another aspect of a preferred embodiment, the incoming data received by the embedded additional user interface are I^2C messages (or other serial communications). Preferably, the embedded processor communicates with the gaming processor, and/or other connected devices, over an I^2C bus (or other serial communications bus). The web content capable display screen of the embedded additional user interface is preferably a color graphic touch screen display. Preferably, the embedded processor is at least a 32-bit processor. Further, the internal operating system of an embedded additional user interface is preferably customized to match the specific hardware to which the internal operating system attaches.

[0026] In accordance with another aspect of a preferred embodiment, the embedded processor utilizes cryptographic technology. In one preferred embodiment, a certification process is offered for authentication and non-repudiation of the web content. Preferably, the certification process provides auditability and traceability. Specifically, the certification process provides sufficient security for gaming regulators to allow casino operators to design their own content.

[0027] In accordance with another aspect of a preferred embodiment, HTML is the web protocol into which the incoming data is translated in the embedded additional user interface. In another preferred embodiment, DHTML is the web protocol into which the incoming data is translated in the embedded additional user interface. In still another preferred embodiment, XML is the web protocol into which the incoming data is translated in the embedded additional user interface. In yet another preferred embodiment, MACROMEDIA FLASH animation technology is the web protocol into which the incoming data is translated in the embedded additional user interface. In one preferred embodiment, the embedded additional user interface connects to an Ethernet-networked backbone. Further, in one preferred embodiment, the embedded additional user interface connects to a web server through an Ethernet-networked backbone.

[0028] In accordance with another preferred embodiment, an embedded user interface system used in association with a gaming machine also includes a web content capable display screen and an embedded processor, as described above. In this embodiment, the dictionary extension receives an incoming text string, parses the text string, initiates a navigation command in response to information in the parsed text string, and navigates the display screen to a uniform resource locator selected by the dictionary extension.

[0029] In accordance with still another preferred embodiment, an embedded user interface system used in association with a gaming machine includes a web page display screen and an embedded processor, as described above. Preferably, the web page display screen presents information to a user via the display screen. In this embodiment, the web page display screen is divided into a plurality of frames that are each capable of displaying a different uniform resource locator. Further, in this embodiment, the dictionary extension receives an incoming text string, parses the text string, initiates a navigation command in response to information in the parsed text string, and navigates a frame of the display screen to a uniform resource locator selected by the dictionary extension.

[0030] In accordance with yet another preferred embodiment, an embedded user interface system used in association with a gaming machine also includes a web content capable display screen and an embedded processor, as described above. In this embodiment, the dictionary extension receives an incoming text string, parses the text string, and in response to information in the parsed text string, initiates a command that launches a pop-up dialog box over a uniform resource locator presented on the display screen without altering the uniform resource locator presented on the display screen.

[0031] One preferred embodiment is directed towards a gaming machine having a gaming presentation. The gaming machine further includes a user interface having a web page display screen, a processor for controlling game play, and a dictionary extension. In this embodiment, the dictionary extension receives an incoming text string, parses the text string, initiates a navigation command in response to information in the parsed text string, and navigates the display screen to a uniform resource locator selected by the dictionary extension.

[0032] In accordance with another preferred embodiment, the claimed invention is directed towards a method for increasing user excitement relating to a gaming machine by providing a richer gaming experience via an embedded user interface system that is incorporated into the gaming machine. Preferably, the embedded user interface system includes an embedded processor, a web page display screen, and a dictionary extension. The method preferably includes: receiving an incoming text string, parsing the text string to identify a navigation command and pull a uniform resource locator from the text string, loading the uniform resource locator pulled from the text string into a variable, and indirectly navigating the web page display screen to the uniform resource locator in the variable.

[0033] In one embodiment, the web content is protected by digital signature verification using DSA (Digital Signature Algorithm) or RSA (Rivest-Shamir-Adleman) cryptographic technology. In this regard, the content is preferably protected using digital signature verification so that any unauthorized changes are easily identifiable. Of course, other suitable protection techniques may also be used in other embodiments.

[0034] Still further, one preferred embodiment utilizes a Message Authentication Code (MAC), which may be used to verify both the content integrity and the authenticity of a message. A Message Authentication Code can be generated faster than using digital signature verification technology, although it is not as robust. In one preferred embodiment, the authentication technique utilized is a BKEY (electronic key) device. A BKEY is an electronic identifier that is tied to a particular individual.

[0035] Typically, in a preferred embodiment, the data is authenticatible and non-repudiatible, rather than hidden or otherwise obfuscated (encrypted). Non-repudiation is a way to guarantee that the sender of a message cannot later deny having sent the message, and that the recipient cannot deny having received the message.

[0036] In accordance with one preferred embodiment, one or more gaming machine system or embedded additional user interface components (or content) are assigned identification codes. The components are grouped together into a protected group of component bindings using cryptographic security procedures and the identification codes of the components in the bindings group. Accordingly, the bindings prevent falsification or repudiation of content entries with respect to any modifications or replacements of components or content within the bindings group.

[0037] In accordance with another aspect of a preferred embodiment, every content entry must be authenticated by being digitally signed with a Hashed Message Authorization Code that is based on the entry itself and on the individual identification codes of the components and content in the bindings group. In the same manner, every entry that attempts

a replacement of any of the embedded additional user interface components or content must be authenticated by being digitally signed with a Hashed Message Authorization Code that is based on the entry itself and on the individual identification codes of the components and content in the bindings group.

[0038] Preferably, the identification codes of the embedded additional user interface components are randomly or pseudo-randomly generated. In accordance with another aspect of the verification system, a Hashed Message Authorization Code key for authenticating access to the component bindings is produced using a SHA-1 hash that is generated using the individual identification codes of the components in the bindings group. Additionally, the embedded additional user interface components are secured within the component bindings using a SHA-1 hash that is generated using the individual identification codes of the components and content in the bindings group.

[0039] Other features and advantages of the claimed invention will become apparent from the following detailed description when taken in conjunction with the accompanying drawings, which illustrate by way of example, the features of the claimed invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0040] FIG. 1 illustrates a component diagram of the system architecture of a generic device controller unit system, in accordance with the invention;

[0041] FIG. 2 illustrates an operational flow diagram of a generic device controller unit system of the invention configured to interface with a processor and a single peripheral device;

[0042] FIG. 3 illustrates an operational flow diagram of a generic device controller unit system of the invention configured to interface with a processor and multiple peripheral devices;

[0043] FIG. 4 illustrates an operational flow diagram of a hybrid system of the invention with one generic device controller unit system configured to interface with a processor and a single peripheral device, and a second generic device controller unit system configured to interface with the same processor and various other multiple peripheral devices;

[0044] FIG. 5A illustrates a logical data flow diagram from a "light bulb" application to an actual light bulb;

[0045] FIG. 5B illustrates a data flow diagram of the top logical transport layer of FIG. 5A, and the logical data flow from an application program interface to a GDCU packet decoder in a second logical transport layer, as well as physical data flow between the top and second layers; and

[0046] FIG. 5C illustrates a data flow diagram of the top logical transport layer of FIG. 5A, the second logical transport layer of FIG. 5B with physical data flow between the top and second layers, a logical data flow from USB device drivers to a GDCU USB interface firmware in a third logical transport layer, and a physical data flow from USB host drivers to GDCU USB interface hardware in the bottom physical transport layer, as well as physical data flow between layers.

[0047] FIG. 6 illustrates a relational diagram of an embedded additional user interface, constructed in accordance with the claimed invention, utilizing a web page display screen and an embedded processor that receives data messages from a game monitoring unit that are translated into web page content and mapped to the web page display screen;

[0048] FIG. 7 illustrates a relational diagram of a prior art gaming system that utilizes a 2x20 VF display and 12-digit keypad;

[0049] FIG. 8 illustrates a relational diagram of embedded additional user interface, constructed in accordance with the claimed invention, utilizing a web page display screen and an embedded processor that receives cryptographically certified web page content from a portable computer via a network adapter port;

[0050] FIG. 9 illustrates a relational diagram of embedded additional user interface, constructed in accordance with the claimed invention, utilizing a web page display screen and an embedded processor that receives web page content from a back-end server via an Ethernet-networked backbone;

[0051] FIG. 10 illustrates a relational diagram of an embedded additional user interface, constructed in accordance with the claimed invention, utilizing a web page display screen and an embedded processor that includes the functionality of a standard gaming processor;

[0052] FIG. 11 illustrates an object interaction diagram of embedded additional user interface, constructed in accordance with the claimed invention;

[0053] FIG. 12 is a diagram showing the sequence of events that occur when data is sent between the embedded additional user interface and the game monitoring unit; and

[0054] FIG. 13 is a diagram showing the sequence of events that occur when a virtual key is pressed on the web page display screen.

[0055] FIG. 14 illustrates a universal game monitoring unit that incorporates a display screen and an expanded display device controller that communicates with a game processor, one or more peripheral display devices, and one or more back-end systems;

[0056] FIG. 15 illustrates a universal game monitoring unit that enables control of an system game indicator that is physically external to the embedded user interface;

[0057] FIG. 16 is a logical flow diagram showing the gaming process for a system-based game that utilizes an expanded pay presentation controlled by a universal game monitoring unit;

[0058] FIG. 17 illustrates a gaming system that connects gaming devices through networking equipment to a backend computer system that provides control and accounting functions;

[0059] FIG. 18 illustrates a traditional gaming system that includes a gaming device networked to an account and control system server, wherein the gaming system does not include a player tracking system or a game monitoring unit (GMU);

[0060] FIG. 19 illustrates a traditional gaming system that includes a gaming device networked to an accounting and control system server and a player tracking system server, wherein the gaming devices use a game monitoring unit to collect accounting and other information from the game main processing unit and to provide player tracking capability;

[0061] FIG. 20 illustrates a novel gaming system that includes a gaming device networked to an accounting and control system server and a player tracking system server, wherein the gaming devices include a game monitoring unit and a master processing unit (MPU) that are each independently connected to a gaming network that is in turn independently connected to the accounting and control system server and to the player tracking system server; and

[0062] FIG. 21 illustrates the logical independent connections between a game monitoring unit and a player tracking system server, and between a master processing unit and an accounting and control system server, as well as the connection between the accounting and control system server and the player tracking system server via their respective APIs.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0063] A preferred embodiment of a generic device controller unit system and methodology constructed, in accordance with the invention, provides a data and protocol communications interface that facilitates "true real time" interconnection between a processor and any of a variety of non-specific peripheral devices sought to be controlled. Referring now to the drawings, wherein like reference numerals denote like or corresponding parts throughout the drawings and, more particularly to FIGS. 1-2, there is shown one embodiment of a generic device controller unit system 10 constructed in accordance with the invention.

[0064] Briefly stated, the generic device controller unit (GDCU) system 10 includes a generic "true real time" peripheral device controller and a data and protocol communications interface. The device controller unit system 10 is generic, in that the system 10 is capable of connecting a processor 40 to a number of various peripheral devices 50, instead of being designed to interconnect a processor to only a specific peripheral device. The generic device controller unit system 10 connects a processor 40 using a standard non-true real time operating system and peripheral devices 50 in such a manner as to employ true real time peripheral device control. The "true real time" device controller of the system 10 allows a standard non-true real time operating system to implement true real time control of the peripheral devices 50, instead of requiring a special "true real time" kernel or a special "true real time" layered operating system to be utilized with the processor 40. Moreover, the generic device controller unit system 10 interfaces between the processor 40 and the peripheral devices 50 such that the data and protocol communications interface of the system allows the processor to utilize a single type of protocol and associated data in order to communicate via the GDCU system with the peripheral devices which may be utilizing different types of protocol and associated data.

[0065] Described now in greater detail, and again referring to FIGS. 1-2, one preferred embodiment generic device controller unit system 10, constructed in accordance with the invention, preferably provides a "true real time" device controller that produces true real time peripheral device control while interfaced with a processor 40 running standard non-true real time software. A preferred embodiment of the invention provides a method of allowing any definition of true real time for any given application, from one millisecond to one nanosecond. In this manner, the system 10 is adaptable to the true real time requirements of any given application. Preferably, the device controller of the system 10 allows the processor 40 (preferably, but not necessarily functioning in a Win32 environment) to employ "true real time" peripheral device control. The generic device controller unit system 10 provides this real time device control to the resource management capabilities of the standard non-true real time operating system. Advantageously, the generic device controller unit system 10 produces true real time peripheral device control without the higher level functionality of the processor 40. This higher processor level functionality, which has previously been required by specific device controller units, is extremely complex and expensive. The invention consequently reduces such complexity and associated expense. Moreover, the invention allows the use of commercially available, off-the-shelf devices from personal computers, consumer electronics, and industrial control businesses, in order to increase the speed of product development and innovation. This allows changes to be introduced both efficiently and rapidly.

[0066] Using the data and protocol communications interface of the system 10, the common interface components from all protocols and associated data are integrated into a single "universal" communications stream, which enables conversion from an existing data and protocol communications stream to any other type of data and protocol communications stream. By "universal," it is meant that the data and protocol communications interface of the GDCU system

10 accepts, for example, the USB protocol and associated data from a processor 40 and converts this protocol and data stream into any of I^2C, RS-232, RS-422/RS-485, parallel printer port, 8-bit bi-directional ports, general purpose digital I/O port interfaces, or any other desired protocol and associated data. Conversely, the data and protocol communications interface of the GDCU system 10 accepts these protocols and data streams, and converts them into the USB protocol and its associated data for use by the processor 40. The data and protocol communications interface of the GDCU system 10 provides such generic data and protocol interface for connecting the processor 40 with any desired process control device 50 to be controlled by the system. Thus, by using the GDCU system 10, in accordance with the invention, any device 50, regardless of its chosen protocol and data, can associate with and interface with the processor 40.

[0067] More particularly, modem software applications and devices 50 are comprised of numerous internal electro-mechanical modules which all need to be controlled by and communicate with higher level systems. The GDCU system 10 provides a controller with sufficient additional input/output capability to control any device. The GDCU system 10 contains custom designed system drivers that allow the GDCU system to be a simple controller which includes components that are common to many devices 50, with the device-specific higher intelligence functions carried out by the processor 40. The GDCU system 10 provides input/output functionality while using the host processor 40 as the higher level intelligence in a conventional WINDOWS® operating system environment. The GDCU system 10 is easily modifiable due to its modularity which allows one level to be changed without having to change other levels. For example, encryption and decryption can be added by changing the packet encode and decode layers without having to change the physical transport layers. Similarly, the protocols and associated data can also be simply changed.

[0068] As stated above, in a preferred embodiment of the invention, multiple protocols and their associated data can be utilized by a single GDCU system 10. As such, a GDCU system 10 can communicate with multiple devices. The GDCU system 10 allows multiple protocols and functions to be combined into one system, while allowing the GDCU system 10 to always communicate with the processor 40 through a consistent interface. Thus, the processor and operating system are only required to use a single protocol with its associated data to communicate with the GDCU system 10 through the consistent interface. The GDCU system 10 incorporates a unique distributed processing configuration that allows for multiple tasks with arbitrary devices.

[0069] Specifically, a preferred embodiment generic device controller system 10 of the invention connects to the processor 40 (sometimes referred to as a master control unit, or a game processor) with associated support hardware. The processor 40 can be any computer, but is preferably a general purpose single board computer including an operating system, software, and associated elements. The single board computer is adapted to plug into an instrument for controlling a process. The preferred operating system is a WINDOWS® NT embedded system image configured to support a protocol, such as USB. Other acceptable operating systems for the processor 40 include, by way of example only, and not by way of limitation: WINDOWS® NT, WINDOWS® 98, WINDOWS® 2000, WINDOWS®. CE, LINUX®, QNX®, DOS, VXWorks®, WHISTLER®, and WHISTLER® embedded.

[0070] Furthermore, a development station can be used by a developer in order to implement customized solutions on the GDCU system 10. Such a development station is built around the processor 40 and the generic device control unit system 10. The development station provides the hardware and software required to work with these two devices in order to design and realize a sophisticated embedded control system. The development station comes with a number of peripheral and plug-in items. These items include, by way of example only, and not by way of limitation: a floppy drive, IDE CD-ROM and hard drives, AGP video board, keyboard, mouse, PCI 10/100 Ethernet network interface card, and a representative assortment of 32-pin plug-in chips for the MCU board including, but not limited to SRAM, FLASH memory, and M-Systems DiskOnChip®.

[0071] In one preferred embodiment of the invention, the generic device controller unit (GDCU) system 10 resolves the hardware interconnect problems that have been experienced in the past by using the industry standard universal serial bus (USB). The universal serial bus was designed by a consortium of major hardware and software manufacturers in order to solve a set of problems that were caused by characteristics and limitations of the "IBM compatible" computer architecture, as it collided with an ever expanding user base of people without specialized technical skills. End users typically want to simply be able to plug in a new device and have it work properly without having to open their computers to install new hardware. The universal serial bus protocol standard was designed to address this need.

[0072] The universal serial bus was designed to centralize much of its complexity into the host so that individual devices could be simple and inexpensive. The bus specification allows for each device, as it is plugged in, to tell the USB host what type of device it is, and what device driver should be dynamically loaded so that the device can be used. For these and other reasons, USB is the preferred embodiment physical transport layer for the GDCU system 10. However, it will be appreciated by those skilled in the art that although some USB characteristics are very desirable for GDCU system 10 purposes, the use of the USB protocol standard is desirable, but not necessary. That is, any suitable protocol can be used. The basic generic device controller unit system 10 is independent of any particular physical bus. Accordingly, ATM, Ethernet, CAN, I^2C, or multi-drop serial communications could also be used with equal effectiveness in alternate preferred embodiments of a generic device controller unit system 10 in accordance with the invention. Moreover, the system can be configured to drive any network protocol, including, by way of example only, and not by

way of limitation: Ethernet, ATM, WAN, Infrared, Serial, and fiber optics.

[0073] In a preferred embodiment of the invention, the GDCU system 10 is designed to assist engineers in taking advantage of the universal serial bus technology while saving time and money. Device drivers and USB communications protocols are provided so that an engineer can focus on developing control system applications. Preferably, the GDCU system 10 uses the USB communications protocol to talk to a host computer (e.g., the processor 40) and one or more of the following protocols (listed by way of example only, and not by way of limitation) for communicating with connected devices 50: RS-232 and RS-422/RS-485 serial ports, LPT parallel printer ports, and 32-bit (i.e., four 8-bit) bi-directional digital I/O. Custom designed device drivers and software libraries are also provided. Preferably, the data lines on the GDCU system 10 are configured for I/O using these drivers. Once the data lines are configured, data can be written and its status examined. The application is written with sub-routine calls that direct the GDCU system 10 to turn particular bits on or off and then to examine the state of other bits.

[0074] In one preferred embodiment of the invention, the processor 40 runs a WINDOWS@ application that translates information into commands for the GDCU system 10. The application uses drivers to communicate with the GDCU system 10 via the processor 40 USB port. In one preferred embodiment of the GDCU system 10 of the invention, the data and protocol communications interface is the communications portion of the system 10 which "talks" to the application in the processor 40 and to the different peripheral devices 50. The data and protocol communications interface of the GDCU system 10 allows a "universal" protocol and associated data to be used when interfacing with various physical devices 50. The data and protocol communications interface of the GDCU system 10 allows multiple events having varying input signals to be interpreted by a single generic device controller unit system 10 which is used to control the various peripheral devices 50.

[0075] Specifically, FIG. 1 illustrates the system architecture of one preferred embodiment of the generic device controller unit system 10, in accordance with the invention. In this embodiment, the GDCU system includes a serial EEPROM with non-volatile memory 20, a PROM memory 22, RAM external memory 24, power fail detection and short duration power backup circuitry 26, an on-board processor 28, a watchdog timer (not shown), software resources, a universal serial bus port 30, and numerous input/output capabilities 32. These numerous input/output capabilities 32, include by way of example only, and not by way of limitation: Inter Integrated Circuit (I^2C) circuitry, RS-232 serial interface circuitry, RS-422/RS-485 serial interface circuitry, 32 general purpose bi-directional I/O lines, and a parallel printer port (and might further include fiber optics, CAN, Ethernet, and ATM).

[0076] In the serial EEPROM 20, which provides non-volatile memory, some of the memory is reserved by the GDCU System 10 for its own use (e.g., to store the Device ID code and the serial number), while the remaining memory is available to the user. In one preferred embodiment of the invention, there are at least 512 bytes of non-volatile serial EEPROM memory 20. One preferred embodiment of the invention which requires at least 8K of RAM and NVRAM is satisfied by the Dallas Semiconductor 32K-by-8NVRAM. This memory is powered by a replaceable ten-year lithium battery. Preferably, but not necessarily requiring, there is at least 64K PROM for code and permanent data tables. A 32-pin socket, wired to accept a 27C256 or larger EPROM or FLASH memory, offers 32 kilobytes of program and data table memory. Additionally, there is preferably at least 32K RAM for variables and volatile data storage.

[0077] The power fail detection circuitry 26 includes a large electrolytic capacitor which buffers the incoming unregulated 9V power source (which is isolated through a diode) and acts as a power fail detector. The source side of that diode is monitored by an interrupt circuit. The effective result of this configuration is that, in the event of a power failure, the onboard processor is alerted to the power loss several hundred milliseconds before the voltage on the capacitor drops to the point where processing fails. This is sufficient time to store at least 128 bytes of data in the serial EEPROM 20. Preferably, the short duration power backup circuitry provides at least enough back-up power for 200 milliseconds of normal operation subsequent to a power failure. This provides protection for "real time" data in the event of power problems.

[0078] Preferably, the on-board processor is an 8051 industry standard 8-bit processor. In one embodiment this microcontroller is a Philips P80C652. This component is essentially identical to the 8051, except that it incorporates I^2C circuitry in addition to the standard UART. Nevertheless, any suitable processor may be used, in accordance with the invention. Other suitable processors include industry standard 8-bit processors by Cypress and Microchip.

[0079] The watchdog timer resets the on-board processor when the internal program stops behaving properly and is incorporated to enhance overall reliability. The watchdog timer's operation is transparent to the user.

[0080] With respect to the software resources, most user applications can be implemented using the built-in features of the GDCU System 10, but some applications may require custom programming of the onboard GDCU System processor 28. In one preferred embodiment, the GDCU System 10 incorporates 64 Kb of PROM 22 memory space, as well as 32 Kb of external RAM 24, for maximum flexibility for custom applications. Custom code development can be accomplished in several different ways, including contracted customer code development to specific user specifications, and merging custom developer's code with original code at compilation time. In one preferred embodiment, the USB port requirements are satisfied by the Philips PDIUSBD12, which is a USB interface with a parallel processor access port.

[0081] In another aspect of one preferred embodiment, the RS-232 and RS-422/RS-485 serial interface circuitry

receivers are multiplexed to the same Received Data In signal input on the 8051 computer. Thus, only one of these serial ports can be used at any one time. The MAX202 interface chip is available from Maxim. It creates +/- ten volts from the +5V supply in order to deal with RS-232 voltages. The MAX3080 is one of Maxim's parts that matches the industry-standard 75180 pinout for RS-422/485 interfacing. The selection of which of the two interfaces is connected to the 80C652's RXD serial input line is configurable by the processor.

[0082] In yet another aspect of one preferred embodiment, the I^2C port is incorporated in the 80C652. Preferably, there is a four-pin header for interfacing with the I^2C port. Preferably, the 32 general purpose bi-directional I/O lines are arranged in four groups of eight lines. All eight lines in each group are either inputs or outputs at any one time. By the use of four ALS646 latching transceivers and two 16V8 programmable Logic Devices to address them, 32 I/O signals are established. They can be configured by the processor as inputs or outputs in groups of eight. Thirteen of those I/O lines perform dual duty as the outputs to the parallel printer port. (The four input lines from the parallel printer port go directly to some otherwise-unused pins on the 80C652).

[0083] In another aspect of one preferred embodiment, the eight data lines of the Parallel Printer Port share one of the four general-purpose groups. Four additional output lines on a second general-purpose group are also used. Thus, when the parallel port is in use, two of the groups are dedicated to output, with twelve of the sixteen lines committed to the parallel port. Since the five parallel port input lines go directly to the processor chip, the other two general-purpose I/O groups remain uncommitted.

[0084] Referring now to the GDCU System 10 interconnects, all USB devices have a hexadecimal USB Vendor ID and Product ID. The USB specification also provides for a 16 bit Binary Coded Decimal (BCD) device ID, which can range from 0000 to 9999. The device ID is used to specify a particular GDCU board in a system where more than one is attached to the USB bus.

[0085] As discussed above, in one preferred embodiment of the invention, the GDCU system 10 is a general-purpose eight bit computer with a USB interface port. In short, it preferably has sufficient PROM and RAM memory to be generally useful for any reasonable interface to external equipment. It has the ability to detect that it is about to be shut down and store critical information in its on-board non-volatile serial EEPROM. For controlling and communicating with other devices it has thirty-two general-purpose I/O lines, an I^2C two-wire interface port, an RS-232 serial port, and a parallel printer port, for a total of sixty-one active I/O signals. The hardware utilized in one preferred embodiment generic device controller unit system 10 of the invention runs applications-specific firmware. The main task of the firmware is to provide proper signals for driving the output devices.

[0086] Furthermore, rather than produce unique firmware for every individual device to which the GDCU system 10 may be connected, a generalized protocol is used. This protocol has appropriate commands for configuring the GDCU system 10 (data directions, baud rates, driver enables, and the like) and for transmitting and receiving data. The firmware for the GDCU system 10 implements this protocol. Likewise, matching WINDOWS® or MACINTOSH® device drivers are implemented for relatively low-level communications with the GDCU system 10 from the host computer side. In this fashion, the complicated intelligence needed to interface with any particular device can be kept in the application layers of the host computers that use the GDCU system 10 as a bridge.

[0087] Referring now to FIG. 2, a generic device controller unit system 10 is shown which is configured to connect a processor 40 for control of a single peripheral device 50 (the peripheral device having multiple tasks which require processor control). This embodiment of the system 10 of the invention utilizes a less powerful processor (e.g., the 8051 processor) and is designed as an "al a carte" or "per device" type of generic device controller unit system 10. In this respect, this embodiment is a simpler, cheaper, and more flexible embodiment of the system 10 of the invention. It allows for control of one peripheral device 50 without the need for expensive circuitry and functionality which is not required for the task at hand.

[0088] Specifically, FIG. 2 shows a gaming assembly (by way of example only) that includes a processor 40 connected to a first GDCU system 60 and three additional GDCU systems 70, 80 and 90, connected to the processor 40 via a hub 100. The first GDCU system 60 interfaces with and controls a hopper device 64, while the three additional GDCU systems 70, 80 and 90, each control buttons 74, lights 84, and a coin mechanism 94, respectively. The buttons 74 and coin mechanism 94 are input devices that send information to the processor 40 for data communication and protocol translation via their respective GDCU systems 70 and 90, (through the hub 100). The processor 40 then processes the incoming data, and returns data as appropriate to the GDCU systems 60 and 80, which communicate and translate this data into commands that are sent to the output devices, specifically the hopper 64 and lights 84. This configuration allows additional devices to be easily added, removed, or swapped out since each device has its own generic device controller unit system.

[0089] Referring now to FIG. 3, a generic device controller unit system 60 is shown which is configured to connect to a single processor 40 for control of multiple peripheral devices 50. This embodiment of the system 60, in accordance with the invention, utilizes a more powerful processor (e.g., a Motorola 68332 processor), and, as such, functions as a more powerful version of the generic device controller unit system 60. In this respect, this embodiment of the system 60 of the invention is capable of handling a greater amount of input/output device requirements.

[0090] Specifically, FIG. 3 shows an assembly that includes a processor 40 connected to a single GDCU system 60.

The single GDCU system 60 interfaces with and controls a hopper device 64, buttons 74, lights 84, and a coin mechanism 94, as well as having an I^2C port. In this embodiment, the buttons 74 and coin mechanism 94 are still input devices which send information to the processor 40. However, in this case, both input devices utilize the single GDCU system 60 for data communication and protocol translation with the processor 40. Again, the processor 40 processes the incoming data using the non-true real time operating system, and returns data as appropriate to the GDCU system 60, which then communicates and translates this data into commands which are properly sent to the lights 84 and hopper 64 output devices using the true real time operating system of the GDCU system 10. This configuration allows a single generic device controller unit system 60 to control multiple devices, but still allows for additional devices to be added without requiring the removal and/or modification of the GDCU system 60, hopper device 64, buttons 74, lights 84, or coin mechanism 94.

[0091] Lastly, FIG. 4 illustrates a hybrid system 10 of the invention with a processor 40 connecting to a plurality of generic device controller unit systems which are each configured to control a single peripheral device, as shown in FIG. 2, and another generic device controller unit system which is configured to control multiple peripheral devices, as shown in FIG. 3.

[0092] Specifically, FIG. 4 shows an assembly that includes a processor 40 connected to a first, more powerful GDCU system 60, and two additional less powerful GDCU systems 110 and 120, connected to the processor 40 via a hub 100. As in FIG. 3, the more powerful GDCU system 60 interfaces with and controls a hopper device 64, buttons 74, lights 84, and a coin mechanism 94, as well as having an I^2C port. Once again, in this embodiment, the buttons 74 and coin mechanism 94 are still input devices which send information to the processor 40, and utilize the more powerful GDCU system 60 for data communication and protocol translation with the processor. The processor 40 processes the incoming data, and returns data, as appropriate, to the GDCU system 60, which then communicates and translates this data into commands that are properly sent to the lights 84 and hopper 64 (output devices). As can be seen from the figures, this lower portion of FIG. 4 is the same as FIG. 3.

[0093] However, in this embodiment of the invention, the processor 40 also returns data as appropriate to the GDCU systems 110 and 120 (via the hub 100), which then communicate and translate instructions from the processor 40 into commands which are properly sent to the additional lights 114 and animatronics 124 (output devices). This configuration allows a single more powerful generic device controller unit system to control multiple devices; allows for additional devices to be added without requiring the removal and/or modification of the GDCU system 60, hopper device 64, buttons 74, lights 84, or coin mechanism 94; and allows for devices with their own generic device controller unit system (e.g. additional lights 114 and animatronics 124) to be easily added, removed, or swapped out since each device has its own generic device controller unit system.

[0094] Previously, for device controller unit systems which were device interface specific, conversion of an existing data and protocol interface to a different data and protocol interface (such as from I^2C to USB) would take substantial development time, effort, and expense, in developing the different code and circuitry required for each process control device. In contrast, the generic device controller unit system 10 of the invention is configured to act as a device-generic, "universal" data and protocol interface.

[0095] In this regard, in accordance with the invention, the GDCU system 10 can replace an embedded control system, a multi-tasking operating system, or any other prior art embedded application. The industry has various names for such an embedded control system. Such names, which include MPU (main or master processing unit), all relate to a single central embedded controller. A single central embedded controller is a complicated device that is capable of including the functionality of a GDCU system 10 and a processor 40 for a specific application. A single embedded control system is capable of controlling both peripheral devices 50 (which are controlled by the GDCU system 10), and application software (which is otherwise controlled by the processor 40). These types of single central embedded controllers are typically undesirable due to their lack of interchangeability and expense (due to having to meet both the GDCU system, processor, and real time operating system requirements). The GDCU system 10 can also eliminate the requirement of having an ISA plug-in card for each activity and the need for a real time layered operating system or expensive and "task specific" real time kernel.

[0096] The logical operations of the various embodiments of the invention are implemented (1) as a sequence of computer implemented steps or program modules running on a computing system and/or (2) as interconnected machine logic circuits or circuit modules within the computing system. The implementation is a matter of choice dependent on the performance requirements of the computing system implementing the invention. Accordingly, the logical operations making up the embodiments of the invention described herein are referred to variously as operations, structural devices, acts or modules. It will be recognized by one skilled in the art that these operations, structural devices, acts and modules may be implemented in the system 10, in firmware, in special purpose logic, analog circuitry, or any combination thereof without deviating from the spirit and scope of the invention as recited within the claims attached hereto. In other words, in a preferred embodiment generic device controller unit system 10 of the invention, the use of an industry standard physical bus, with various elements supplied by different sources, allows a layered software interface concept to be utilized by the invention.

[0097] Referring now to FIGS. 5A, 5B, and 5C to illustrate the above concept, consider the act of controlling a light bulb. In this case, a simple WINDOWS@ application employs a single push button. As shown in FIG. 5A, according to this application, when the button is clicked with a mouse, a light bulb is illuminated. There is, of course, no physical connection between the WINDOWS@ light bulb application 200 and the light bulb 300, but logically there is a connection. This very top layer of the communications and control structure is depicted as logical data flow from a light bulb application 200 to the actual light bulb 300.

[0098] Logically, this represents the desired implementation. The user's application wants to be able to turn the light bulb on and off without worrying about all of the system level requirements that are actually needed in order for this light bulb switching task to be implemented. However, a WINDOWS® application has no way of talking to a light bulb. As shown in FIG. 5B, what the application actually does is talk to an additional layer of software below it. The light bulb application 200 sends a physical data flow down to an application program interface (API) 210 which sends a logical data flow across to a packet decoder 290 which in turn is connected to the actual light bulb 300.

[0099] The light bulb software engineer has been told by the overall system designer that his light bulb is connected, for example, to Bit 3 on I/O Port 2 of the GDCU board, and that when the bit is set to High, the bulb will turn on. So when it is time to turn on the light bulb, all the "light bulb" application has to do is call the appropriate API library routine with the instruction "Set Bit 3 on I/O Port 2 to High."

[0100] The "light bulb" application 200 neither knows nor cares how the API routine 210 is going to arrange to turn on the bit. The application 200 does not know if the API routine 210 will perform the action itself, send a TCP/IP packet over the internet to a light bulb in Cleveland, or send e-mail to a janitor. The application just sends the request down and expects that the bulb will, indeed, turn on.

[0101] Likewise, the API routine 210 doesn't know why the "light bulb" application 200 wants the Bit set to High. What it does know how to do is encode the instruction "Set Bit 3 on I/O Port 2 to High" into a GDCU data packet that it then sends, in the logical sense, over to the matching GDCU data packet decoder 290 that resides in the firmware of the GDCU board. When the GDCU packet decoder 290 receives the packet, it pulls it apart and examines the packet. The packet decoder 290 learns that it is one of the packet types for controlling the digital I/O data bits on the GDCU board, and Sets Bit 3 on I/O Port 2 to High, which causes the light bulb to light.

[0102] Once again, this is a logical connection. As shown in FIG. 5C, the API packet encoder routine 210 in the host computer cannot talk directly to the packet decoder 290 in the GDCU firmware. In the actual physical data flow communications path, physical data flows down from the light bulb application 200 to the application program interface (API) 210, down from the API 210 to the USB device driver 220, down from the USB device driver 220 to the USB host drivers 230, from the USB host drivers 230 across to the GDCU USB interface hardware 270, from the GDCU USB interface hardware 270 up to the GDCU USB interface firmware 280, from the GDCU USB interface firmware 280 up to the GDCU packet decoder firmware 290, which is finally connected to the light bulb 300 itself. Thus, two additional levels have been added to the structure.

[0103] The bottom layer in the above-described actual communications path is the physical transport layer. In one preferred embodiment GDCU system 10 of the invention, that is the hardware of the universal serial bus. The interfaces on both sides of the bottom layer are supplied by the manufacturers of the USB interface hardware. As mentioned previously, since USB is a more frequently and more widely used protocol, there are numerous chip sets for both host and device side interfaces which adhere to the published USB specifications for physical and electrical interconnections.

[0104] On the host side of the connection, there are two logical protocols that have been defined by the USB user's group for USB communications. One is the universal host control interface (UHCI), and the other is the open host control interface (OHCI). In either case, the manufacturer supplies a WINDOWS® device driver which allows the next layer up to communicate with the hardware.

[0105] The generic device controller unit system 10 typically has much less computational power available than does the host, and the operating system requirements (if any) are much simpler. The various makers of such chip sets have simple interfaces that allow a calling routine to determine the status of the USB, send a block of data, receive a block of data, and the like.

[0106] Returning to the host side, the job of translating between the application level GDCU software routines and the bottom level hardware routines is implemented by the GDCU device driver. This routine is effectively part of the operating system. Operating with trusted kernel level privileges, it can take the GDCU packets from the layer above and send them down to the hardware to be transmitted to the device. Logically, those USB data blocks are transmitted horizontally to the USB interface level of the firmware of the GDCU system 10. The USB interface level has the job of talking to the hardware, accepting the packets, and passing them upwards to the packet decoder.

[0107] For simplicity, the communications path has been described (and shown in FIGS. 5A-5C) as a uni-directional flow. In actuality, however, the communications are bi-directional, with the communications path arrows flowing in both directions. The above-described layered structure, although seemingly complex, actually conveys a greater flexibility in design. Each layer can be replaced without affecting the layers below it or above it.

[0108] For example, it may be desired to encrypt the GDCU data packets in order to prevent their content from being

ascertained on the bus, or to implement data compression to improve data transmission time. This would only require changing the GDCU application program interface level on the host side, and rewriting the packet decoder level on the device side. Everything else would stay the same.

[0109] As an additional example, the physical transport layer could be changed from USB to ATM. Thus, the bottom layer would have to change. On the host side, a different GDCU device driver would have to be supplied, because its interface with the bottom level would be different. However, everything else on the host side would remain the same. Correspondingly, on the device side, the GDCU USB interface firmware that interfaces with the communications hardware would have to be rewritten and changed, because the hardware would change. Again, however, its interface upward would remain the same.

[0110] From the point of view of the system designer and application developer, the functionality of the bottom three levels can be ignored. All they need to know is the capabilities of the GDCU system 10, and how to access them. As far as the application developer is concerned, the answer to those questions lie in the interface specifications of the GDCU application program interface software. The layered structure of the GDCU system 10 means that functionality can be changed or augmented by changing the GDCU API software on the host, and the packet decoder level on the device. Such functionality can be altered without paying attention to the transport levels below, and likewise the transport levels can be changed without requiring any altercations to the higher levels. This results in shorter development time and quicker time to market.

[0111] Referring now to the software resources, in one preferred embodiment to the invention, a program is provided called GDCUCONFIG, which is used to change the Device ID on a GDCU board. Using GDCUCONFIG, the designer assigns a unique Device ID to each GDCU board. Then, when an application using the GDCU calls the various library routines to perform an I/O request, it specifies the Device ID for the target GDCU board.

[0112] With respect to the GDCU System 10 library software, in a preferred embodiment to the invention, the following five files are used to compile and link the library software: ESTGDCU.H - Declarations and definitions; ESTGDCU.LIB - Multithreaded; ESTGDCUL.LIB - Multithreaded DLL; ESTGDCUD.LIB - Debug Multithreaded; and ESTGDCUDL.LIB - Debug Multithreaded DLL. The ESTGDCU.H must be included in the source file. The library selected depends on the choice of code generation.

[0113] The GDCU System 10 library routines are as shown generally in the following table:

ROUTINE	FUNCTION
GdcuSetPort Direction	Sets the direction of one of the four 8-bit ports
GdcuSetPortData	Sets the output data on one of the digital I/O ports
GdcuSetAllPortsData	Sets all four data ports in a single call
GdcuGetAllPortsData	Gets the data from the digital I/O ports
GdcuSelectRS232	Sets the serial I/O to RS-232 and established the baud rate
GdcuSelectRS422	Sets the serial I/O to RS-422/RS-485 and establishes the baud rate
GdcuSendSerialData	Puts a block of data into the serial output buffer
GdcuReceiveSerialData	Returns any received serial data
GdcuNvmRead	Reads data from the non-volatile serial EEPROM
GdcuNvmWrite	Writes data to the non-volatile serial EEPROM
GdcuGetFirmwareVersion	Returns the firmware version of the GDCU board
CountOurUsbDevices	Returns a count of GDCU boards and enumerates their symbolic handles (low-level routine)
GetGdcuSerialNumbers	Returns the serial numbers and status of all GDCU boards (low-level routine)
GdcuWrite	Transfers data from the host to the device (low-level host-to-device data transfer)
GdcuRead	Transfers data from the device to the host (low-level device-to-host data transfer)

[0114] The following section outlines the usage information for the GDCU System 10 library routines. In one preferred embodiment of the invention, the GDCU System 10 routines include the following: CountOurUsbDevices, GdcuGetAllPortsData, GdcuGetFirmwareVersion, GdcuNvmRead, GdcuNvmWrite, GdcuRead, GdcuReceiveSerialData, GdcuSelectRS232, GdcuSelectRS422, GdcuSendSerialData, GdcuSetAllPortsData, GdcuSetPortData, GdcuSetPortDirection, Gdcu Write, and GetGdcuSerialNumbers.

[0115] The GDCU System 10 CountOurUsbDevices routine returns the number of GDCU boards currently attached to the system's USB bus. Each of those devices has a complicated device name which is assigned by the system. Those names are filled into the ppDeviceNames array. This array should be cleared before the first time the CountOurUsbDevices routine is called. If any of the ppDeviceNames pointers are not NULL, this routine attempts to release them with

the C++ delete operator. Subsequent calls to CountOurUsbDevices cause the enumeration to be performed again, thus freeing up the results from any previous calls. It is up to the user to free up the memory represented by those character strings after the final call to CountOurUsbDevices.

[0116] The CountOurUsbDevices routine is used internally by other library routines for keeping track of the GDCU boards attached to the system. However, it is not required for normal use. This routine, together with the GetGdcuSerialNumbers routine is provided as a convenience for enumerating all of the boards connected to the system.

[0117] In a preferred embodiment of the invention, the GDCU System 10 GdcuGetAllPortsData routine retrieves the data from the digital I/O ports. After specifying the device ID of the target GDCU board (BDC value 0000 through 9999), the size of the pbyData array is initialized (which can be any value 1 through 5). The pbyData array is the array of BYTES to be filled by the routine.

[0118] GdcuGetFirmwareVersion routine retrieves the version level of the GDCU firmware. The GdcuNvmRead routine reads to the non-volatile serial EEPROM memory in blocks of sixteen bytes. The routine contains a pointer to the array of bytes to be filled and the available size of the array in bytes.

[0119] Further, the GdcuRead routine transfers data from the device to the host. This routine also includes a pointer to the buffer to be filled from the GDCU System 10, as well as arguments for the available size of the buffer and the number of bytes received. The GdcuRead routine is only used when custom code is created for the GDCU firmware. The GdcuRead routine should not be called unless there is information in the GDCU System 10 waiting to be transferred. If the GDCU System 10 receives a read request from the USB host when it does not have data to go out, it responds by sending back a single ASCII question mark character.

[0120] The GDCU System 10 library contains the GdcuReceiveSerialData routine which returns any received serial data. This routine also includes a pointer to the array of bytes to be filled, as well as arguments directed towards the available size of the array and the number of bytes received in the array.

[0121] The GdcuSelectRS232 routine sets the serial I/O to RS-232 and includes an argument which determines the baud rate to be one of 300, 600, 1200, 2400, 4800, 9600, 19200, or 38400. Any other value causes the circuitry to default to 2400. Although the GDCU System 10 contains circuitry for both RS-232 and RS-422/RS-485 communications, only one of those can be enabled at one time. Calling this routine specifies subsequent RS-232 communications.

[0122] In a preferred embodiment of the invention, the GDCU System 10 library also contains the GdcuSelectRS422 routine. This routine sets the serial I/O to RS-422/RS-485 and contains an argument directed towards determining the baud rate to be one of 300, 600, 1200, 2400, 4800, 9600, 19200, or 38400. Once again, any other value causes the circuitry to default to 2400. This routine also contains a OutputOn argument which is used to specify between the TRUE RS-422 mode (the default), and the FALSE RS-485 mode. As discussed above, although the board contains circuitry for both RS-232 and RS-422/RS-485 communications, only one of those can be enabled at one time. Calling this routine specifies subsequent RS-422/RS-485 communications. The difference between RS-422 and RS-485 communications is that the RS-422 is continuously enabled, while RS-485 output drivers are only enabled when the device is transmitting. One preferred embodiment of the invention also contemplates this routine to contain arguments to support automatic switching of the driver to the ON state while transmitting.

[0123] The GDCU System 10 library also includes the GdcuSendSerialData routine which puts a block of data into the serial output buffer. This routine contains a pointer to the array of bytes to be transmitted, as well as an argument directed towards the number of bytes to be transmitted. This routine does not return until all of the bytes in the buffer have been transmitted to the GDCU System 10.

[0124] Additionally, the GDCU system 10 library further includes the GdcuSetAllPortsData routine which sets all four data ports in a single cell. This routine contains a pointer to four bytes of data to be latched into the four output ports. The pbyData argument must point to a valid array of at least four bytes to avoid possible memory exception errors.

[0125] Continuing, the GDCU System 10 library includes the GdcuSetPortData routine. This routine contains arguments which set the following values: GDCU_PORT_0: the port on connector J8; GDCU_PORT_1: the port on connector J9; GDCU_PORT_2: the port on connector J10; and GDCU_PORT_3: the port on connector J11. This routine also contains an argument specifying eight bits of data to be latched into the port. It should be noted that data can be latched into a port even when it is set to GDCU_PORT_INWARD. When the port direction is subsequently switched to GDCU_PORT_OUTWARD, the previously latched data appears on that port at that time.

[0126] The GDCU System 10 library also contains the GdcuSetPortDirection routine which sets the direction of one of the four 8-bit ports. This routine contains some of the same arguments as in the GdcuSetPortData routine relating to setting the values of the GDCU ports 0 -3 to the ports on connectors J8 - J11, respectively. The GdcuSetPortDirection routine further contains arguments directed towards the following values. GDCU_PORT_INWARD: read the port; and GDCU_PORT_OUTWARD: drive the port.

[0127] Further, the GDCU System 10 library also contains the GdcuWrite routine which transfers data from the host to the device. This routine contains a pointer to the buffer to be sent to the GDCU, as well as arguments relating to the number of bytes to be sent to the buffer (buffer size), and the number of bytes finally sent (bytes transferred). The GdcuWrite routine is only used when customer code is created for GDCU firmware.

[0128] Finally, the GDCU System 10 library also includes the GetGdcuSerialNumbers routine. This routine contains several pointers, the first of which is a pointer to an array of 127 character pointers containing the system-defined names for the GDCU boards on the bus. This array is filled using the CountOurUsbDevices routine. The GetGdcuSerialNumbers routine also contains a point to an array for 127 BOOL variables. On return, this array contains TRUE for each valid DeviceName (FALSE means something is wrong with the board. Either some other routine has a handle to it open at this time, or there has been a surprise disconnect during the last few seconds, and the system has not yet decided that it no longer exists.). The routine also contains a pointer to an array of 127 WORD variables. Each WORD variable gets filled in with the Device ID for each valid GDCU board currently attached to the USB bus. Finally, the GetGdcuSerial-Numbers routine also contains a pointer to an array of 127 DWORD variables. Each one of these DWORD variables gets filled in with the binary serial number of each valid GDCU board currently attached to the USB bus. The GetGdcu-SerialNumbers routine is used internally by other library routines for keeping track of the GDCU boards attached to the system. It is not required for normal. This routine, together with the CountOurUsbDevices routine is provided as a convenience for enumerating all of the boards connected to the system.

[0129] In summary, a preferred embodiment generic device controller unit system includes a generic "true real time" peripheral device controller and a data and protocol communications interface. The system is generic, such that the system is capable of connecting a processor to any number of various peripheral devices, instead of being designed to interconnect a processor only to a specific peripheral device. The system interfaces between a standard non-true real time operating system and peripheral devices in such a manner as to employ true real time peripheral device control, while allowing for bandwidth sharing, data speed differences, and accommodating for various levels of interrupt priority. The device controller of the system allows a standard non-true real time operating system to implement true real time control of peripheral devices. The system interfaces between a processor and peripheral devices such that the data and protocol communications interface of the system allows the processor to utilize a single protocol and associated data in order to communicate with peripheral devices which are utilizing different protocols and associated data.

[0130] In a preferred embodiment of the invention, device connection is not limited to a few number of com ports, since the hardware interface of the system allows large numbers of devices to be "daisy-chained" together. The invention eliminates the need to rely on com ports, which are slow (typically 9600 baud) and, further, which do not address the need to mix high speed data (video) and low speed data (mouse clicks) communications, as does a preferred embodiment of the invention. Moreover, a preferred embodiment of the invention allows the use of commercially available, off-the-shelf, devices from the personal computer, consumer electronics, and industrial control businesses, which increases the speed of product development and innovation. In addition, the invention eliminates the need for developers to have to perform undesirable WINDOWS® device driver development work. Finally, the GDCU system 10 of the invention is adaptable to the true real time requirements of each particular application, therefore, allowing virtually any definition of true real time for use in any given application, (e.g. from one millisecond to one nanosecond).

[0131] While the generic device controller unit system of the invention has been described with respect to gaming systems and gaming assemblies, it will be appreciated by those of ordinary skill in the art that the generic device controller unit system and methodology can be readily applied in various other non-gaming technological areas. These other non-gaming technical areas include, by way of example only, and not by way of limitation; manufacturing, amusement parks, control systems, security systems, and mechanical assembly production lines.

[0132] A preferred embodiment of the embedded additional user interface, constructed in accordance with the invention, is directed towards the integration of an embedded additional user interface into a gaming machine to increase user excitement by providing a richer gaming experience. The embedded additional user interface provides enhanced player satisfaction and excitement, as well as improved gaming device reliability, interactivity, flexibility, security, and accountability. The user interface is sometimes referred to herein as "additional" in that the user interface is separate from the gaming screen (or other gaming presentation). Further, the user interface is sometimes referred to herein as "embedded" in that the user interface includes its own processor in some preferred embodiments of the invention. Additionally, the display screen, which is referred to herein commonly as a web content capable display screen, may also (or alternatively) be an animation capable display screen, a web page display screen, or a multimedia display screen.

[0133] Referring now to the drawings, wherein like reference numerals denote like or corresponding parts throughout the drawings and, more particularly to FIGS. 6-10, there is shown one embodiment of an embedded additional user interface 310. Specifically, FIG. 6 shows an embedded additional user interface 310 that includes a web page display screen 320 and an embedded processor 330. The user interface 310 is incorporated into a gaming machine 340 that, in turn, includes a gaming screen 350, (and/or non-screen gaming region 350, e.g., spinning reels or other gaming presentation) gaming processor 360, and a game monitoring unit 365. The embedded processor 330 employs an internal operating system and communicates with the gaming processor 360, preferably via the game monitoring unit 365. The embedded processor 330 reads incoming data, translates the data into a web authoring language, and maps the data to the web page display screen 320. The display screen 320 presents web page information to a user via the display screen, thereby increasing user excitement by providing a richer gaming experience. The game monitoring unit 365 monitors the information that is input through the user interface 310. This provides a dramatic improvement over traditional

system components 370 that have been used as in the past to provide user information. The user interface 310 communicates with the game monitoring unit 365 in the same manner as the previous system components 370 communicated with the game monitoring unit.

[0134] As shown in FIG. 7, prior art gaming devices typically utilized a single video display screen as a gaming screen 350 for the gaming machine 340, while additional system components 370 were attached or juxtaposed next to the gaming machine. The display may comprise, for example, a 2-line, 20 character VF (Vacuum Fluorescent) display 320. An input device may comprise a 12-digit keypad 371.

[0135] However, referring again to FIG. 6, in a preferred embodiment of the invention, the system components 370 that were used in prior art systems are replaced with the embedded additional user interface 310 to provide the advanced functionality of a web page display screen 320. Such functionality includes, by way of example only, and not by way of limitation, the ability to display animation, multimedia, and other web-type content. The embedded additional user interface 310 enables presentation of additional information (e.g., enhanced player information) to a player (or potential player) through the web page display screen 320 in an exciting, eye-catching format, while not interfering with the normal gaming processes being displayed on the gaming screen 350. Further, the embedded additional user interface 310 does not interfere with the normal gaming hardware in the gaming machine 340, but rather is easily integrated into a gaming machine 340.

[0136] In situations involving multiple gaming machine (or gaming component) manufacturers, an embedded additional user interface 310 can be incorporated into a gaming machine (either originally or by retrofitting) without requiring access to the game logic or other gaming systems that might be proprietary and inaccessible with a gaming machine from another gaming manufacturer. Thus, in a preferred embodiment of the invention, the embedded additional user interface 310, which includes a web page display screen 320 for presenting supplementary information to a player, is incorporated into a gaming machine 340 in addition to the standard gaming screen 350 typically found in a gaming machine. The embedded additional user interface 310 may also be incorporated into a gaming machine 340 that utilizes a gaming region (e.g., a reel-spinner) instead of a standard gaming screen 350. This supplemental information may include general gaming information, player specific information, player excitement and interest captivation content, advertising content (targeted or otherwise), and the like. Further, in other preferred embodiments, the embedded additional user interface 310 may have the ability to interact with the game logic of the gaming processor 360, preferably via the game monitoring unit 365, and thus, provide further functionality, such as bonus games, system games, and/or the ability to incorporate awards, promotional offers, or gifts from the web page display screen 320 to the gaming screen 350. Moreover, the web page display screen 320 may display supplemental information in an "attract mode" when there is no game play occurring. Also the gaming processor 360 may use the web page display screen 320 to present casino employees with a web based dialogue to facilitate gaming machine configuration and event investigation activities without disturbing the gaming screen/region 350.

[0137] In a preferred embodiment of the invention, the embedded additional user interface 310 is used to make casino services more accessible and friendly to casino patrons. In one preferred embodiment, the embedded additional user interface 310 is designed to interface with the hardware configuration of game platforms currently employed in an existing gaming communication systems network, thus decreasing implementation costs for the casino. A standard gaming network interface to the systems network, such as a Mastercom system, includes a multi-drop bus method of communicating to a keypad and display. The Mastercom system is available from Bally Manufacturing, and is described in U.S. Pat. No. 5,429,361 to Raven et al. incorporated herein by reference. One such currently utilized bus is an EPI (Enhanced Player Interface), which uses an industry standard I^2C bus and signaling.

[0138] In one preferred embodiment, the embedded additional user interface 310 is used to replace/upgrade an EPI. Preferably, the embedded additional user interface 310 replaces the EPI of the gaming machine in a "plug and play" manner. In other words, the old EPI can be unplugged and the new embedded additional user interface 310 can simply be plugged into the I^2C bus of the game monitoring unit 365 in the gaming machine 340. The user interface 310 utilizes the currently employed industry standard I^2C bus and signaling without requiring any further modification. The embedded processor 330 of the embedded additional user interface 310 reads incoming I^2C data (content), translates the data into a web authoring language (e.g., HTML, DHTML, XML, MACROMEDIA FLASH), and maps the data to the web page display screen 320. In this manner, the previous I^2C data messages, which were typically presented on a 2-line, 20 character VF display, are automatically transformed by the embedded additional user interface 310 into an attention grabbing, animated (multimedia) web page style format. This results in enhanced player satisfaction and excitement with extremely minimal retrofitting requirements.

[0139] Since, in one preferred embodiment, the embedded additional user interface 310 utilizes I^2C hardware and signaling, this enables the user interface 310 to speak and understand the I^2C protocol message set, and thus, communicate directly with the gaming processor 360 of the gaming machine 340 (or other similarly networked devices) in the same fashion in which the gaming processor previously communicated with the EPI. Accordingly, in a preferred embodiment of the invention, the functionality of the previously utilized hardware (e.g., the EPI) can be replaced or augmented and thus substantially upgraded with the integration of the embedded additional user interface 310 into the

gaming machine 340. As such, the limitations placed upon the gaming processor 350 by the low function external hardware of such system components 370 (e.g., a keypad and a 2-line, 20 character VF display) may be eliminated.

[0140] As stated above, in one preferred embodiment, the incoming data received by the embedded additional user interface 310 is in I^2C signaling protocol; however, in other preferred embodiments other serial communication protocols (or electronic communication format) may be utilized. Preferably, the embedded processor 330 communicates with the gaming processor 360 via the game monitoring unit 365, and/or other connected devices, over an I^2C bus (or over another serial communications bus in embodiments that utilize another protocol). The web page display screen 320 of the embedded additional user interface 310 is preferably a color-graphic touch screen display. Preferably, the embedded processor 330 is at least a 32-bit processor. A preferred embodiment utilizes a 32-bit processor because cryptographic techniques, such as SHA-1 (or better) and DSA algorithms, are written and operate natively on a 32-bit system. Additionally, the Microsoft® WINDOWS® environment, which is utilized in some preferred embodiments of the invention, is also 32-bit. Further, the internal operating system of the embedded additional user interface 310 may be adapted or customized to match the specific communication bus hardware used by the devices in the gaming machine 340 to which the internal operating system communicates.

[0141] Preferably, the embedded additional user interface 310 is an embedded computer board that, in addition to the embedded processor 330 and the web page display screen 320, further includes a removable COMPACT FLASH® card 375 (or other memory storage device), as shown in FIG. 6, and a network adapter port. Content and feature updates to the embedded additional user interface 310 are accomplished by physically swapping out the COMPACT FLASH® card 375 (or other memory storage device). Thus, in order to retrieve data from the embedded additional user interface 310, the data is accessed by physically removing and reading the COMPACT FLASH®. card 375. In other embodiments, as described below, updates may be provided by direct or peer-to-peer downloading over a network.

[0142] In one preferred embodiment, the internal operating system utilized by the embedded processor 330 of the embedded additional user interface 310 is WINDOWS® CE version 4.2 (or higher). Preferably, the embedded additional user interface 310 is built upon a PXA255-based board developed by the Kontron Corporation. Additionally, in a preferred embodiment of the embedded additional user interface 310, the browser control for the web page display screen 320 is MICROSOFT® INTERNET EXPLORER®. 6.0 (or higher), which is shipped standard with WINDOWS® CE 4.2, the preferred internal operating system for the embedded processor 330.

[0143] A preferred embodiment of the embedded additional user interface 310 also provides a mechanism for inputting system information into, and retrieving system information from, the game machine 340. As stated above, the embedded additional user interface 310 preferably uses industry standard I^2C hardware and signaling. The I^2C protocol has multi-master capabilities, i.e., is capable of participating as both a slave and as a master. The embedded additional user interface 310 enables system information (such as information input by a player into a web page display screen 320) to be sent from the game machine 340 to a slot system network (or to another destination location). Likewise, the embedded additional user interface 310 also enables the system information (such as display messages) to be sent from the systems network (or from another source location) to the game machine 340 for viewing by the player through the web page display screen 320.

[0144] In a preferred embodiment, information can also be input by a user into the web page display screen 320 of the user interface 310. The web page display screen 320 of the user interface 310 employs a virtual keypad. Further, the user interface 310 uses a keypad dictionary that allows a user to be able to enter a vastly greater amount of information than was previously possible using a 12 digit VF keypad. For example, the virtual key on the touch screen that is displayed by the browser is pressed by a user. This calls the Keypad object by calling its Dispatch interface with a string that identifies which virtual key was pressed. The Keypad object looks up the string in the Dictionary object which has been loaded at initialization time with a set of keys to return when that string is passed to it. When it retrieves this set of zero or more key characters, it passes them to the GMU by calling the interface exposed by the object.

[0145] Typically, a network interface (or equivalent system) is used to control the flow of funds used with the gaming machine 340 within a particular casino. By utilizing the embedded additional user interface 310 of the invention, the gaming network interface can be instructed to move funds between player's accounts and gaming devices by merely touching the web page display screen 320. In addition, many other more sophisticated commands and instructions may be provided. Thus, the embedded additional user interface 310 improves the player and casino employee interface to the gaming machine 340, directly at the gaming device itself.

[0146] In a preferred embodiment of the invention, the web page display screen 320 of the embedded additional user interface 310 enables a player to be shown player messages in an animated, multimedia, web content style environment. These messages would previously have been displayed in a significantly more mundane format on a separate display device (e.g., a 2-line VF display device). In some preferred embodiments, touch screen buttons in the web page display screen 320 are used by the player to navigate between windows in web page display screen 320 and allow access to system functions such as cashless withdrawal, balance requests, system requests, points redemption, and the like. In other preferred embodiments of the invention, the web page display screen 320 utilizes various other data input techniques commonly known in the art, instead of the touch screen data entry. Thus, implementation of the embedded additional

user interface 310 is an efficient, highly beneficial, and substantial upgrade to a gaming machine 340 that greatly increases the functionality over what was previously possible using an EPI.

[0147] In one preferred embodiment, text data messages are translated into web page navigation requests by the embedded processor 330 and then displayed on the web page display screen 320 as shown and discussed with respect to FIGS. 11A and 11B below. Script languages, such as JAVA SCRIPT and VB SCRIPT, are also utilized for some of the web pages. Preferably, the embedded additional user interface 310 emulates the 12-digit keypad and the 2x20 VF display on the web page display screen 320, which has touch screen capabilities. In this embodiment, commands that were previously displayed on the 2x20 VF display are matched to a corresponding URL and a browser is used to render the page on the web page display screen 320. The web pages displayed contain touch-screen keys that effectively emulate hardware keys.

[0148] With reference to FIGS. 11A and 11B, in one preferred embodiment of the invention, a dictionary URL approach is used for translating the data messages into web page information. In this manner, data messages are "looked up" in a dictionary data file where they can be redirected to an attractive URL. The embedded processor 330 responds to requests on the I^2C bus that were intended for the prior art enhanced player interface (EPI) VF display. The web page display screen 320 is not a passive display device like traditional PC monitors, but rather the display screen 320 must respond to commands with text type responses. These requests include initialization requests, status requests, and display requests. With reference to FIG. 12, as each text data message to be displayed is passed into the embedded processor 330, the processor 330 calls a URL Dictionary to look up a URL with which to replace the text data message. Once the substitution is complete, the embedded processor 330 instructs the web page display screen 320 to present (or navigate to) the appropriate web page.

[0149] Accordingly, with reference to FIG. 13, a URL Dictionary component is used to map a text string, sent from the embedded processor 330 and intended for the display on the 2x20 VF display, to a URL that can be used to display a much more visually enhanced graphical representation of the same message. Thus, the URL Dictionary component contains a listing of the possible text messages to be supported that could be sent from the embedded processor 330, and a mapping to a set of the desired eye-catching, web content to be displayed on the web page display screen 320. In this event that a message is not in the URL Dictionary, such a message is mapping to a page that substitutes for the 2-line mode.

[0150] In the preferred embodiments described above, the embedded processor 330 of the embedded additional user interface 310 reads incoming I^2C data messages, translates the I^2C data messages into a web authoring language (e.g., HTML, DHTML, XML, MACROMEDIA FLASH), and maps the newly translated web page data message to the web page display screen 320. Additionally, the embedded additional user interface 310 can also read incoming data messages that are already in a web authoring language (e.g., HTML, DHTML, XML, MACROMEDIA FLASH), and map this web page data to the web page display screen 320. Further, and highly advantageously, a preferred embodiment of the invention also allows casinos that are using the embedded additional user interface 310 to design and use their own content, thereby giving the casinos the ability to decide what the web page presented on the web page display screen 320 of the user interface 310 will look like.

[0151] Referring now to FIG. 8, in this preferred embodiment, content may be locally downloaded. Specifically, in one preferred embodiment, the content is updated through a physical USB (or other connection) that is used to download the new content. In one preferred embodiment, the data on the COMPACT FLASH® card 375 can be accessed by connecting a separate computer 378 to the network adapter port of the embedded additional user interface 310. This embodiment allows updating the contents of the operating system, changing the operating system itself, and receiving data from the COMPACT FLASH® card 375. Physical removal of the COMPACT FLASH® card 375 is also still an option for update and inspection of files on the embedded additional user interface 310.

[0152] In one preferred embodiment, a portable computer is used to store and publish data content to the COMPACT FLASH® card 375 on the embedded additional user interface 310, as well as to receive data from the COMPACT FLASH® card 375 on the embedded additional user interface. In this embodiment, all content on the embedded additional user interface 310 is authenticated as if it were a gaming machine.

[0153] In another preferred embodiment, a network adapter port is run on the embedded computer board of the user interface 310. This embodiment also includes a boot loader. Further, in this embodiment, the portable computer 378 (described above) includes components for use in uploading data to, and downloading data from, the COMPACT FLASH® card 375 on the embedded additional user interface 310. Specifically, the components that run on the portable computer 378 are for moving new data content to the embedded additional user interface 310, and for validation and verification of the data content that is on the embedded additional user interface. Preferably, all data that is used to update the COMPACT FLASH® card 375 moves to or from the embedded additional user interface 310 over the single built in network adapter port on the board.

[0154] Prior to the advent of the embedded additional user interface 310 of the invention, gaming regulators would have been unwilling to allow casino operators to design their own content. However, due to the cryptographic technology implemented by the embedded processor 330 in the embedded additional user interface 310, a certification process is

provided by the invention with sufficient security for gaming regulators to allow casino operators to design their own content. Specifically, in one preferred embodiment, the certification process offered ensures authentication and non-repudiation of the casino operator designed web content. Preferably, in the invention the certification process provided further ensures auditability and traceability. Various cryptographic technologies, such as authentication and non-repudiation (described herein below), are utilized in preferred embodiments of the invention, to provide sufficient security for gaming regulators to allow casino operators to design their own content.

[0155] In one preferred embodiment, this certification process is used to certify "signed content" (created by the casino owners) in the same manner that a "signed program" is certified. Preferably, PKI (Public Key Infrastructure) is utilized in the certification process. PKI is a system of digital certificates, Certificate Authorities, and other registration authorities that verify authenticity and validity. In one preferred embodiment, a "new tier" or second PKI is created that is rooted in the primary PKI and that leverages the capabilities of the certificate (e.g., a x509 certificate) that allow for limited access. Thus, this preferred embodiment allows the attributes within the certificate are used to provide "levels" of code access and acceptance in the gaming industry.

[0156] In one embodiment, the content is protected by digital signature verification using DSA (Digital Signature Algorithm) or RSA (Rivest-Shamir-Adleman) technology. In this regard, the content is preferably protected using digital signature verification so that any unauthorized changes are easily identifiable. A digital signature is the digital equivalent of a handwritten signature in that it binds an individual's identity to a piece of information. A digital signature scheme typically consists of a signature creation algorithm and an associated verification algorithm. The digital signature creation algorithm is used to produce a digital signature. The digital signature verification algorithm is used to verify that a digital signature is authentic (i.e., that it was indeed created by the specified entity). In another embodiment, the content is protected using other suitable technology.

[0157] In one preferred embodiment, a Secure Hash Function-1 (SHA-1) is used to compute a 160-bit hash value from the data content or firmware contents. This 160-bit hash value, which is also called an abbreviated bit string, is then processed to create a signature of the game data using a one-way, private signature key technique, called Digital Signature Algorithm (DSA). The DSA uses a private key of a private key/public key pair, and randomly or pseudo-randomly generated integers, to produce a 320-bit signature of the 160-bit hash value of the data content or firmware contents. This signature is stored in the database in addition to the identification number. In other preferred embodiments, higher level Secure Hash Functions are used, such as SHA-256 or SHA-512.

[0158] In another preferred embodiment, the invention utilizes a Message Authentication Code (MAC). A Message Authentication Code is a specific type of message digest in which a secret key is included as part of the fingerprint. Whereas a normal digest consists of a hash (data), the MAC consists of a hash (key + data). Thus, a MAC is a bit string that is a function of both data (either plaintext or ciphertext) and a secret key. A Message Authentication Code is attached to data in order to allow data authentication. Further, a MAC may be used to simultaneously verify both the data integrity and the authenticity of a message. Typically, a Message Authentication Code (MAC) is a one-way hash function that takes as input both a symmetric key and some data. A symmetric-key algorithm is an algorithm for cryptography that uses the same cryptographic key to encrypt and decrypt the message.

[0159] A Message Authentication Code can be generated faster than using digital signature verification technology; however, a Message Authentication Code is not as robust as digital signature verification technology. Thus, when speed of processing is critical the use of a Message Authentication Code provides an advantage, because it can be created and stored more rapidly than digital signature verification technology.

[0160] In one preferred embodiment, the authentication technique utilized is a BKEY (electronic key) device. A BKEY is an electronic identifier that is tied to a particular individual. In this manner, any adding, accessing, or modification of content that is made using a BKEY for authentication is linked to the specific individual to which that BKEY is associated. Accordingly, an audit trail is thereby established for regulators and/or other entities that require this kind of data or system authentication.

[0161] Another preferred embodiment of the verification system utilizes "component bindings" for verification using cryptographic security. In component binding, some components come equipped with unalterable serial numbers. Additionally, components such as web content or the game cabinet may also be given another random identification number by the owner. Other components in the system, such as the CMOS memory in the motherboard, the hard drive, and the non-volatile RAM, are also issued random identification numbers. When all or some of these numbers are secured together collectively in a grouping, this protected grouping is referred to as a "binding." Each component of the machine contains its portion of the binding.

[0162] In one such preferred embodiment, every critical log entry made to the content is signed with a Hashed Message Authorization Code (HMAC) that is based on the entry itself, and on the individual binding codes. In this manner, the security produced by the bindings ensures that log entries that are made cannot be falsified or repudiated.

[0163] After the critical gaming and/or system components are selected, given individual identifiers, and combined into a protected grouping that is secured using the component "bindings," any changes to those components will then be detected, authorized, and logged. For example, content within the binding is digitally signed (SHA-1 or better) using

the key derived from the bindings. This signature is verified whenever an entry is made to a component within the binding. If the signature is wrong, this security violation and the violator are noted, but typically the entry is not prohibited. In other embodiments, the entry may be prohibited as well. Thus, the component binding produces a cryptographic audit trail of the individuals making changes to any of the components within the binding.

[0164] Moreover, bindings ensure that the critical components of a gaming machine system, or the content utilized therein, that have been selected to be components within the binding have not been swapped or altered in an unauthorized manner. Preferably, bindings use unique identification numbers that are assigned to vital parts of the gaming platform including, by way of example only, and not by way of limitation, the cabinet, motherboard, specific software, non-volatile RAM card, content (data), and hard drive. These identification numbers combine in a cryptographic manner to form a "binding" that protects and virtually encloses the included components, such that no component within the binding can be modified, removed, or replaced without creating an audit trail and requiring authentication. Thus, for one of these components within the binding to be changed, appropriate authentication is required and a log file entry is made documenting the activity and the identity of the individual making the change. In one preferred embodiment, a specific level of BKEY clearance or classification is required to make specific changes.

[0165] Referring now to FIG. 9, in one preferred embodiment, the embedded additional user interface 310 connects to an Ethernet-networked backbone 380 instead of a local system network. Currently, casino networks are not Ethernet, but rather are smaller, more simplistic local system networks. Thus, in this Ethernet-networked backbone 380 embodiment, the current system network is replaced by an industry standard Ethernet backbone, such as 10/100 base T Ethernet running over Cat 3, 4, 5, 6, or higher. Thus, a standard 10/100 base T Ethernet card is added to the processor in this embodiment. Preferably, the network employs TCP/IP, HTTP, and XML messaging or a variant of XML. Nevertheless any suitable protocol may be used.

[0166] Further, in another preferred embodiment, the embedded additional user interface 310 connects to a full featured, back end, download configuration server 390 through the above-described Ethernet-networked backbone 380 as shown in FIG. 9. In such an embodiment, the full-featured server 390 can schedule downloads of content (gaming or otherwise) as well as upload information from the gaming machines 340, such as what options the gaming machines 340 currently possess. Accordingly, in a preferred embodiment, the primary use of the server 390 is as data download and data retrieval server. While this server 390 does upload and download web content style information, it is typically not connected to the World Wide Web.

[0167] This server 390 must be authenticated (just like a gaming machine) to make the content served to the embedded additional user interface 310 acceptable to the gaming regulators. Preferably, utilization of the Ethernet-networked backbone 380 and the server 390 provides many system benefits, including but not limited to reliability, maintainability, security, content staging, content testing, deployment procedures, and incident recovery. In one embodiment, deliverables also preferably include content templates and guidelines for casino owners and operators to create their own web content for deployment to the web server. In one embodiment, the web server 390 has its content authenticated in the same manner as the embedded additional user interface 310 to allow content to be downloaded to the web page display screen 320.

[0168] Referring now to FIG. 10, in another preferred embodiment of the invention, the functions previously performed by the gaming monitoring unit 365, as shown in FIGS. 6-9, of the gaming machine 340 are supported by the embedded processor 330 of the embedded additional user interface 310. Otherwise stated, the GMU code is transitioned from the gaming monitoring unit 365 into the embedded processor 330 in the embedded additional user interface 310. Accordingly, such a configuration removes the need for the gaming monitoring unit 365 in the gaming machine 340. This results in a significant reduction in the amount and complexity of the hardware, as well as completing a phased transition of more traditional style gaming machines into more modernized upgraded gaming machines.

[0169] Thus, in such a preferred embodiment, the invention is directed towards an embedded additional user interface 310 that is incorporated into a gaming machine 330, the gaming machine in turn including a gaming screen 350 or other appropriate gaming region (e.g., spinning reels), but does not include a gaming monitoring unit 365. Such an embedded additional user interface 310 still includes a web content capable display screen 320 and an embedded processor 330. Once again, the web content capable display screen 320 presents web information to a user via the display screen. The embedded processor 330 preferably utilizes an internal operating system. Furthermore, in this embodiment the embedded processor 330 additionally includes standard gaming monitoring unit functionality (GMU code), since it replaces the gaming monitoring unit 365 in the gaming machine 340. As before, the embedded processor 330 reads incoming data, translates the data into a web protocol (web authoring language), if necessary, and maps the data to the web content capable display screen 320.

[0170] In one embodiment, the embedded additional user interface 310, the messages are flashed (e.g., animation, multimedia, and the like) to the player within the web page display screen 320 while the gaming screen 350 is used for game play. These web page style messages can be set at virtually any desired length, format, or style. A message might display, for example, "Welcome to Harrah's Las Vegas! You have 1200 bonus points. Would you like to make a hotel or dinner reservation?" Importantly, while a previous utilized EPI would only been capable of scrolling this message in

one-quarter inch (0.25") tall monochrome text, in contrast, the web page display screen 20 would "flash" this message in bright red, white, black, and green animated format, on six inch (6.0") by three inch (3.0") color graphic display. Additionally, in some embodiments, inserting a player identification card into a card reader and/or selecting a player services button activates additional player services functionality.

[0171] In one exemplary embodiment of the embedded additional user interface 310 that utilizes a card reader (or other identification technique, such as a player ID code) to recognize a particular player, the web page display screen 320 displays an eye-catching, web page-style message to that player, for example, "Welcome, Mr. Smith!" in response to identifying Mr. Smith. Preferably, the web page display screen 320 also has touch screen capabilities that include, by way of example only, and not by way of limitation, "Beverages," "Change," "Services," "Transactions," and "Return to Game." In one embodiment, each of the touch screen icon buttons, when selected, launches a new full screen display within the web page display screen 320 for the player.

[0172] For example, in one embodiment, when the "Transactions" touch screen icon button is selected, a new screen is activated that includes the web page style message, "Mr. Smith, Account Balance: Bonus Points = 1200, Player Funds = $150, Available Credit = $850, Casino Matching Funds Available = $25," as well as the "Return to Game" icon button. As a further example, when the player selects a "Cashless Withdrawal" button in another embodiment, a new screen is activated that includes a touch screen keypad and flashes the question, "How much do you want?" as well as "Enter," "Clear," and "Back" buttons. Preferably, this interface also includes an "Information" button that, when selected, launches a new screen within the web page display screen 320 that provides answers to frequently asked questions and other useful information. Moreover, the web page display screen 320 preferably also includes a "History" button that, when selected, launches a new screen within the web page display screen 320 that provides a history log of all transactions and other actions performed on that gaming machine 340.

[0173] In accordance with another preferred embodiment, the invention is directed towards a method for increasing user excitement relating to a gaming machine by providing a richer gaming experience via an embedded additional user interface that is incorporated into the gaming machine. The method preferably includes: receiving a serial data message (e.g., an I^2C data message) containing enhanced player information over a serial communication bus (e.g., an I^2C) bus in the embedded additional user interface 310; translating the data message (using the embedded processor 330) into a web authoring language; and mapping the data message to the web page display screen 320, wherein the display screen presents web page information to a user via the display screen.

[0174] The potential advantages of utilizing the embedded additional user interface 310 of the invention are numerous. These potential advantages include, by way of example only, and not by way of limitation: providing animated and/or multimedia web style content; providing fonts and icons which are larger and more aesthetically appealing; providing special services to players, (e.g., multiple languages, assistance for handicapped individuals); facilitating interactive uses of the web page display screen 320; providing the ability to customize the "look and feel" of the web page display screen 320 for players and casino employees; increased player excitement and participation; and simplified replaceability and/or upgradeability from an EPI or other similar non-web page style components.

[0175] Generally, player tracking systems have long been limited to small displays and fairly generic sound capabilities. However, it is desirable to incorporate a wide variety of output (and potentially input) devices into a player tracking system. Additionally, promotional system-based games are relatively new, and have thus far been limited to video presentations on fairly small screens. It would be advantageous to produce a device and/or system that would enable a player tracking system and/or a promotional system game to utilize larger gaming presentations or other peripheral devices 440.

[0176] In this regard, with respect to another aspect of the invention, FIG. 14 illustrates a preferred embodiment of a universal game monitoring unit 410 (which includes both GMU 365 and an iView 310 functionality, and is built upon a GDCU 10 architecture) incorporates a display screen 420 and an UGMU processor 430 (e.g. expanded display device controller) that communicates with a game processor 360 in a gaming machine 340, one or more peripheral display devices 440, and one or more back-end systems 450. In some preferred embodiments, the display screen 420 is an interactive touchscreen that is capable of both displaying and receiving information to and from a player. A preferred embodiment of the universal game monitoring unit 410 (UGMU) enables a system-based iView 310 game to not be limited to game play inside the iView itself, but rather to enable the use of peripheral devices 440 and systems 450 outside of the iView component. In some preferred embodiments, the display screen 420 is not incorporated into the universal game monitoring unit 410, but rather is one another one of the peripheral display devices 440 that are connected to, and associated with, the universal game monitoring unit.

[0177] In some preferred embodiment, the universal game monitoring unit 410 employs programming and an operating system that enables the UGMU to expand beyond the function of a traditional GMU 365 to include system-game features, including by way of example only, and not by way of limitation: (1) driving a graphic display (e.g., a video screen) for presentation of a game to casino patrons; (2) driving mechanical reels (or other mechanical game presentation components) over an interface, such a USB; or (3) driving other gaming peripheral devices 440 (e.g., coin acceptor, bill acceptor, hopper, printer and the like).

[0178] In this regard, a universal game monitoring unit 410 can be used to enable several different kinds of functionality, including by way of example only, and not by way of limitation: (1) an external system game controller (i.e., controls the outcome of an external (to the UGMU/iView) "pay to play" system game), (2) an external system "expanded primary pay indicator" controller (i.e., controls the display of an external "pay to play" system prize), (3) an external "promotional" system prize display controller (i.e., controls the display of an external "promotional" system prize), and (4) a non-game related, system information display controller (i.e., controls the display of external non-game related information).

[0179] In one preferred embodiment of the invention, the universal game monitoring unit 410 includes a player tracking system and attention-grabbing color animation that are provided on the traditional small graphics display screen 420. In addition to creating a more compelling presentation, the universal game monitoring unit 410 has the potential sales advantage of necessitating additional hardware to support the deployment of these premium player-tracking systems. Furthermore, many payout indicators and peripheral devices 440 (e.g., wheels, reels, lights, buttons, card readers, and the like) can be connected to the UGMU processor 430 (expanded display device controller) of the universal game monitoring unit 410 at the gaming machine 340 for presentation by the player tracking system of the UGMU 410. Additionally, as described above, in some preferred embodiments, the display screen 420 is actually a peripheral device 440 that is connected to, and associated with, the universal game monitoring unit 410 instead of being incorporated into the UGMU itself.

[0180] Accordingly, any presentation device or other peripheral devices 440 that can be driven directly or indirectly (using a peripheral controller such as a reel control unit (RCU)) can be controlled by the universal game monitoring unit 410. Specifically, these peripheral devices 440, which are external to the UGMU (and included iView) device 410, that are controllable by the universal game monitoring unit include, by way of example only, and not by way of limitation: reels, wheels, light wheels, lights, meters, sliding indicators, rotating pointers, sound devices, and the like (i.e., anything that can be controlled directly by a player tracking system-based game computer or can be controlled indirectly by a controller attached thereto). In this regard, peripheral devices 440 can be anything used for the display of primary or secondary system-based game outcomes, such as the expanded primary pay indicator shown in FIG. 15.

[0181] Referring again to FIG. 15, one peripheral device 440 that is controllable by the UGMU controller 430 of the universal game monitoring unit 410 is a Monte Carlo-style wheel (or other similar wheel display). In this specific, non-limiting example, a Monte Carlo-style wheel controller is attached to the UGMU controller 430 of the universal game monitoring unit 410 using a USB, serial port, or other appropriate interface. Using this configuration, a system-based Monte Carlo reel spinning game can be played on the UGMU display screen 420 (which is now the iView screen), thereby enabling the wheel device to be spun, as needed, to enhance player appeal. By utilizing the universal game monitoring unit 410 in this manner, any popular game (e.g., the Bally Monte Carlo game) can now be made available on any gaming machine 340 in a casino, regardless of the base game and the manufacturer of the base game. This dramatically increases the variety and proliferation of game themes available across a casino floor, as well as breaking down barriers created by competing game manufacturers.

[0182] As described above, a peripheral device 440 such as a Monte Carlo-style wheel (or other similar wheel display) can be used (1) as the sole presentation for system-based game outcomes, (2) as a traditional "bonus" device (e.g. Monte Carlo) or (3) as an expanded primary pay indicator for a system-based game. In this regard, FIG. 16 illustrates how a peripheral device 440, such as the shown in FIG. 15, may be implemented as an expanded primary pay indicator. More specifically, FIG. 16 is a logical flow diagram showing the gaming process for a system-based game that utilizes an expanded pay presentation controlled by a universal game monitoring unit 410.

[0183] Referring again to FIG. 14, in another preferred embodiment of the universal game monitoring unit 410, devices can be used for other than system-based game presentation. Otherwise stated, the universal game monitoring unit 410 can be used for any kind of system information presentation (e.g., awarding a mystery bonus by moving a pointer to a dinner, a show, or a room.). Thus, the award does not have to be strictly part of a game, but rather simply be system-based.

[0184] Furthermore, in another aspect of a preferred embodiment, the universal game monitoring unit 410 presents different "messages" from the UGMU computer (e.g., messages that are not limited to system-based game outcomes) when the casino wants some information to have a more dramatic effect than that achievable by the traditional small display screen. In one specific, non-limiting example, participation in the game by a "gold" player would illuminate a representation of a candle that was viewable by a slot host. In essence, the universal game monitoring unit 410 is transformed into an extension of a browser. In another example, a player that acquires a certain number of session points turns on a lights, ring a bell, or receives some kind of award.

[0185] In one preferred embodiment, the universal game monitoring unit 410 can be built from a PC-based processing engine combined with a gaming baseboard. Thus, any advantages related to production capacity and/or technology advancements from the PC industry can be leveraged by the universal game monitoring unit 410. Additionally, due to the capabilities of the universal game monitoring unit 410, it is advantageous (but not required) to attach a gaming baseboard to the standard PC processing engine.

[0186] In some embodiments, the gaming baseboard is designed for minimal cost and function then upgraded at a later date to provide higher features and benefits. Preferably, the gaming baseboard is customizable to allow for com-

patibility with older systems and games, while yet providing hardware interfaces for upgrading to newer networking standards such as Ethernet.

[0187] In one preferred embodiment, universal game monitoring unit 410 is constructed using an ETX module form factor single board computer, which is available from numerous vendors including Kontron and Axiomtek. This module includes the core processing functions of a PC combined with standard physical size and connector pinouts. Thus, the device gains flexibility in procurement. The ETX module also has a very small physical footprint, which provides advantages for a device such as a universal game monitoring unit 410 which needs to fit into slot machines which are produced by multiple manufacturers. As such, small physical size is advantageous. Moreover, low power consumption and the need for only a single source power voltage are also advantageous.

[0188] Additionally, the ETX module is compatible with a broad range of operating systems: proprietary, LINUX®, WINDOWS® CE and WINDOWS @ XP, which provides for greater flexibility in programming and deployment. Continuing, since ETX modules share a common footprint and have similar power operating requirements, the task of upgrading from a lower cost ETX module to one of much greater processing power is greatly simplified. Such an upgrade might be necessitated as new features such as system-games are added, which require greater processing power, after basic units have been initially sold into the market.

[0189] In one preferred embodiment, universal game monitoring unit 410 can be designed to accommodate legacy connections to user interface components with the proper baseboard design. Such components may include keypad, card reader and two-line display. The universal game monitoring unit 410 may also be configured to connect to VGA, XGA, or better graphics displays, as well as touchscreens over a LVDS cable driven circuit. In this manner, the universal game monitoring unit 410 enables user interface components to be remotely located from the UGMU processing device 420.

[0190] In various alternate preferred embodiments, the universal game monitoring unit 410 may be housed in multiple ways, including by way of example only, and not by way of limitation: (1) as a stand-alone device; (2) attached to the user interface equipment, as a video, network, and game processing device (thereby leaving GMU processing to a secondary device); or (3) as both a GMU and gaming device with remote connection capability to the user interface components (i.e., a long cable to the touchscreen and keypad).

[0191] Referring now to FIGS. 17-21, another aspect of a preferred embodiment is directed towards a system and method for tracking the game play of customers, as well as providing other marketing and gaming functions on a network of gaming devices that do not have inherent support for player tracking functions. Such an embodiment of the universal game monitoring unit 410 enables the above described functionality to be achieved without making changes in the approved software of the existing gaming devices. This is of material value to the operators of such networks, and is accomplished by using a system-to-system interface that enables more rapid and economical implementation of such a player tracking system than would be possible using more traditional techniques.

[0192] In this regard, FIG. 17 shows a gaming system that is well known in the art, which connects gaming devices through networking equipment to backend computer systems that provide control and accounting functions. Specifically, FIG. 18 shows a traditional gaming system that includes a gaming device networked to an accounting and control system server, and in which the gaming system does not include a player tracking system or a game monitoring unit (GMU). However, player tracking systems have since become desirable and relatively common after a time when configurations such as that shown in FIG. 18 were the standard. Therefore, new system configurations were needed that would incorporate player tracking functionality. Accordingly, FIG. 19 illustrates a traditional gaming system that includes a gaming device networked to both an accounting and control system server and a player tracking system server. Continuing, in this configuration the gaming devices use a game monitoring unit to collect accounting and other information from the game main processing unit and to provide player tracking capability.

[0193] In this regard, a preferred embodiment of the universal game monitoring unit 410 provides a mechanism for implementing a player tracking system with a wide array of potential marketing and game enhancing features. The universal game monitoring unit 410 can be implemented in any type of environment where a system gathers game play data from gaming devices without requiring any software modifications to the gaming devices themselves. Referring now to FIG. 20, a novel gaming system is illustrated that includes a gaming device networked to an accounting and control system server and a player tracking system server. In this embodiment, the gaming device includes a game monitoring unit and a game processor (e.g., a master processing unit (MPU)) that are each independently connected to a gaming network that is in turn independently connected to the accounting and control system server and to the player tracking system server. In this embodiment, there is not direct connection between the game monitoring unit and a master processing unit. Such a connection would require the software modifications to the gaming devices modifications referenced above.

[0194] As shown in FIG. 20, in one preferred embodiment, the universal game monitoring unit uses a separate processing element from the master processing unit (MPU). The peripherals in the gaming device communicate with a central computer system. In this embodiment, the universal game monitoring unit 410 is co-resident in the gaming device with the main processing unit, but is electrically and logically independent of that unit. All necessary exchange of data occurs

via the central computer.

[0195] In a traditional casino system, such as the system shown in FIG. 19, a game monitoring unit (e.g., a game monitoring unit (GMU)) or other player tracking device communicates with both a central computer, (such as the Slot Data System, produced by Bally Gaming and Systems) and a game processor. In this traditional configuration, the game processor is resident in the gaming cabinet and the central computer is in a remote location (possibly, but not necessarily in the same building). When a player inserts a player tracking card into the gaming device, a signal is sent to the GMU. The GMU communicates with the game processor (using a communications protocol, (e.g., Slot Accounting System®)) to gather the state of the "meters" that record the activity level of the machine. The meter information is appended to the identification information read from the card and a message containing at least that data is sent to the central system, where it is recorded in a database for future use.

[0196] Continuing, in such a traditional configuration, when a user plays games the gaming machine, the main processor updates the "meters" to record changes in the amount of play, amount of wins, and other specific information which may contribute to the characterization of the play. Additionally, the processor may notify the central computer when a threshold is reached or other marketing information is detected. When the user ceases playing, the user typically removes the player tracking card from the machine. This causes a signal to be sent to the game monitoring unit which again determines the updated meter readings for the gaming device and sends a message to the central system that indicates that the player's card has been removed. Additionally, updated meter information is attached. In some embodiments, information on the player's activity during the play session is sent as well as, or alternatively to, the meter information. In this regard, the game play information is generally recorded in the system database and used for an array of marketing functions.

[0197] In contrast, in a system configuration that implements a preferred embodiment of the universal game monitoring unit 410 (e.g., FIG. 20), there is no direct communication between the universal game monitoring unit 410 and the game processor, yet equivalent functionality is obtained. Instead, the universal game monitoring unit 410 utilizes the central system, which has access to real-time game play information. Preferably, this information is collected in real-time (i.e., approximately once per play period - about 5 seconds). This data collection rate coincides with the collection rate of "high speed" networks (e.g., Ethernet and the like). Referring now to FIG. 20, in another aspect of a preferred embodiment, a real-time Application Program Interface (API) is utilized that enables a player tracking and marketing server to access game play information. This can be done at a particular machine by querying the central computer, such as an accounting and control system computer.

[0198] Generally stated, a preferred embodiment of the universal game monitoring unit 410 is directed towards adapting gaming network that does not have player tracking to include those capabilities without requiring software changes in the individual gaming devices. In one embodiment, as shown in FIG. 17, gaming devices are interconnected via a local communication network. In this embodiment, the network can adopt many methodologies, depending on the designer and installer of the system. It may be one of several forms of serial networks, such as a hub arrangement or, more typically, a multi-drop polled system. Alternatively, the network may be an Ethernet link using Internet Protocol (an IP network). The network is to enables bi-directional communication between a multiplicity of gaming devices and a central computer, either directly, or through the use of a local concentration device. In some embodiments, a local concentration device may take the form of a general purpose computer or a proprietary device developed by a supplier to perform communications functions and, in some cases, ancillary functions, such as encryption, ticket validation, report generation and other operations functions.

[0199] The gaming devices are utilized by customers to play many different types of games (e.g., games of chance and/or skill). Their play and winnings are monitored by the game processor in the gaming device, and the information is posted in a timely fashion (e.g., within 10 seconds) to the accounting and control system. That cycle of operation is typical of many systems in operation today. The game machines may play many types of games, including by way of example only, and not by way of limitation: traditional casino style games with mechanical, electro-mechanical or video reels, poker games, video games with bonus modes or bonus devices, bingo-based games, central determination games, or various skill games. Prizes may range from small to progressive games with very large jackpots that accumulate over play from games at many locations.

[0200] Referring again to FIG. 20, in a preferred embodiment, a universal game monitoring unit may be installed within, attached to, or in close proximity to the gaming machine. The universal game monitoring unit enables the recording of customer game play at gaming devices in a gaming network. The game play data is used for marketing purposes and also can provide a wide array of game enhancing functions, including by way of example only, and not by way of limitation: advertising, free giveaways, bonus games, promotions, and any other action that requires an interactive point-of-sale experience for the player. The universal game monitoring unit is capable of controlling of array of peripherals devices, including one of many types of player identification devices. These include read magnetic striped card readers, smart card readers, biometric identifiers, radio frequency identification devices (RFID), and any other device that is machine readable and provides an identifying token (which can be associated with a player, either solely, or in combination with other tokens). For example, a fingerprint reader may not have enough precision to uniquely identify a player, but in combination with an account identification obtained by reading a card or manual input, can be used to ensure that a

unique identification is made.

[0201] Referring now to FIG. 21, in a preferred embodiment, the player tracking transaction begins when a customer inserts a player tracking card, or otherwise identifies himself to the universal game monitoring unit. The universal game monitoring unit formulates a message to a player tracking computer that contains the identification of the player who has identified himself. Typically, this identification is in the form of a number (or string) that uniquely identifies an account. The system validates that this is a known account and accesses an API that enables it to communicate with the accounting and control computer. The accounting and control computer accesses its own data storage and retrieves the game play meters for the gaming device which contains the activated universal game monitoring unit. Game play information is then returned through the API to the player tracking computer, which records initial values for the player's play session. Typically, a message is then returned to the universal game monitoring unit, which provides a greeting message to the player, and confirms that their game play is being tracked.

[0202] As the player plays games on the gaming device, the accounting/control computer updates its internal game play information. When the player completes his play session, he indicates to the system that he is concluding his play. Typically, this is done by removing his identification card (or equivalent token), although other means are possible, such as depressing a button. When this occurs, the universal game monitoring unit sends a message to the player tracking computer that provides the player's identification. The player tracking computer again accesses the API to the accounting/control computer and retrieves ending meters for the player's session (or other equivalent data). The player tracking computer then records the player's total play in the player's data record, which may qualify the player for marketing (or other) rewards. This data is then also available to the gaming system operator for use in a wide array of marketing programs.

[0203] Although the invention has been described in language specific to computer structural features, methodological acts, and by computer readable media, it is to be understood that the invention defined in the appended claims is not necessarily limited to the specific structures, acts, or media described. Therefore, the specific structural features, acts and mediums are disclosed as exemplary embodiments implementing the invention.

[0204] Furthermore, the various embodiments described above are provided by way of illustration only and should not be construed to limit the invention. Those skilled in the art will readily recognize various modifications and changes that may be made to the invention without following the example embodiments and applications illustrated and described herein, and without departing from the true spirit and scope of the invention, which is set forth in the following claims.

Claims

1. An embedded user interface incorporated into a gaming device, the gaming device including a gaming presentation of a base game and a gaming processor for controlling the base game, wherein the gaming processor of the gaming device enables play of the base game without requiring use of the embedded user interface, the embedded user interface comprising:

   a player tracking interface including a display screen, wherein the player tracking interface enables display of a system game to a user, wherein the player tracking interface enables presentation of information to the user, and wherein the player tracking interface enables reception of information from the user; and
   an embedded processor, wherein the embedded processor employs an internal operating system and communicates with the gaming processor, wherein the embedded processor enables control of the system game and player tracking information;

   wherein the embedded user interface enables control of a system game of which at least a portion of the system game is presented physically external to the display screen; and
   wherein the embedded user interface enables control of a system game indicator that is physically external to the display screen.

2. The embedded user interface of claim 1, wherein at least one of the portion of the system game that is presented physically external to the embedded user interface or the system game indicator that is physically external to the display screen includes: an additional gaming presentation.

3. The embedded user interface of claim 1, wherein at least one of the portion of the system game that is presented physically external to the embedded user interface or the system game indicator that is physically external to the display screen includes: an additional display screen.

4. The embedded user interface of claim 1, wherein at least one of the portion of the system game that is presented

physically external to the embedded user interface or the system game indicator that is physically external to the display screen includes: a wheel.

5. The embedded user interface of claim 1, wherein at least one of the portion of the system game that is presented physically external to the embedded user interface or the system game indicator that is physically external to the display screen includes: one or more reels.

6. The embedded user interface of claim 1, wherein at least one of the portion of the system game that is presented physically external to the embedded user interface or the system game indicator that is physically external to the display screen includes: a sound-generating mechanism.

7. The embedded user interface of claim 1, wherein at least one of the portion of the system game that is presented physically external to the embedded user interface or the system game indicator that is physically external to the display screen includes: one or more lights.

8. An embedded user interface system incorporated into a gaming device, the gaming device including a gaming presentation of a base game and a gaming processor for controlling the base game, wherein the gaming processor of the gaming device enables play of the base game without requiring use of the embedded user interface system, the embedded user interface system comprising:

a player tracking interface including a display screen, wherein the player tracking interface enables display of a system game to a user, wherein the player tracking interface enables presentation of information to the user, and wherein the player tracking interface enables reception of information from the user; and
an embedded processor, wherein the embedded processor employs an internal operating system and communicates with the gaming processor, wherein the embedded processor enables control of the system game and player tracking information;

wherein the embedded user interface enables control of a system game of which at least a portion of the system game is presented physically external to the display screen; and
wherein the embedded user interface enables control of a system game indicator that is physically external to the display screen.

9. The embedded user interface system of claim 8, wherein at least one of the portion of the system game that is presented physically external to the embedded user interface or the system game indicator that is physically external to the display screen includes: an additional gaming presentation.

10. The embedded user interface system of claim 8, wherein at least one of the portion of the system game that is presented physically external to the embedded user interface or the system game indicator that is physically external to the display screen includes: an additional display screen.

11. The embedded user interface system of claim 8, wherein at least one of the portion of the system game that is presented physically external to the embedded user interface or the system game indicator that is physically external to the display screen includes: a wheel.

12. The embedded user interface system of claim 8, wherein at least one of the portion of the system game that is presented physically external to the embedded user interface or the system game indicator that is physically external to the display screen includes: one or more reels.

13. The embedded user interface system of claim 8, wherein at least one of the portion of the system game that is presented physically external to the embedded user interface or the system game indicator that is physically external to the display screen includes: a sound-generating mechanism.

14. The embedded user interface system of claim 8, wherein at least one of the portion of the system game that is presented physically external to the embedded user interface or the system game indicator that is physically external to the display screen includes: one or more lights.

15. An embedded user interface system incorporated into a gaming device, the gaming device including a gaming presentation of a base game and a gaming processor for controlling the base game, wherein the gaming processor

of the gaming device enables play of the base game without requiring use of the embedded user interface system, the embedded user interface system comprising:

a player tracking interface including a display screen, wherein the player tracking interface enables display of a system game to a user, wherein the player tracking interface enables presentation of information to the user, and wherein the player tracking interface enables reception of information from the user; and
an embedded processor, wherein the embedded processor employs an internal operating system and communicates with the gaming processor, wherein the embedded processor enables control of the system game and player tracking information;

wherein the embedded user interface enables control of a system game of which at least a portion of the system game is presented physically external to the display screen.

16. The embedded user interface system of claim 15, wherein the portion of the system game that is presented physically external to the display screen includes: an additional gaming presentation.

17. The embedded user interface system of claim 15, wherein the portion of the system game that is presented physically external to the display screen includes: an additional display screen.

18. The embedded user interface system of claim 15, wherein the portion of the system game that is presented physically external to the display screen includes: a wheel.

19. The embedded user interface system of claim 15, wherein the portion of the system game that is presented physically external to the display screen includes: one or more reels.

20. The embedded user interface system of claim 15, wherein the portion of the system game that is presented physically external to the display screen includes: a sound generating mechanism.

21. The embedded user interface system of claim 15, wherein the portion of the system game that is presented physically external to the display screen includes: one or more lights.

22. An embedded user interface system incorporated into a gaming device, the gaming device including a gaming presentation of a base game and a gaming processor for controlling the base game, wherein the gaming processor of the gaming device enables play of the base game without requiring use of the embedded user interface system, the embedded user interface system comprising:

a player tracking interface including a display screen, wherein the player tracking interface enables display of a system game to a user, wherein the player tracking interface enables presentation of information to the user, and wherein the player tracking interface enables reception of information from the user; and
an embedded processor, wherein the embedded processor employs an internal operating system and communicates with the gaming processor, wherein the embedded processor enables control of the system game and player tracking information;

wherein the embedded user interface enables control of a system game indicator that is physically external to the display screen.

23. The embedded user interface system of claim 22, wherein the system game indicator that is physically external to the display screen includes: an additional gaming presentation.

24. The embedded user interface system of claim 22, wherein the system game indicator that is physically external to the display screen includes: an additional display screen.

25. The embedded user interface system of claim 22, wherein the system game indicator that is physically external to the display screen includes: a wheel.

26. The embedded user interface system of claim 22, wherein the system game indicator that is physically external to the display screen includes: one or more reels.

27. The embedded user interface system of claim 22, wherein the system game indicator that is physically external to the display screen includes: a sound-generating mechanism.

28. The embedded user interface system of claim 22, wherein the system game indicator that is physically external to the display screen includes: one or more lights.

29. A gaming system comprising:

a player tracking system server connected to a network, wherein the player tracking system server includes an application program interface;
an accounting and control system server connected to the network, wherein the player tracking system server includes an application program interface through which communication with the accounting and control system server is enabled via the application program interface of the player tracking system server;
one or more gaming devices connected to the network, wherein each gaming device includes a gaming presentation of a base game and a master processing unit for controlling the base game, and wherein the master processing unit enables communication with the accounting and control system server; and
an embedded user interface incorporated into each gaming device, wherein the embedded user interface enables communication with the player tracking system server, each embedded user interface comprising:

a player tracking interface including a display screen, wherein the player tracking interface enables display of a system game to a user, wherein the player tracking interface enables presentation of information to the user, and wherein the player tracking interface enables reception of information from the user; and
an embedded processor, wherein the embedded processor employs an internal operating system and communicates with the gaming processor, wherein the embedded processor enables control of the system game and player tracking information;

wherein communication between a master processing unit of a gaming device and an embedded user interface incorporated into said gaming device is only enabled through the network and is not direct enabled via a direct connection.

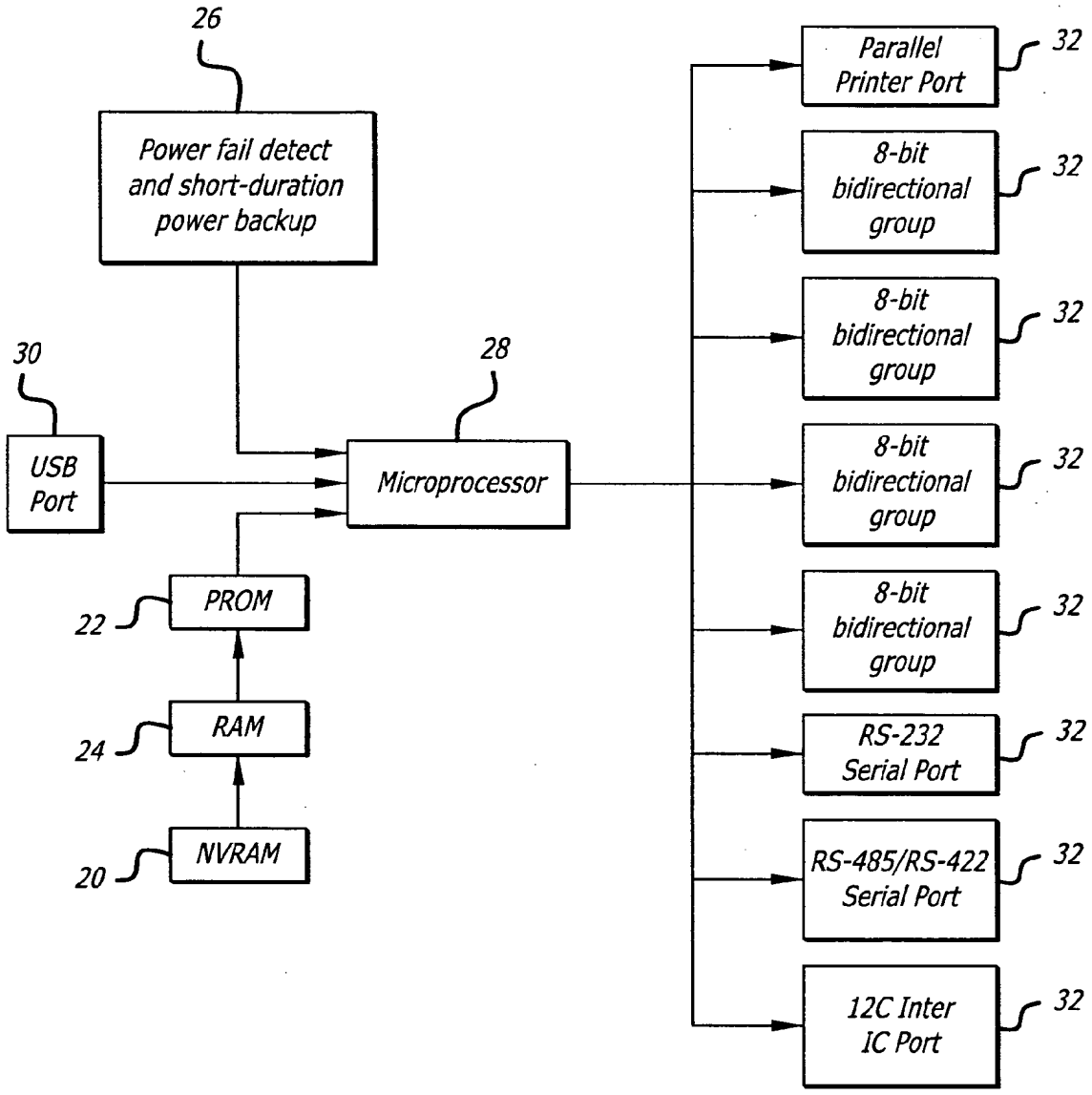

26
Power fail detect and short-duration power backup
30
USB Port
28
Microprocessor
22
PROM
24
RAM
20
NVRAM
Parallel Printer Port
32
8-bit bidirectional group
32
8-bit bidirectional group
32
8-bit bidirectional group
32
8-bit bidirectional group
32
RS-232 Serial Port
32
RS-485/RS-422 Serial Port
32
12C Inter IC Port
32

FIG. 1

FIG. 2

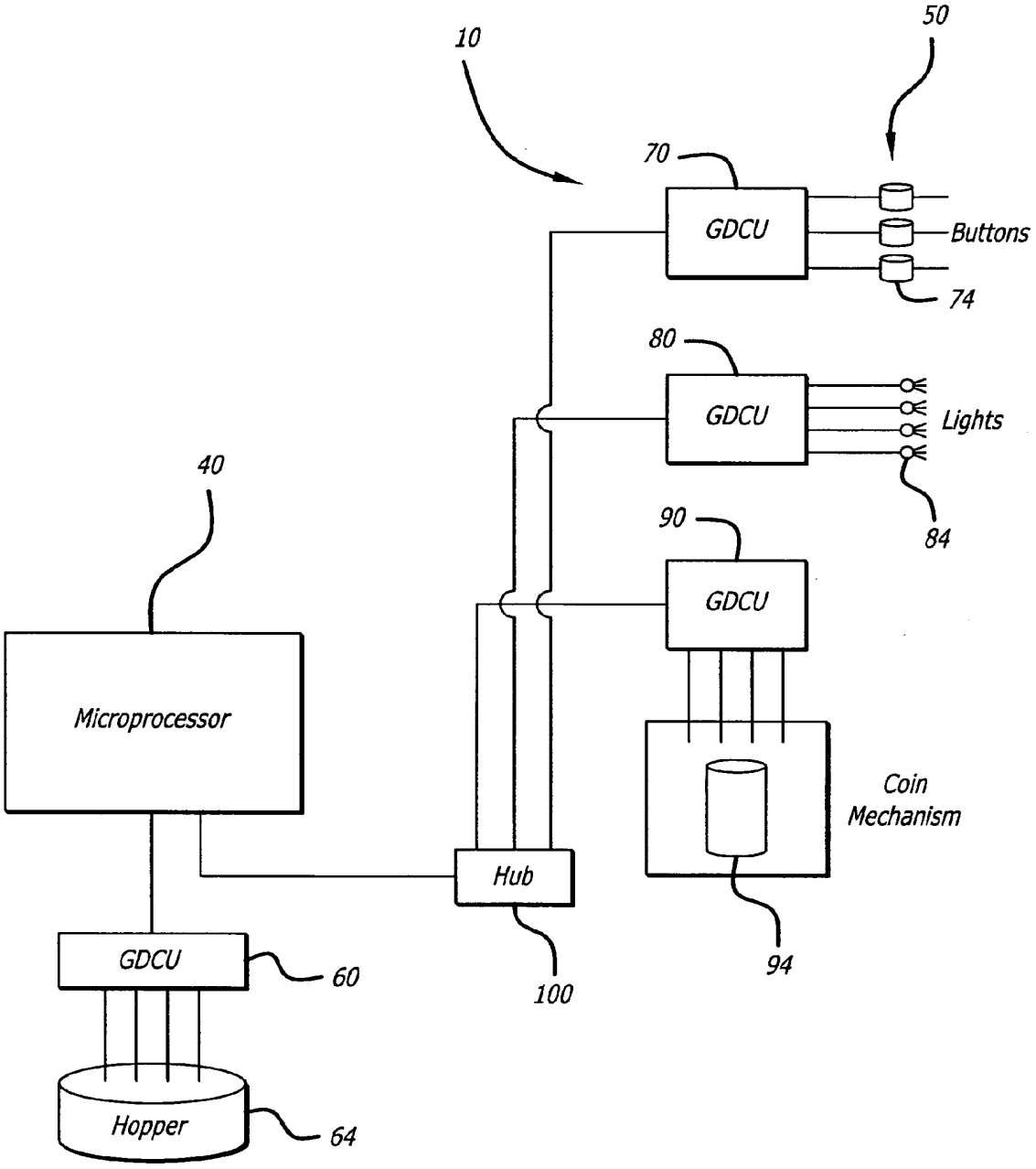

10
50
70
GDCU
Buttons
74
80
GDCU
Lights
84
40
90
GDCU
Microprocessor
Coin
Mechanism
Hub
GDCU
60
100
94
Hopper
64

FIG. 3

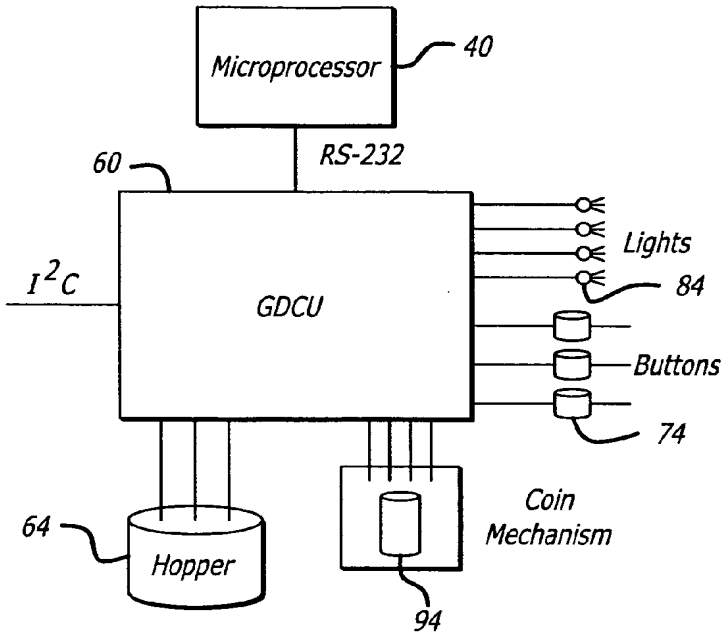
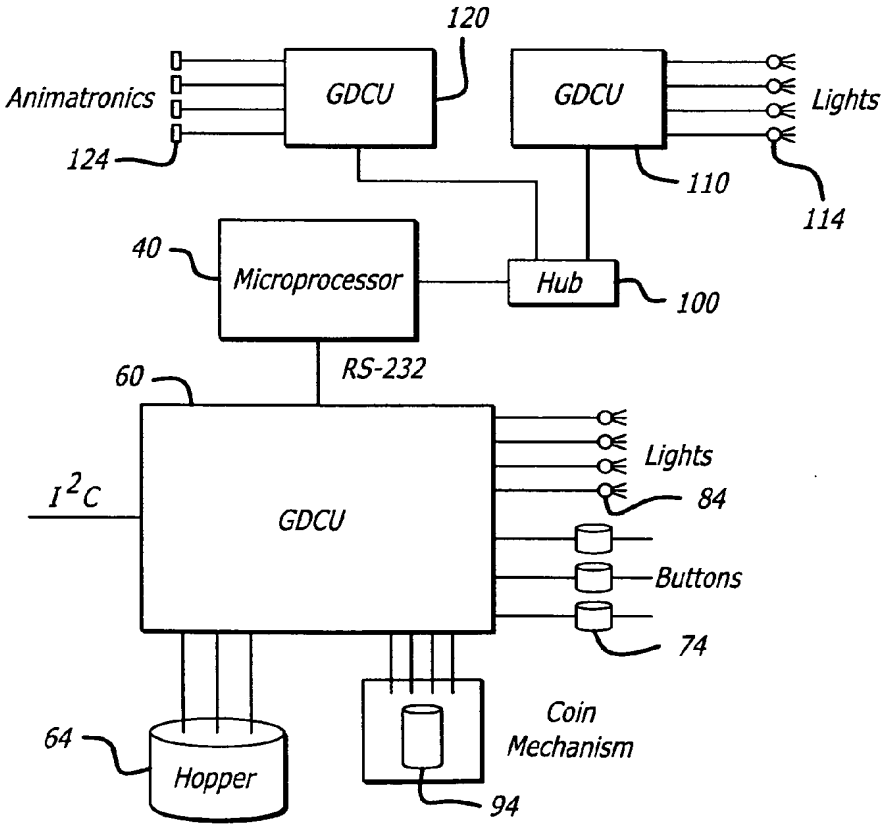

Microprocessor
40
RS-232
60
I²C
GDCU
Lights
84
Buttons
74
64
Hopper
Coin
Mechanism
94

FIG. 4


120
Animatronics
GDCU
GDCU
Lights
124
110
114
40
Microprocessor
Hub
100
RS-232
60
I²C
GDCU
Lights
84
Buttons
74
64
Hopper
Coin
Mechanism
94

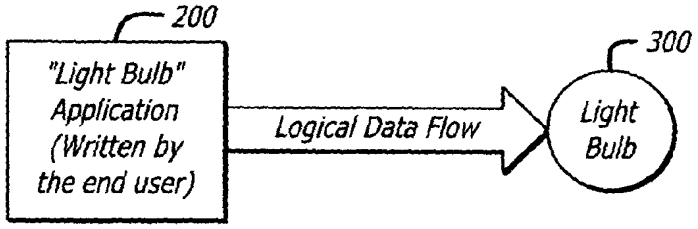

200
"Light Bulb" Application (Written by the end user)
Logical Data Flow
300
Light Bulb

FIG. 5A

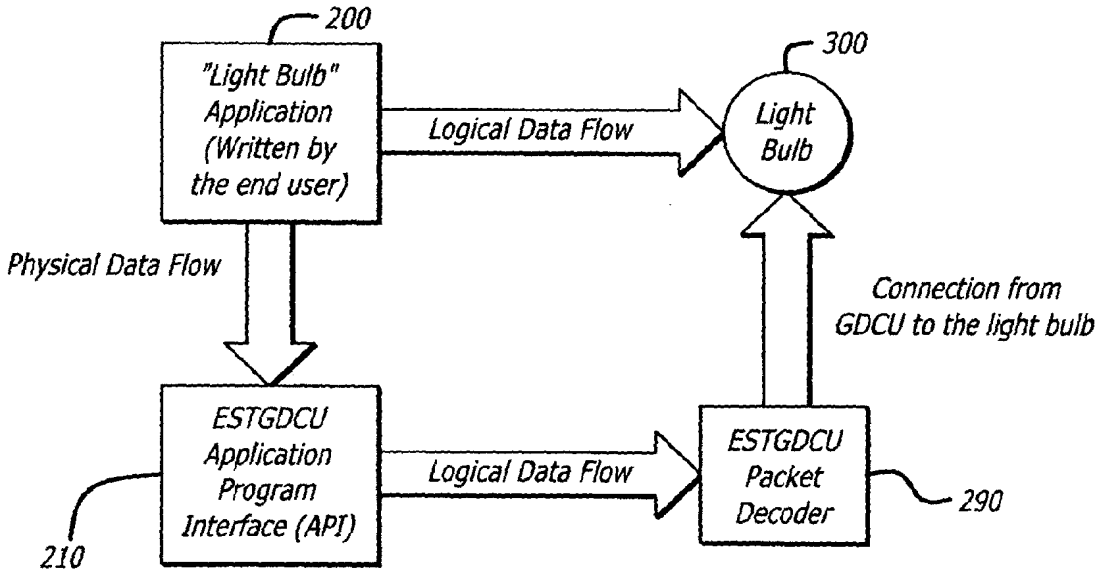

200
"Light Bulb" Application (Written by the end user)
Logical Data Flow
300
Light Bulb
Physical Data Flow
Connection from GDCU to the light bulb
ESTGDCU Application Program Interface (API)
Logical Data Flow
ESTGDCU Packet Decoder
290
210

FIG. 5B

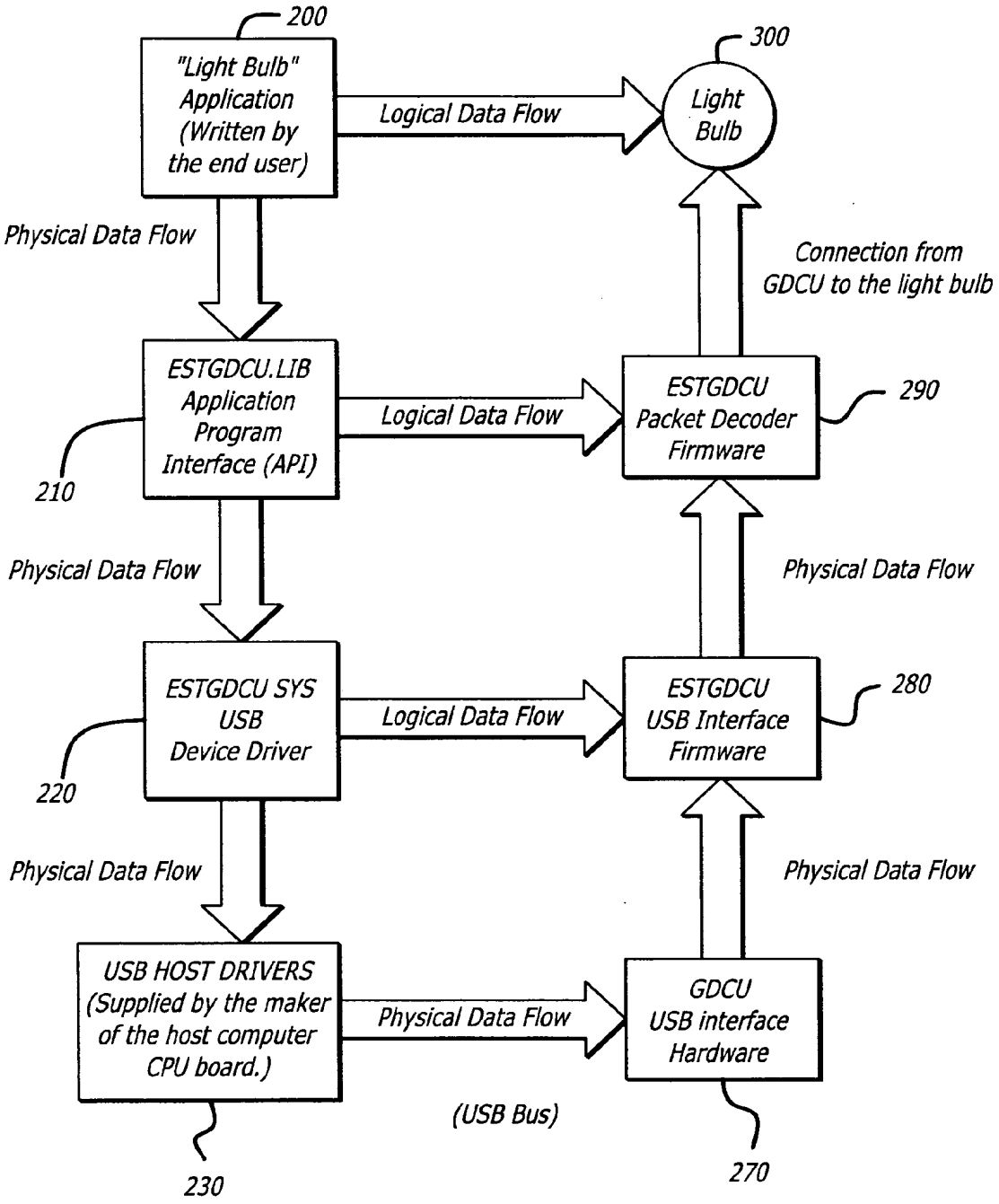

200
"Light Bulb" Application (Written by the end user)
Logical Data Flow
300
Light Bulb
Physical Data Flow
Connection from GDCU to the light bulb
ESTGDCU.LIB Application Program Interface (API)
210
Logical Data Flow
ESTGDCU Packet Decoder Firmware
290
Physical Data Flow
Physical Data Flow
ESTGDCU SYS USB Device Driver
220
Logical Data Flow
ESTGDCU USB Interface Firmware
280
Physical Data Flow
Physical Data Flow
USB HOST DRIVERS (Supplied by the maker of the host computer CPU board.)
Physical Data Flow
GDCU USB interface Hardware
(USB Bus)
230
270

FIG. 5C

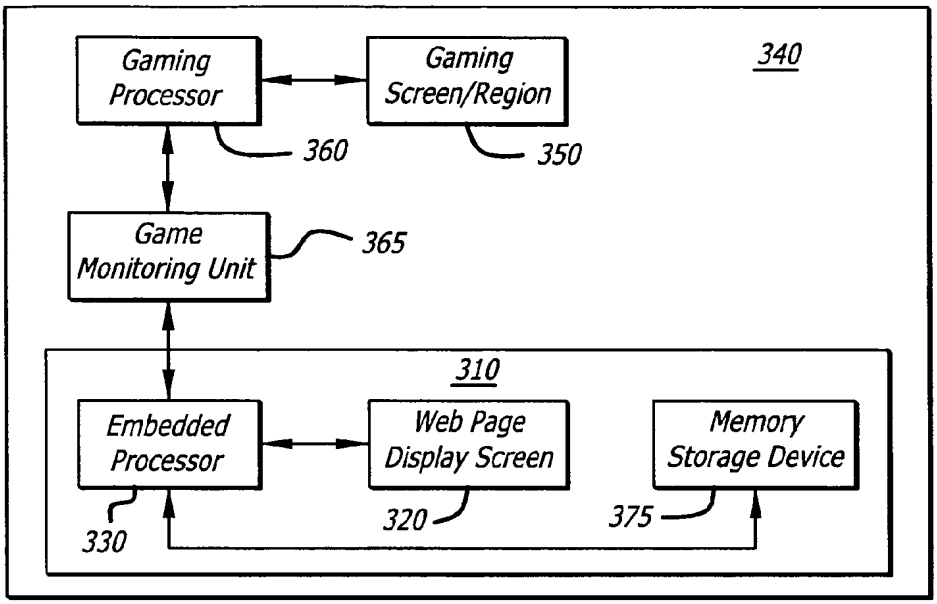

Gaming Processor
Gaming Screen/Region
340
360
350
Game Monitoring Unit
365
310
Embedded Processor
Web Page Display Screen
Memory Storage Device
330
320
375

FIG. 6

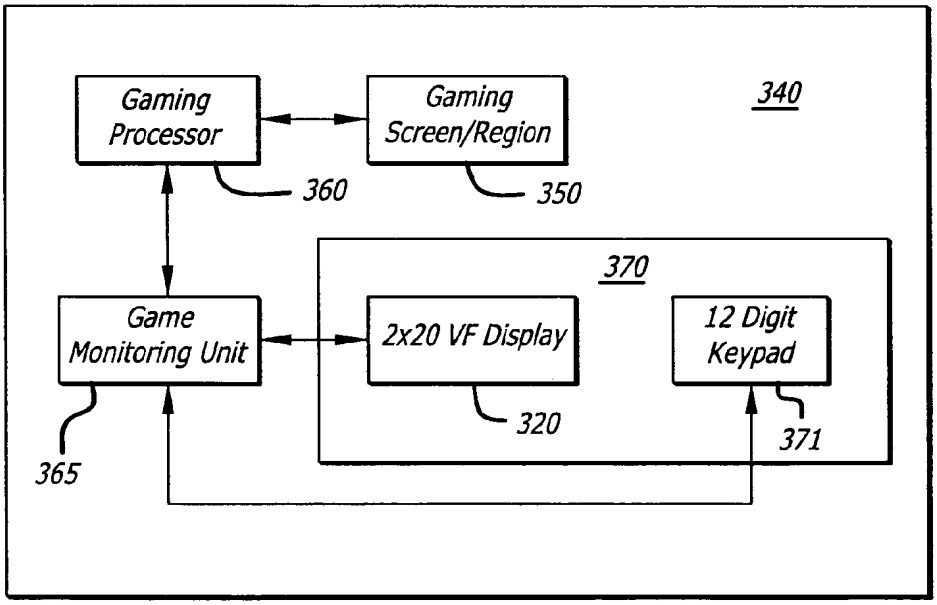

Gaming Processor
Gaming Screen/Region
340
360
350
370
Game Monitoring Unit
2x20 VF Display
12 Digit Keypad
320
371
365

FIG. 7

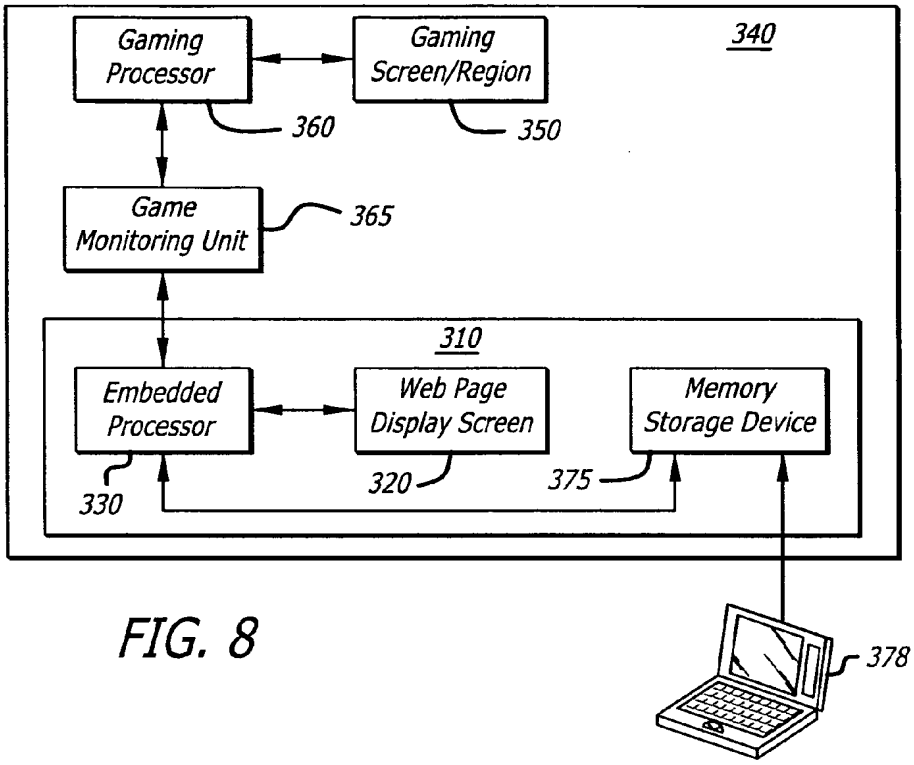

Gaming Processor
Gaming Screen/Region
340
360
350
Game Monitoring Unit
365
310
Embedded Processor
Web Page Display Screen
Memory Storage Device
330
320
375
378

FIG. 8

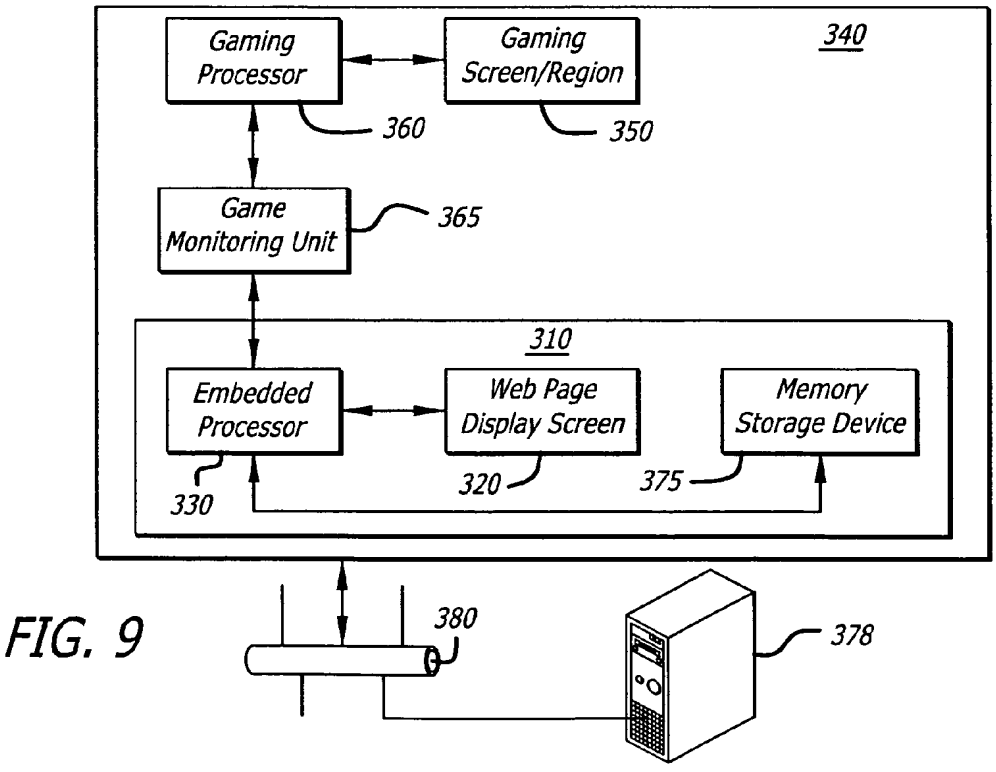

Gaming Processor
Gaming Screen/Region
340
360
350
Game Monitoring Unit
365
310
Embedded Processor
Web Page Display Screen
Memory Storage Device
330
320
375
380
378

FIG. 9

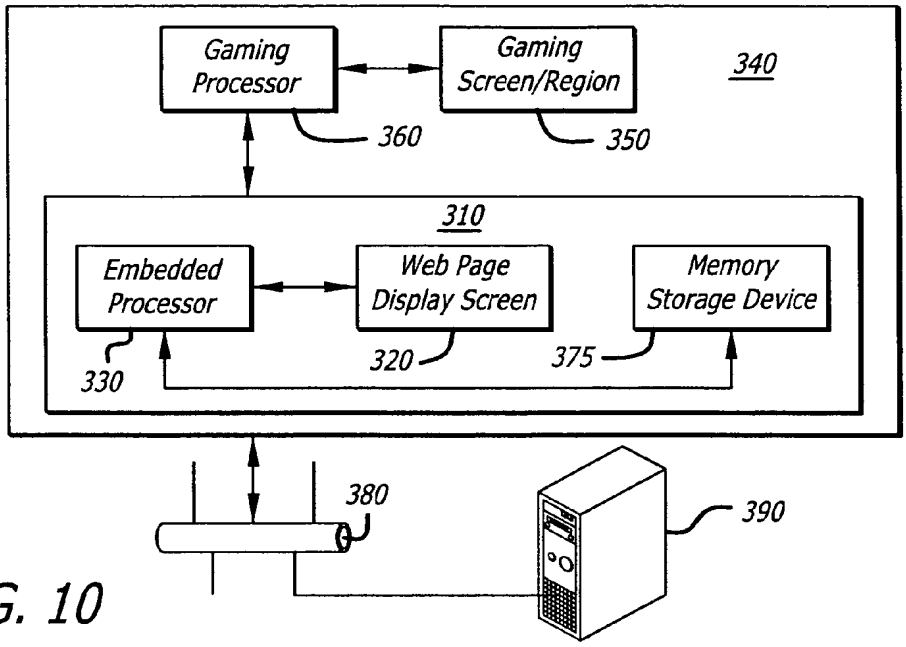

Gaming Processor
Gaming Screen/Region
340
360
350
310
Embedded Processor
Web Page Display Screen
Memory Storage Device
330
320
375
380
390

FIG. 10

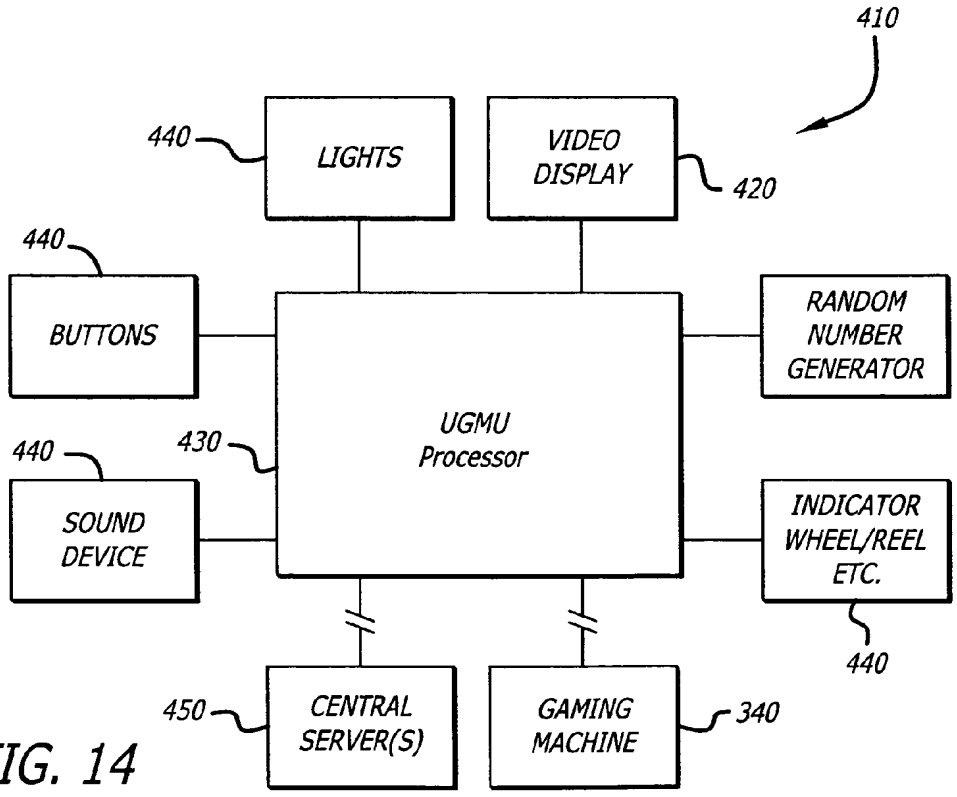

410
440
LIGHTS
VIDEO DISPLAY
420
440
BUTTONS
RANDOM NUMBER GENERATOR
UGMU Processor
430
440
SOUND DEVICE
INDICATOR WHEEL/REEL ETC.
440
450
CENTRAL SERVER(S)
GAMING MACHINE
340

FIG. 14

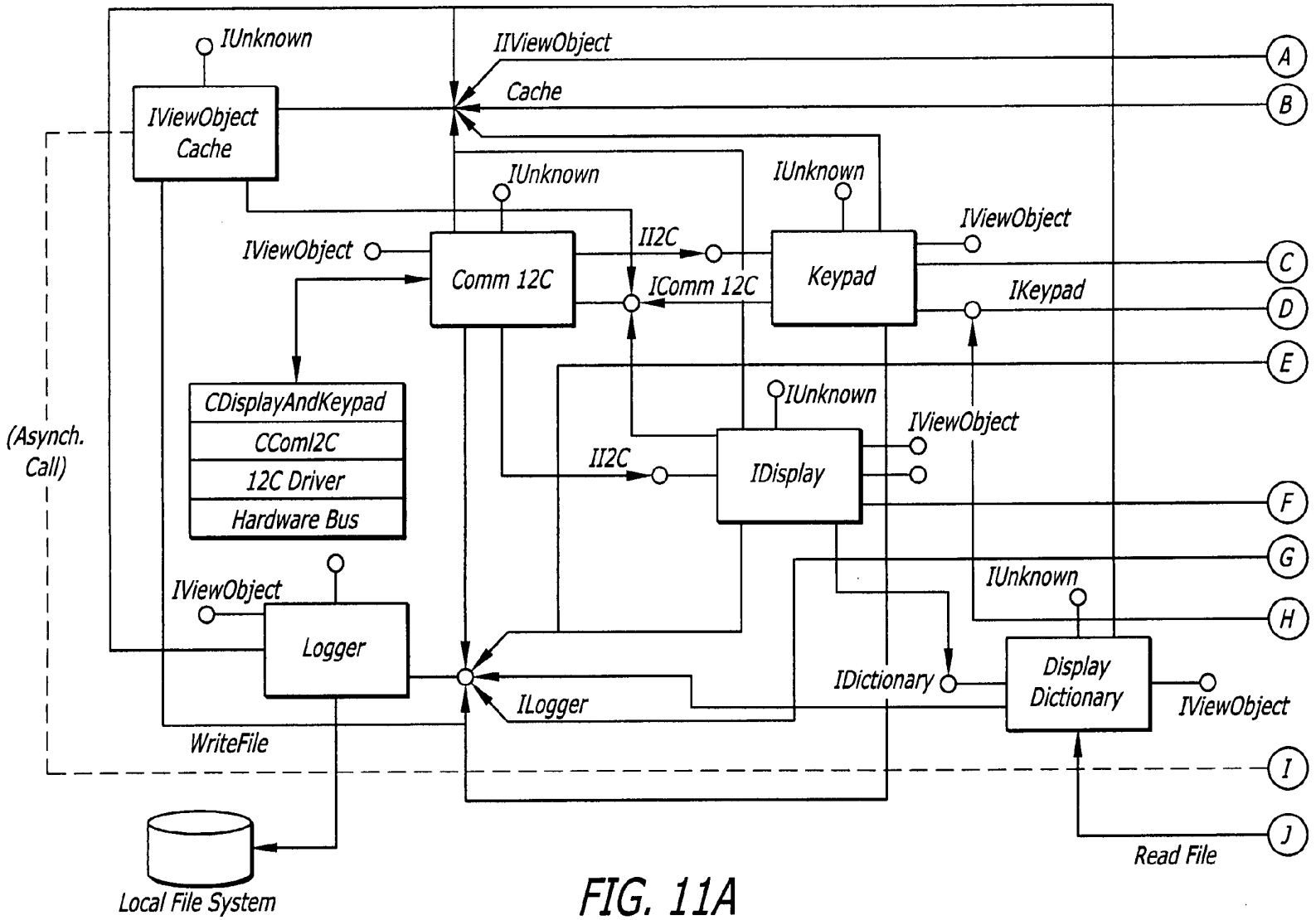


FIG. 11A

EP 1 879 143 A2

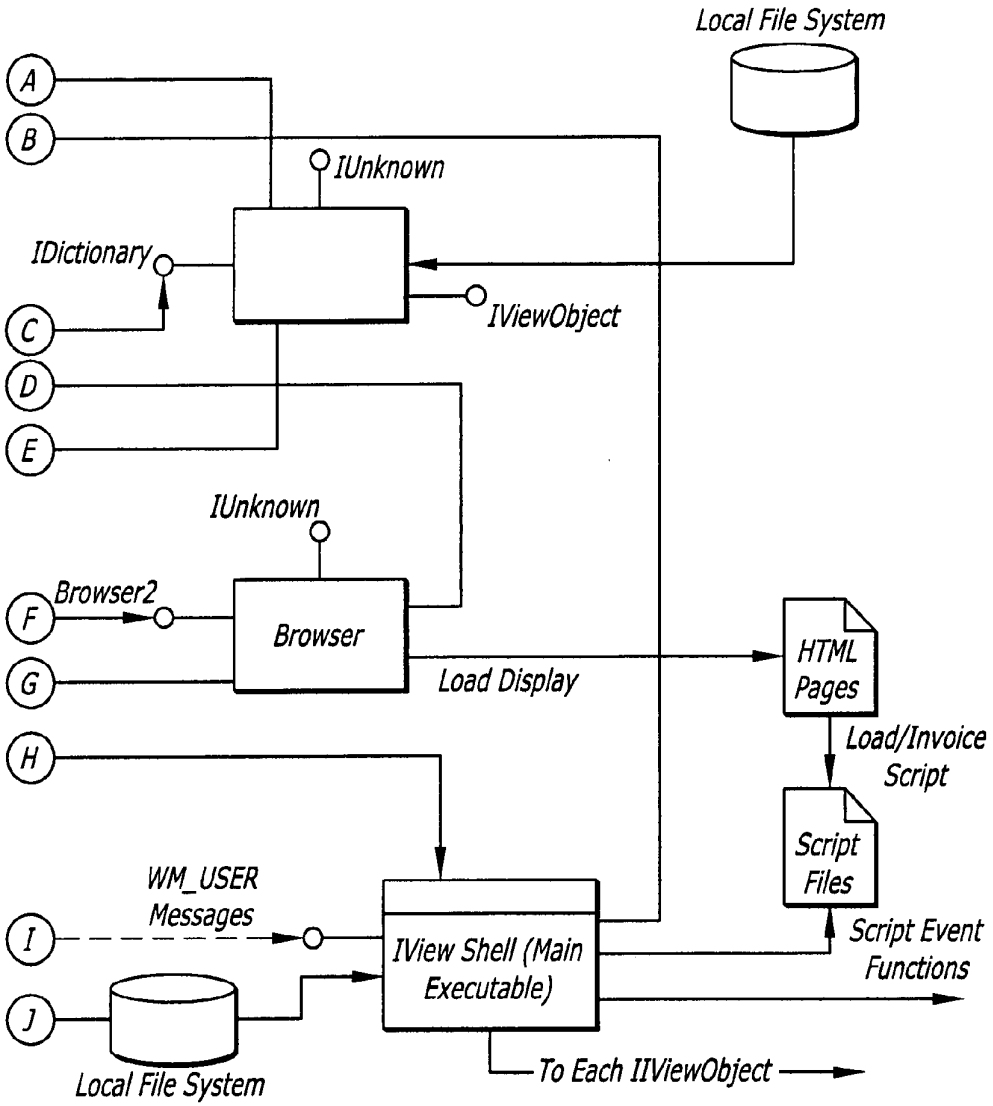

Local File System
A
B
IUnknown
IDictionary
IViewObject
C
D
E
IUnknown
Browser2
F
Browser
G
Load Display
HTML Pages
Load/Invoice Script
H
Script Files
WM_USER Messages
I
IView Shell (Main Executable)
Script Event Functions
J
Local File System
To Each IIViewObject

FIG. 11B

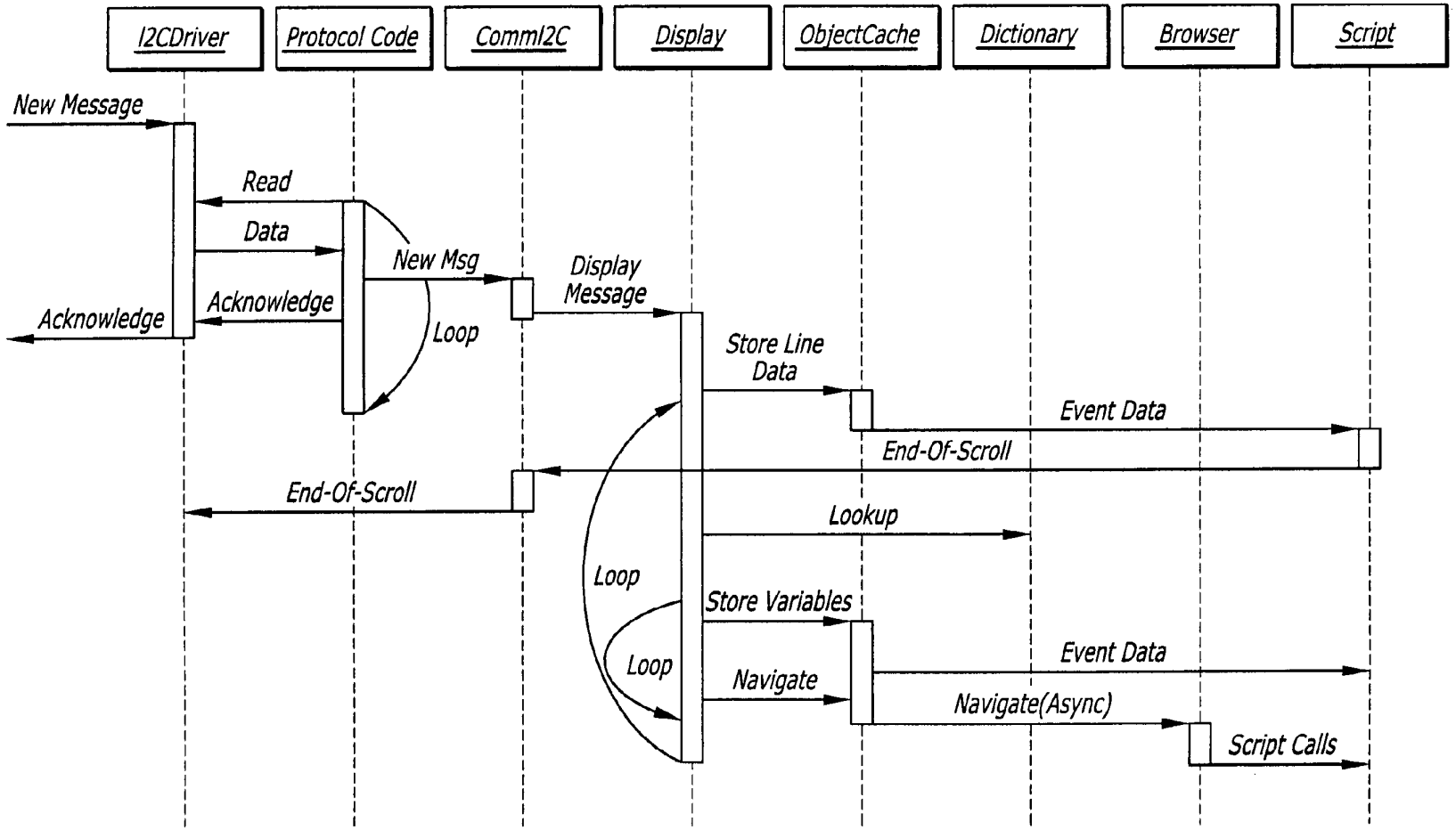

I2CDriver
Protocol Code
CommI2C
Display
ObjectCache
Dictionary
Browser
Script
New Message
Read
Data
New Msg
Display Message
Acknowledge
Acknowledge
Loop
Store Line Data
Event Data
End-Of-Scroll
End-Of-Scroll
Lookup
Loop
Store Variables
Loop
Navigate
Event Data
Navigate(Async)
Script Calls

FIG. 12

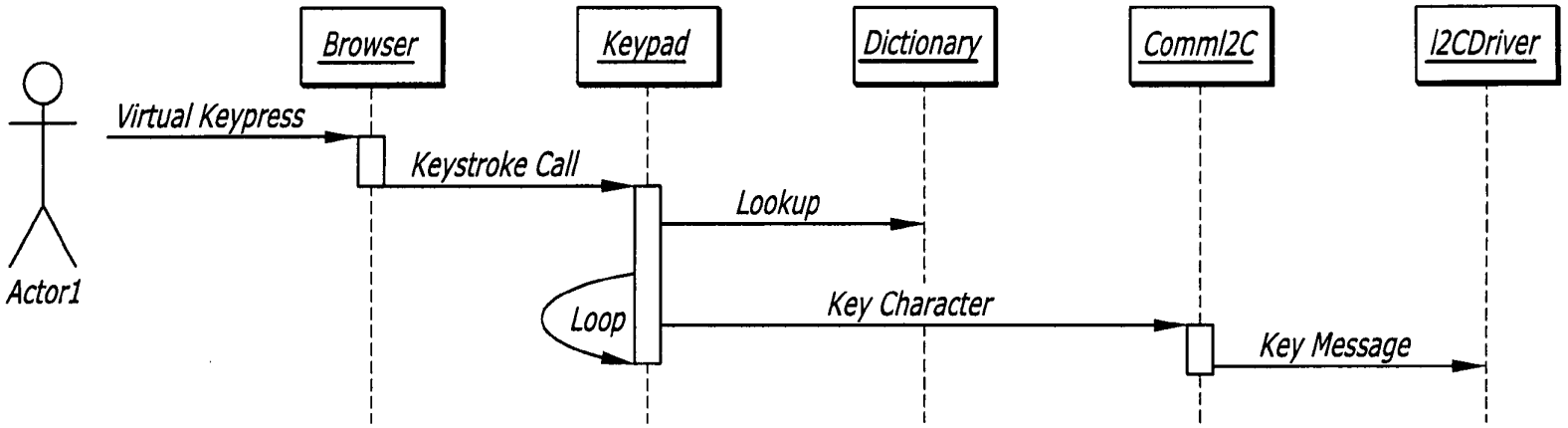
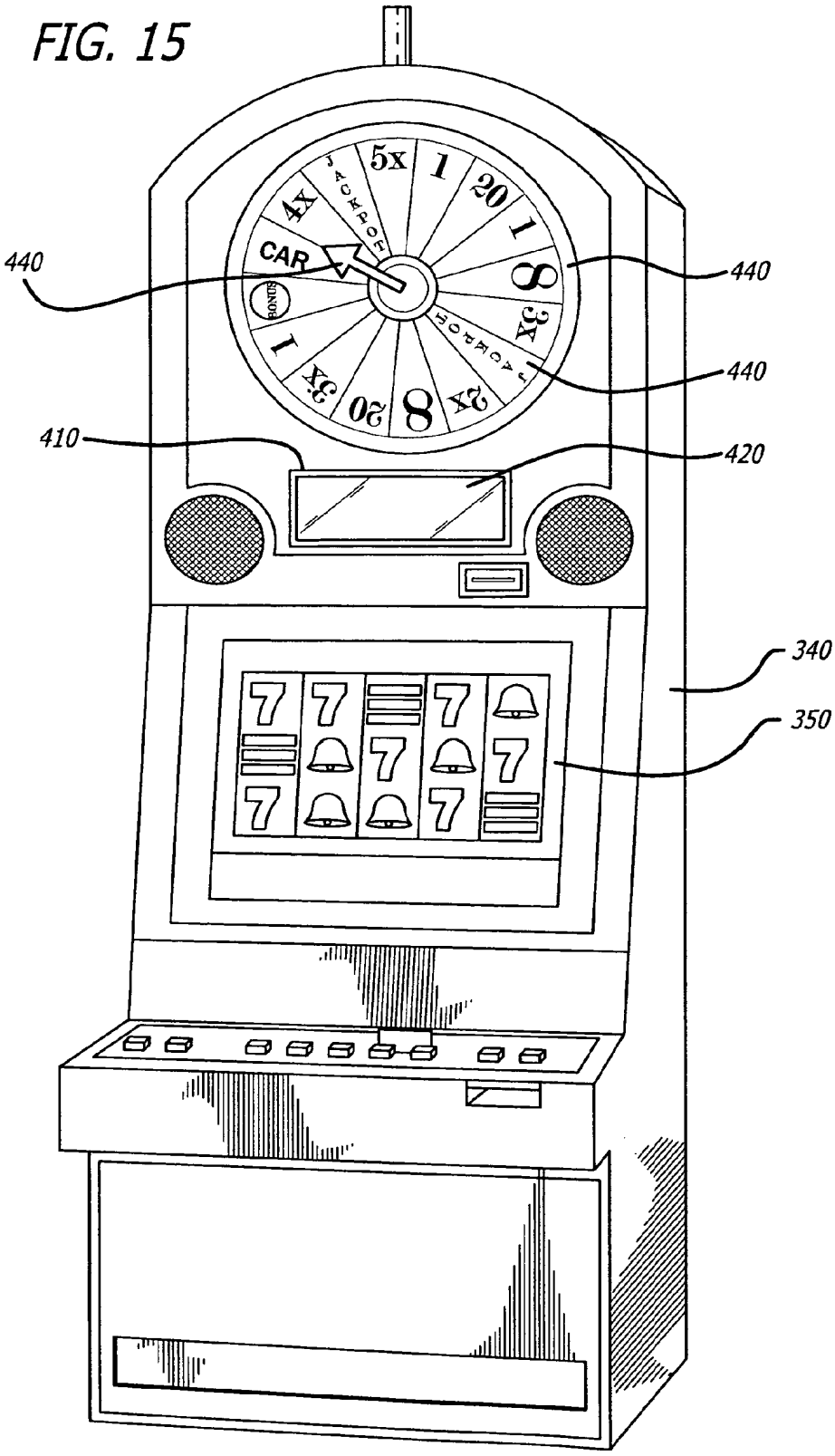

Browser
Keypad
Dictionary
CommI2C
I2CDriver
Actor1
Virtual Keypress
Keystroke Call
Lookup
Loop
Key Character
Key Message

FIG. 13

FIG. 15


440
440
440
440
410
420
340
350
5X
1
20
1
3X
2X
8
20
3X
1
4X
JACKPOT
CAR
BONUS
7

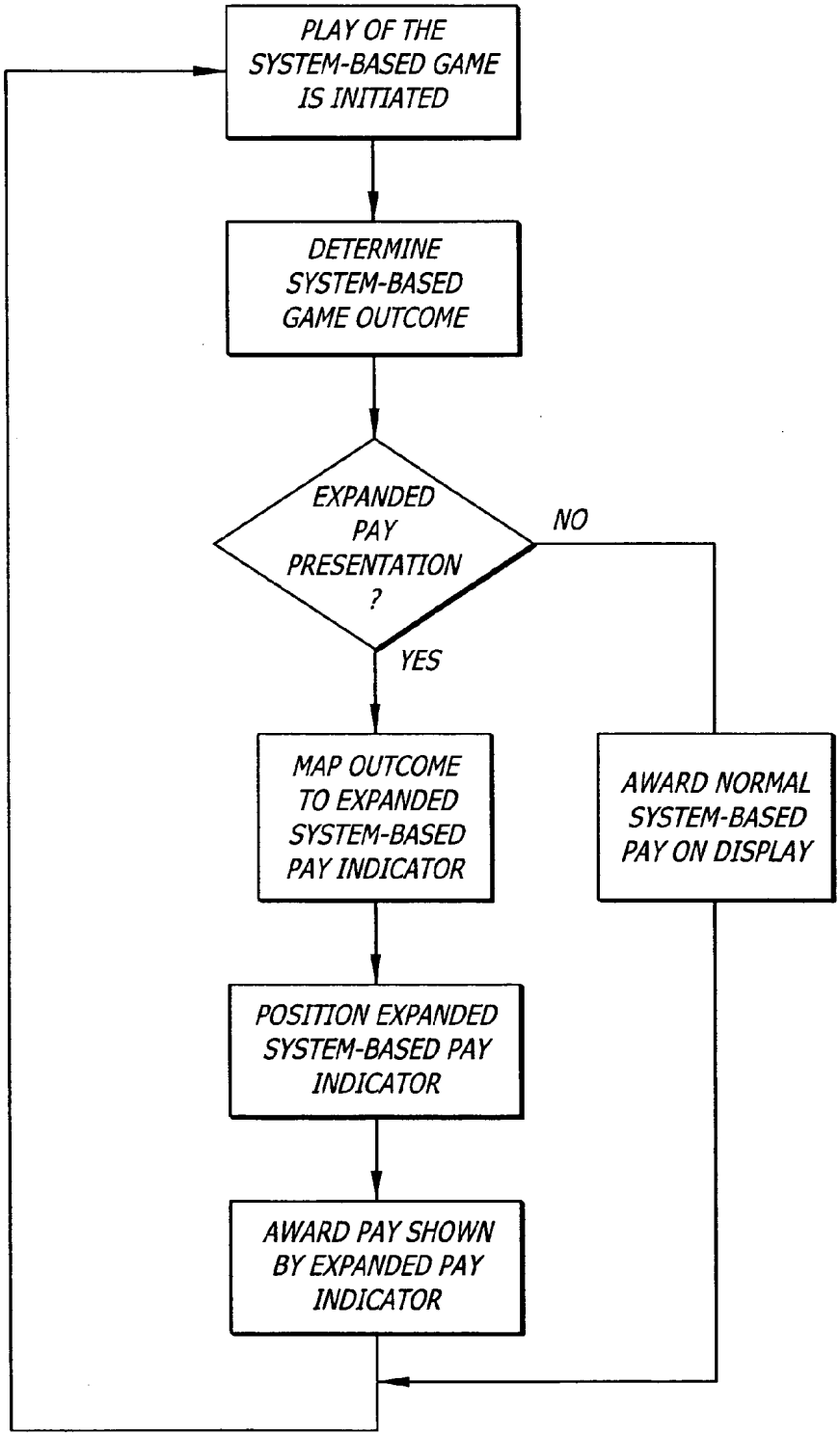

PLAY OF THE SYSTEM-BASED GAME IS INITIATED
DETERMINE SYSTEM-BASED GAME OUTCOME
EXPANDED PAY PRESENTATION ?
NO
YES
MAP OUTCOME TO EXPANDED SYSTEM-BASED PAY INDICATOR
AWARD NORMAL SYSTEM-BASED PAY ON DISPLAY
POSITION EXPANDED SYSTEM-BASED PAY INDICATOR
AWARD PAY SHOWN BY EXPANDED PAY INDICATOR

FIG. 16

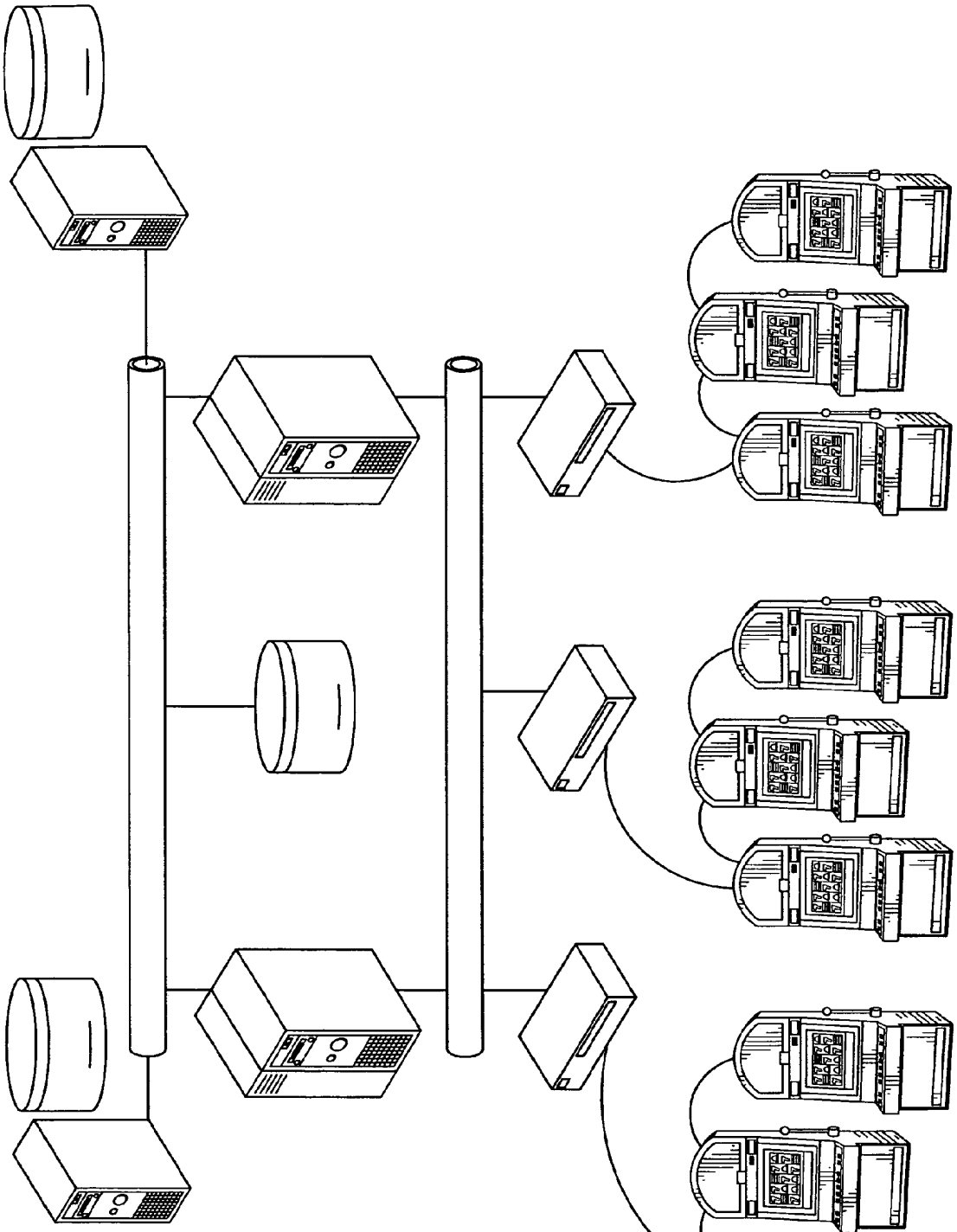


FIG. 17

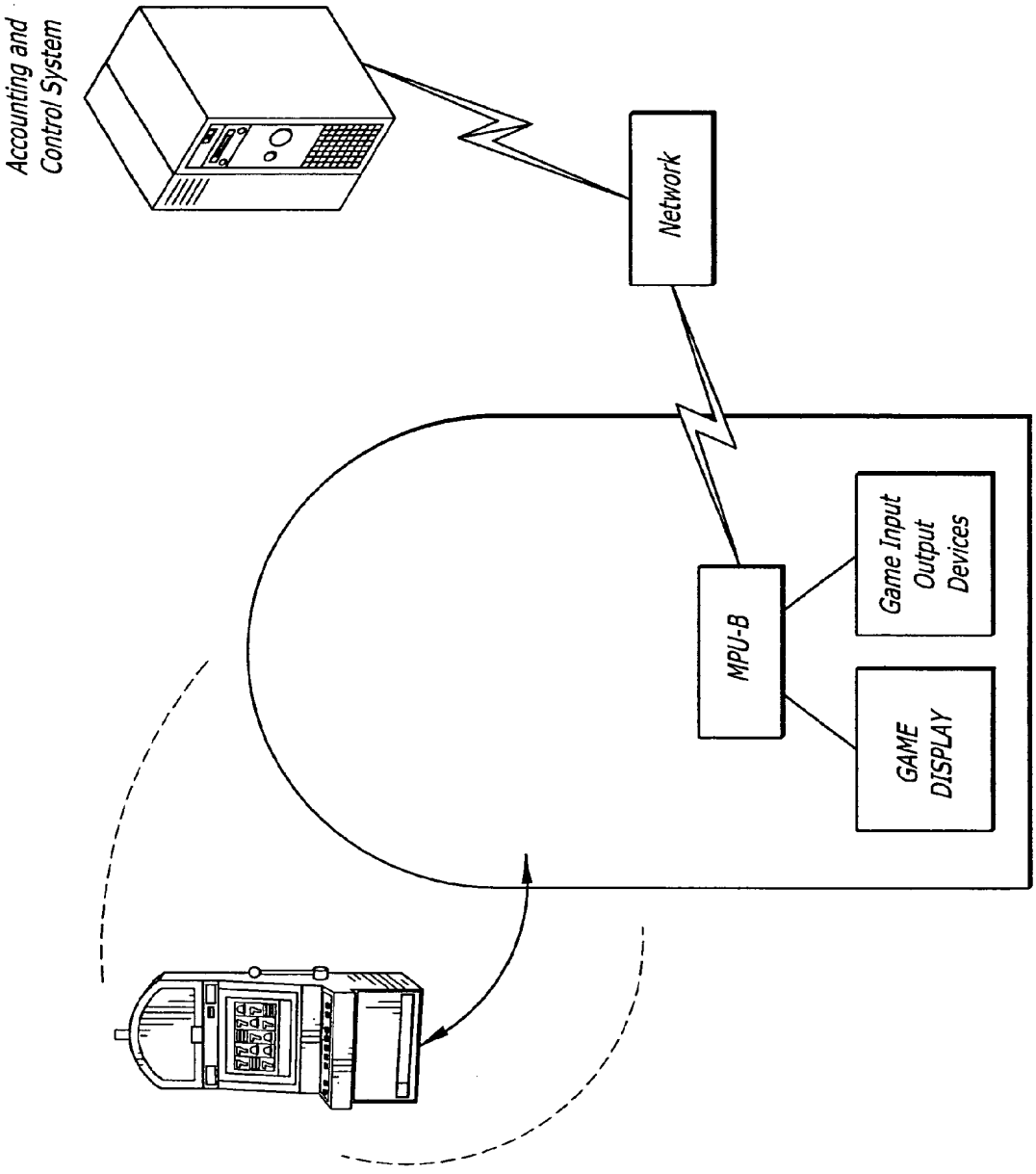

Accounting and Control System
Network
MPU-B
Game Input Output Devices
GAME DISPLAY

FIG. 18

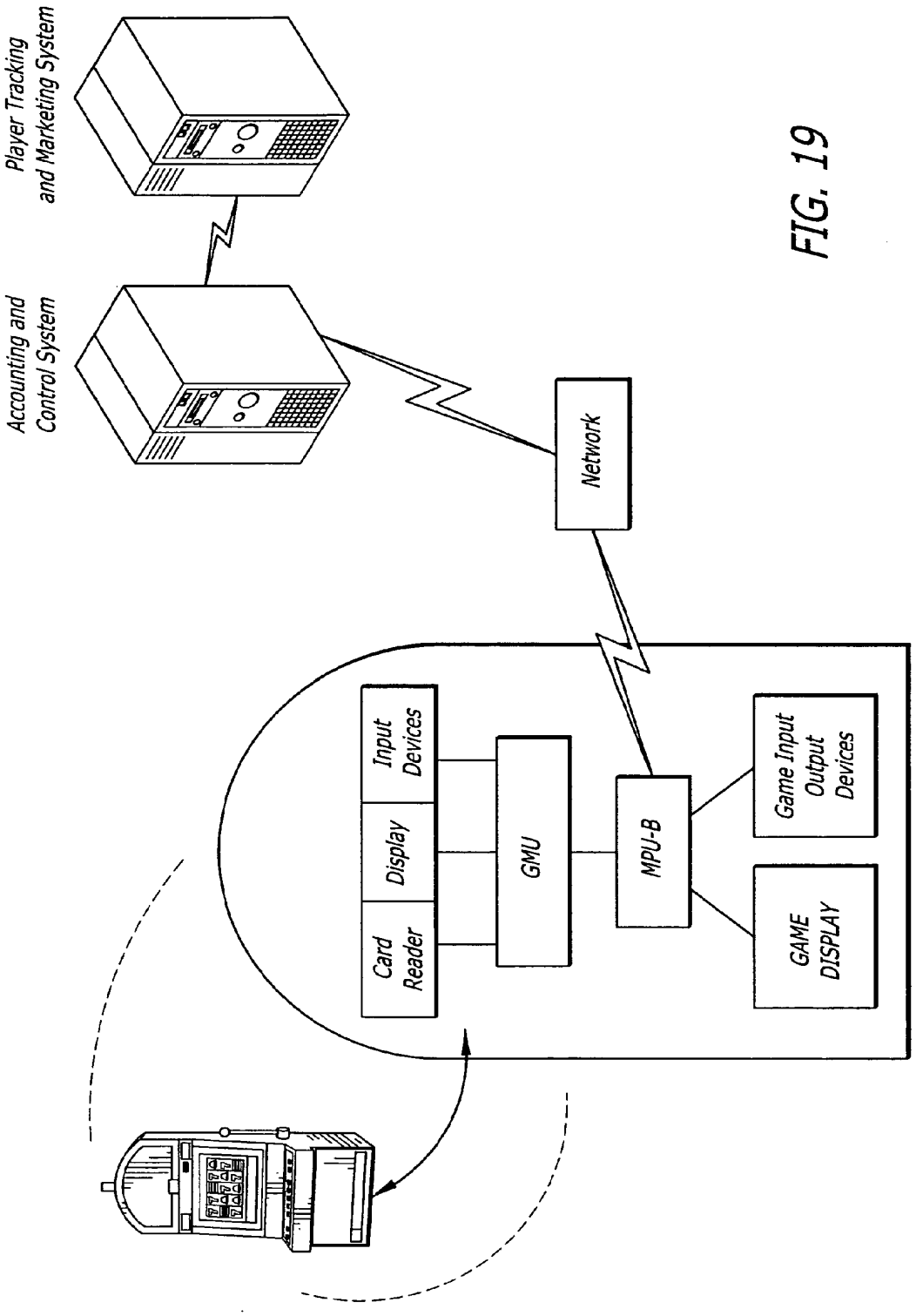
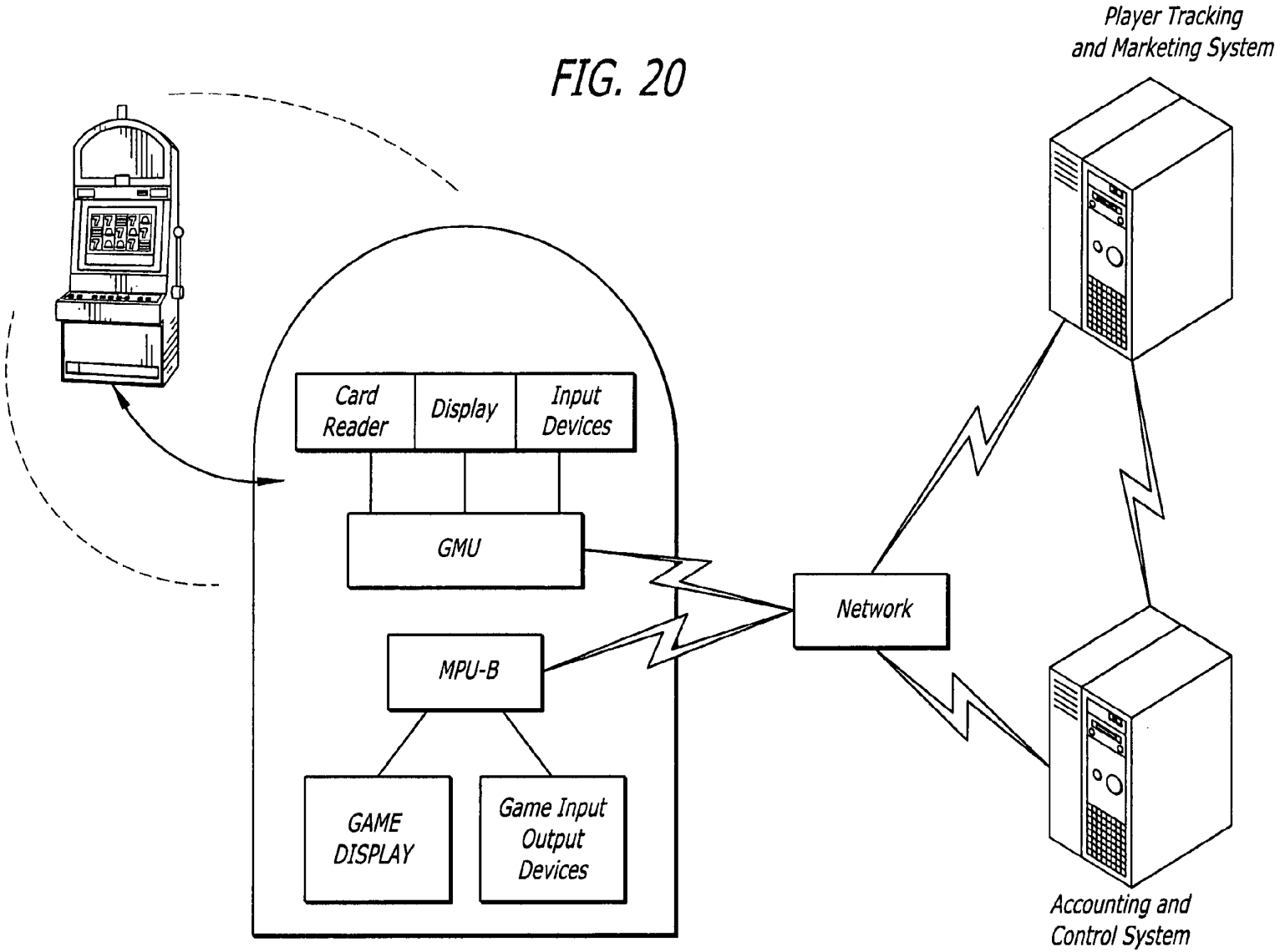

Player Tracking and Marketing System
Accounting and Control System
Network
Input Devices
Display
Card Reader
GMU
MPU-B
Game Input Output Devices
GAME DISPLAY

FIG. 19

FIG. 20


Player Tracking
and Marketing System
Card
Reader
Display
Input
Devices
GMU
Network
MPU-B
GAME
DISPLAY
Game Input
Output
Devices
Accounting and
Control System

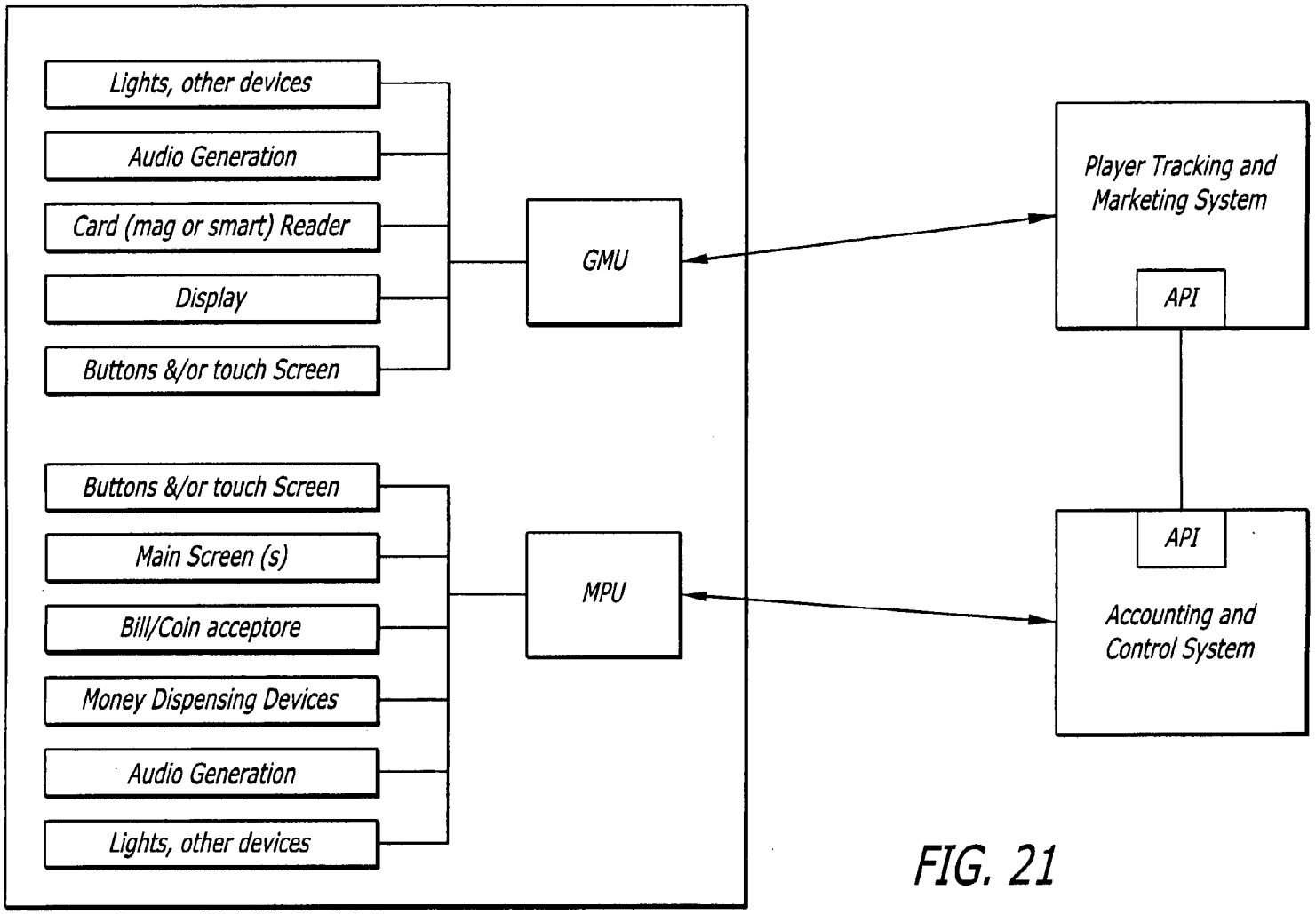

Lights, other devices
Audio Generation
Card (mag or smart) Reader
Display
Buttons &/or touch Screen
GMU
Buttons &/or touch Screen
Main Screen (s)
Bill/Coin acceptore
Money Dispensing Devices
Audio Generation
Lights, other devices
MPU
Player Tracking and Marketing System
API
API
Accounting and Control System

FIG. 21

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 94377104 A **[0002]**
- US 74685400 A **[0002]**
- US 71475405 P **[0002]**
- US 5429361 A, Raven **[0137]**

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European Patent Office
Office européen des brevets

(11) EP 3 099 009 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
30.11.2016 Bulletin 2016/48

(51) Int Cl.:
H04L 12/18 *(2006.01)* *H04L 29/06* *(2006.01)*

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(22) Date of filing: **14.09.2012**

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(30) Priority: **18.04.2012 GB 201206841**

(62) Document number(s) of the earlier application(s) in accordance with Art. 76 EPC:
12761958.3 / 2 839 604

(27) Previously filed application:
14.09.2012 PCT/EP2012/068169

(71) Applicant: **Barco N.V.**
8500 Kortrijk (BE)

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10551 Taipei (TW)
- **Dewaele, Ronny**
B-8980 Zonnebeke (BE)

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Technologielaan 9
3001 Heverlee (BE)

Remarks:
This application was filed on 22-05-2016 as a divisional application to the application mentioned under INID code 62.

(54) ELECTRONIC TOOL AND METHODS FOR MEETINGS

(57) An electronic meeting tool and method for communicating arbitrary media content from users at a meeting is described. These can include a node configuration means adapted to operate a display node of a communications network, the display node being coupled to a first display. The node configuration means is adapted to receive user selected arbitrary media content and to control display of the user selected arbitrary media content on the first display. At least one peripheral device adapted to communicate the user selected arbitrary media content via the communications network is provided, wherein the peripheral device is a connection unit comprising: (e) a connector adapted to couple to a port of a processing device having a second display, a memory and an operating system; and (f) a transmitter for communicating with the communications network, A program is provided that is adapted to be loaded onto the processing device and to run on the operating system of the processing device, said program being adapted to obtain user selected arbitrary media content, said program leaving a zero footprint on termination. An input device is provided to allow the user to carry out a user action that triggers transfer of said user selected arbitrary media content to said transmitter through said port.

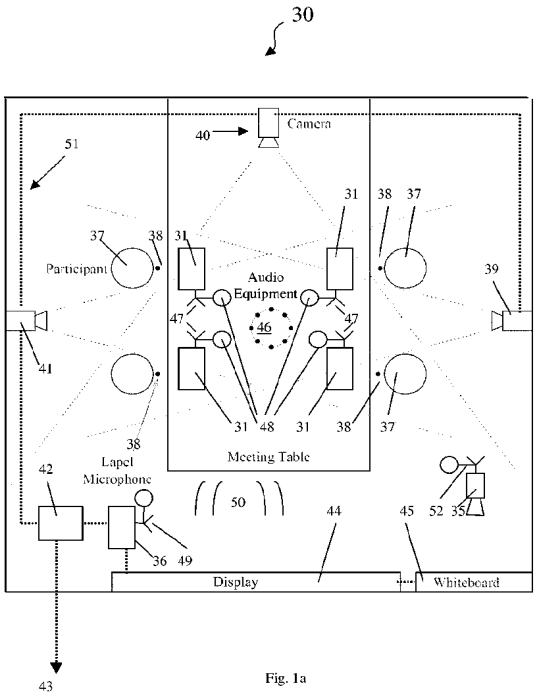


Fig. 1a

EP 3 099 009 A1

Description

[0001] The present invention relates to electronic tools for meetings including methods or devices for providing connection to a communications network, to networks or methods of operating the network, methods or devices for use in displaying media content as well as software for performing any of these methods.

Technical background

Tools for collaboration

[0002] Allowing *ad hoc* groups of persons to communicate with each other is one of the fundamental aspects of collaboration, problem solving, negotiation, teaching and education, etc. To assist in communication, there has been an explosion of electronic communication tools such as electronic conferencing tools, e.g. synchronous and asynchronous conferencing, online chat, Instant Messaging, audio conferencing, videoconferencing, data conferencing, application sharing, remote desktop sharing, electronic meeting systems, collaborative management (coordination) tools, project management systems, knowledge management systems, and social software systems.

[0003] One classic approach is the lecture or seminar often involving a presentation using presentation software. To a large extent the traditional single person presentation or lecture has been maintained with the audience being in a rather passive mode as far as determining, constructing, augmenting or modifying the information to be presented is concerned.

[0004] As with other business processes, meetings are going digital. Increasingly, people are using computer technology alone and in conjunction with broadband networks to support their meeting objectives prior to and during an actual meeting. For example, email is used to pass around files for people to read prior to a meeting.

[0005] Collaborative workspaces in corporate networks and on the Internet offer geographically distributed collaborators a virtual repository for documents related to a project or a meeting. Electronic meeting support systems, such as interactive network-connected white boards and videoconferencing appliances, are available for the benefit of those who share the same room as well as those who are in remote locations.

[0006] The AMIDA Final Public Report describes the overall methodology behind the development of meeting support technologies. It reports that numerous studies confirm that meetings dominate the way people work. Namely, according to a study conducted by MCI Worldcom in 2003 a business person participates in 60 meetings per month. People meet in groups for a multitude of reasons. They interact in numerous predictable and unpredictable ways and the results of their interactions are as varied as the people who participate and the projects on which they are collaborating or communicating. Studies of business processes also reveal that approximately 80% of the "workload" associated with a project or process happens in preparation for a meeting. In other words, many people view the "live" meeting as a milestone or deadline by which they can pace and measure their productivity and that of their colleagues. Unfortunately, for many information managers, being in perpetual meetings has reduced their ability to prepare adequately for the next meeting, perpetuating a vicious and negative cycle.

[0007] However, Marc Al-Hames et al. report in "Audio-Visual Processing in Meetings: Seven Questions and Current AMI Answers", that although large parts of working days are consumed by meetings and conferences, unfortunately a lot of them are neither efficient, nor especially successful. They report a study in which people were asked to select emotion terms that they thought would be frequently experienced in a meeting. The top answer - mentioned from more than two third of the participants - was "boring"; furthermore nearly one third mentioned "annoyed" as a frequently perceived emotion.

[0008] The conclusion is that despite the plethora of electronic aids to meetings, fundamental problems in handling meetings have not been solved. In fact organising and conducting meetings in a business context involves a large number of factors.

Participation

[0009] A lack of efficiency of meetings is addressed in the article "Mood indicators on electronic meeting tools" IBM, IP.com number: IPCOM000011711D, Publication Date: March 12, 2003. This article addresses the issue that the lack of direct feedback makes meetings clumsy, inefficient and often unproductive. It proposes a "mood indicator" as well as an "I want to ask a question" indicator which allow the presenter to choose an appropriate moment to pause, change track or field a question. It is argued that interrupting a presenter in full flow can be awkward; however, sometimes it is difficult to get an opportunity to ask a question or make a comment when many different people are trying to make their voices heard. In a similar vein, US6966035 suggests displaying a "murmur frame" for a participant to express a view. To increase user participation, US 2010/0087139 discloses a system for sending a selection to another computer, and US 2006/0095376 discloses a system for secure voting. Commenting, voting or selecting requires that a central authority provides the information that is to be selected or commented or voted on. Hence, these proposals still leave a central figure such as the presenter in a dominating position and the other members of the meeting are largely an audience with limited selection or voting or participation rights.

[0010] A further problem with meetings is that someone is usually late or has to leave early. With the person arriving late one has to decide if the meeting is interrupted and a summary of the proceedings so far is given. For the person leaving early (often a senior person), subse-

quent discussions can go missing. If there is a notes taker, this provides a personal summary of the meeting - but not an objective one.

[0011] Presents systems do not provide an optimal solution.

Legal and security issues

[0012] A legal requirement of a meeting is that presentations, comments and submissions need to be completely reproducible - in some circumstances, e.g. in a share holders' meeting, the events in the meeting should be subject to total recall. Computer-supported collaborative work technologies, particularly those which capture human verbal and non-verbal communications (audio and video interaction) in addition to text and graphics generated during a meeting, promise to have a long term impact on how people will prepare for and behave during and following meetings. In addition, connecting to a network brings the danger of virus, malware or spyware transfer in either direction, and there is danger of copying of confidential information.

Practical Difficulties

Scalability and ease of use

[0013] There are even more fundamental problems with using electronic tools in meetings. If two persons want to make two presentations then usually either both presentations must be placed on one machine or there is a need to swap between the presenters' machines. To bring the display content of a computer to a projector, the most common ways are to use a cable that connects the display adapter of the graphics card to the video input of the projector [method 1] or to use a software that captures the display contents and sends it over a wired or wireless network to a remote base unit connected to the projector [method 2]. This is often called "remote desktop" and is mostly used for remote administration or remote IT assistance purposes.

[0014] Less common but also practiced methods are to use a special device connected to the display adapter of the graphics card, that captures, encodes and streams the display content over a wired or wireless network [method 3].

[0015] Method 1 has several practical problems and disadvantages. In meetings where people want to contribute content from their own computers, e.g. to project images on a display, typically a video cable such as a VGA cable is used to connect each PC one at a time to the projector. This is not only not scalable but also can be and often is quite a cumbersome process that typically wastes valuable meeting time and takes the dynamism out of the meeting. Connection can be made more difficult and time consuming for example if the computer has to be rebooted for it to detect the projector or when the format of the PC differs from the format of the projector. In addition changing format can leave the computer with a new format that is not compatible with its own screen so that on reboot of the PC alone, nothing is displayed on the computer screen. Without a visible screen image the necessary re-configuration can be difficult. These issues are aggravated by a number of elements:

- The use of many different video adapters, such as VGA, DVI, DP, HDMI,...
- Reach depends on cable length: too long leaves a tangled cable "salad" in the meeting room, too short reduces flexibility, often necessitating people to move around in the meeting room when they want to present something.
- Cable connection is either point to point or requires tedious and extensive cabling and the use of complex and expensive video switches.
- It is often difficult and time consuming to find the right display resolution and refresh rate that both the computer and the display or projector support.

[0016] Method 2 also has many drawbacks. If the connection is made to a corporate LAN there is a danger of virus, malware or spyware transfer in either direction, there is danger of copying of confidential information, and there is the difficulty of making the connection, e.g. entry of a user code and password, as well the administration of such passwords and user codes.

[0017] The advantage of method 3 is that the computer does not need to use its own processing power to bring the display content in a form that is easily transported over a network. This advantage becomes less relevant as computers grow in processing power. A drawback of method 3 is that the same problems often encountered with method 1 of connecting to the display adapter remain. Another drawback is that the special device referred to requires significant processing power, which means that this device will consume much power, be relatively big and certainly be relatively expensive.

[0018] An alternative method in the making today is to use the well known USB interface of the computer for extracting the display content of the computer. US 2009/0198839 discloses such a pluggable cable arrangement. US 2011/0115689 discloses a similar USB solution for wireless connection to a projector. Accordingly connecting a projector to a computer using the standard USB port might become commonplace with time. However, this usually requires special drivers and even special hardware. Connecting a projector to a computer using the standard USB port hence might become commonplace - but even when that happens there will be a mix of new and legacy machines for several years.

Firewalls

[0019] Additional problems can occur with firewalls. Typically a visitor to a meeting will bring a computer such as a laptop that is set up for a different corporate net-

working environment and hence has different or incompatible networking settings. The setting up of a firewall can be complicated and if this is not done correctly, telecommunication software that has to pass through a firewall may be blocked. In order to solve problems associated with firewalls it may be necessary to open ports or identify or even add programs in an exception list. If, besides a network (hardware) firewall and an operating system firewall, there is any software based third-party firewall like Zonealarm, CA Internet Security Suite or McAfee Firewall, then it is necessary to follow that software developer's documentation to place programs on a safe list or adding exceptions to the firewall rules. Such activity is beyond the usual user. Fussing with computer settings, or having to call for IT support wastes valuable meeting time and takes the dynamism out of the meeting.

Conclusion

[0020] The following problems remain for holding a face-to-face meeting using advanced electronic tools at the present time:

- Complexity of the networking infrastructure.
- High demands on technical expertise of users in current systems that are supposed to be designed to support everyday use by the non-expert user.
- Barriers to the use of complicated technology in meetings.
- Great variety of possible collaborative software solutions - none of which seems to solve the fundamental problems of holding successful meetings.
- Meetings being boring or annoying for members of the meeting.
- Complexity of firewalls and other security measures employed in corporate networks.
- Lack of, or restriction of participation by members of a meeting.
- Time taken to prepare presentations for meetings.
- Need to record events in the proper time sequence at meetings without burdening a meeting more than necessary.

[0021] Although some tools solve some of these problems effectively, no electronic meeting tool solves all of them.

Summary of the invention

[0022] An object of the present invention is to provide network solutions including electronic tools for meetings as well as devices for providing connection to a communications network, to methods of operating the network, methods of displaying media content as well as software for performing any of these methods or for implementing such systems.

[0023] In an aspect of the present invention a method for displaying arbitrary media content obtained from a processing device (e.g. a digital processing device) on a display device is provided, the media content being transmitted through a communications network, the processing device having a memory and a display, the method comprising:

use of a peripheral device to provide a token that inherently or discretely provides authentication to display content on the display device and provides a link to the display device.

[0024] In particular the present invention provides a method for displaying arbitrary media content obtained from a processing device (e.g. a digital processing device) on a display device in a meeting with a plurality of participants, the media content being transmitted through a shared resource communications network, the processing device having a memory and a display, the method comprising:

use of a peripheral device to provide a token that when transferred to the communications network inherently or discretely provides authentication or permission to display the arbitrary media content on the display device, the token also providing a link to the display device;
routing the arbitrary media content through the communications network from the processing device;
obtaining unilateral electronic access to the display device; and displaying the arbitrary media content.

[0025] The arbitrary media content is preferably obtained by screen scraping data from the processing device.

[0026] In a further aspect the present invention provides a method for displaying arbitrary media content obtained from a processing device on a display device in a meeting with a plurality of participants, the media content being transmitted through a shared resource communications network, the processing device having a memory and a display, the method comprising:

use of a peripheral device to provide a token that when transferred to the communications network inherently or discretely provides authentication or permission to display the arbitrary media content on the display device, the token also providing a link to the display device;
obtaining the arbitrary media content by screen scraping data from the processing device;
routing the screen scraped arbitrary media content through the communications network from the processing device;
obtaining electronic access to the display device; and
displaying the arbitrary media content.

[0027] Obtaining user selected arbitrary media content

is preferably not obtained by application sharing but by the process of screen scrapping. Although software packages that provide screen scraping require installation on the target device, or at least require the installation of dedicated and/or custom drivers, embodiments of the present invention use software loaded onto the peripheral device which allows screen scraping when run on the processing device but leaves a zero footprint when terminated. Embodiments of the present invention can screen scrape full HD videos at 20fps without requiring any installation of a program on the processing device nor requiring configuring the processing device such as a PC that they run on for the connectivity to the network hence meeting "zero footprint" requirements.

[0028] On the peripheral device a mass storage device is provided that stores the software to be run on the processing device. The mass storage device can be logically closed once the software has been read and loaded and is running from RAM in the processing device. Also provided on the peripheral device is a further device such as an HID (human interface device) to capture user input and provide user feedback. In embodiments of the present invention, the peripheral device contains multiple internal logical devices that are combined:

An HID (human interface device) used for capturing user input (e.g. following a user action such as pressing or activating a button) and providing user feedback, e.g. by an optical indicator such as a light ring around the button e.g. an LED ring, and for streaming the screen scraped video content to the network and hence to a base unit and a display,

A mass storage device used to store the application, and optionally An audio device that acts as a virtual sound card to a client PC over USB, using a generic driver such as a UAC or UAC2 device driver.

[0029] Screen scraping is able to capture all material in a neutral manner rather than being limited by proprietary applications. Further the screen scraper application is zero footprint on termination rather than being fully installed on the processing device. Embodiments of the present invention can provide arbitrary "full content" to the meeting room and participants can display in real-time,

The real-time content is shown on a central display rather than being broadcast to individual participants or archived.

[0030] Embodiments of the present invention "auto compose" arbitrary user data on a central display or screen so that full real-time content that is provided by multiple meeting participants who intentionally share this content in order to make the meeting more effective and efficient,

Embodiments of the present invention implement a principle of "democratic screen sharing", in which the meeting participants decide themselves on a peer-to-peer basis which content to share when and where. Peer-to-peer data sharing differs from systems in which the content to be displayed is determined by a a presenter or meeting director. The user determines where his content is routed to and can do so without any software configuration on the user processing device.

[0031] In yet a further aspect the present invention provides an electronic meeting tool for communicating arbitrary media content from users at a meeting comprising:

a node configuration means adapted to operate a display node of a communications network, the display node being coupled to a first display, the node configuration means being adapted to receive user selected arbitrary media content and to control display of the user selected arbitrary media content on the first display; and

at least one peripheral device adapted to communicate the user selected arbitrary media content via the communications network, wherein the peripheral device is a connection unit comprising:

(a) a connector adapted to couple to a port of a processing device having a second display, a memory and an operating system; and

(b) a transmitter for communicating with the communications network,

a program adapted to be loaded onto the processing device and to run on the operating system of the processing device, said program being adapted to obtain user selected arbitrary media content, said program leaving a zero footprint on termination, and an input device to allow the user to carry out a user action that triggers transfer of said user selected arbitrary media content to said transmitter through said port.

[0032] The program can be stored on the peripheral device. The transmitter can be a wireless transmitter or transceiver. The peripheral device can be a plug-and-play device. The program cane adapted to screen scrape content of the second display.

[0033] The input device can be physical actuator coupled to the peripheral device. The physical actuator preferably has a surface area of between 100 and 14,400 square mm. Alternatively, the input device can be a key displayed on the second display. The key displayed on the second display can be one not screen scraped by the program.

[0034] In another aspect the present invention provides a method for connecting a processing device to a communications network, the processing device having a memory, a display and an operating system with at least one pre-installed generic driver providing a generic communications protocol for communication between processing device and a standard class of peripheral devices, the method comprising the steps of:

a) coupling a peripheral device to the processing device, the peripheral device having a transceiver;
b) setting up, by means of the pre-installed generic driver of the operating system, a means for communication between the peripheral device and the processing device;
c) coupling the processing device to a communications network via the peripheral device;
d) routing screen scraped data between the processing device and the communication network via the means for communication, wherein the generic communication protocol is used for transferring the screen scraped data between the processing device and the peripheral device.

[0035] The routing of the screen scraped data can be to a defined network node such as a display node without user entry of configuration details. Thus the routing can be dedicated to a specific network node such as a display node, base station etc. This is achieved by pairing of the peripheral device to the relevant node before the communication starts.

[0036] In accordance with embodiments of the present invention users start an application from the peripheral device such as a USB dongle, thus making the connection in a 3 step process: (1) connect, e.g. plug in the peripheral device to the processing device, (2) start the screen scraping application, (3) perform a user action such as click on a button on the peripheral device to allow content to be displayed on the central screen or display. To achieve step 2 Autorun or AutoPlay can be used with some Windows operating systems, but there are many different variants based on the OS version and which patches have been installed. Furthermore, this mechanism is generally considered a security hazard, which is why most IT departments will disable Autorun/Autoplay. Other OS providers have disabled this function, e.g. Apple removed a similar functionality entirely from its OS/X since Snow Leopard.

[0037] In an embodiment of the present invention a very small service - also called daemon on some OS's - is provided that requires installation on the processing device such as a laptop. This service is pre-installed on the processing device. The installation is required only once on every processing device such as a laptop. The role of this is to provide a permanently running service which continuously monitors if a peripheral device according to the present invention has been offered up for connection to the processing device. When such a peripheral device is connected, the service will detect this and start the client application software residing in the mass storage area of the peripheral device. Once the service is installed, connectivity with the peripheral device becomes a 2 step process: connect, e.g. plug in the peripheral device to the processing device, (2) perform a user action such as click on a button on the peripheral device to go allow content to be displayed on the central screen or display. The application loaded from the processing device still leaves a zero footprint on termination

[0038] Step b) can comprise presenting the peripheral device to the processing device as a human interface device and wherein the pre-installed generic driver is a human interface device driver.

[0039] Alternatively or additionally step b) can comprise presenting the peripheral device to the processing device as a mass storage device and wherein the pre-installed generic driver is a mass storage device driver.

[0040] Alternatively or additionally, step b) comprises presenting the peripheral device to the processing device as a composite device and wherein pre-installed generic drivers drive different device interfaces independently.

[0041] A client application can be stored on the peripheral device which when run on the processing device obtains the screen scraped data. Such a client application can be a portable application and leaves no footprint on termination.

[0042] In another aspect the present invention provides a peripheral device for providing communication connectivity to a processing device which is provided with memory, a display and an operating system with at least one pre-installed generic driver providing a generic communication protocol for communication between the processing device and a standard class of peripheral devices, the peripheral device comprising a memory in which executable software code is stored for execution on the processing device, said executable software code comprising:

a first software code portion for setting up, by means of the pre-installed generic driver of the operating system, a means for communication between the peripheral device and the processing device;
a second software code portion for connecting the processing device to a communications network via the peripheral device, the peripheral device having a transceiver;
a third software code portion for screen scraping data from the processing device; and a fourth software code for routing screen scraped data between the processing device and the communications network over the means for communication; wherein the first software code portion is adapted to use the generic communication protocol for transferring the screen scraped data between the processing device and the peripheral device.

[0043] The first software code portion can be adapted to present the peripheral device to the processing device as a human interface device and wherein the pre-installed generic driver is a human interface device driver. The first software code portion can be adapted to present the peripheral device to the processing device as a mass storage device and wherein the pre-installed generic driver is a mass storage device driver. The first software code portion can be adapted to present the peripheral device

to the processing device as a composite device and wherein pre-installed generic drivers drive different device interfaces independently.

[0044] The executable software code can comprise fifth code for providing a means for connecting to the communications network including a base node. The executable software third code can comprise sixth code for providing means for capturing video frame buffers of the processing device.

[0045] The executable software code can comprise seventh code for providing a means for encoding, compressing and optionally encrypting the screen scraped data and sending the screen scraped data the communication network. The executable software code can comprise eighth code for providing a means for handling the peripheral device. The executable software code can comprise ninth code for providing means for initiating connection to the base node. The executable software code can comprise tenth code for receiving inputs from an input device on the peripheral device. The executable software code can comprise eleventh code for providing a means for sending state changes to the visual indicator on the peripheral device. The executable software code can comprise twelfth code for providing a means for presenting to the user a GUI. The executable software code can comprise thirteenth code for presenting a GUI for administration of the said executable software code when executed as a portable application. The executable software code can comprise fourteenth code for providing a means for displaying and activating a key on the display of the client processing device for allowing a user to input the start the transfer of data from the processing device to the base node.

[0046] In another aspect the present invention provides a peripheral device for providing communication connectivity to a processing device which is provided with memory, a display and an operating system with at least one pre-installed generic driver providing a generic communication protocol for communication between the processing device and a standard class of peripheral devices, the peripheral device comprising a memory in which executable software code is stored for execution on the processing device, said executable software code comprising:

a first software code portion for setting up, by means of the pre-installed generic driver of the operating system, a means for communication between the peripheral device and the processing device;

a second software code portion for connecting the processing device to a communications network via the peripheral device, the peripheral device having a transceiver; and

a third processing software code for routing data between the processing device and the communications network over the means for communication;

wherein the first software code portion is adapted to use the generic communication protocol for transferring the data between the processing device and the peripheral device, and an input device coupled to the peripheral device, the input device being adapted to react to a user action to trigger the transfer of the data from the processing device to the peripheral device.

[0047] The first software code portion can be adapted to present the peripheral device to the processing device as a human interface device and wherein the pre-installed generic driver is a human interface device driver. The first software code portion can be adapted to present the peripheral device to the processing device as a mass storage device and wherein the pre-installed generic driver is a mass storage device driver. The first software code portion can be adapted to present the peripheral device to the processing device as a composite device and wherein pre-installed generic drivers drive different device interfaces independently.

[0048] The input device is preferably a physical actuator coupled to the peripheral device. The physical actuator preferably has a surface area of between 100 and 14,400 square mm. The input device can be for example a key for display on the display. The executable software code can comprise fourth code for providing a means for connecting to the communications network including a base node. The executable software code can comprise fifth code for providing a means for capturing video frame buffers of the processing device. The executable software code can comprise sixth code for providing a means for encoding, compressing and optionally encrypting the video frames and sending them over a secure link to the base node. The executable software code can comprise seventh code for providing a means for handling the peripheral device. The executable software code can comprise eighth code for providing a means for initiating connection to the base node. The executable software code can comprises ninth code for receive inputs from an input device on the peripheral device. The executable software code can comprise tenth code for providing a means for sending state changes to the visual indicator on the peripheral device. The executable software code can comprise eleventh code for providing a means for presenting the user a GUI. The executable software code can comprise twelfth code for presenting GUI for administration of the executable software code when executed as a portable application. The executable software code can comprise thirteenth code for providing a means for displaying and activating a key on the display of the processing device for allowing a user input to start the transfer of data from the processing device to the base node.

[0049] In another aspect of the invention a peripheral device is provided for providing communication connectivity to a processing device which is provided with memory, a display and an operating system with at least one pre-installed generic driver providing a generic communication protocol for communication between the processing device and a standard class of peripheral de-

vices, the peripheral device comprising a memory in which executable software code is stored for execution on the processing device, said executable software code comprising:

a first software code portion for setting up, by means of the pre-installed generic driver of the operating system, a means for communication between the peripheral device and the processing device;
a second software code portion for connecting the processing device to a communications network via the peripheral device, the peripheral device having a transceiver;
a third software code portion for receiving media content from the network and for displaying the media content on the display in accordance with a set of rules; wherein the first software code portion is adapted to use the generic communication protocol for transferring the media content between the peripheral device and the processing device.

[0050] The executable software code can comprise fourth code for providing a means for correctly configuring a receiver as an access point. The executable software code can comprise fifth code for providing a means for listening for output of connection units trying to connect on a specific port. The executable software code can comprise sixth code for providing a means for a GUI for administration purposes. The executable software code can comprise seventh code for providing a means for publishing its presence over the network using the zeroconf protocol. The executable software code can comprise eighth code for providing a means for accepting and installing software updates. The executable software code can comprise ninth code for providing a means for providing facilities for pairing of connection units to the processing device. The executable software code can comprise tenth code for providing a means for auto-composing of different incoming arbitrary media streams and rendering of composited image on display. The executable software code can comprise eleventh code for providing a means for receiving, decrypting and decoding incoming arbitrary media content. The executable software code can comprise twelfth code for scaling of incoming arbitrary media streams. The executable software code can comprise thirteenth code for providing a means for displaying incoming arbitrary media content in accordance with a set of rules.

[0051] The present invention also provides a method for communicating arbitrary media content from users at a meeting comprising:

operating a display node of a communications network, the display node being coupled to a first display, to receive user selected arbitrary media content and to control display of the user selected arbitrary media content on the first display; and
connecting a peripheral device to a port of a processing device and communicating the user selected arbitrary media content via the communications network,
loading a program onto the processing device and running the program on the operating system of the processing device to obtain user selected arbitrary media content, said program leaving a zero footprint on termination, and
triggering transfer of said user selected arbitrary media content to said transmitter through said port after a user action on an input device.

[0052] The present invention also provides a peripheral device comprising:

a base
a connector for connection to a plug and play port of a host processing device,
a flexible connection between the base and the connector for transferring data signals and power,
an actuator on the base for actuating a signal and for transferring the signal to the connector for transfer to the port, wherein the base has electronics comprising permanent storage for storing a portable application, a processing engine, a transceiver and a visual indicator.

[0053] The present invention also provides a method for providing communication connectivity from a processing device,
setting up a communications network between a base node of the communications network and a peripheral device coupled to the processing device;
transferring media content between the processing device and the peripheral device,
transmitting the media content from the peripheral device to the communications network,
receiving media content from the communications network at the base node and
displaying the media content on a display in accordance with a set of rules.

[0054] Any of the above software code stored on a non-transitory storage medium.

Definitions

[0055] "unilateral" means that the displaying process is obtained by the action of only one participant involved in the meeting, without requiring the agreement of another or the others. The term "unilateral" implies that the data for display is allowed to override or replace any data displayed on the screen by the same or another participant of the meeting.

[0056] "Plug and play" is a term used to describe the characteristic of a computer bus, or device specification, which facilitates the discovery of a hardware component in a system, without the need for physical device configuration, or user intervention in resolving resource con-

flicts. Plug and play devices can be added to a bus of a computing system (while running or when shut down), and the newly added device and possibly the rest of the computing system is automatically configured to make the newly added device work, both from hardware and from software perspective.

[0057] Plug and play interfaces include for example (not an exhaustive list): Firewire (IEEE-1394), PCI, Mini PCI, PCI Express, Mini PCI Express, PCMCIA, PC Card, Universal Serial Bus (USB), SDIO cards.

[0058] "Auto-configuration" is the automatic configuration of devices without manual intervention, without setting any switches or jumpers, and without any need for software configuration. An example of auto-configuring devices: USB devices. Examples of auto-configuring protocols: DHCP, Zeroconf, Bonjour.

[0059] A plug and play device has auto-configuration software by default to make it plug and play. Example: USB devices are made to be plug and play by including the correct auto-configuration software (e.g. host driver, host stack, application software). Autoconfiguration can also refer to a software alone and is not restricted to a physical device.

[0060] "Hot swapping and hot plugging" are terms used to describe the functions of replacing computer system components without shutting down the system. More specifically, hot swapping describes replacing components without significant interruption to the system, while hot plugging describes the addition of components that would expand the system without significant interruption to the operation of the system. A well-known example of this functionality is the Universal Serial Bus (USB) that allows users to add or remove peripheral components such as a mouse, keyboard, or printer. Other examples are eSATA, PCIe, FireWire, for example.

[0061] A "portable application" (portable app), sometimes also called standalone, is a computer software program designed to run without installation on the target machine. This type of application is stored on a removable storage device such as a CD, USB flash drive, flash card, or floppy disk - storing its program files, configuration information and data on the storage medium alone. It is a program that can be stored on an electronic device such as a USB flash drive, iPod, memory card, portable hard drive or other portable electronic device and runs on a computer or other processing device coupled to the electronic device without making permanent configuration changes to the host computer. All such programs have a zero-footprint, meaning all temporary files, registry entries, and any other changes to the machine exist only while the program is running.

[0062] To be considered a portable application, for purpose of this invention, a software program must:

> Not require any kind of formal installation onto a computer's permanent storage device to be executed, and can be stored on a removable storage device such as USB flash drive, iPod, memory card, portable hard drive or other portable electronic storage device thus enabling it to be used on multiple computers.

[0063] Settings are stored with, and can be preferably carried around with, the software (i.e., they are written to the electronic device such as a USB drive). Settings are not stored to the registry or any other central system database of the computer.

[0064] Leaves a zero (or near-zero) "footprint" on any PC it is run on after being used. i.e., all temporary files/registry settings should be either avoided or at least removed once the program has exited, and files created by the user can be saved directly to the same removable media as the application is stored on.

[0065] A portable application does not leave its files or settings on the host computer on which it runs. For example, the application does not write to the Windows registry or store its configuration files (such as an INI file) in the user's profile; instead, it stores its configuration files in the program's directory. Another requirement, since file paths will often differ on changing computers due to variation in Windows drive letter assignments, is the need for applications to store them in a relative format. Preferably, such a program does not require a launcher program to copy necessary settings and files to the host computer when the application starts and move them back to the application's directory when it closes as this may leave a residue on the hard drive in case of power failure.

[0066] "Electronic meeting systems" (EMS) need to be distinguished on the one hand from classic groupware, on the other from web conferencing systems. In reality, there is some overlap between minor features of products of the named categories. The main difference from groupware is the intensity of collaboration. EMS should be distinguished from systems with which it is possible to show the contents of an individual computer screen on a remote display with multiple users at the same time.

[0067] "Groupware" supports collaboration within groups where the individual contributions remain identifiable. In contrast, EMS enable the group to cooperatively produce a result for which the group is responsible as a whole. In a business process, groupware and electronic meeting systems complement each other: Groupware supports teams when researching and creating documents in the run up to an EMS session or when implementing the results of such a session.

[0068] "Web conferencing systems" and "electronic meeting systems" complement each other in the online meeting or workshop: EMS extends the web conferencing system by providing interactive tools for producing and documenting group results. On the other hand, "web conferencing systems" complement EMS with the screen sharing and voice conferencing functionality required in synchronous online meetings and not present in EMS.

[0069] "Data conferencing" refers to a communication session among two or more participants sharing compu-

ter data in real time. Interaction and presentation devices such as a screen, keyboard, mouse, camera, etc. can be shared. It is a term used to distinguish from video conferencing and audio conferencing. The data can include screen, documents, graphics, drawings and applications that can be seen by the participants of the meeting.

[0070] "Application sharing" is an element of remote access, falling under the collaborative software umbrella, that enables two or more users to access a shared application or document from their respective computers simultaneously in real time. Generally, the shared application or document will be running on a host computer, and remote access to the shared content will be provided to other users by the host user. Application sharing should be distinguished from systems in which collaboration on the applications between different users is not possible but the contents of individual computer screens can be projected onto a remote display with multiple users at the same time.

[0071] The term "arbitrary media content" refers to the fact that a user may generate, create or select any media content that is appropriate to display. This differs from client voting on, or selecting of media content that is displayed by another in a meeting or presentation. This term refers to client oriented, distributed rights and privileges for the display of content rather than a central presenter providing content which is presented to the members of the meeting.

[0072] "Screen scraping" in our sense refers to reading the video frame buffers and processing them, rather than just rendering them on a display. Screen scraping for presentations is described in US2002/0196378 to Slobodin et al which is included herein by reference.

[0073] "Auto composition" or "auto layout" refers to the automatic nature in which multiple graphics/video sources are rendered on a central display, without user intervention and in a way that a user would intuitively expect it to happen.

[0074] "Wireless" and "wireless communication network" can be any network that does not use cable links between nodes, e.g. uses RF, optical or InfraRed for communication purposes, such as IrDA, diffuse infra-red, WLAN, WiMax, WiFi, WiFi Direct, Bluetooth or any other wireless communication network known to the person skilled in the art.

[0075] "Computer" generally refers to a processing device, i.e. having a processing engine capable of various types of digital processing, such as rendering graphics images for display. A computer can be in the form of a work station, a personal computer, a laptop, a palm top, a PDA, a smartphone, a tablet etc. Generally a computer has memory such as volatile RAM. Non-volatile memory such as a hard disc, optical disk or solid state memory can be included in the computer or can be a peripheral device. Currently most computers are electronic but the term "computer" also include optics based computing devices.

[0076] The term "pre-installed generic driver" is intended to mean a driver which is installed on a processing device such as a computer as a standard driver, e.g. is installed with the installation of the operating system. Such a driver is standard for the operating system and can drive a standard class of peripheral devices coupled to or connected to the processing device. The installation of a specific driver for such a peripheral device is not required. Such a generic driver can be a human interface driver (HID) or a mass storage device driver, which has predetermined software components configured for driving mass storage, a CD-ROM, a keyboard etc. or combinations of these. Such devices can be readable and writable computer peripheral memory devices such as USB memory sticks, flash memories, external hard drives, or more.

Brief Descriptions of the drawings

[0077] Fig. 1a shows a meeting room that can be used with embodiments of the present invention. Fig. 1b shows a combination of a client processing device, a connection unit, a base node and a display in accordance with an embodiment of the present invention.

Fig 2 shows a screen display in accordance with an embodiment of the present invention.

Figs. 3 to 5 show a base node and a peripheral device and a client processing device in accordance with embodiments of the present invention.

Fig 6 shows a display in accordance with an embodiment of the present invention.

Fig. 7 shows a peripheral device in accordance with an embodiment of the present invention.

Fig. 8 shows a client processing device in accordance with an embodiment of the present invention.

Fig. 9 shows a further client processing device in accordance with an embodiment of the present invention.

Fig. 10 shows an embodiment of a peripheral device in accordance with an embodiment of the present invention.

Fig. 11 shows an embodiment using a tablet.

Fig. 12 shows a further embodiment of the present invention.

Figs. 13 to 15 show use of a QR code in accordance with an embodiment of the present invention for remote access.

Fig. 16 shows pairing in accordance with an embodiment of the present invention.

Detailed Description of the Embodiments of the present Invention

[0078] The present invention will be described with respect to particular embodiments and with reference to certain drawings but the invention is not limited thereto but only by the claims. The drawings described are only schematic and are non-limiting.

[0079] Furthermore, the terms first, second, third and the like in the description and in the claims, are used for distinguishing between similar elements and not necessarily for describing a sequential or chronological order. The terms are interchangeable under appropriate circumstances and the embodiments of the invention can operate in other sequences than described or illustrated herein.

[0080] Moreover, the terms top, bottom, over, under and the like in the description and the claims are used for descriptive purposes and not necessarily for describing relative positions. The terms so used are interchangeable under appropriate circumstances and the embodiments of the invention described herein can operate in other orientations than described or illustrated herein.

[0081] The term "comprising", used in the claims, should not be interpreted as being restricted to the means listed thereafter; it does not exclude other elements or steps. It needs to be interpreted as specifying the presence of the stated features, integers, steps or components as referred to, but does not preclude the presence or addition of one or more other features, integers, steps or components, or groups thereof. Thus, the scope of the expression "a device comprising means A and B" should not be limited to devices consisting only of components A and B. It means that with respect to the present invention, the only relevant components of the device are A and B.

[0082] Similarly, it is to be noticed that the term "coupled", also used in the description or claims, should not be interpreted as being restricted to direct connections only. Thus, the scope of the expression "a device A coupled to a device B" should not be limited to devices or systems wherein an output of device A is directly connected to an input of device B. It means that there exists a path between an output of A and an input of B which may be a path including other devices or means.

[0083] Elements or parts of the described devices may comprise logic encoded in media for performing any kind of information processing. Logic may comprise software encoded in a disk or other computer-readable medium and/or instructions encoded in an application specific integrated circuit (ASIC), field programmable gate array (FPGA), or other processor or hardware.

[0084] References to software can encompass any type of programs in any language executable directly or indirectly by a processor.

[0085] References to logic, hardware, processor or circuitry can encompass any kind of logic or analog circuitry, integrated to any degree, and not limited to general purpose processors, digital signal processors, ASICs, FPGAs, discrete components or transistor logic gates and so on.

[0086] Embodiments of the present invention provide solutions to three major problems with meetings:

a) the time taken to prepare for a meeting. This is mainly achieved by allowing "on-the-fly" presentation of any displayable information. This information does not have to be linked into any particular presentation software, nor to be compatible with any such presentation software,

b) the time taken to conduct the meeting using electronic meeting tools. This is achieved by reducing the time to connect computers to the display or projection system.

c) the time taken to reflect and review and document the meeting afterwards. This is achieved by providing the possibility of recording the course of the meeting in the same time sequence that it was carried out as well as be able to store all data presented and who presented it.

[0087] Meetings in which visual information is presented on a display or projector commonly suffer from a monopoly effect: one single presenter determines the display contents and thereby has a disproportionate power to influence the meeting dynamics and thereby its outcome. Systems are known that allow multiple individuals to simultaneously show their information.

[0088] Separately, most meetings are initiated by some sort of invitation system (Outlook, WebEx, GoToMeeting etc.) which is external to the meeting room system (typically via email) and thereby confusing and inflexible.

[0089] While the above issues may not present obstacles in highly structured and expertly managed gatherings such as board meetings, they do cause confusion and frequent delays to more ad-hoc meetings especially those without structured agenda's and attendee lists.

[0090] Fig. 1a is a schematic representation of a generic meeting room 30 with a meeting table that can be used with embodiments of the present invention. Participants 37 having some form of processing device 31 such as a laptop computer, a tablet, a PDA etc. Each of the processing devices 31 can be a host device and has a first connection unit 47 to which it is coupled. The first connection unit 47 provides access to a network 50 which in this case is a wireless network, but could be a wired network. The network is a shared resources communications network as different devices and participants can transmit data over the network. Each connection unit 47 may be coupled to an input device 48 which will be described in more detail later. A user 37 will typically at a distance from the processing device 37 which is ergonomically satisfactory. This ergonomic boundary is typically an area of about 1000 sq cm to 4000 sq cm. This ergonomic boundary will typically have the user as one side of the boundary and the comfortable reach of the arms will determine an area on the left and right of the processing device which falls within the ergonomic boundary and the far edge of the boundary of the processing device (normally delimited by a display screen) will determine the other side of the ergonomic boundary. The area defined by the ergonomic boundary will overlap or include the processing device 31 itself.

The processing device will also have an outer physical boundary. The input device 48 is preferably arranged to operate outside the boundary of the processing device 31 but within the ergonomic boundary. Preferably the input device is arranged to function when it is flat on the table. The input device preferably has a size of activation area of between 1 and 144 square cm.

[0091] Preferably the network 50 is a local area network, i.e. and shared resources communication network and preferably local to the meeting room for security reasons but the network 50 may have access to other local or wide area networks such as 51 or to a larger corporate network or the internet 43, for example via a router 42. Another node of the network 50 is the base or display node 36. This node 36 may optionally be a wireless access point. The base node 36 may also be a processing device or host computer and may be coupled to a second connection unit 49 that provides access to the network 50 thus linking all of the processing devices 31, 36 together. The connection unit may have an input device as described above. Alternatively, network connections installed on the base node 36 can be used. Audio equipment 46 may be provided, e.g. a telephone that allows other members of the meeting to call in from remote destinations.

[0092] The display node 36 is coupled to and adapted to allow display of media on some kind of display 44. The display node is in embodiments of the present invention a base node of the communications network 50. The display 44 may be a projector and screen, the projector being coupled to the base node 36. A whiteboard 45 can optionally be provided that can be optionally coupled to the display 44 and/or the base node 36, e.g. when the whiteboard can record electronically what is written on it. Optionally, a camera 35 may be provided to record the entries on the whiteboard 45. The camera 35 may have a third connection unit 52 for connecting the camera 35 to the network 50 so that the data from the whiteboard can be recorded and stored or transmitted to other networks via router 42. The connection unit 52 may have an input device as described above with respect to connection unit 47.

[0093] Optional equipment can be cameras 39, 40, 41 for recording the progress of the meeting. These cameras can be linked by a network 51, e.g. a cable network to the router 42 and/or the base node 36. Another optional item is a microphone or microphones 38 that can be used to transfer audio, e.g. to the processing devices 31 and to loud speakers (not shown) attached to the base node 36 or part of the display 44.

[0094] Any or all of the outputs of the processing devices 31, the cameras, the whiteboard, etc. can be recorded and stored digitally, e.g. in node 36 or elsewhere to provide a complete record with correct time sequence.

[0095] Summarising the above, the present invention provides an electronic meeting tool for communicating arbitrary media content between different users 37 (with their own processing devices 31, e.g. PC, mobile phone, or tablet) and one display or projector or multiple displays or projectors 44 in the meeting room 30.

[0096] Referring to Figs. 1a and 1b embodiments of the present invention comprise a base or display node 36 being a processing device, e.g. a host computer adapted to receive user selected arbitrary media content, the base node 36 being coupled to a central display 44 which can be a fixed format display or a projector or similar. The arbitrary media content can be provided from any of the user processing devices 31. The base node 36 can be adapted to display the received user selected arbitrary media content in accordance with a set of rules, e.g. FIFO, automatically, on request or approval, forced to display, in accordance with a priority etc. Optionally the base node 36 is adapted to force display of the received user selected arbitrary media content, i.e. to allow participation in the meeting by an individual user displaying own selected content on display 44 independently of the person who is nominally responsible for giving a presentation or chairing the meeting. Forcing the display can also be considered as a rule. The phrase "unilateral electronic access to the display device" defines this kind of rule as "unilateral" means that the displaying process is obtained by the action of only one participant involved in the meeting, without requiring the agreement of another or the others. The term "unilateral" implies that the data for display is allowed to override or replace any data displayed on the screen by the same or another participant of the meeting. The meeting tool can also be adapted to allow a priority setting. This means that a user can set a priority setting for the media to be displayed. A priority of "1" for example can be interpreted by the base node as a forced display, a priority "2" can be interpreted by the base node as display as soon as possible, priority "3" can be interpreted by the base node as place in queue and display as the time comes etc. Setting and using priorities for display are also considered to be working to rules. To execute the rules, the base node 36 may have a decision module. The base node 36 may be a host computer having a processing engine such as a microprocessor and a memory. Preferably, the base node 36 is adapted to treat media content passed to the base node 36 from any or all of the connection units 47 in an equal manner. The base node 36 may be adapted to auto compose the media content on the central display 44 connected to it, e.g. from one or more processing devices 31.

[0097] An independent aspect of the present invention is at least one connection unit 47, (optionally 49 for receiving or unit 52) adapted to communicate the user selected arbitrary media content to said base node 36. Preferably the connection units 47 and/or optionally 49 or 52 are physical plug-and-play devices. An example of a connection unit is shown schematically in Fig. 10.

[0098] The connection unit 47 may be integrated into a user processing device 31, e.g. as an internal peripheral device or may preferably be an external peripheral device comprising a connector adapted to couple to a port of a

user processing device 31. The processing device 31 may have a client display, a processing engine such as a microprocessor, a memory and an operating system. The optional connection unit 49 may integrated into the base node 36, e.g. as an internal peripheral device or may be an external peripheral device comprising a connector adapted to couple to a port of the base node 36. The connection unit 49 may be fully integrated into the base node 36, e.g. is an internal network interface of the base node 36. The base node 36 may have a processing engine such as a microprocessor, a memory and an operating system.

[0099] The user processing devices 31, the connection units 47, (optionally 49 or 52) and the base node 36 cooperate to form a communication network 50 for linking between at least one of the plurality of processing devices 31, 36 and the central display device 44. The communication network 50 is adapted to receive arbitrary media content from at least one of the plurality of processing devices 31 and to transmit the arbitrary media content of at least one of the plurality of processing devices to the central display device 44.

[0100] An independent aspect of the present invention is a portable application 60 adapted to be loaded onto a client processing device 31 and to be run on the operating system of the client processing device 31. The portable application 60 runs as a process on the client processing device 31 that is adapted to deliver an arbitrary media content from the client processing device 31 to the communication network 50 in response to a user action applied to an input device 48, the process leaving a zero footprint on the processing device 31 on termination. The network 50 is a shared resources communications network as different devices and participants can transmit data over the network. Optionally the portable application 60 is stored on each connection unit 47 and optionally 49 or 52. Preferably the portable application 60 is adapted to "screen scrape" content of the client display of the client processing device 31. Optionally the portable application 60 when run on a processing device 31 is adapted to "screen scrape" content of the client display of this client processing device 31 and to transmit it via a connection unit 47. Optionally the portable application 60 when run on the processing device is adapted to "screen scrape" content of the client display of the client processing device 31 and to transmit it via a network interface of the processing device 31, for example if the connection unit 47 has no transmitter.

[0101] The connection unit 47 for communicating with said base node 36 has a network interface e.g. comprising a transmitter 62. The transmitter 62 is preferably a transceiver. Optionally the transmitter/receiver can be a wireless transmitter/receiver.

[0102] The base node 36 for communicating with the connection unit 47 has a receiver 63 which can be included in the connection unit 49 or integrated into the base node 36. The receiver is preferably a transceiver. Optionally the transmitter/receiver can be a wireless transmitter/receiver.

[0103] The input device 48 allows a user interaction with the connection unit 47. Preferably the input device 48 is physical actuator coupled to the connection unit 47. The user action applied to the input device 48 generates a signal that can trigger transfer of data from the processing device 31 (to which the connection unit 47 is coupled) to the network 50. Preferably the input device 48 has an activating surface that is between 100 and 14,400 square mm. Optionally, the input device 48 can be a key displayed on the client display 1 of a client processing device 31. This key can be activated, e.g. by use of a pointing device such as a mouse trigger transfer of data from the processing device 31 to the network 50.

[0104] The connection unit 47 is preferably provided with a visual indicator 61, e.g. for allowing user feedback from the connection unit 47 of the status of any activity.

[0105] The system also can include a server program 64 adapted to be loaded onto the base node 36, said program 64 being adapted to receive arbitrary media content from one or a plurality of client processing devices 31 through said connection units 47, (optionally 49), and to show this plurality of arbitrary media content streams on one or a plurality of displays 44. The server program 64 may be adapted to allow display in accordance with one or more rules, e.g. FIFO, automatically, on request, forced, in accordance with a priority etc. The forcing rule can be described as allowing "unilateral electronic access to the display device" by a participant. "Unilateral" means that the displaying process is obtained by the action of only one participant involved in the meeting, without requiring the agreement of another or the others. The term "unilateral" implies that the data for display is allowed to override or replace any data displayed on the screen by the same or another participant of the meeting. To execute the rules, the server program 64 may have a decision module.

[0106] Preferably, the server program 64 is adapted to treat media content passed to it from any or all of the connection units 47 in an equal manner. The server program 64 may be adapted to auto compose the media content on the central display 44.

[0107] The server program 64 may be a portable application adapted to be loaded onto the base node 36 and to be run on the operating system of the base node 36. The portable application 64 runs a process on the base node 36 that is adapted to display an arbitrary media content received from the client processing device 31 via the communication network 50, the process leaving a zero footprint on the base node 36 on termination. Optionally the portable application 64 is stored on each connection unit 49 and optionally 7 and can be installed therefrom.

[0108] The system may also include a central display device 44 and optionally a whiteboard 45 or other display means such as a printer. The display 44 being adapted to receive user selected arbitrary media content, and may be adapted to allow display of the received user selected

arbitrary media content in accordance with one or more rules, e.g. FIFO, automatic, forced, on request or approval, in accordance with a priority etc. The forcing rule can be described as allowing "unilateral electronic access to the display device" by a participant. "Unilateral" means that the displaying process is obtained by the action of only one participant involved in the meeting, without requiring the agreement of another or the others. The term "unilateral" implies that the data for display is allowed to override or replace any data displayed on the screen by the same or another participant of the meeting.

[0109] Optionally, one of the connection units 47 can be adapted to be a master connection unit. Such a master connection unit may be adapted to instruct the base node when media content from a client processing device 31 may be displayed or which of the processing devices may be allowed to send content for display.

[0110] In embodiments of the present invention, at least one portable application is used, e.g. for the client software on a client processing device 31 or optionally on the base node 36. In these embodiments, one of the pre-installed generic drivers of the operating system on the relevant computer device 31, 36 is exploited for setting up communication from the computer device 31, 36 to the network 50 via the connection unit 47, (optionally 49 or 52). The generic driver is used in connection with the connection unit 47, (optionally 49 or 52) operating as a peripheral device but the use can go beyond that of the standard class of peripheral devices for which the generic driver is intended. In some embodiments the connection unit 47, (optionally 49 or 52) operated as a peripheral device communicates with the relevant processing device 31, 36 by using a generic communication protocol provided by the pre-installed generic driver. Pre-installed USB drivers are examples. Preferably the setting up of the communication of network 50 using connection unit 47, (optionally 49) does not alter or affect the networking capability of the relevant processing device 31, 36. For example, if a browser is started on the client processing device 31, this browser can use the standard network interfaces on the processing device 31. This means that transfer of data via the connection unit 47 (optionally 49) is independent of transfer of data over the network interfaces of processing device 31 or 36. This has the advantage that each user can carry out processing such as searching on the internet to gather data independently of the transfer of data to be displayed during a meeting, or receive emails etc.

[0111] The use of a portable application has the advantage that any modification to settings in the register or generally in the operating system can be avoided, so that upon any form of termination, e.g. disconnecting the electronic device, system crash, no trace is left. This is generally termed "zero footprint".

[0112] The present invention has the advantage of scalability. It can provide a display system for use by a plurality of users in meetings. Every user in the meeting thus can have a client processing device 31 for coupling to a connection unit 47. A first user action connects the client processing device 31 to the base node 36, e.g. by inserting a connection unit 47 into the relevant interface connector on the processing device 31, e.g. a USB interface. A second user action comprising activating a button or key on the input device (e.g. by depressing it) then starts the process of transmitting arbitrary media content from the client processing device 31 to the base node 36. This process preferably includes screen scraping data from the processing device. Using screen scraping avoids special programs being installed on the base node 36 to carry out graphical commands sent from the processing device 31. When the base node 36 receives the plurality of arbitrary media content, it can allow auto composition of this media content on the central display connected to it.

[0113] The present invention will now be described further with reference to certain more specific embodiments.

[0114] The present invention in some embodiments provides a system and/or a method to which in one aspect can override all currently displayed material when arbitrary material is presented on a display device from more than one source processing devices such as a laptop, PDA, smartphone, computer, tablet etc. The present invention in one aspect controls the display of visual communication and information by a method akin to talking, i.e. full-duplex and with the option to interrupt or to obtain unilateral electronic access to a display device.

[0115] One embodiment the present invention can be implemented through a connectable peripheral device e.g. a USB compatible device, such that when the peripheral device is connected to a processing device that is used to provide arbitrary information such as text, video, pictures etc., each individual user with a processing device can to gain access to the display, e.g. screen. By being present at the meeting a user can pair the peripheral device to a processing device by inserting the peripheral device. The user can also pair the peripheral device to a base node or base unit that controls the display in the meeting room and which is connectable to the peripheral device via a communications network such as a wired or wireless communications network. The network is a shared resources communications network as different devices and participants can transmit data over the network. To achieve this, the peripheral device has a transceiver capable of transmitting the arbitrary data from the processing device to the display via the base node. In one option the information displayed on the local display of the processing device is screen scraped and transmitted. To allow this the peripheral device can include a portable application that is able to execute on the processing device leaving a zero-footprint on termination. Although a physically connectable peripheral device is convenient, the peripheral device could also be coupled to the processing device via a wireless connection, e.g. via the Bluetooth protocol.

[0116] For meetings with remote participants it is not possible to rely on the same hardware connectable pe-

ripheral device to provide access from a remote location to the display in the meeting room directly. Typically, at home or in a hotel, the participant only has a phone and internet access on a laptop or some other kind of portable computing device. Remote participants lack context (e.g. non-verbal communications) and have less than ideal audio/video connections and consequently suffer from a power-asymmetry. Typically, remote participants also have no way of 'pushing' their contents on screen, since the meeting is controlled by a meeting organiser or director who orchestrates the sequence of presentations.

[0117] One of the key advantages of the present invention is to provide remote collaboration while maintaining a kind of 'situational awareness'. This means that what you see has a straightforward relationship with your internal mental map. This allows keeping track of multiple information flows and being able to correlate that quickly with any other information, e.g. with a search carried out on the local computing device.

[0118] In another aspect of the present invention confusion and frustration is avoided by:

1. retaining aspect ratio of any image that is sent from any location to the display in the meeting room or displays in meeting rooms (e.g. a long thing remains a long thing)
2. not overlapping images and/or windows on any of the display devices in the meeting rooms (e.g. you never have to guess or remember what's hidden)
3. showing the same arrangement of images on each screen (everyone sees the same things and can refer to them), this means that the topological arrangement of images on each screen of multiple screens is the same,
4. maximizing the use of screen real-estate (e.g. the images presented do not have borders containing no useful information), while preferably no allowing overlapping of the images
5. allowing local manipulation of zoom and pan but allowing to return to the default layout of item 3 above
6. arranging the images on each display taking into account the local display characteristics, such as any of resolution, pixel density, aspect ratio,
7. optionally also allowing an ongoing audio connection to be heard by all participants, e.g. that verbal communications will be used to alter the contents of the screen.

[0119] Components of the present invention in embodiments are preferably:

A shared (e.g. virtual, digital) ***canvas***, on which all visual information is stored. The canvas is mapped onto one or more physical displays at one or more geographic locations and can be at least as large as the largest display. Meeting participants can add or delete visual information, e.g. local participants can use a peripheral device according to embodiments of the present invention whose operation is: one click adds the users screen to the canvas, another click removes it. Optionally, a long click replaces the current canvas contents with only the user's screen. The canvas is maintained in a location that is accessible electronically (e.g. virtual, digital)) for all meeting participants, but participants can only change the canvas if they have a "token". By using a single canvas, giving access to all participants to this canvas and broadcasting the information on the canvas to other locations, controllable and consistent amendments can be made to the canvas by any participant.

[0120] A ***token*** is at the same time a means to change information on the canvas and the right to make these changes. Tokens are a sign of trust; they are only transferred from individual persons to other individual persons. Only participants with tokens can give additional tokens to other individuals. A hardware peripheral device used locally is an example of a token. The user pairs the peripheral device with a processing device and with a base node or unit. The user is associated with the peripheral device because of the selection of it and its pairing to a processing device. This procedure inherently provides trust - the same trust as was granted to the user to be present at the meeting. In accordance with an aspect of the present invention, remote participants have the same rights as anyone else possessing a token, but a physical token is not passed remotely to a user. In one aspect, first contact between meeting participants is with voice communication. Voice communication is a good medium to transfer tokens. It is suitable for trust transfers because a. by knowing someone's phone number (either a personal cell phone number or the number of the location the user is currently at, such as a hotel or home) there is an implication of a personal connection and b. the human voice is a pretty good identification means.

[0121] The token in this embodiment is transferred by verbal instruction and needs to convey the means to make a contribution to the canvas. One way to implement the token is the combination of a URL plus a unique session ID for the meeting and implicitly one or more meeting rooms. In one aspect the combination of these two gives access to a meeting-specific website that serves two purposes: 1. optionally to download and install a screen capture software program and 2. to give access to the shared canvas. The combination of 1. and 2. offers remote participants using a portable processing such as a laptop, PDA or smartphone the same functionality as local participants. Since the verbal instruction needs to be concise, a service similar to tinyURL.com (or lilURL or TightURL) can be used to combine the website + session ID. To avoid mistakes the shortened URL will use a sub-set of characters that are easily pronounced and avoid language confusion (such as between G & J or I & E). An example is hexadecimal characters only.

[0122] An alternative method for transferring a token is the use of a messaging service such as by the Short

Message Service (SMS). This is not a voice contact but it includes the same level of trust as a mobile phone number of a known person is used. If necessary to improve security the person can be contacted by phone first and only then is the SMS message sent. If required a password can be used whereby a second password can be used to indicate that the person is under duress so that the SMS message should not be sent.

[0123] A meeting ***session ID*** indicates a temporary connection between the canvas, the tokens and the screens. In one aspect a session ID is generated automatically when the first physical peripheral device is inserted in a processing device in a meeting room and makes a connection with a base node or unit. This session ID can then be made visible to each individual that owns a peripheral device. It can be implemented by a. changing the name of the mass storage device implemented by the peripheral device, or b. changing the name or the contents of a text file on the mass storage device volume on the peripheral device or c. by a display on the peripheral device if such a display is provided, or d. by display on the central display device in the meeting room. The meeting ID or media conference code makes it easy for multiple participants, who can be at different locations, to engage in a media conference.

[0124] For example, on the display of the meeting room, a numerical or alpha-numerical media conference code is displayed. In order to share content, the participants can connect their processing devices such as a laptop over the network with the meeting room by entering the media conference code on their processing device, for example either in a webpage or a dedicated software client.

[0125] The session ID performs the following functions:

- Access control: Only people physically present in the meeting room are able to see the code. This ensures that only people in the room or people who received the code from someone in the room (e.g. through e-mail or telephone) can connect with the meeting room. This provides trust.
- **Meeting room location:** The remote person entering the code is automatically connected with the right meeting room and doesn't have to bother with searching the meeting room in a list of possible meeting rooms or entering the address (IP, phone number,...) of the meeting room. The participants don't even have to be aware of which meeting room they're in.

[0126] A media conference can start as soon as one person is connected to the central display. Optionally, as long as no-one is connected to the central display, the ID or media conference code changes at a certain frequency (e.g. once every minute). When a new code appears, previous codes are no longer usable. This ensures that a possible intruder cannot peek at the media conference code before the actual conference starts. The ID or code remains the same for the whole duration of the media conference. A media conference ends when the last participant disconnects. Afterwards, the ID or code will change again.

[0127] The ID provides a combination of multiple purposes (access control and meeting room location) in a single easy to use code. The products that are currently on the market require a separate meeting room location code (e.g. phone number, e-mail address, IP address,...) and a separate means of controlling access to the media conference (e.g. password, manual acceptation of incoming calls by conference host...). For example, to join a WebEx conference, the participants need to know both the meeting number (= location) and meeting password (= access control). A video conference device requires that remote participants know the telephone number/IP address (= location) and that a local participant accepts the incoming call (= access control).

[0128] In an embodiment, the start of a meeting session is preferably asymmetric, in that a remote participant cannot initiate a session. A meeting must start with an individual in possession of a physical peripheral device.

[0129] A session ends when all tokens (local and remote) have cut their connections with the canvas i.e. all physical peripheral devices are unplugged and all remote sessions are disconnected from the meeting website. Since it is possible for remote users to stay connected, accidentally or surreptitiously, alternative ways to end a session are: session ends when all peripheral devices are unplugged and a preset time has passed or the reset button on the meeting base station or base unit has been pushed.

[0130] A canvas is a shared memory that stores a visual bitmap that is or can be displayed on one or more displays or projectors. A canvas is a simple two-dimensional structure that is easy and cheap to implement. An alternative implementation is to store the canvas as an HTML5 page that can be rendered by a browser.

[0131] The size of the canvas (its width, height and color depth) is preferably at least the size of the largest display. This ensures that the largest display is used at its maximum capability. Canvas mapping functions optimize legibility on smaller displays.

[0132] The canvas is mapped onto a display by a transform function that optimizes its visual appearance on each particular display (e.g. interpolation, (de-)interlacing, size re-sampling, scaling etc). The canvas mapping function first determines the type of display that it is mapping to and then chooses resolution, frame rate, color depth and color mapping functions (gamma, brightness, contrast) for optimum legibility in a typical meeting room environment and also to maintain the topological arrangement of the images when multiple images are displayed - this means that remote participants can refer to the image consistently, e.g. "top left".

[0133] The canvas mapping conserves boundaries and aspect ratio's across displays (i.e. it does not stretch

nor crop). In a typical implementation of mapping onto large fixed format display such as an LCD display or onto projector screens the canvas is preferably re-sized to fill the screen's full height or width. In an implementation for smart phones this same approach is used but the end-user can zoom-in on details e.g. by pinching/stretching.

[0134] Multiple contributors can modify rectangular, non-overlapping sections of the canvas. By restricting the layout to simple rectangular sections it is possible to draw attention to particular contents by verbally referring to its position on the screen ("look at the top-left picture"). Canvas sections can be labeled by an identification of their contributors (such as user or computer names).

[0135] The size and position of a contribution to the canvas is under control of an automated algorithm. The algorithm is a simple rule, such as: 1. the first contribution fills the whole canvas, 2. the second contributions splits the screen horizontally into two equal sections, with the first contribution displayed on the left, 3. the third contribution splits the canvas vertically with the first two contributions on top, etc. The simplicity of this rule, and the absence of direct contributor influence on the algorithmic positioning, allows meeting participants to predict where contents will be displayed thereby minimizing confusion amongst (remote) participants.

[0136] One implementation of a canvas is memory stored on one physical location with (remote) access functions to update and map its contents. Local caching combined with dirty-tiling or region-of interest coding techniques can be used to minimize communication payload. Alternatively a web-based technique can be used as in www.shared-canvas.org.

[0137] One implementation of the canvas is a logical description of the canvas layout and all it's components in a XML, HTML or similar format, where the physical instantiation of the canvas only takes place at the participating endpoints in a session. Maintaining the canvas content and/or the canvas definition, the session ids, the tokens, the relationships between the tokens and the sessions can be offered as an external service to the users of the solution.

[0138] An alternative method for transferring a token is a visual code that can be picked up by a camera, such as a web camera or a camera in smart phones and tablets. The token can be in the form of a code such as a 2D barcode. Such a code is a "QR" code - see Figs 13 to 15. The code can be displayed on a display of a processing device such as a computer, laptop etc.

[0139] The QR (Fig. 13) functions as a secret code that is convenient to use for the combination of an electronic screens and smart phones. The secret (i.e. the contents of the QR code) information in the code is *which screen belongs to which meeting.*

[0140] So, a local meeting room base station knows which screen it is connected to. It does not know which meeting it belongs too. A mechanism can be provided like the first time a physical peripheral device is inserted in a local processing device, optionally after a suitable time-out period (see above) to initiate a meeting and thereby make an association between a central display and a meeting. Then a QR code can be generated. The QR code contains a meeting ID and a URL to access the central display (in preferred embodiments indirectly via a shared canvas)

[0141] This QR code is displayed and can be picked up by any meeting participant. These participants then do not need a peripheral device, but can use the resources listed in the QR code to connect to an online canvas on which they can display their data.

[0142] Fig. 14 shows the images from the processing devices of two participants as seen on a local display or a central display.

[0143] The user labels in the center of the images can be visible after each change for a few seconds (e.g. when a new processing devices was added to or removed from the meeting).

[0144] The token of the user is what the canvas service knows, when a source is connected it asks the user/source service the public user name of the user associated with the source associated with the token from this the user label is known.

[0145] Especially in a remote session this is important because it allows all users to associate sources and hence areas on the screens with users, now they can say 'I don't agree with the numbers Piet is showing, even if Piet is remote and not in the room ...'

[0146] The image shown in Fig. 15 can be shown at any moment to allow other participants to get access to the session QR code to start sharing of content if they would have missed that opportunity at the beginning of the meeting.

[0147] For remote participants a method is provided to communicate the secret (the meeting ID and the URL). This could be a voice instruction, or SMS message as described earlier.

[0148] An aspect of the present invention is the realization that verbal communications can be an integral component of the total system. The verbal meaning is interwoven with the visual meaning, not just in the sense that the presentation is a multimedia event (slides and talk), but that the management of the meeting can be a verbal and a (electronic) visual cooperation. For example:

- One way of transferring tokens is to verbally communicate them to a remote participant. This assumes the presence of a audio link before anything else and needs a short and simple token string to keep communication errors to a minimum.

- By maintaining one single layout (topology) for all meeting participants it is easy to refer to elements on the screen by verbal instruction. Inversely, all screen management that cannot be described in simple words is forbidden.

- Since, in this scenario, one can always rely on the presence of an audio channel, one can also use this infrastructure to eliminate or reduce the number of hardware physical peripheral devices and/or virtual on-screen buttons. One can use verbal commands, in combination with voice recognition, to alter the screen layout. The 'virtual button' could be a Siri-like interface:

- "Show my screen"
- "Enlarge my screen"
- "Hide my screen"
- "Remove top-right screen"
- "Remove all screens"

[0149] As described before, users can get access to a token in various ways, by verbal communication, by messaging such as SMS or by scanning a QR code using a camera, e.g. in their smart phone or tablet. The last missing link is a further aspect of the present invention is to connect the user content with the token.

[0150] E.g. A user might have a processing device such as a laptop, PC, smart phone or tablet that the user wants to use as a content source in the meeting session, but the user is using a mobile phone to retrieve his token. The user could try to move the token from the phone to the portable processing device PC, e.g. by simply copying it and entering it on a web page on the portable processing device PC, but since this is a repetitive action, i.e. the user would have to do this each time he/she participates in a meeting.

[0151] The present invention in another aspect also provides a solution for this problem as shown in Fig. 11. In one embodiment the system or method of the present invention allows the possibility to download and install an application on the mobile device or devices of choice of the user. The user then registers himself/herself at a central service where the user gets assigned an ID. From that application the user can pair computer sources (the user processing device his PC or possibly multiple processing devices such as PC's or tablet computers) with the user ID.

[0152] The process of pairing a processing device computer source can be as simple as surfing to a web page from the processing device, which will show a unique source ID (e.g. by showing a QR code again). With reference to Fig. 16, by reading the QR code from the PC local screen of the processing device with the mobile device, the PC local processing device gets linked to the user ID. The information is stored on the processing device PC in the form of a cookie or similar approach. If the user source processing device PC can not store permanent data, an alternative way is that the user would point his processing device PC to a web location where the user logs in to the central service, at which moment the source processing device PC gets automatically associated again with the user ID.

[0153] Another implementation could be a browser application that plays the same role as the mobile phone app on the processing device PC and that would connect to the central service when the user activates it (example implementation could be a Chrome browser app).

[0154] When the user then retrieves a token to participate in a session using the user mobile phone app, the app will allow the user to share the computing source or to select one of the local computing his sources to be added or removed from the canvas cited with the session the token is connected with.

[0155] Fig. 11 shows how a tablet could connect leaving a connection to corporate network or the internet, and no integration of the wireless network used for display being in corporate IT. It only requires outbound connectivity of base station, e.g. could be directed straight to a router in DMZ of company.

[0156] Here there is a pairing from tablet to session. The app can be for the strongest, non-connected wireless network. The 'session' can be static and named, e.g. a displayed session ID., or by analyzing the content on the screen, e.g. the base station could send fingerprint of content to server that can be computed by the app or the cloud service by sending image of current screen. Since there is an App, it can come with instructions on how to realize the pairing. If the base station has audio input it could be done by a suitable audio message requested by the cloud service.

[0157] Referring to Fig. 12, storage in a plug and play peripheral device *1* stores code that is automatically executed by the first processing device when the plug-and-play device is connected to the first processing device via the first plug-and-play interface **1a**. When a button 2 on the plug and play device is pressed a first time (first user action), code is executed by the first processing device **L11** to initiate a display data exchange between the first processing device and a second computing device, i.e. a base unit or node. The data exchange is preferably done wirelessly (e.g. Bluetooth, IEEE 802.11 / Wi-Fi® WiFi, IEEE 802.15.4 and ZigBee ...) but could be done via a wired connection. The data exchange between the processing device **L11** and the computing device **B1** can be done independently of the internet (e.g. direct wireless communication between both computing devices) or through the internet and an intermediary storage device **C**. The storage device C typically has computing capabilities to extract information from e.g. a data packet, sort it, re-arrange it, create a data file, write to a file, erase specific elements in a file ... Unless stated otherwise or made obvious by the context, the case will be discussed where display data is exchanged between computing processing devices like **L11,** base units like **B1** and a storage device C. In that case, display data is sent to storage device C through the generally available communication interface of processing device **L11** (Wifi, Ethernet ...). Supporting equipment like router(s), LAN hardware, internet provider hardware, land lines, access to GPRS and/or Mobile Phone Network ... is assumed to be available and not a limitation on the present invention

and will not be discussed further. The base unit **B1** is for example a computer equipped with among other things a graphical card, a hard disk memory, and with a Processor like e.g. an AMD® Sempron™ 150 (2.9GHz, 1MB Cache), an AMD Athlon™ II X2 250 (3,0 GHz, 1 MB cache), an AMD® Athlon™ II X4 645 (3,1 GHz, 2 MB cache), a processing system like e.g. Windows® 7 Professional, 64-bits, a memory e.g. 6GB Dual Channel DDR3 SDRAM at 1333Mhz -3 DIMM's a hard disk 1000 GB SATA, an optical station to read CD ROM, a video card like e.g. an ATI Radeon™ HD4200 integrated graphic card, a 512 MB NVIDIA® GeForce G405 graphic card, a 1GB DDR3 AMD® Radeon™ HD 6450 graphic card or similar graphical cards available off the shelf, a 10/100/1000 Ethernet-LAN on the system card; a wireless communication interface like e.g. a Dell Wireless 1525 802.11n PCIe-network card, a VGA-connection and/or an HDMI™ connection for connection to display **D1.**

[0158] The central storage device C may also be a computer identical or similar to **B1** that has been configured as a server.

[0159] The display data **3** "screen scraped" from the first processing device **L11** is sent to a central storage device **C** (either directly by **L11** or, in another embodiment, by the base unit **B1**). The information is encoded in e.g. HTML5 including an identifier **id** identifying the origin, in this example **L11,** of the screen scraped information. The storage device **C** is then consulted by the base unit **B1** in order to display the display data on display **D1.**

[0160] When the button **2** is pressed a second time, the processing device **L11** informs the central storage **C** that the screen scraped display data **3** must be erased. In a first embodiment, the central storage **C** informs the base unit **B1** that the display data has been altered. **B1** then consults the central storage **C** and upload the display data still available on **C** and displays it on **D1.** In the simple example given here above, assuming that no display data was available on **C** prior to pressing button **2** a first time, no display data will remain on **C** and no data will be displayed on **D1** (e.g. black screen if **D1** is an Liquid Crystal Display). The identifier may be any practical marker that can be encoded in the data packet sent by a processing device as **L11**. This could be an IP address, a MAC address, a unique identifier recorded in the plug and play device (e.g. a number assigned to the plug and play device as it is assembled by either programming a flash memory, setting a dipswitch ...). In the case of a smart phone **P31** discussed further in this description, the unique identifier could be the phone number itself. Biometrics could also be used to identify a user and assign the user an identifier id.

[0161] In a second embodiment, **L11** communicates with the base unit **B1** which in turn informs **C** that it must erase the display data **3** from its memory. In a particular case, communication with the base unit **B1** is done through the plug and play device **1** equipped with an RF interface.

[0162] In the remainder of the description, unless stated otherwise, pressing the button (or the equivalent actions described further) and the eventual impact on the data displayed on **D1** / available on the memory device **C** will be referred to as an "event".

[0163] The plug and play device might be replaced by e.g. a code running on the processing device **L11.** In that case the button **2** is replaced by a (well defined) zone of a touch screen (as might be the case for a smart phone) or a key on the keyboard of a laptop computer. The zone of the touch screen that will trigger an event might be either indicated by a displayed icon. Alternatively, no icon will be displayed and an event will be triggered by "swiping" the touch screen. Other alternative methods include gesture recognition made by a camera connected to the computing device, voice recognition and activation, fingerprint sensing ...

[0164] Several users e.g. **U11, U12, U13** equipped respectively with computing devices (e.g. "laptop computers") **L11, L12** or smart phones like **P13** are gathered in a first meeting room **R1** equipped with a base unit **B1** and a display **D1.** A first processing device **L11** is equipped with a peripheral device **d11** while another, **L12**, will rely on a key of its keyboard (or an alternative sensor) to trigger an event while Smart phone **P13** will rely on its touch screen.

[0165] In another meeting room **R2** geographically remote from **R1**, users **U21**, **U22**, **U23** ... are equipped with computing devices **L21, L22, L23 ...** equipped with plug and play devices **d21, d22, d23** ... or one of the alternative to trigger an event.

[0166] In yet another location, e.g. a hotel room, a car ... a "road warrior" U31 makes use of a smart phone **P31** to communicate with users **U11, U12 ... U23 ...**

[0167] An event will be identified by a set of indices i, j and k. Indices i and j represents a user at the origin of an event (example: i=2 and j=1 represents an event triggered by user **U21**). Index k is either 1 (button **2** of plug and play device **d21** is pressed a first time and display data screen scraped on e.g. processing device **L21** is sent to and stored on **C** and displayed on **D1, D2** and **P31**) or 2 (button **2** is pressed a second time and display data d21 is erased from C and disappears from display D1, D2 , P31)

[0168] The proposed set-up allows any of the users to share display data at the same time with all the other users on the displays **D1** and **D2** and on the display of smart phones like **P31** by triggering a first event. The set-up allows any user to withdraw her / his contribution to the data displayed on **D1, D2** and **P31** by triggering a second event.

[0169] The data displayed on **D1**, **D2** and **P31** depends on (a) display data sent by any of the computing devices to the memory device **C** and stored in **C** and (b) a configuration document **CD** updated at each event and stored on **C**.

[0170] The display data stored in **C** and structured by

the configuration document may be referred to as the Canvas in this description.

[0171] For an event **Eij1**, display data screen scraped from the display of a processing device **Lij** (or **Pij**) is sent to the storage device **C** together with an identifier **idij**.

[0172] The temporal sequence with which display data is received by the storage device **C** is recorded under the form of a temporal index **m**. The temporal sequence is determined by e.g. the time of the local clock at C upon receipt of display data ddij. Alternatively, the temporal index for an event Eij is determined by the time of the local clock of Lij expressed in GMT or Universal Time.

[0173] If the storage device **C** receives contribution from more than one processing device **Lij** (or **Pij**) the configuration document is updated to reflect this.

[0174] In a first example (for the configuration document), the configuration document will assign to received display data **DDij** from processing device **Lij** / **Pij** (a) an identifier **idij** (b) a temporal index **mij** and (c) metadata concerning the source (e.g. name or identifier of user **Uij**). The metadata can be superimposed to the corresponding display data on displays D1, D2 ...

[0175] Based on the number of contributions, the configuration document will determine the layout for the combined display data. Example: if contributions from 2 computing devices **Lij** / **Pij** are received, the configuration document assigns half of the display space on **D1** and **D2** to each of the display data **ddij.**

[0176] If contributions from 3 or 4 computing devices **Lij** / **Pij** are received, the configuration document assigns a quarter of the display space on **D1** and **D2** to each of the display data **ddij.**

[0177] If contributions from more than 4 computing devices are received, the configuration document assigns a quarter of the display space on **D1** and **D2** to the four display data **ddij** with the most recent temporal index **mij.**

[0178] For an event **Eij2**, the display data from processing device **Lij** / **Pij** is erased from the storage device **C**, the corresponding identifier **idij** and temporal index **mij** disappears from the Configuration Document **CD** and the data displayed on **D1** and **D2** will be modified accordingly, for instance, according to the example given here above.

[0179] The display **D1** and **D2** might have different characteristics (resolution, dimension of the active display area ...). In order for all users to have access to (as close as possible) to identical visual data, displays **D1** and **D2** (with or without support from their base unit) use the configuration document to determine if the display data ddij must be re-sized to fill the screen's full height or width.

[0180] More generally, the display data **ddij** to be displayed are mapped by a transform function **TFi** that optimizes the visual appearance on each particular display by means of e.g. interpolation, de-interlacing, size resampling; choice of resolution, frame rate, color depth, gamma, brightness, contrast ... according to the needs of users **Uij** in their meeting room **Ri.** Aspect ratio and boundaries between contributions **ddij** are conserved.

[0181] The configuration document contains a tagged mark-up language description of the image to be displayed

[0182] If display data **DDij** is variable, the corresponding temporal index **mij** is kept constant and equal to its earliest value (e.g. upon reception of the first data packet).

[0183] The configuration document may be or may contain a tagged mark-up language description of the image to be displayed. Languages/formats/styles such as SGML, XML, SVG can be used, for example.

[0184] The configuration document may comprise a full description of the image content to be displayed. The full description may be defined in the document by means of a network address for the display data **ddij.**

[0185] A relevant property of SVG drawings is that they can be dynamic and interactive. Time-based modifications to the elements can be described in SMIL (Synchronized Multimedia Integration Language), or can be programmed in a scripting language (e.g., ECMAScript or JavaScript). The W3C explicitly recommends SMIL as the standard for animation in SVG. The SVG drawings may for instance be edited or transformed according to the example developed earlier whenever an Event Eij requires it. A related example of canvas as meant in this description is a dynamic web page created by server side scripting (such as PHP, Perl, JSP or ASP.NET) before being sent to a "client" (e.g. a base unit) for display / rendering on a browser running on the client side.

[0186] More detailed examples of how the display data stored on the storage device **C** can be distributed to remote displays **D1** and **D2** is given in US patent application 11/487,357 published under number US20070033289 "Network displays and method of their operation" by Geert Nuyttens and Ronny Dewaele. Examples of hardware needed to display graphical information sent by C are given in US patent application serial number 11/487,357 as well.

[0187] The techniques described in US patent application serial number 11/487,357 are particularly relevant when e.g. the display D1 in meeting room 1 consists of two (or more) separate display screens e.g. two 82" LCD screens mounted side by side. The configuration document generated at C will determine how the canvas will be distributed over the two displays. Building up on the earlier example where maximum 4 contributions are displayed on the (then single screened) D1, the display data ddij with the latest temporal index mij may be displayed on the first of the separate displays in meeting room 1, and doing so making the latest contribution more visible to the participants, while the other contributions ddij will be displayed on the second separate display in meeting room 1. The same is done in meeting room 2 assuming that a second screen is also available in meeting room 2. The techniques described in US 11/487,357 are leveraged to take into account e.g. failure of one of the two or more displays in the same meeting room and allow to

continue the meeting with as little disturbance as possible.

[0188] When a processing device **Lij** shares data with others through the base unit Bi with the support of a plug and play interface **1**, some adaptations are needed to set-up / draft the configuration document.

(1) Display data **ddij** is sent to the base station **Bi**. Data display **dij** is time stamped either by the local clock of **Lij** or that of **Bi**. The time stamp tij is expressed as GMT or universal time.
(2) The display data **ddij** is sent by the base station **Bi** to the storage device **C** where the temporal index **mij** is determined based on the time stamp tij. This guarantees that the users and the event they trigger in different meeting rooms will get the same priority regardless of differences in transmission time between the various meeting rooms and the storage device **C**.
(3) The Canvas is assembled based on the display data **ddij** and the temporal indices **mij** as was done when the computing devices **Lij** communicated directly (i.e. without using **Bi** as an intermediary) with the storage device **C**.

[0189] When a base station is required to access the storage device **C**, a specific procedure is required to allow "road warrior" **U31** to share display data with the users **U11, U12... U21** ...

[0190] A token (i.e. an authorization and means to alter the display data **ddij** stored on **C**) is needed to be transferred by verbal instruction and needs to convey the means to make a contribution to the canvas. One way to implement the token is the combination of a URL plus a unique session ID. The combination of these two gives access to a meeting-specific website that serves two purposes: (1) to download and install screen capture software program and (2) to give access to the shared canvas. The combination of (1) and (2) offers remote participants like road warrior **U31** using laptops or smart phones the same functionality as participants with access to the base units **B1** or **B2**. Since the verbal instruction needs to be concise, a service similar to tinyURL.com (or lilURL or TightURL) will be used to combine the website + session ID. To avoid mistakes the shortened URL will use a sub-set of characters that are easily pronounced and avoid language confusion (such as between G & J or I & E). An example is hexadecimal characters only. When the phone number of P31 is used as an identifier for U31, it can be verified by the downloaded screen capture software program or accessed by the website itself. In that later case, the phone number may be used to authorize access to the canvas C through the website.

[0191] Road Warrior **U31** having no access to displays **D1** or **D2** will have to rely on local display means to see the display data **dij** visible to Users **U1j** and **U2j**. The screen of a smart phone being far smaller than the screen of a display like **D1** and **D2** used in meeting rooms, the configuration document is used advantageously together with a transform function. For instance, having recognized that the screen of smart phone **P31**; geographically remote from displays **D1** and **D2**; has smaller dimension and resolutions, information like the temporal index can be used to display only one contribution **ddij** at a time on the screen of smart phone **P31**. Switching from one of the maximum 4 (in the example treated above) data display **ddij** to another may be done by road warrior **U31** by scrolling, clicking a specific key on his / her smart phone or "swiping" on a touch screen of **P31**.

[0192] Instead of being done by voice over the phone, the invitation to join the virtual meeting between participants **U11, U12** ... **U21** ... **U31** may be sent by e-mail pr through social media. User **U31** merely has to click the url indicated in the invitation, the web site will verify the phone number of **P31** and **U31** will be able to see and share display data with the other participants.

[0193] The integration of voice command issued by users Uij and display data increases the focus of participants **Uij** and in particular participants like "road warrior' **U31** who has only access to a small display screen on his/her smart phone P31.

[0194] To that end, the computing devices **Lij** is equipped with off the shelf voice recognition software. When a user, e.g. **U12** issues a voice command, digital information VC is generated as a result by the voice recognition software. That digital information can be linked through e.g. a look-up table to an instruction that can be interpreted by server side scripting and trigger a real time modification of the canvas e.g. the dynamic web page discussed previously. Example 1: a voice command like "zoom top corner left" will result in the top left corner of the canvas (as visible before the voice command is issued) being zoomed in and occupying e.g. the full screen of display D1, D2 and more importantly the screen of smart phone P31. Example 2: if the layout of data display is limited to maximum 4 contributions as described previously, the voice command could be "top left" "top right", "bottom left" and "bottom right". Based on those information, server side scripting would tailor the displayed data on smart phone P31 and only the top left or ... or bottom right contribution would fill in the screen of smart phone P31.

[0195] Returning to Fig. 2, the base node software (6) running on a base node 36 can be adapted to display on the central display a splash screen (21) showing its readiness to receive arbitrary media content over its receiver. This splash screen (21) can also show instructions on how to use the system, as well as the configuration parameters (see later) to reach the base node 36. These configuration parameters are also shown in a transparent canvas at the bottom of the central display (22).

[0196] A client processing device 31 that wants to have its arbitrary media content displayed on the central display connected to the base node 36 is connected to a connection unit 47. The portable application 60 will be

executed on the client processing device 31 as a host device. A first user interaction creates a connection between the portable application 60 and the base node 36 using the transmitter in the connection unit 47 and the receiver in the base node 36. A second user interaction, this time on the input device 48, activates screen scraping by the portable application of the arbitrary media content from the client processing device display, which is then sent over the connector unit 47 to the base node.

[0197] The base node 36 receives the plurality of arbitrary media content coming from one or more connection units 47, and auto composes this media content for rendering on the central display.

[0198] The visual indicator 61 on the connection unit 47 indicates to the user and to other participants in the meeting that media content is being sent by that connection unit 47 to the base node 36 for display.

[0199] Repeating the second user interaction on the input device 48 of a connection unit 47 decouples the media content from that connection unit 47 from the base node 36. The base node 36 removes that media content from the composed image on the central display and recomposes the remaining content on the central display.

[0200] The content on the central display/projector is auto arranged as shown in figure 2. When user 1 adds content, his/her display will be scaled to fill the available central display canvas as much as possible, but without affecting the aspect ratio. When user 2 adds in, his content is added to the side of the first image. When user 3 adds his content, the arrangement is triangle wise. Adding user 4, the image becomes a 2 by 2 tiling, which is the maximum available. When an additional user attempts to add content, he will be blocked. When a user initiates action to remove his/her content, his/her media content is removed from the central display and one moves backward in the composition sequence shown in figure 2.

Base node software

[0201] The base node software has one or more of the following features:

- First code for providing a means or a method step for correctly configuring the receiver of the base node.
- Second code for providing a means or a method step for listening for output of connection units trying to connect on a specific port.
- Optionally, third code for providing a means or a method step for a GUI for administration purposes, offered for example over a web interface.
- Optionally, fourth code for providing a means or a method step for publishing its presence over the network using the zeroconf protocol.
- Optionally, fifth code for providing a means or a method step for accepting and installing software updates of the base node as well as for the portable application software for the connection units.
- Sixth code for providing a means or a method step for providing facilities for pairing of connection units to the base node.
- Seventh code for providing a means or a method step for auto-composiing of different incoming arbitrary media streams and rendering of composited image on display or projector screen.
- Eighth code for providing a means or a method step for receiving, decrypting and decoding incoming arbitrary media content.
- Optionally ninth code for providing a means or a method step for scaling of incoming arbitrary media streams
- Optionally tenth code for providing a means for displaying incoming arbitrary media content in accordance with a set of one or more rules.

[0202] Any of the above code may be stored on a non-transitory machine readable storage medium such as an optical disk, a magnetic disk, magnetic tape, solid state memory etc.

Portable application for the client processing device

[0203] The portable application comprises an algorithm for screen scraping. Screen scraping algorithms include VNC and RDP or similar. The algorithm may include a combination of algorithms such as VNC and RDP that are optimized for different content, e.g. static text or video. The portable application has one or more of the following features:

- Eleventh code for providing a means or a method step for connecting to a network including the base node.
- Twelfth code for providing a means or a method step for capturing video frame buffers of the client processing device, i.e. computer (C), also called screen scraping.
- Thirteenth code for providing a means or a method step for encoding, compressing and optionally encrypting these video frames and sending them over a secure link to the base node. Only changed areas such as rectangles or triangles of the screen need to be transferred, and different types of rectangles or triangles are encoded in different ways (e.g. RLE, JPEG,...) to optimise performance.
- Fourteenth code for providing a means or a method step for handling the connection unit.
- Fifteenth code for providing a means or a method step for initiating connection to base node.
- Sixteenth code for receive inputs from the input device on the connection unit.
- Seventeenth code for providing a means or a method step for sending state changes to the visual indicator on the connection unit.
- Optionally, eighteenth code for providing a means

or a method step for presenting the user a GUI (18).
- Optionally, nineteenth code for presenting GUI for administration of the portable application.
- Optionally, twentieth code for providing a means or a method step for displaying and activating a key on the display of the client processing device for allowing a user input to start the transfer of data from the client device to the base node.

[0204] Any of the above code may be stored on a non-transitory machine readable storage medium such as an optical disk, a magnetic disk, magnetic tape, solid state memory etc.

[0205] In this embodiment the portable application stored on the connection unit, and is executed in an execution context on the client processing device. The portable application does not need to be copied to or installed on the computer. It can be executed directly from the connection unit. It will only be copied temporarily into an execution context on the client processing device. There are also no changes in configuration or settings in the client processing device. This means that nothing will remain on the client processing device when the connection unit is removed. It also implies that the portable application will run on client processing devices where the user does not have the necessary access rights to install software.

[0206] The portable application is designed in such a way that

- No specific drivers need to be installed on the client processing device.
- Pre-installed drivers are used, e.g. for classes of peripheral devices.
- It is independent from vendor specific graphics hardware.
- It runs on at least one and preferably on a variety of different client processing devices, including Windows, Mac OS/X, Linux, Android, iOS and many others.

Advantages

[0207] The present application has one or more of the following advantages:

- No need for a master role in the meeting
- Standard plug and play connectivity of connection units to base node
- Simple and well known user actions are employed
- Own networking facilities of client processing devices not blocked
- No configuration changes on the client processing device
- Input devices are easily accessible; e.g. large size
- Program updates of portable application and server program can be performed locally
- Portable applications are used, no installation, multi-platform, no vendor specifics
- Particular implementation of screen scraping done by portable application avoids vendor specific graphics devices
- Standard drivers are used hence no driver has to be installed
- No configuration changes on the client processing devices
- Zero footprint applications on client processing devices - nothing to clear up or adjust or reset
- Own networking facilities of client processing devices not blocked
- No configuration changes on the user computers
- Low virus, malware and spyware risk

[0208] The portable application may be stored on a non-transitory machine readable storage medium such as an optical disk, a magnetic disk, magnetic tape, solid state memory, USB mass storage etc.

Second Embodiment

[0209] In the second embodiment, referring to Figs. 2 to 5, the base node is a separate physical processing device called base unit (B), comprising permanent storage, memory, a processing engine, a wireless access point (4), a plug and play interface such as a USB port (11), a graphics display output adapter (5) like VGA/DP/DVI/HDMI, and optionally an audio output adapter (27). An input device having an actuator such as a button 13 and a visual indicator 14 are optional.

[0210] The connection unit is a physical device in the form of an external peripheral device (shown in the drawings as a "dongle" D) comprising permanent storage storing the portable application (7) and configuration parameters (12), memory, a processing engine (e.g. CPU, FPGA), a wireless transmitter such as WiFi (3), a plug and play interface such as a USB interface (2), a button as input device (9), an LED ring as visual indicator (10). The portable application is stored on the peripheral device (7).

[0211] The client processing device is host device, for example a computer or laptop comprising a display, a plug and play interface such as a USB port (2), memory, and a processing engine such as a microporcessor.

The system thus comprises

[0212]

- an external peripheral device (D) that has a plug and play interface such as a USB interface (2) on one end and a communications interface such as a wireless interface configured as client (3) on the other end.
- a base unit (B) that has a communications interface such as a wireless interface configured as access point on one end (4) and a video card adapter (5) like VGA, DVI, DP or HDMI on the other end.

- a portable application (7) stored on the peripheral device (D) but executed on the client processing device (C)
- a base node software (6) stored and executed on the base unit (B)

[0213] The external peripheral device (D) also preferably has any one or any combination of:

- a large button as actuator for the input device (9) allowing user interaction with the peripheral device. The button preferably has an actuation surface area of between 100 and 14,400 square mm.
- visual indication such as a LED (10) allowing user feedback from the peripheral device

[0214] An advantage of embodiments of the present invention is to provide data transfer to the peripheral device via a peripheral interface such as a USB interface on any processing device such as a computer in a manner that is largely operating system independent and without leaving a footprint (Zero-Footprint). Installation of drivers and/or applications onto such a processing device as a computer is not necessary wherever pre-installed generic drivers are present. Administrator rights on the processing device such as a computer are preferably not necessary. To avoid the need for administrator rights, embodiments of the present invention use other peripheral device pre-installed drivers such as USB class drivers supported without any extra installation. Embodiments of the present invention route at least screen scraped data presented by client software running on the processing device for transfer to a communications network via a peripheral device such as a USB device. This bypasses any network interface of the processing device (and hence many firewalls) but only for the specific client software. Other applications are not affected and can make use of the standard network interfaces, i.e. packets from/to the TCP/IP stack are transferred to a network device as normal. The client software is launched from the peripheral device such as a USB composite device or storage device as a portable application, which can avoid that any traces are left on the host OS.

Basic usage scenario of the second embodiment

[0215] The base node software (6) displays on the projector a splash screen - (21) in figure 5 - showing its readiness to receive arbitrary media content over its receiver (4). This splash screen (21) also shows instructions on how to use the system, as well as the configuration parameters (see later) to reach the base node. These configuration parameters are also shown in a transparent canvas at the bottom of the central display (22).

[0216] To avoid user interaction for the configuration of the connection between peripheral device and base unit, a pairing process is used. This pairing process provides the peripheral device, i.e. the connection unit with networks parameters needed to set up the local network. As an example, the peripheral device can be briefly plugged into the USB port (11) of the base unit (B). The base unit then optionally does a software validity check, optionally does a software update of the portable application stored on the peripheral device, and writes the connection parameters on the peripheral device (D) required for the peripheral device and base unit to find each other to the permanent storage (8). For example, when using WiFi, this would be the SSID, WEP/WPA2 keys and IP address of the base unit's receiver, as well as the port number used by the base node software although not all of these need to be exchanged.

[0217] A client processing device that wants to have its arbitrary media content displayed on the central display connected to the base node (5) connects a peripheral device (D) to its USB port via (2). The peripheral device presents itself to the computer over interface (2) as a composite device comprising a mass storage device and a keypad. This has the major advantage that no specific driver is required, since all these devices are natively supported in every personal computer system that has a USB port. If autorun is enabled, then the computer will automatically execute the client software (7) stored in mass storage (8) on the peripheral device. The first user interaction mentioned in the general case is then just the connection of the peripheral device to the USB port. If security measures disabled auto-run, the user needs to explore the mass storage on the mass storage of the peripheral device and start the portable application manually.

[0218] The portable application will use the wireless, e.g. WiFi interface of the peripheral device (3) to connect to the correct base node. To know the right base unit to connect to, the configuration parameters needed to make this connection are stored in the database (12) on the mass storage device (8) during the pairing process described earlier.

[0219] Once the connection is made, the peripheral device goes into connected mode. This means that there is now at least one channel from the peripheral device to the base unit. The content is not shown yet. The LED (10) on the peripheral device now turns white to give a visual indication of this new state.

[0220] When the user at the computer (C) wants to show her content, she presses the button (9). When the button was previously in state "connected" (see figure 6), it will check the state of the base unit (P). If the base unit is not in state "full", the peripheral device will send the screen scraped arbitrary media content to the base unit (B), which will add the media content to the composition on the central display. The peripheral device LED (10) now turns red to indicate "showing" state (figure 6).

[0221] The button (9) acts as a toggle. When the user presses the button again, that computer displays content will be removed from the projector. The LED (10) goes back to white.

[0222] Use of the auto-run feature is optional if possible

and enabled on the computer (C) to start the client software (7) as soon as the peripheral device is plugged in. On Windows for example, this means mounting the peripheral device as a mass storage device and using the autorun.inf file stored on the peripheral device.

[0223] In many cases however, this auto-run feature will be disabled for security reasons. In that case, we will, if possible and enabled on the computer (C), use the auto-play feature to show the logo of the connected peripheral device on the desktop of the computer. The user then needs to double click on that logo to start the client software. If the auto-play feature as described above is also not possible or enabled, the user must browse to the file system of the connected peripheral device and start the application manually. This means double clicking the client.exe file on Windows, client.app on Mac OS/X or tapping the appropriate application icon on a tablet or any mobile device with touch screen.

[0224] Third Embodiment: Portable application stored on standard solid state memory such as a USB stick.

[0225] In the third embodiment, the portable application is stored on a solid state memory such as a regular USB memory stick (figure 7).

[0226] With a solid state memory such as a regular USB memory stick, there is no input device, visual indicator or transmitter of the kinds described above for the connection unit. This means that the system needs to:

- Use the transmitter/receiver from the client processing device.
- Use as input device a key or button on the client processing device like a physical key on the keyboard, a special mouse press, a button area on a touch screen, a button displayed on the screen to be clicked on with a mouse pointer.
- Present the visual indicator on the client processing device's display.

[0227] The client processing device then looks like figure 8.

[0228] This embodiment provides a peripheral interface such as the USB interface on any processing device acting as a host device such as a computer in a manner that is largely operating system independent. Installation of drivers and/or applications onto such a processing device as a computer is not necessary wherever pre-installed generic drivers are present. Administrator rights on the processing device such as a computer are preferably not necessary. To avoid the need for administrator rights, this embodiment uses other peripheral device pre-installed drivers such as USB class drivers supported without any extra installation. This embodiment of the present invention routes at least screen scraped data presented by client software running on the processing device for transfer to a communications network via a network connection of the processing device. The client software is launched from the peripheral device such as the USB device as a portable application.

[0229] The first user operation then comprises:

- plugging in the solid state device such as a USB memory stick,
- starting the portable application (if autorun is disabled)
- configuring the transmitter on the client processing device to connect to the correct base node, using the configuration parameters (22) shown on the central display
- triggering the connection of the portable application with the base node, for example by interacting with an element on the GUI (18) of the portable application presented on the display of the client processing device.

[0230] Presenting visual feedback on user actions is in this embodiment also done using elements in the GUI of the display of the client operating device.

[0231] In this embodiment, the advantage of zero footprint is partly realized by the portable application in the sense that no software is installed on or copied to the client operating device, but there is a configuration change needed to connect the transmitter of the client operating device with the base node, which needs to be undone afterwards.

[0232] Optionally, the portable application can make the configuration changes to the transmitter for the user.

Advantages lost in this embodiment

[0233]

- Partial loss of zero footprint nature of portable application
- More complex first user interaction
- More expertise required from user
- GUI needed on client operating device display, which is possibly also shown on central display
- Need to find free key on client operating device when using physical key for second user action
- Network interface is blocked from other uses by portable application

[0234] Optionally, the last point can be avoided by using the base unit as a gateway to the network that the client operating device wanted to connect to through its own interface.

[0235] Advantages are:

- tight control of user connectivity to corporate network through settings on the base unit
- keep network connectivity intact even when transmitter is now also used for display purposes

[0236] Disadvantage is a higher vulnerability of the system because the display connection is now possible a doorway into the corporate network.

[0237] What remains as advantages are

- the availability of a physical medium to distribute the portable application to users
- no need to install or copy software to client operating device
- easy way to maintain software updates on the connection units (here: memory sticks) via the base unit
- possibility to write configuration data on the connection unit by the base unit, for example in the form of a configuration profile that can be read and used by the client operating device

[0238] Fourth Embodiment: Software only client installed on the client processing device.

[0239] This embodiment is similar to the third embodiment, with as only difference that the software is copied on the client operating device (figure 9). In this case, no plug and play port such as a USB port is required on the client operating device.

[0240] This embodiment will typically be used for tablet PC's and mobile devices. In that case

- there is often no USB port available
- application distribution is easy and widely accepted through application stores Fifth embodiment: Base node software OEM'ed to projector or display equipment

[0241] In this embodiment, the base node is not realized as a separate physical box, but integrated into the processing unit inside a display or projector. All other details are as previously described.

Sixth embodiment

[0242] In this embodiment, the base node is not realized as a separate physical box, but integrated into the codec of a video conferencing equipment. All other details are as previously described.

Seventh embodiment: Remote meeting participant

[0243] In this embodiment, one or multiple client operating devices are not in the direct vicinity of the base node but on a remote location.

[0244] To accommodate this case, the following adaptations are needed:

- further compression and or scaling of the arbitrary media content to allow use of low bandwidth connection
- possibility to communicate connection parameters of the base node to a remote user
- connectivity of the base node to the WAN network to which the remote user is connected

[0245] All other details are as previously described.

Eighth embodiment: multiple base nodes

[0246] In this embodiment, multiple base nodes are used. This can be done for different purposes:

- connectivity of multiple central displays
- extension of real estate of central display
- connectivity of base nodes in different remote locations

[0247] Thi provides the advantage that one can present on multiple base units from a single peripheral device. This is useful for a number of cases:

- personal peripheral device: user can have a personal peripheral device that is paired with multiple meeting rooms that he regularly uses
- use in meeting room with multiple base units each controlling a different display in the same meeting room

[0248] The proposal uses a special variant of the peripheral device called a multi base peripheral device. The multi base peripheral device is equipped with a rotating wheel around the circular central "show me" button. This could be a mechanical rotating multi-position switch or something like the touch wheel on the iPod classic.

[0249] The pairing of this multi-base variant of the peripheral device:

- the rotation wheel is put in the position of the corresponding base unit.
- the peripheral device is paired to the base node in the regular way
- the configuration parameters are stored in a permanent storage location; every position of the rotating wheel has a corresponding set of connection parameters (e.g. different rows in a table) each corresponding with a particular base

[0250] The connection of the peripheral device is as follows:

- multi-base peripheral device X is plugged into a PC
- rotation wheel on peripheral device X is put in position A
- peripheral device X reads configuration parameters in position A of its internal memory
- peripheral device X connects to base node A
- base node A indicates connection of multi-base peripheral device X on central display screen
- rotation wheel on peripheral device X is put in position B
- peripheral device X reads configuration parameters in position B of its internal memory
- peripheral device X connects to base node B
- base node B indicates connection of multi-base peripheral device X on screen

- continue until correct base is selected with rotation wheel
- click the peripheral device input device e.g. button to show content on central display of base node
- rotating the wheel always first clicks away content from the base of the last position

Ninth embodiment

[0251] Fig. 10 shows a peripheral device 47 in accordance with an independent embodiment of the present invention including an input device. This embodiment can be used with any of the embodiments described above.

[0252] The peripheral device is configured as a connection unit and is a physical device in the form of a connector for a plug and play interface of a user processing device as a host computer such as a USB connection, a flexible data and power connection connected to the connector and a base, the base having an actuator, e.g. a button configured to be an input device with the functions as described above.

[0253] The base and/or the actuator is preferably large in size, e.g. having a surface area between 100 and 14,400 square mm. The base can be square, rectangular, round, hexagonal, oval, polygonal in shape or any other ergonomically suitable shape. The actuator is preferably round but can be square, rectangular, hexagonal, oval, polygonal in shape etc. there can be more than one actuator on one base.

[0254] The length of the flexible data and power connection, e.g. cable is preferably adapted to place the peripheral device (when in its connected in its operating position), especially the base and the actuator, in the region between the boundary of the connected user processing device and the ergonomic boundary as defined above. In addition the flexible data and power connection should be adapted so that the base lies flat on the meeting table independent of the orientation of the connector needed to insert the connector into the plug and play interface.

[0255] The base preferably includes electronics such as having permanent storage for storing the portable application and the network configuration parameters, memory, a processing engine (e.g. CPU, FPGA), a wireless transmitter/receiver such as for WiFi, a plug and play interface such as a USB interface, a LED ring as visual indicator. The portable application can be stored on the peripheral device, i.e. in the base. The visual indicator is for allowing user feedback from the connection unit of the status of any activity.

- Some examples for activation of the actuator which can be used with any of the embodiments of the present invention:
    - Sound activated (hand clap, voice recognition, computer sound, music, ...)
    - Remote controlled via wireless connected device (IR, Bluetooth, WiFi, ...)
    - Light activated
    - Pressure activated, e.g. depression with a finger or hand.
    - Touch activated
    - Proximity ('near-touch' on the actuator or bringing the actuator close to some object
    - Biometric reader such as Fingerprint reader, Iris scanner, DNA analyser
    - Keypad, e.g. for entering Keycode e.g. a password

Alternative embodiments

[0256] In the above embodiments, once the connection is made between the connection device and a host computer, the peripheral device goes into connected mode. This means that there is at least one channel from the peripheral device to the base node. In accordance with any of the embodiments of the present invention a plurality of channels can be set up between the connection device and the base node. These channels may be logical channels.

[0257] Some examples for such a multichannel arrangement may include the first and one or more of the additional channels:

- First channel is for the Scraped image stream (XDS)
- Second channel is for GPU commands (OpenGL, DirectX)
- Third channel is for Mouse pointer coordinates (absolute, relative)
- Fourth channel is for Mouse pointer icons
- Fifth channel is for Image data files (JPEG, PNG, GIF, ...)
- Sixth channel is for Multimedia data files or streams (MPEG2, MPEG4, OGG, H.26x, ...)
- Seventh channel is for Audio data files or streams (MP3, MP4, AAC, WMA, ...)
- Eighth channel is for text or Document data files (DOC, DOCX, PPT, PPTX, ODT, ODS, PDF, ...)
- Ninth channel is for transmission of a priority value 1,2, 3... as described above.

[0258] In the above embodiments, a particular method of pairing the peripheral device with the base node has been described. Any of the embodiments of the present invention may include other pairing mechanisms of which some examples are given below.

- Some examples for pairing
    - Plug in the peripheral device, to a generic peripheral device port such as a USB port of the base node or other USB enabled device. Pairing info is transmitted over the generic peripheral interface such as USB.
    - The Signal strength of the wireless channel to

the base node is used to identify which base nod is to be used

◦ The Signal strength of the wireless channel or any other channel. Example is an NFC/RFID transmitter can be provided underneath the meeting room table. Putting the user processing device such as a laptop and the peripheral device plugged in on this table automatically pairs the peripheral device with the base of this meeting room

◦ Manual pairing (e.g. by entering IP address, hostname, wireless ID (like SSID on WiFi))

Claims

1. A method for meetings for providing a connection to a communications network (50) for displaying arbitrary media content obtained from a processing device on a display device, the media content being transmitted through the communications network (50) having a base node (36), the method comprising:

   use of a peripheral device to provide a token that inherently or discretely provides authentication to display content on the display device and provides a link to the display device and further a camera (35) having a connection unit (52) for connecting the camera (35) to the network (50), the connection unit (52) having an input device adapted to communicate user selected arbitrary media content to said base node (36) for display on the display device.

2. The method of claim 1, wherein the camera (35) captures images from a whiteboard.

3. The method of claim 1 or 2 further comprising connecting the camera (35) to the network (50) for recording and storing data from the whiteboard.

4. The method of claim 1 or 2 further comprising connecting the camera (35) to the network (50) for transmitting the data from the whiteboard to other networks.

5. The method of any previous claim, wherein a token is a visual code that can be picked up by a camera.

6. The method of any previous claim, wherein access to a token is by scanning a QR code using a camera.

7. The method of any previous claim further comprising :

   routing the arbitrary media content through the communications network (50) from the processing device;
   obtaining unilateral electronic access to the display device; and
   displaying the arbitrary media content.

8. The method of any previous claim further comprising :

   setting up a communications network between the base node (36) of the communications network and the peripheral device coupled to the processing device.

9. The method according to any previous claim wherein the base node (36) is coupled to the display device, the base node (36) being adapted to receive user selected arbitrary media content and to control display of the user selected arbitrary media content on the display device and connecting the peripheral device to a port of a processing device and communicating the user selected arbitrary media content via the communications network (50).

10. An electronic tool for meetings for providing connection to a communications network (50) for displaying arbitrary media content obtained from a processing device on a display device, the media content being transmitted through the communications network (50) having a base node (36), the tool comprising: a peripheral device for providing a token that inherently or discretely provides authentication to display content on the display device and provides a link to the display device and a camera (35) having a connection unit (52) for connecting the camera (35) to the network (50), the connection unit (52) having an input device adapted to communicate user selected arbitrary media content to said base node (36) for display.

11. The electronic tool of claim 10, wherein the camera (35) is adapted to capture images from a whiteboard.

12. The electronic tool according to any of the claims 10 or 11 wherein the connection unit (52) is adapted for connecting the camera (35) to the network (50) so that the data from the whiteboard can be recorded and stored or transmitted to other networks.

13. The electronic tool according to any of the claims 10 to 12 wherein a token is a visual code that can be picked up by a camera.

14. The electronic tool according to any of the claims 10 to 13 wherein a token is a QR code obtainable by scanning using a camera.

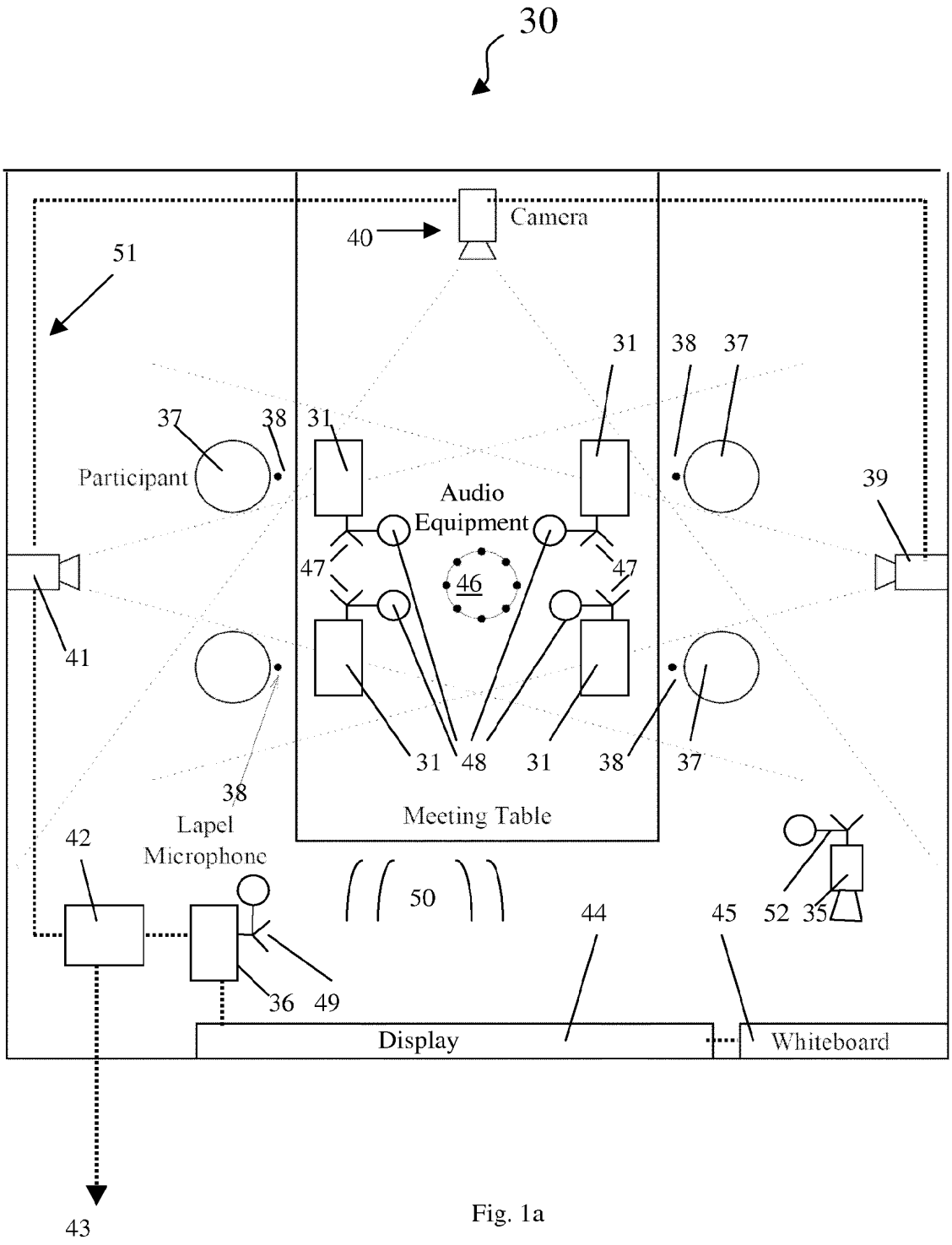

30
Camera
40
51
31
38
37
37
38
31
Participant
Audio
Equipment
39
47
46
47
41
31
48
31
38
37
38
Lapel
Microphone
Meeting Table
42
50
44
45
52
35
36
49
Display
Whiteboard
43

Fig. 1a

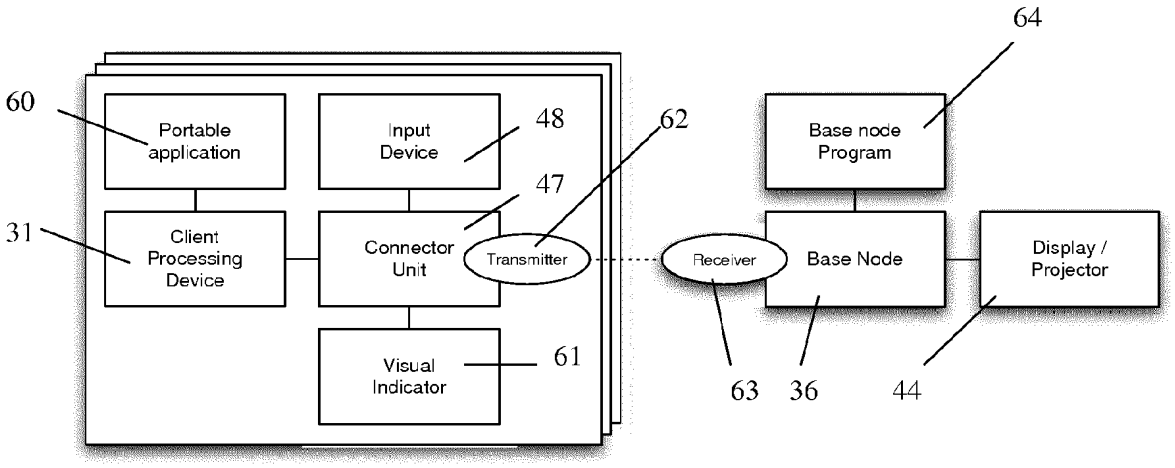

60
Portable application
Input Device
48
62
64
Base node Program
47
31
Client Processing Device
Connector Unit
Transmitter
Receiver
Base Node
Display / Projector
Visual Indicator
61
63
36
44

Fig. 1b

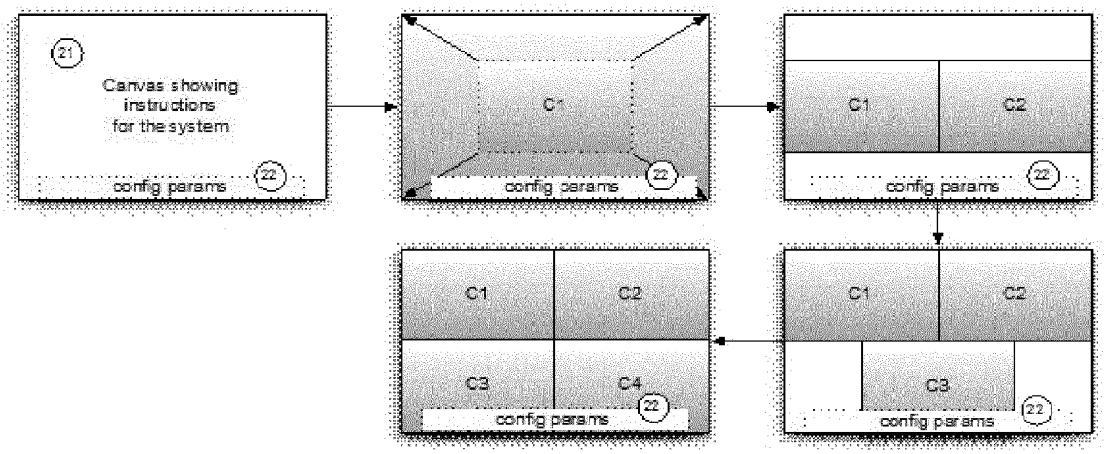

21
Canvas showing instructions for the system
config params
22
C1
C2
C3
C4

Fig. 2

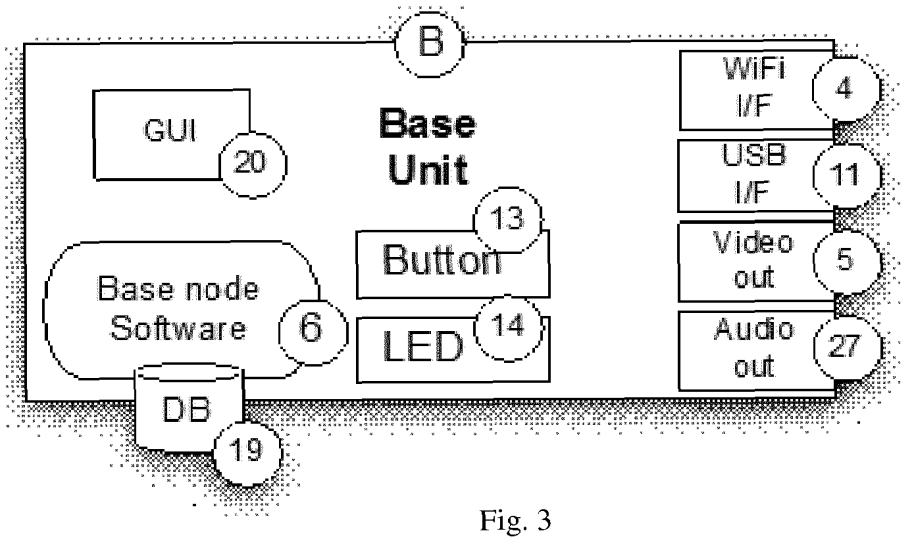


Fig. 3

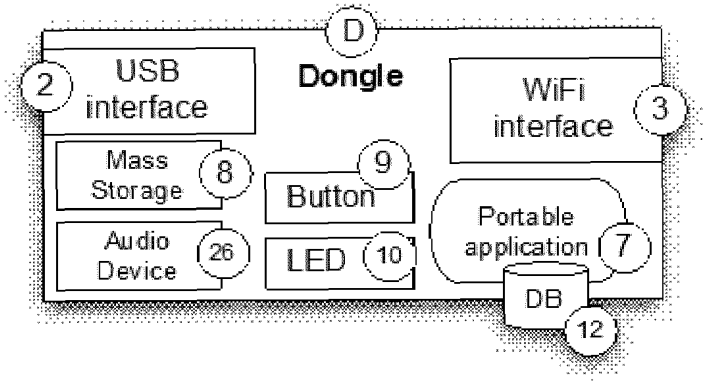


Fig. 4

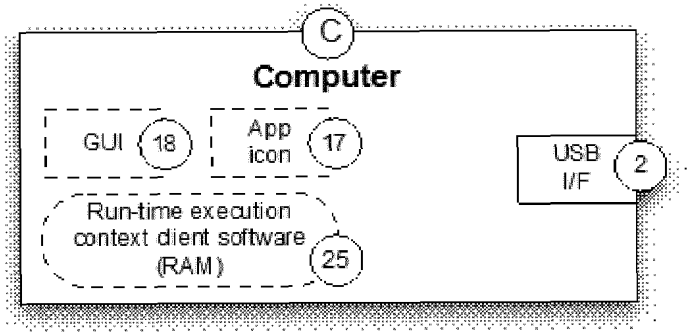


Fig. 5

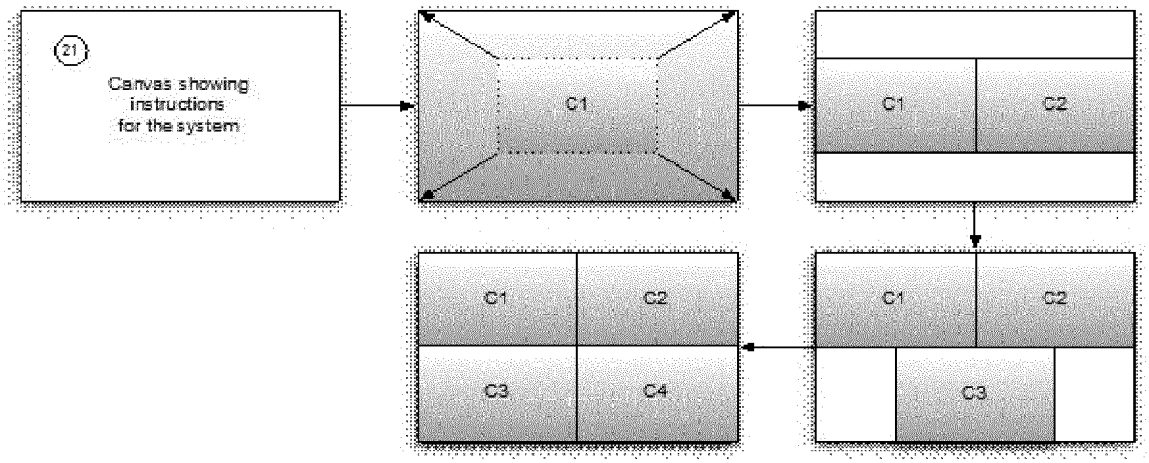


Fig. 6

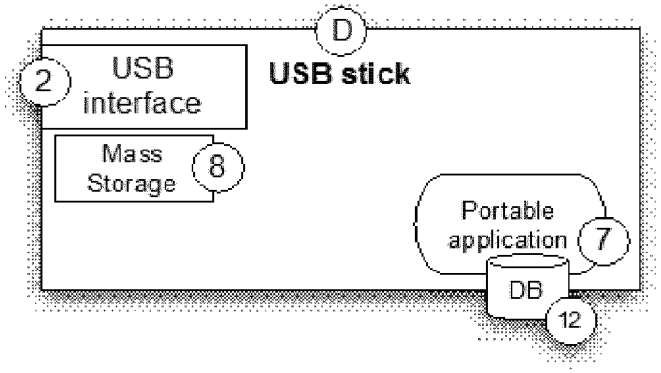


Fig.7

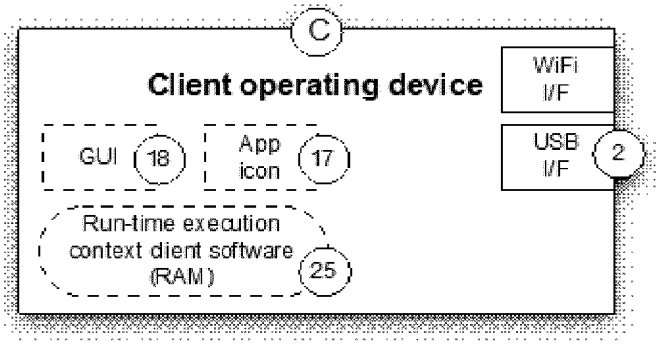


Fig. 8

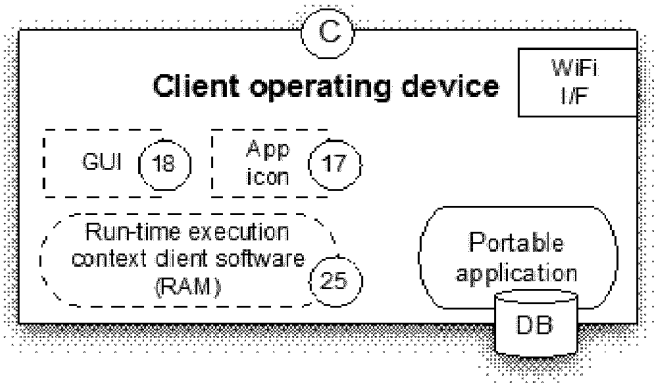

C
Client operating device
WiFi I/F
GUI
18
App icon
17
Run-time execution context client software (RAM)
25
Portable application
DB

Fig. 9

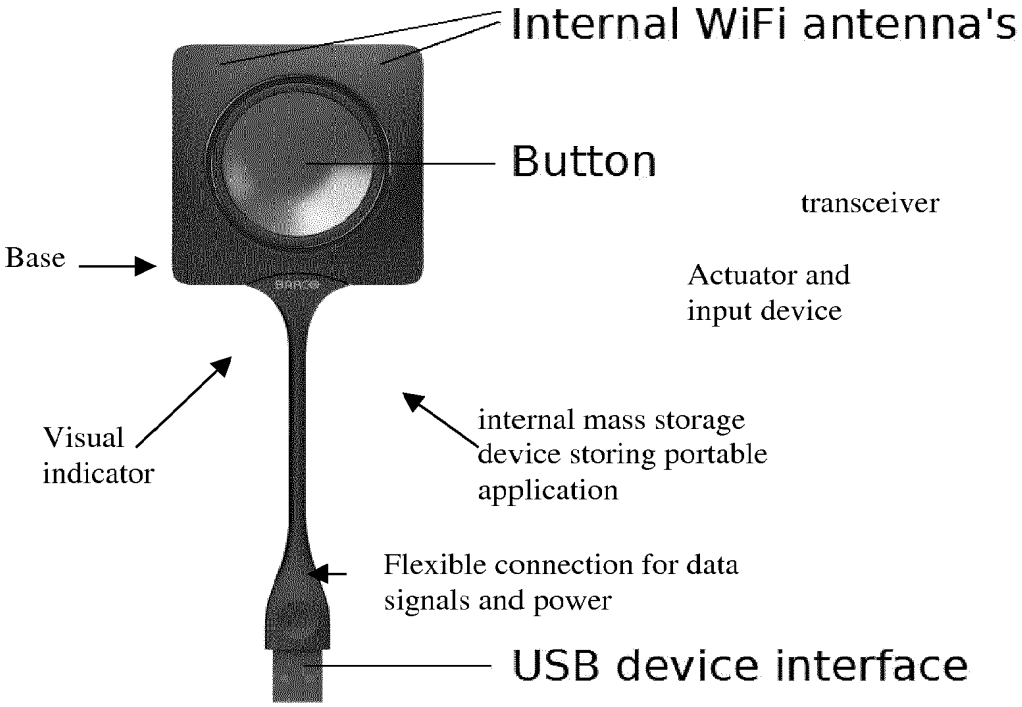

Internal WiFi antenna's
Button
transceiver
Base
Actuator and input device
Visual indicator
internal mass storage device storing portable application
Flexible connection for data signals and power
USB device interface

Fig. 10

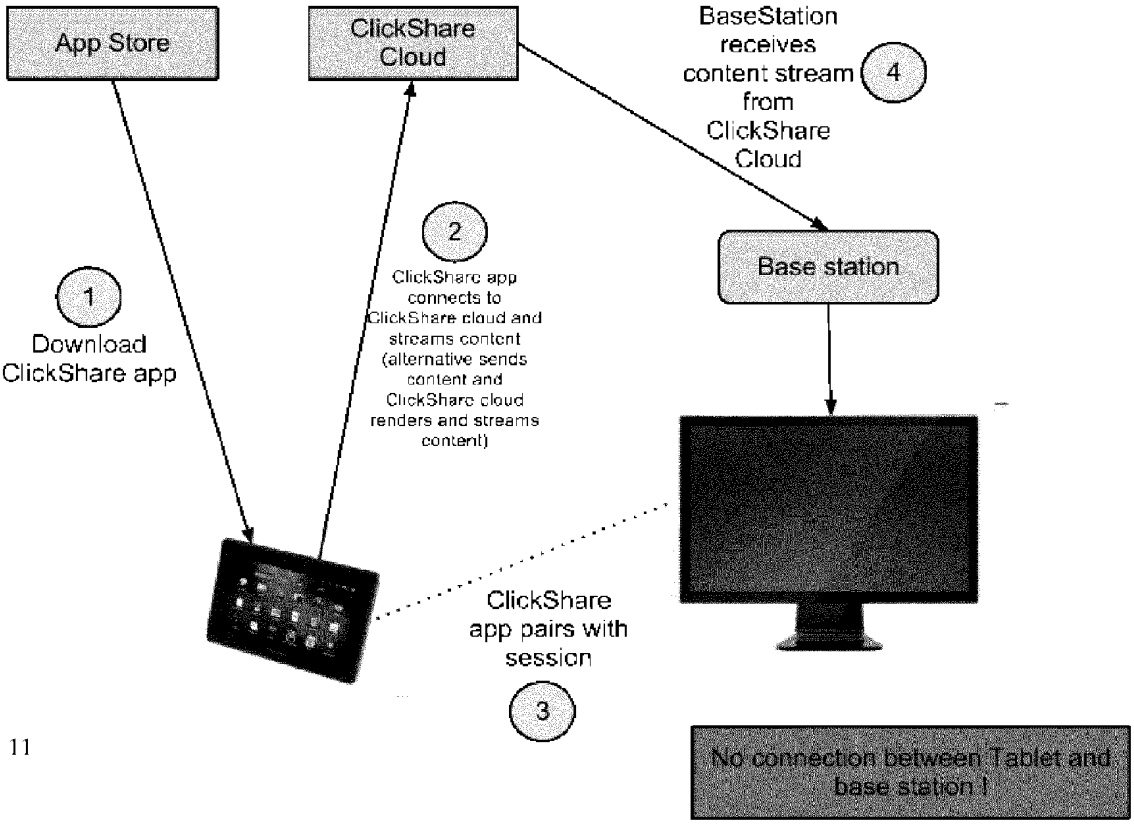

App Store
ClickShare Cloud
BaseStation receives content stream from ClickShare Cloud
4
2
ClickSharc app connects to ClickShare cloud and streams content (alternative sends content and ClickShare cloud renders and streams content)
Base station
1
Download ClickShare app
ClickShare app pairs with session
3
No connection between Tablet and base station !

Fig. 11

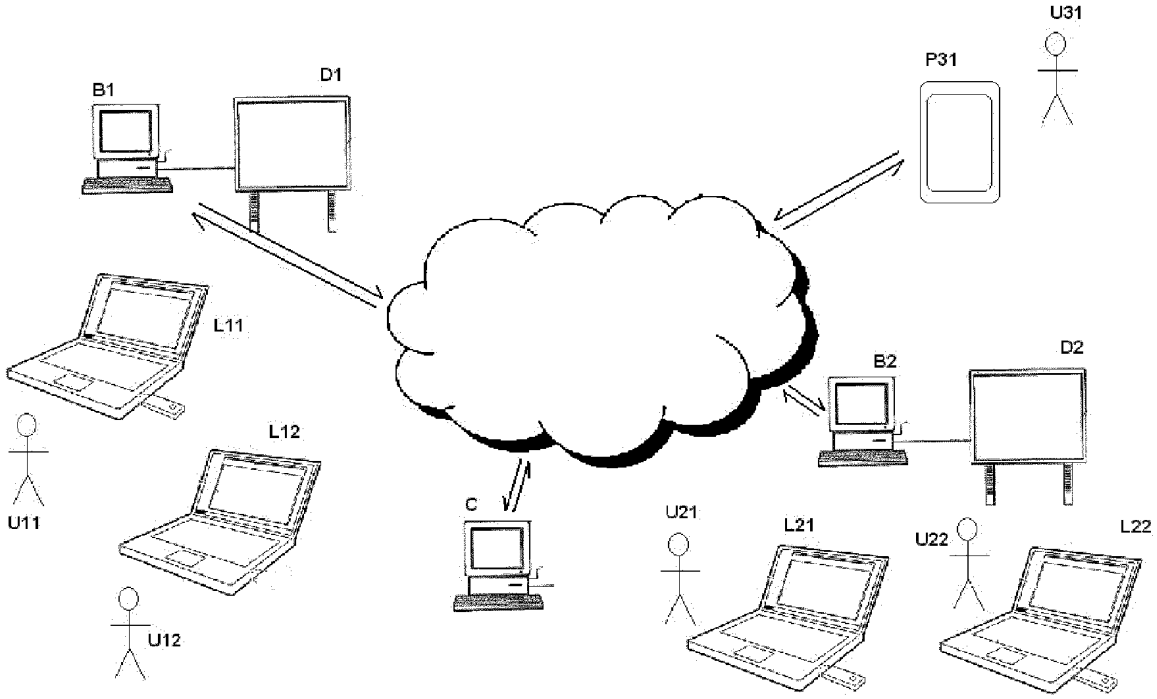


Fig. 12



Fig. 13

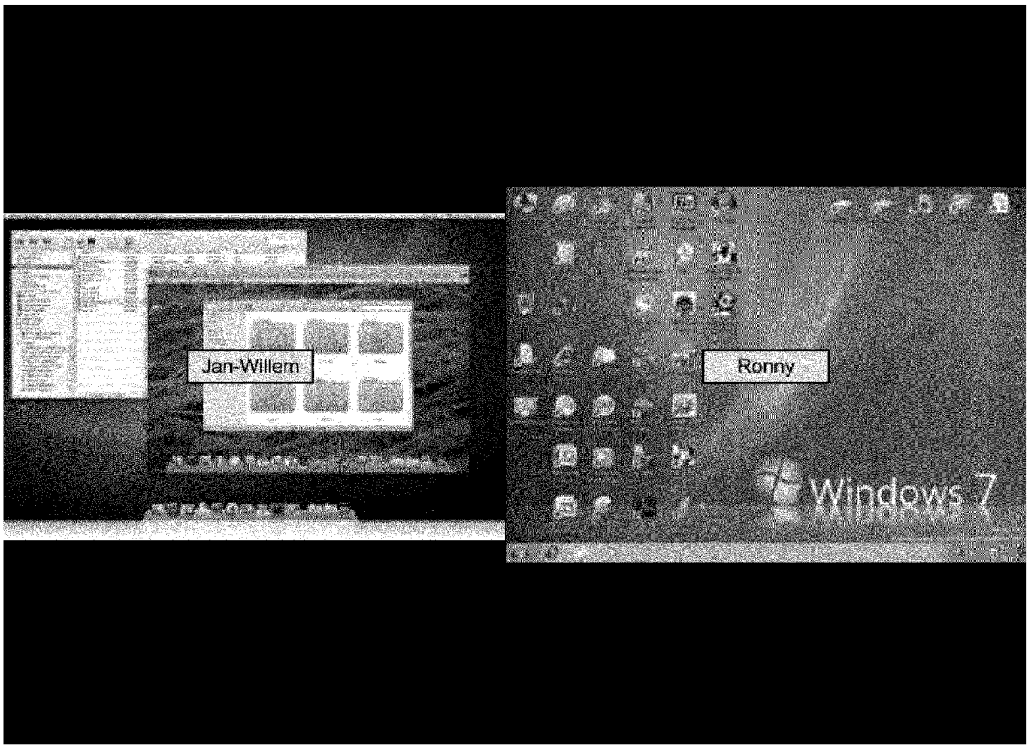


Fig. 14



Fig. 15

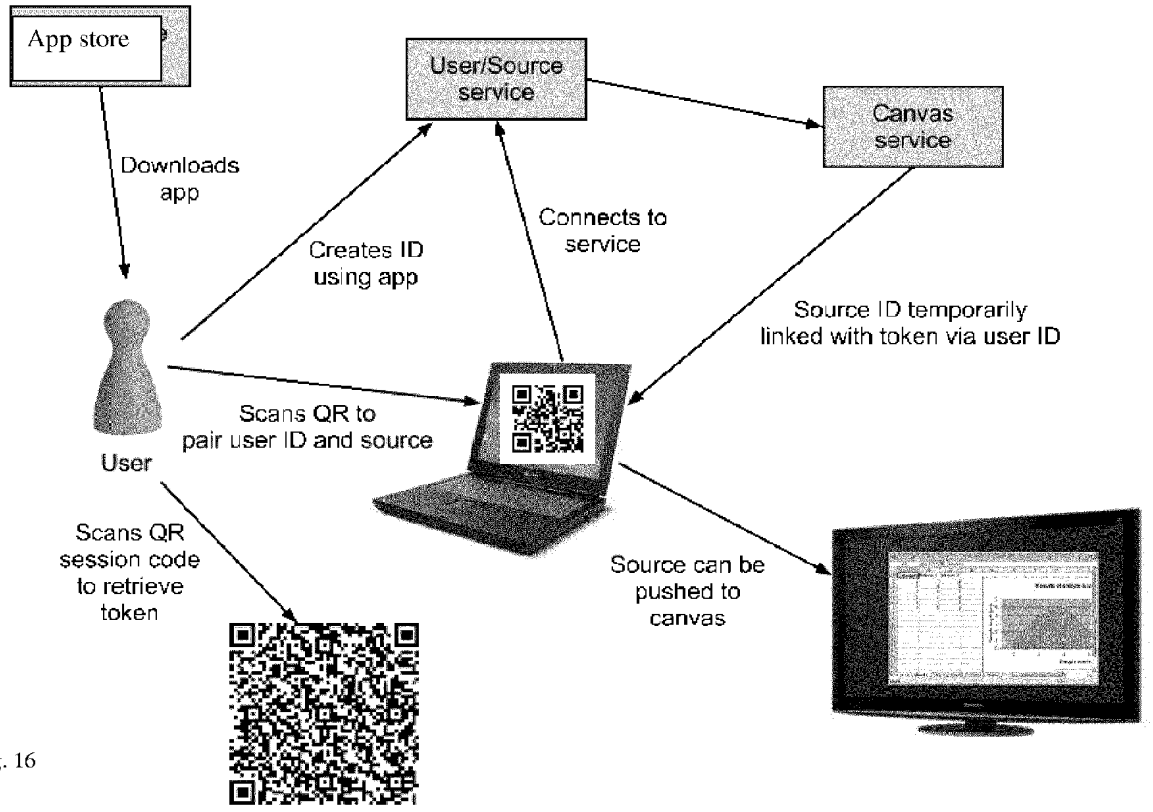

App store
User/Source service
Canvas service
Downloads app
Creates ID using app
Connects to service
Source ID temporarily linked with token via user ID
Scans QR to pair user ID and source
User
Scans QR session code to retrieve token
Source can be pushed to canvas

Fig. 16

Europäisches Patentamt
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EUROPEAN SEARCH REPORT

Application Number
EP 16 17 0760

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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X Y	US 2011/179182 A1 (VADLA RAVNAES OLE ANDRE [NO]) 21 July 2011 (2011-07-21) * page 1, paragraph 2 - page 4, paragraph 35 *	1,10 2-9, 11-14	
X Y	US 2005/015719 A1 (MARCHON DONALD F [US] ET AL) 20 January 2005 (2005-01-20) * page 1, paragraph 3 - page 9, paragraph 143 *	1,10 2-9, 11-14	
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A	EP 1 246 395 A1 (MOTOROLA INC [US]) 2 October 2002 (2002-10-02) * column 1, paragraph 2 - column 8, paragraph 45 *	1-14	

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H04L
G06F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	26 October 2016	Oteo Mayayo, Carlota

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

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26-10-2016

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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61/635,234	18 April 2012 (18.04.2012)	US

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[Continued on next page]

(54) Title: ELECTRONIC TOOL AND METHODS WITH AUDIO FOR MEETINGS

(57) Abstract: An electronic meeting tool and method for communicating arbitrary media content from users at a meeting is described. These can include a node configuration means adapted to operate a display node of a communications network, the display node being coupled to a first display. The node configuration means is adapted to receive user selected arbitrary media content and to control display of the user selected arbitrary media content on the first display. At least one peripheral device adapted to communicate the user selected arbitrary media content via the communications network is provided, wherein the peripheral device is a connection unit comprising: (e) a connector adapted to couple to a port of a processing device having a second display, a memory and an operating system; and (f) a transmitter for communicating with the communications network, A program is provided that is adapted to be loaded onto the processing device and to run on the operating system of the processing device, said program being adapted to obtain user selected arbitrary media content, said program leaving a zero footprint on termination. An input device is provided to allow the user to carry out a user action that triggers transfer of said user selected arbitrary media content to said transmitter through said port.

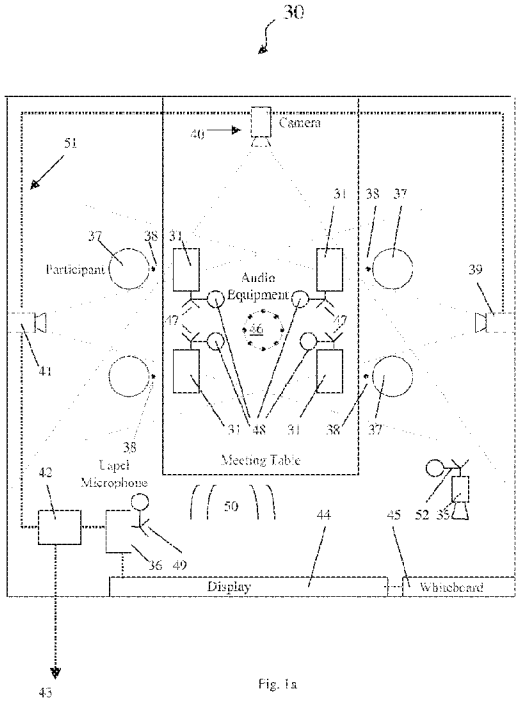


Fig. 1a

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Published:

— *without international search report and to be republished upon receipt of that report (Rule 48.2(g))*

ELECTRONIC TOOL AND METHODS WITH AUDIO FOR MEETINGS

The present invention relates to electronic tools for meetings with audio including methods or devices for providing connection to a communications network, to networks or methods of operating the network, methods or devices for use in displaying media content with audio as well as software for performing any of these methods.

Technical background

Tools for collaboration

Allowing *ad hoc* groups of persons to communicate with each other is one of the fundamental aspects of collaboration, problem solving, negotiation, teaching and education, etc. To assist in communication, there has been an explosion of electronic communication tools such as electronic conferencing tools, e.g. synchronous and asynchronous conferencing, online chat, Instant Messaging, audio conferencing, videoconferencing, data conferencing, application sharing, remote desktop sharing, electronic meeting systems, collaborative management (coordination) tools, project management systems, knowledge management systems, and social software systems.

One classic approach is the lecture or seminar often involving a presentation using presentation software. To a large extent the traditional single person presentation or lecture has been maintained with the audience being in a rather passive mode as far as determining, constructing, augmenting or modifying the information to be presented is concerned.

As with other business processes, meetings are going digital. Increasingly, people are using computer technology alone and in conjunction with broadband networks to support their meeting objectives prior to and during an actual meeting. For example, e-mail is used to pass around files for people to read prior to a meeting.

Collaborative workspaces in corporate networks and on the Internet offer geographically distributed collaborators a virtual repository for documents related to a

project or a meeting. Electronic meeting support systems, such as interactive network-connect whiteed boards and videoconferencing appliances, are available for the benefit of those who share the same room as well as those who are in remote locations.

The AMIDA Final Public Report describes the overall methodology behind the development of meeting support technologies. It reports that numerous studies confirm that meetings dominate the way people work. Namely, according to a study conducted by MCI Worldcom in 2003 a business person participates in 60 meetings per month. People meet in groups for a multitude of reasons. They interact in numerous predictable and unpredictable ways and the results of their interactions are as varied as the people who participate and the projects on which they are collaborating or communicating. Studies of business processes also reveal that approximately 80% of the "workload" associated with a project or process happens in preparation for a meeting. In other words, many people view the "live" meeting as a milestone or deadline by which they can pace and measure their productivity and that of their colleagues. Unfortunately, for many information managers, being in perpetual meetings has reduced their ability to prepare adequately for the next meeting, perpetuating a vicious and negative cycle.

However, Marc Al-Hames et al. report in "Audio-Visual Processing in Meetings: Seven Questions and Current AMI Answers", that although large parts of working days are consumed by meetings and conferences, unfortunately a lot of them are neither efficient, nor especially successful. They report a study in which people were asked to select emotion terms that they thought would be frequently experienced in a meeting. The top answer – mentioned from more than two third of the participants – was "boring"; furthermore nearly one third mentioned "annoyed" as a frequently perceived emotion.

The conclusion is that despite the plethora of electronic aids to meetings, fundamental problems in handling meetings have not been solved. In fact organising and conducting meetings in a business context involves a large number of factors.

Participation

A lack of efficiency of meetings is addressed in the article "Mood indicators on electronic meeting tools" IBM, IP.com number: IPCOM000011711D, Publication Date: March 12, 2003. This article addresses the issue that the lack of direct feedback makes meetings clumsy, inefficient and often unproductive. It proposes a "mood indicator" as well as an "I want to ask a question" indicator which allow the presenter to choose an appropriate moment to pause, change track or field a question. It is argued that interrupting a presenter in full flow can be awkward; however, sometimes it is difficult to get an opportunity to ask a question or make a comment when many different people are trying to make their voices heard. In a similar vein, US6966035 suggests displaying a "murmur frame" for a participant to express a view. To increase user participation, US 2010/0087139 discloses a system for sending a selection to another computer, and US 2006/0095376 discloses a system for secure voting. Commenting, voting or selecting requires that a central authority provides the information that is to be selected or commented or voted on. Hence, these proposals still leave a central figure such as the presenter in a dominating position and the other members of the meeting are largely an audience with limited selection or voting or participation rights.

A further problem with meetings is that someone is usually late or has to leave early. With the person arriving late one has to decide if the meeting is interrupted and a summary of the proceedings so far is given. For the person leaving early (often a senior person), subsequent discussions can go missing. If there is a notes taker, this provides a personal summary of the meeting – but not an objective one.

Presents systems do not provide an optimal solution.

Legal and security issues

A legal requirement of a meeting is that presentations, comments and submissions need to be completely reproducible – in some circumstances, e.g. in a share holders' meeting, the events in the meeting should be subject to total recall. Computer-supported collaborative work technologies, particularly those which capture human verbal and non-verbal communications (audio and video interaction) in addition to text and graphics generated during a meeting, promise to have a long term impact on how

people will prepare for and behave during and following meetings. In addition, connecting to a network brings the danger of virus, malware or spyware transfer in either direction, and there is danger of copying of confidential information.

Practical Difficulties

Scalability and ease of use

There are even more fundamental problems with using electronic tools in meetings. If two persons want to make two presentations then usually either both presentations must be placed on one machine or there is a need to swap between the presenters' machines. To bring the display content of a computer to a projector, the most common ways are to use a cable that connects the display adapter of the graphics card to the video input of the projector [method 1] or to use a software that captures the display contents and sends it over a wired or wireless network to a remote base unit connected to the projector [method 2]. This is often called "remote desktop" and is mostly used for remote administration or remote IT assistance purposes.

Less common but also practiced methods are to use a special device connected to the display adapter of the graphics card, that captures, encodes and streams the display content over a wired or wireless network [method 3].

Method 1 has several practical problems and disadvantages. In meetings where people want to contribute content from their own computers, e.g. to project images on a display, typically a video cable such as a VGA cable is used to connect each PC one at a time to the projector. This is not only not scalable but also can be and often is quite a cumbersome process that typically wastes valuable meeting time and takes the dynamism out of the meeting. Connection can be made more difficult and time consuming for example if the computer has to be rebooted for it to detect the projector or when the format of the PC differs from the format of the projector. In addition changing format can leave the computer with a new format that is not compatible with its own screen so that on reboot of the PC alone, nothing is displayed on the computer screen. Without a visible screen image the necessary re-configuration can be difficult. These issues are aggravated by a number of elements:

- The use of many different video adapters, such as VGA, DVI, DP, HDMI,...
- Reach depends on cable length: too long leaves a tangled cable "salad" in the meeting room, too short reduces flexibility, often necessitating people to move around in the meeting room when they want to present something.
- Cable connection is either point to point or requires tedious and extensive cabling and the use of complex and expensive video switches.
- It is often difficult and time consuming to find the right display resolution and refresh rate that both the computer and the display or projector support.

Method 2 also has many drawbacks. If the connection is made to a corporate LAN there is a danger of virus, malware or spyware transfer in either direction, there is danger of copying of confidential information, and there is the difficulty of making the connection, e.g. entry of a user code and password, as well the administration of such passwords and user codes.

The advantage of method 3 is that the computer does not need to use its own processing power to bring the display content in a form that is easily transported over a network. This advantage becomes less relevant as computers grow in processing power. A drawback of method 3 is that the same problems often encountered with method 1 of connecting to the display adapter remain. Another drawback is that the special device referred to requires significant processing power, which means that this device will consume much power, be relatively big and certainly be relatively expensive.

An alternative method in the making today is to use the well known USB interface of the computer for extracting the display content of the computer. US 2009/0198839 discloses such a pluggable cable arrangement. US 2011/0115689 discloses a similar USB solution for wireless connection to a projector. Accordingly connecting a projector to a computer using the standard USB port might become commonplace with time. However, this usually requires special drivers and even special hardware. Connecting a projector to a computer using the standard USB port hence might become commonplace – but even when that happens there will be a mix of new and legacy machines for several years.

Firewalls

Additional problems can occur with firewalls. Typically a visitor to a meeting will bring a computer such as a laptop that is set up for a different corporate networking environment and hence has different or incompatible networking settings. The setting up of a firewall can be complicated and if this is not done correctly, telecommunication software that has to pass through a firewall may be blocked. In order to solve problems associated with firewalls it may be necessary to open ports or identify or even add programs in an exception list. If, besides a network (hardware) firewall and an operating system firewall, there is any software based third-party firewall like ZoneAlarm, CA Internet Security Suite or McAfee Firewall, then it is necessary to follow that software developer's documentation to place programs on a safe list or adding exceptions to the firewall rules. Such activity is beyond the usual user. Fussing with computer settings, or having to call for IT support wastes valuable meeting time and takes the dynamism out of the meeting.

Audio

Software based systems for presentations typically rely on specific software drivers to be installed on the client PC. An example of this is Soundflower on Apple Mac OS/X. In case the built-in generic audio driver is used, it is hard to guarantee that the audio will work on any given hardware, considering the large variety of sound cards in PC's.

Conclusion

The following problems remain for holding a face-to-face meeting using advanced electronic tools at the present time:

- Complexity of the networking infrastructure.
- High demands on technical expertise of users in current systems that are supposed to be designed to support everyday use by the non-expert user.
- Barriers to the use of complicated technology in meetings.
- Great variety of possible collaborative software solutions – none of which seems to solve the fundamental problems of holding successful meetings.
- Meetings being boring or annoying for members of the meeting.
- Complexity of firewalls and other security measures employed in corporate

networks.

- Lack of, or restriction of participation by members of a meeting.
- Time taken to prepare presentations for meetings.
- Need to record events in the proper time sequence at meetings without burdening a meeting more than necessary.
- Lack of standards for audio
- Need to install proprietary drivers for audio
- Large number of different, non-standardised sound cards in use

Although some tools solve some of these problems effectively, no electronic meeting tool solves all of them.

Summary of the invention

An object of the present invention is to provide network solutions including electronic tools with audio for meetings as well as devices for providing connection to a communications network, to methods of operating the network, methods of displaying media content with audio as well as software for performing any of these methods or for implementing such systems.

In one aspect the present invention relates to a method for capturing audio for use in presentation systems e.g. at meetings. A wireless network may be used to connect a processing device such as a laptop, personal computer, PDA, smartphone etc to a display device, e.g. via a projector. The present invention addresses the problems caused by the many different audio cards in use for commercial PC's, a lack of a standard way for capturing audio that works on all PC platforms (Windows, Mac, Linux, Android) and the need for synchronization of the captured audio with the captured video to provide lip synchronization.

The present invention provides in embodiments a method and a system for connecting a processing device, e.g. a digital processing device such as a laptop, smartphone, PDA, computer, tablet and suchlike to a communications network, the processing device having a memory, a display and an operating system with pre-installed generic drivers providing a generic communications protocol for communication between processing device and a standard class of peripheral devices. The method and/or

system are adapted for:

a) coupling a peripheral device to the processing device, the peripheral device having a transceiver;

b) setting up, by means of the pre-installed generic driver of the operating system, a means for communication between the peripheral device and the processing device;

c) coupling the processing device to a communications network via the peripheral device;

d) routing audio data between the processing device and the communication network via the means for communication, wherein the generic communication protocol is used for transferring the audio data between the processing device and the peripheral device.

In particular the method and/or system can be adapted for:

a) coupling a peripheral device to the processing device, the peripheral device having a transceiver;

b) setting up, by means of a first pre-installed generic audio driver of the operating system, a means for audio communication between the peripheral device and the processing device and by means of a second pre-installed generic driver of the operating system, a means for data communication between the peripheral device and the processing device;

c) coupling the processing device to a communications network via the peripheral device;

d) routing audio data between the processing device and the communication network via the means for audio communication, wherein the first pre-installed generic audio driver is used for transferring the audio data between the processing device and the peripheral device.

In an embodiment audio data is captured through a virtual sound card interface added as a logical device over the physical interface provided in the peripheral device. On the processing device only a generic sound driver such as a USB sound driver is required which is generally standard on any modern processing devices such as a PC (UAC1 or UAC2).

In an aspect the present invention provides an electronic meeting tool for communicating arbitrary media content from users at a meeting comprising:
a node configuration means adapted to operate a display node of a communications network, the display node being coupled to a first display, the node configuration means being adapted to receive user selected arbitrary media content and to control display of the user selected arbitrary media content on the first display; and
at least one peripheral device adapted to communicate the user selected arbitrary media content via the communications network, wherein the peripheral device is a connection unit comprising:

(a) a connector adapted to couple to a port of a processing device having a second display, a memory and an operating system; and
(b) a transmitter for communicating with the communications network,

a program adapted to be loaded onto the processing device and to run on the operating system of the processing device, said program being adapted to obtain user selected arbitrary media content, said program leaving a zero footprint on termination, and
an input device to allow the user to carry out a user action that triggers transfer of said user selected arbitrary media content to said transmitter through said port.

Obtaining user selected arbitrary media content is preferably not obtained by application sharing but by the process of screen scrapping. Although software packages that provide screen scraping require installation on the target device, or at least require the installation of dedicated and/or custom drivers, embodiments of the present invention use software stored on the peripheral device which allows screen scraping when run on the processing device but leaves a zero footprint when terminated. Embodiments of the present invention can screen scrape full HD videos at 20fps without requiring any installation of a program on the processing device nor requiring configuring the processing device such as a PC that they run on for the connectivity to the network hence meeting "zero footprint" operational requirements.

The program adapted to be loaded onto the processing device and to run on the

operating system of the processing device and being adapted to obtain user selected arbitrary media content can be stored on the peripheral device. The transmitter can be a wireless transmitter or transceiver. The peripheral device can be a plug-and-play device. The program can adapted to screen scrape content of the second display.

The input device can be physical actuator coupled to the peripheral device. The physical actuator preferably has a surface area of between 100 and 14,400 square mm. Alternatively, the input device can be a key displayed on the second display. The key displayed on the second display can be one not screen scraped by the program.

On the peripheral device a mass storage device is provided that stores the software to be run on the processing device. The mass storage device can be logically closed once the software has been read and loaded and is running from RAM in the processing device. Also provided on the peripheral device is a further device such as an HID (human interface device) to capture user input and provide user feedback. In embodiments of the present invention, the peripheral device contains multiple internal logical devices that are combined:

An HID (human interface device) used for capturing user input (e.g. following a user action such as pressing or activating a button) and providing user feedback, e.g. by an optical indicator such as a light ring around the button e.g. an LED ring,

for streaming the screen scraped video content to the network and hence to a base unit and a display,

A mass storage device used to store the application, and optionally

An audio device that acts as a virtual sound card to a client PC over USB, using a generic driver such as a UAC1 or UAC2 device driver.

Embodiments of the present invention are not limited to application sharing but make use of screen scraping which is able to capture all material in a neutral manner rather than being limited by proprietary applications. Further the screen scraper application is zero footprint on termination rather than being fully installed on the processing device. Embodiments of the present invention can provide arbitrary "full content" to the meeting room and participants can display in real-time,

The real-time content is shown on a central display rather than being broadcast to

individual participants or archived.

Embodiments of the present invention "auto compose" arbitrary user data on a central display or screen so that full real-time content that is provided by multiple meeting participants who intentionally share this content in order to make the meeting more effective and efficient,

Embodiments of the present invention implement a principle of "democratic screen sharing", in which the meeting participants decide themselves on a peer-to-peer basis which content to share when and where. In particular in some embodiments a participant can obtain unilateral access to the display device, i.e. without agreement of other participants. Peer-to-peer data sharing differs from systems in which the content to be displayed is determined by a presenter or meeting director. The user determines where his content is routed to and can do so without any software configuration on the user processing device.

In another aspect the present invention provides a method for connecting a processing device to a communications network, the processing device having a memory, a display and an operating system with at least one pre-installed generic driver providing a generic communications protocol for communication between processing device and a standard class of peripheral devices, the method comprising the steps of:

a) coupling a peripheral device to the processing device, the peripheral device having a transceiver;

b) setting up, by means of the pre-installed generic driver of the operating system, a means for communication between the peripheral device and the processing device;

c) coupling the processing device to a communications network via the peripheral device;

d) routing screen scraped data between the processing device and the communication network via the means for communication, wherein the generic communication protocol is used for transferring the screen scraped data between the processing device and the peripheral device.

The routing of the screen scraped data can be to a defined network node such as a display node without user entry of configuration details. Thus the routing can be

dedicated to a specific network node such as a display node, base station etc. This is achieved by pairing of the peripheral device to the relevant node before the communication starts.

In accordance with embodiments of the present invention users start an application from the peripheral device such as a USB dongle, thus making the connection in a 3 step process: (1) connect, e.g. plug in the peripheral device to the processing device, (2) start the screen scraping application, (3) perform a user action such as click on a button on the peripheral device to go allow content to be displayed on the central screen or display. To achieve step 2 Autorun or AutoPlay can be used with some Windows operating systems, but there are many different variants based on the OS version and which patches have been installed. Furthermore, this mechanism is generally considered a security hazard, which is why most IT departments will disable Autorun/Autoplay. Other OS providers have disabled this function, e.g. Apple removed a similar functionality entirely from its OS/X since Snow Leopard.

In an embodiment of the present invention a very small service - also called daemon on some OS's – is provided that requires installation on the processing device such as a laptop. This service is pre-installed on the processing device. The installation is required only once on every processing device such as a laptop. The role of this is to provide a permanently running service which continuously monitors if a peripheral device according to the present invention has been offered up for connection to the processing device. When such a peripheral device is connected, the service will detect this and start the client application software residing in the mass storage area of the peripheral device. Once the service is installed, connectivity with the peripheral device becomes a 2 step process: connect, e.g. plug in the peripheral device to the processing device, (2) perform a user action such as click on a button on the peripheral device to allow content to be displayed on the central screen or display. The application loaded from the processing device still leaves a zero footprint on termination

Step b) can comprise presenting the peripheral device to the processing device as a human interface device (e.g. a USB HID) and wherein the pre-installed generic driver is a human interface device driver (e.g. USB HID driver).

Alternatively or additionally step b) can comprise presenting the peripheral device to the processing device as a mass storage device and wherein the pre-installed generic driver is a mass storage device driver.

Alternatively, or additionally step b) comprises presenting the peripheral device to the processing device as a composite device (e.g. USB composite device) and wherein pre-installed generic drivers drive different device interfaces independently.

A client application can be stored on the peripheral device which when run on the processing device obtains the screen scraped data. Such a client application can be a portable application and can leave a zero footprint on termination.

In another aspect the present invention provides a peripheral device for providing communication connectivity to a processing device which is provided with memory, a display and an operating system with at least one pre-installed generic driver providing a generic communication protocol for communication between the processing device and a standard class of peripheral devices, the peripheral device comprising a memory in which executable software code is stored for execution on the processing device, said executable software code comprising:

a first software code portion for setting up, by means of the pre-installed generic driver of the operating system, a means for communication between the peripheral device and the processing device;

a second software code portion for connecting the processing device to a communications network via the peripheral device, the peripheral device having a transceiver;

a third software code portion for screen scraping data from the processing device; and

a fourth software code for routing screen scraped data between the processing device and the communications network over the means for communication; wherein the first software code portion is adapted to use the generic communication protocol for transferring the screen scraped data between the processing device and the peripheral device.

The first software code portion can be adapted to present the peripheral device to the processing device as a human interface device and wherein the pre-installed generic driver is a human interface device driver. The first software code portion can be adapted to present the peripheral device to the processing device as a mass storage device and wherein the pre-installed generic driver is a mass storage device driver. The first software code portion can be adapted to present the peripheral device to the processing device as a composite device and wherein pre-installed generic drivers drive different device interfaces independently.

The executable software code can comprise fifth code for providing a means for connecting to the communications network including a base node. The third code can comprise means for capturing video frame buffers of the processing device.

The executable software code can comprise sixth code for providing a means for encoding, compressing and optionally encrypting the screen scraped data and sending the screen scraped data the communication network. The executable software code can comprise seventhcode for providing a means for handling the peripheral device. The executable software code can comprise eighth code for providing means for initiating connection to the base node. The executable software code can comprise ninth code for receiving inputs from an input device on the peripheral device. The executable software code can comprise tenth code for providing a means for sending state changes to the visual indicator on the peripheral device. The executable software code can comprise eleventh code for providing a means for presenting to the user a GUI. The executable software code can comprise twelfth code for presenting a GUI for administration of the said executable software code when executed as a portable application. The executable software code can comprise thirteenth code for providing a means for displaying and activating a key on the display of the client processing device for allowing a user to input the start the transfer of data from the processing device to the base node.

In another aspect the present invention provides a peripheral device for providing communication connectivity to a processing device which is provided with memory, a display and an operating system with at least one pre-installed generic driver providing

a generic communication protocol for communication between the processing device and a standard class of peripheral devices, the peripheral device comprising a memory in which executable software code is stored for execution on the processing device, said executable software code comprising:

a first software code portion for setting up, by means of the pre-installed generic driver of the operating system, a means for communication between the peripheral device and the processing device;

a second software code portion for connecting the processing device to a communications network via the peripheral device, the peripheral device having a transceiver; and

a third processing software code for routing data between the processing device and the communications network over the means for communication; wherein the first software code portion is adapted to use the generic communication protocol for transferring the data between the processing device and the peripheral device, and an input device coupled to the peripheral device, the input device being adapted to react to a user action to trigger the transfer of the data from the processing device to the peripheral device.

The first software code portion can be adapted to present the peripheral device to the processing device as a human interface device and wherein the pre-installed generic driver is a human interface device driver. The first software code portion can be adapted to present the peripheral device to the processing device as a mass storage device and wherein the pre-installed generic driver is a mass storage device driver. The first software code portion can be adapted to present the peripheral device to the processing device as a composite device and wherein pre-installed generic drivers drive different device interfaces independently.

The input device is preferably a physical actuator coupled to the peripheral device. The physical actuator preferably has a surface area of between 100 and 14,400 square mm. The input device can be for example a key for display on the display. The executable software code can comprise fourth code for providing a means for connecting to the communications network including a base node. The executable software code can comprise fifth code for providing a means for capturing video frame

buffers of the processing device. The executable software code can comprise sixth code for providing a means for encoding, compressing and optionally encrypting the video frames and sending them over a secure link to the base node. The executable software code can comprise seventh code for providing a means for handling the peripheral device. The executable software code can comprise eighth code for providing a means for initiating connection to the base node. The executable software code can comprises ninth code for receive inputs from an input device on the peripheral device. The executable software code can comprise tenth code for providing a means for sending state changes to the visual indicator on the peripheral device. The executable software code can comprise eleventh code for providing a means for presenting the user a GUI. The executable software code can comprise twelfth code for presenting GUI for administration of the executable software code when executed as a portable application. The executable software code can comprise thirteenth code for providing a means for displaying and activating a key on the display of the processing device for allowing a user input to start the transfer of data from the processing device to the base node.

In another aspect of the invention a peripheral device is provided for providing communication connectivity to a processing device which is provided with memory, a display and an operating system with at least one pre-installed generic driver providing a generic communication protocol for communication between the processing device and a standard class of peripheral devices, the peripheral device comprising a memory in which executable software code is stored for execution on the processing device, said executable software code comprising:

a first software code portion for setting up, by means of the pre-installed generic driver of the operating system, a means for communication between the peripheral device and the processing device;

a second software code portion for connecting the processing device to a communications network via the peripheral device, the peripheral device having a transceiver;

a third software code portion for receiving media content from the network and for displaying the media content on the display in accordance with a set of rules; wherein the first software code portion is adapted to use the generic communication protocol

for transferring the media content between the peripheral device and the processing device.

The executable software code can comprise fourth code for providing a means for correctly configuring a receiver as an access point. The executable software code can comprise fifth code for providing a means for listening for output of connection units trying to connect on a specific port. The executable software code can comprise sixth code for providing a means for a GUI for administration purposes. The executable software code can comprise seventh code for providing a means for publishing its presence over the network using the zeroconf protocol. The executable software code can comprise eighth code for providing a means for accepting and installing software updates. The executable software code can comprise ninth code for providing a means for providing facilities for pairing of connection units to the processing device. The executable software code can comprise tenth code for providing a means for auto-composing of different incoming arbitrary media streams and rendering of composited image on display. The executable software code can comprise eleventh code for providing a means for receiving, decrypting and decoding incoming arbitrary media content. The executable software code can comprise twelfth code for scaling of incoming arbitrary media streams. The executable software code can comprise thirteenth code for providing a means for displaying incoming arbitrary media content in accordance with a set of rules.

The present invention also provides a method for communicating arbitrary media content from users at a meeting comprising:

operating a display node of a communications network, the display node being coupled to a first display, to receive user selected arbitrary media content and to control display of the user selected arbitrary media content on the first display; and

connecting a peripheral device to a port of a processing device and communicating the user selected arbitrary media content via the communications network,

loading a program onto the processing device and running the program on the operating system of the processing device to obtain user selected arbitrary media content, said program leaving a zero footprint on termination, and

triggering transfer of said user selected arbitrary media content to said transmitter

through said port after a user action on an input device.

The present invention also provides a peripheral device comprising:
a base
a connector for connection to a plug and play port of a host processing device,
a flexible connection between the base and the connector for transferring data signals and power,
an actuator on the base for actuating a signal and for transferring the signal to the connector for transfer to the port, wherein the base has electronics comprising permanent storage for storing a portable application, a processing engine, a transceiver and a visual indicator.

The present invention also provides a method for providing communication connectivity from a processing device,
setting up a communications network between a base node of the communications network and a peripheral device coupled to the processing device;
transferring media content between the processing device and the peripheral device,
transmitting the media content from the peripheral device to the communications network,
receiving media content from the communications network at the base node and displaying the media content on a display in accordance with a set of rules.

Any of the above software code stored on a non-transitory storage medium.

Definitions

"Plug and play" is a term used to describe the characteristic of a computer bus, or device specification, which facilitates the discovery of a hardware component in a system, without the need for physical device configuration, or user intervention in resolving resource conflicts. Plug and play devices can be added to a bus of a computing system (while running or when shut down), and the newly added device and possibly the rest of the computing system is automatically configured to make the newly added device work, both from hardware and from software perspective.

Plug and play interfaces include for example (not an exhaustive list): Firewire (IEEE-1394), PCI, Mini PCI, PCI Express, Mini PCI Express, PCMCIA, PC Card, Universal Serial Bus (USB), SDIO cards.

"Auto-configuration" is the automatic configuration of devices without manual intervention, without setting any switches or jumpers, and without any need for software configuration. An example of auto-configuring devices: USB devices. Examples of auto-configuring protocols: DHCP, Zeroconf, Bonjour.

A plug and play device has auto-configuration software by default to make it plug and play. Example: USB devices are made to be plug and play by including the correct auto-configuration software (e.g. host driver, host stack, application software). Autoconfiguration can also refer to a software alone and is not restricted to a physical device.

"Hot swapping and hot plugging" are terms used to describe the functions of replacing computer system components without shutting down the system. More specifically, hot swapping describes replacing components without significant interruption to the system, while hot plugging describes the addition of components that would expand the system without significant interruption to the operation of the system. A well-known example of this functionality is the Universal Serial Bus (USB) that allows users to add or remove peripheral components such as a mouse, keyboard, or printer. Other examples are eSATA, PCIe, FireWire, for example.

A "portable application" (portable app), sometimes also called standalone, is a computer software program designed to run without installation on the target machine. This type of application is stored on a removable storage device such as a CD, USB flash drive, flash card, or floppy disk – storing its program files, configuration information and data on the storage medium alone. It is a program that can be stored on an electronic device such as a USB flash drive, iPod, memory card, portable hard drive or other portable electronic device and runs on a computer or other processing device coupled to the electronic device without making permanent configuration

changes to the host computer. All such programs have a zero-footprint, meaning all temporary files, registry entries, and any other changes to the machine exist only while the program is running.

To be considered a portable application, for purpose of this invention, a software program must:

Not require any kind of formal installation onto a computer's permanent storage device to be executed, and can be stored on a removable storage device such as USB flash drive, iPod, memory card, portable hard drive or other portable electronic storage device thus enabling it to be used on multiple computers.

Settings are stored with, and can be preferably carried around with, the software (i.e., they are written to the electronic device such as a USB drive). Settings are not stored to the registry or any other central system database of the computer.

Leaves a zero (or near-zero) "footprint" on any PC it is run on after being used. i.e., all temporary files/registry settings should be either avoided or at least removed once the program has exited, and files created by the user can be saved directly to the same removable media as the application is stored on.

A portable application does not leave its files or settings on the host computer on which it runs. For example, the application does not write to the Windows registry or store its configuration files (such as an INI file) in the user's profile; instead, it stores its configuration files in the program's directory. Another requirement, since file paths will often differ on changing computers due to variation in Windows drive letter assignments, is the need for applications to store them in a relative format. Preferably, such a program does not require a launcher program to copy necessary settings and files to the host computer when the application starts and move them back to the application's directory when it closes as this may leave a residue on the hard drive in case of power failure.

"Electronic meeting systems" (EMS) need to be distinguished on the one hand from classic groupware, on the other from web conferencing systems. In reality, there is some overlap between minor features of products of the named categories. The main

difference from groupware is the intensity of collaboration. EMS should be distinguished from systems with which it is possible to show the contents of an individual computer screen on a remote display with multiple users at the same time.

"Groupware" supports collaboration within groups where the individual contributions remain identifiable. In contrast, EMS enable the group to cooperatively produce a result for which the group is responsible as a whole. In a business process, groupware and electronic meeting systems complement each other: Groupware supports teams when researching and creating documents in the run up to an EMS session or when implementing the results of such a session.

"Web conferencing systems" and "electronic meeting systems" complement each other in the online meeting or workshop: EMS extends the web conferencing system by providing interactive tools for producing and documenting group results. On the other hand, "web conferencing systems" complement EMS with the screen sharing and voice conferencing functionality required in synchronous online meetings and not present in EMS.

"Data conferencing" refers to a communication session among two or more participants sharing computer data in real time. Interaction and presentation devices such as a screen, keyboard, mouse, camera, etc. can be shared. It is a term used to distinguish from video conferencing and audio conferencing. The data can include screen, documents, graphics, drawings and applications that can be seen by the participants of the meeting.

"Application sharing" is an element of remote access, falling under the collaborative software umbrella, that enables two or more users to access a shared application or document from their respective computers simultaneously in real time. Generally, the shared application or document will be running on a host computer, and remote access to the shared content will be provided to other users by the host user. Application sharing should be distinguished from systems in which collaboration on the applications between different users is not possible but the contents of individual computer screens can be projected onto a remote display with multiple users at the

same time.

The term "arbitrary media content" refers to the fact that a user may generate, create or select any media content that is appropriate to display. This differs from client voting on, or selecting of media content that is displayed by another in a meeting or presentation. This term refers to client oriented, distributed rights and privileges for the display of content rather than a central presenter providing content which is presented to the members of the meeting.

"Screen scraping" in our sense refers to reading the video frame buffers and processing them, rather than just rendering them on a display. Screen scraping for presentations is described in US2002/0196378 to Slobodin et al which is included herein by reference.

"Auto composition" or "auto layout" refers to the automatic nature in which multiple graphics/video sources are rendered on a central display, without user intervention and in a way that a user would intuitively expect it to happen.

"Wireless" and "wireless communication network" can be any network that does not use cable links between nodes, e.g. uses RF, optical or InfraRed for communication purposes, such as IrDA, diffuse infra-red, WLAN, WiMax, WiFi, WiFi Direct, Bluetooth or any other wireless communication network known to the person skilled in the art such as optical networks like LiFi.

"Computer" generally refers to a processing device, i.e. having a processing engine capable of various types of digital processing, such as rendering graphics images for display. A computer can be in the form of a work station, a personal computer, a lap-top, a palm top, a PDA, a smartphone, a tablet etc. Generally a computer has memory such as volatile RAM. Non-volatile memory such as a hard disc, optical disk or solid state memory can be included in the computer or can be a peripheral device. Currently most computers are electronic but the term "computer" also include optics based computing devices.

The term "pre-installed generic driver" is intended to mean a driver which is installed on a processing device such as a computer as a standard driver, e.g. is installed with the installation of the operating system. Such a driver is standard for the operating system and can drive a standard class of peripheral devices coupled to or connected to the processing device. The installation of a specific driver for such a peripheral device is not required. Such a generic driver can be a human interface driver (HID) or a mass storage device driver, which has predetermined software components configured for driving mass storage, a CD-ROM, a keyboard etc. or combinations of these. Such devices can be readable and writable computer peripheral memory devices such as USB memory sticks, flash memories, external hard drives, or more.

Brief Descriptions of the drawings

Fig. 1a shows a meeting room that can be used with embodiments of the present invention. Fig. 1b shows a combination of a client processing device, a connection unit, a base node and a display in accordance with an embodiment of the present invention.

Fig 2 shows a screen display in accordance with an embodiment of the present invention.

Figs. 3 to 5 show a base node and a peripheral device and a client processing device in accordance with embodiments of the present invention.

Fig 6 shows a display in accordance with an embodiment of the present invention.

Fig. 7 shows a peripheral device in accordance with an embodiment of the present invention.

Fig. 8 shows a client processing device in accordance with an embodiment of the present invention.

Fig. 9 shows a further client processing device in accordance with an embodiment of the present invention.

Fig. 10 shows an embodiment of a peripheral device in accordance with an embodiment of the present invention.

Fig. 11 is a schematic representation of a communications system for presentations in which audio has been integrated in accordance with an embodiment of the present invention.

Detailed Description of the Embodiments of the present Invention

The present invention will be described with respect to particular embodiments and with reference to certain drawings but the invention is not limited thereto but only by the claims. The drawings described are only schematic and are non-limiting.

Furthermore, the terms first, second, third and the like in the description and in the claims, are used for distinguishing between similar elements and not necessarily for describing a sequential or chronological order. The terms are interchangeable under appropriate circumstances and the embodiments of the invention can operate in other sequences than described or illustrated herein.

Moreover, the terms top, bottom, over, under and the like in the description and the claims are used for descriptive purposes and not necessarily for describing relative positions. The terms so used are interchangeable under appropriate circumstances and the embodiments of the invention described herein can operate in other orientations than described or illustrated herein.

The term "comprising", used in the claims, should not be interpreted as being restricted to the means listed thereafter; it does not exclude other elements or steps. It needs to be interpreted as specifying the presence of the stated features, integers, steps or components as referred to, but does not preclude the presence or addition of one or more other features, integers, steps or components, or groups thereof. Thus, the scope of the expression "a device comprising means A and B" should not be limited to devices consisting only of components A and B. It means that with respect to the present invention, the only relevant components of the device are A and B.

Similarly, it is to be noticed that the term "coupled", also used in the description or claims, should not be interpreted as being restricted to direct connections only. Thus, the scope of the expression "a device A coupled to a device B" should not be limited to devices or systems wherein an output of device A is directly connected to an input of device B. It means that there exists a path between an output of A and an input of B which may be a path including other devices or means.

Elements or parts of the described devices may comprise logic encoded in media for performing any kind of information processing. Logic may comprise software encoded in a disk or other computer-readable medium and/or instructions encoded in an application specific integrated circuit (ASIC), field programmable gate array (FPGA), or other processor or hardware.

References to software can encompass any type of programs in any language executable directly or indirectly by a processor.

References to logic, hardware, processor or circuitry can encompass any kind of logic or analog circuitry, integrated to any degree, and not limited to general purpose processors, digital signal processors, ASICs, FPGAs, discrete components or transistor logic gates and so on.

Embodiments of the present invention provide solutions to three major problems with meetings:

a) the time taken to prepare for a meeting. This is mainly achieved by allowing "on-the-fly" presentation of any displayable information. This information does not have to be linked into any particular presentation software, nor to be compatible with any such presentation software,
b) the time taken to conduct the meeting using electronic meeting tools. This is achieved by reducing the time to connect computers to the display or projection system.
c) the time taken to reflect and review and document the meeting afterwards. This is achieved by providing the possibility of recording the course of the meeting in the same time sequence that it was carried out as well as be able to store all data presented and who presented it.

Fig. 1a is a schematic representation of a generic meeting room 30 with a meeting table that can be used with embodiments of the present invention. Participants 37 having some form of processing device 31 such as a laptop computer, a tablet, a PDA

etc. Each of the processing devices 31 can be a host device and has a first connection unit 47 to which it is coupled. The first connection unit 47 provides access to a network 50 which in this case is a wireless network, but could be a wired network. Each connection unit 47 may be coupled to an input device 48 which will be described in more detail later. A user 37 will typically at a distance from the processing device 37 which is ergonomically satisfactory. This ergonomic boundary is typically an area of about 1000 sq cm to 4000 sq cm. This ergonomic boundary will typically have the user as one side of the boundary and the comfortable reach of the arms will determine an area on the left and right of the processing device which falls within the ergonomic boundary and the far edge of the boundary of the processing device (normally delimited by a display screen) will determine the other side of the ergonomic boundary. The area defined by the ergonomic boundary will overlap or include the processing device 31itself. The processing device will also have an outer physical boundary. The input device 48 is preferably arranged to operate outside the boundary of the processing device 31 but within the ergonomic boundary. Preferably the input device is arranged to function when it is flat on the table. The input device preferably has a size of activation area of between 1 and 144 square cm.

Preferably the network 50 is a local area network, i.e. preferably local to the meeting room for security reasons but the network 50 may have access to other local or wide area networks such as 51 or to a larger corporate network or the internet 43, for example via a router 42. Another node of the network 50 is the base or display node 36. This node 36 may optionally be a wireless access point. The base node 36 may also be a processing device or host computer and may be coupled to a second connection unit 49 that provides access to the network 50 thus linking all of the processing devices 31, 36 together. The connection unit may have an input device as described above. Alternatively, network connections installed on the base node 36 can be used. Audio equipment 46 may be provided, e.g. a telephone that allows other members of the meeting to call in from remote destinations.

The display node 36 is coupled to and adapted to allow display of media on some kind of display 44. The display node is in embodiments of the present invention a base node of the communications network 50. The display 44 may be a projector and/or screen,

the projector being coupled to the base node 36. A whiteboard 45 can optionally be provided that can be optionally coupled to the display 44 and/or the base node 36, e.g. when the whiteboard can record electronically what is written on it. Optionally, a camera 35 may be provided to record the entries on the whiteboard 45. The camera 35 may have a third connection unit 52 for connecting the camera 35 to the network 50 so that the data from the whiteboard can be recorded and stored or transmitted to other networks via router 42. The connection unit 52 may have an input device 53 as described above for the connection unit 47.

Optional equipment can be cameras 39, 40, 41 for recording the progress of the meeting. These cameras can be linked by a network 51, e.g. a cable network to the router 42 and/or the base node 36. Another optional item is a microphone or microphones 38 that can be used to transfer audio, e.g. to the processing devices 31 and to loud speakers (not shown) attached to the base node 36 or part of the display 44.

Any or all of the outputs of the processing devices 31, the cameras, the whiteboard, etc. can be recorded and stored digitally, e.g. in node 36 or elsewhere to provide a complete record with correct time sequence.

Summarising the above, the present invention provides an electronic meeting tool for communicating arbitrary media content between different users 37 (with their own processing devices 31, e.g. PC, mobile phone, or tablet) and one display or projector or multiple displays or projectors 44 in the meeting room 30.

Referring to Figs. 1a and 1b embodiments of the present invention comprise a base or display node 36 being a processing device, e.g. a host computer adapted to receive user selected arbitrary media content, the base node 36 being coupled to a central display 44 which can be a fixed format display and/or a projector or similar. The arbitrary media content can be provided from any of the user processing devices 31. The base node 36 can be adapted to display the received user selected arbitrary media content in accordance with a set of rules, e.g. FIFO, automatically, on request or approval, forced to display, in accordance with a priority etc. Optionally the base node

36 is adapted to force display of the received user selected arbitrary media content, i.e. to allow participation in the meeting by an individual user displaying own selected content on display 44 independently of the person who is nominally responsible for giving a presentation or chairing the meeting. Forcing the display can also be considered as a rule. The meeting tool can also be adapted to allow a priority setting. This means that a user can set a priority setting for the media to be displayed. A priority of "1" for example can be interpreted by the base node as a forced display, a priority "2" can be interpreted by the base node as display as soon as possible, priority "3" can be interpreted by the base node as place in queue and display as the time comes etc. Setting and using priorities for display are also considered to be working to rules. To execute the rules, the base node 36 may have a decision module. The base node 36 may be a host computer having a processing engine such as a microprocessor and a memory. Preferably, the base node 36 is adapted to treat media content passed to the base node 36 from any or all of the connection units 47 in an equal manner. The base node 36 may be adapted to auto compose the media content on the central display 44 connected to it, e.g. from one or more processing devices 31.

An independent aspect of the present invention is at least one connection unit 47, (optionally 49 for receiving or optionally connection unit 52) adapted to communicate the user selected arbitrary media content to said base node 36. Preferably the connection units 47 and/or optionally 49 or optionally connection unit 52 are physical plug-and-play devices. An example of a connection unit is shown schematically in Fig. 10.

The connection unit 47 be may integrated into a user processing device 31, e.g. as an internal peripheral device or may preferably be an external peripheral device comprising a connector adapted to couple to a port of a user processing device 31. The processing device 31 may have a client display, a processing engine such as a microprocessor, a memory and an operating system. The optional connection unit 49 may be integrated into the base node 36, e.g. as an internal peripheral device or may be an external peripheral device comprising a connector adapted to couple to a port of the base node 36. The connection unit 49 may be fully integrated into the base node 36, e.g. is an internal network interface of the base node 36. The base node 36 may have a

processing engine such as a microprocessor, a memory and an operating system.

The user processing devices 31, the connection units 47, (optionally 49 or optionally connection unit 52) and the base node 36 co-operate to form a communication network 50 for linking between at least one of the plurality of processing devices 31, 36 and 35 and the central display device 44. The communication network 50 is adapted to receive arbitrary media content from at least one of the plurality of processing devices 31 and to transmit the arbitrary media content of at least one of the plurality of processing devices to the central display device 44.

An independent aspect of the present invention is a portable application 60 adapted to be loaded onto a client processing device 31 and to be run on the operating system of the client processing device 31. The portable application 60 runs as a process on the client processing device 31 that is adapted to deliver an arbitrary media content from the client processing device 31 to the communication network 50 in response to a user action applied to an input device 48, the process leaving a zero footprint on termination on the client processing device 31. Optionally the portable application 60 is stored on each connection unit 47 and optionally 49. Preferably the portable application 60 is adapted to "screen scrape" content of the client display of the client processing device 31. Optionally the portable application 60 when run on a processing device 31 is adapted to "screen scrape" content of the client display of this client processing device 31 and to transmit it via a connection unit 47. Optionally the portable application 60 when run on the processing device is adapted to "screen scrape" content of the client display of the client processing device 31 and to transmit it via a network interface of the processing device 31, for example if the connection unit 47 has no transmitter or this is not functioning.

The connection unit 47 for communicating with said base node 36 has a network interface e.g. comprising a transmitter 62. The transmitter 62 is preferably a transceiver. Optionally the transmitter/receiver can be a wireless transmitter/receiver.

The base node 36 for communicating with the connection unit 47 has a receiver 63 which can be included in the connection unit 49 or integrated into the base node 36.

The receiver is preferably a transceiver. Optionally the transmitter/receiver can be a wireless transmitter/receiver.

The input device 48 allows a user interaction with the connection unit 47. Preferably the input device 48 is physical actuator coupled to the connection unit 47. The user action applied to the input device 48 generates a signal that can trigger transfer of data from the processing device 31 (to which the connection unit 47 is coupled) to the network 50. Preferably the input device 48 has an activating surface that is between 100 and 14,400 square mm. Optionally, the input device 48 can be a key displayed on the client display 1 of a client processing device 31. This key can be activated, e.g. by use of a pointing device such as a mouse trigger transfer of data from the processing device 31 to the network 50.

The connection unit 47 is preferably provided with a visual indicator 61, e.g. for allowing user feedback from the connection unit 47 of the status of any activity.

The system also can include a server program 64 adapted to be loaded onto the base node 36, said program 64 being adapted to receive arbitrary media content from one or a plurality of client processing devices 31 through said connection units 47, (optionally 49 or 52), and to show this plurality of arbitrary media content streams on one or a plurality of displays 44. The server program 64 may be adapted to allow display in accordance with one or more rules, e.g. FIFO, automatically, on request, forced, in accordance with a priority etc. To execute the rules, the server program 64 may have a decision module.

Preferably, the server program 64 is adapted to treat media content passed to it from any or all of the connection units 47 or 52 in an equal manner. The server program 64 may be adapted to auto compose the media content on the central display 44.

The server program 64 may be a portable application adapted to be loaded onto the base node 36 and to be run on the operating system of the base node 36. The portable application 64 runs a process on the base node 36 that is adapted to display an arbitrary media content received from the client processing device 31 via the

communication network 50, the process leaving a zero footprint on the base node 36 on termination. Optionally the portable application 64 is stored on each connection unit 49 and optionally 47 and can be installed therefrom.

The system may also include a central display device 44 and optionally a whiteboard 45 or other display means such as a printer. The display 44 being adapted to receive user selected arbitrary media content, and may be adapted to allow display of the received user selected arbitrary media content in accordance with one or more rules, e.g. FIFO, automatic, forced, on request or approval, in accordance with a priority etc.

Optionally, one of the connection units 47 can be adapted to be a master connection unit. Such a master connection unit may be adapted to instruct the base node when media content from a client processing device 31 may be displayed or which of the processing devices may be allowed to send content for display.

In embodiments of the present invention, at least one portable application is used, e.g. for the client software on a client processing device 31 or optionally on the base node 36. In these embodiments, one of the pre-installed generic drivers of the operating system on the relevant computer device 31, 36 is exploited for setting up communication from the computer device 31, 36 to the network 50 via the connection unit 47, (optionally 49). The generic driver is used in connection with the connection unit 47, (optionally 49) operating as a peripheral device but the use can go beyond that of the standard class of peripheral devices for which the generic driver is intended. In some embodiments the connection unit 47, (optionally 49) operated as a peripheral device communicates with the relevant processing device 31, 36 by using a generic communication protocol provided by the pre-installed generic driver. Pre-installed USB drivers are examples. Preferably the setting up of the communication of network 50 using connection unit 47, (optionally 49) does not alter or affect the networking capability of the relevant processing device 31, 36. For example, if a browser is started on the client processing device 31, this browser can use the standard network interfaces on the processing device 31. This means that transfer of data via the connection unit 47 (optionally 49) is independent of transfer of data over the network interfaces of processing device 31 or 36. This has the advantage that each user can

carry out processing such as searching on the internet to gather data independently of the transfer of data to be displayed during a meeting, or receive emails etc.

The use of a portable application has the advantage that any modification to settings in the register or generally in the operating system can be avoided, so that upon any form of termination, e.g. disconnecting the electronic device, system crash, no trace is left. This is generally termed "zero footprint".

The present invention has the advantage of scalability. It can provide a display system for use by a plurality of users in meetings. Every user in the meeting thus can have a client processing device 31 for coupling to a connection unit 47. A first user action connects the client processing device 31 to the base node 36, e.g. by inserting a connection unit 47 into the relevant interface connector on the processing device 31, e.g. a USB interface. A second user action comprising activating a button or key on the input device (e.g. by depressing it) then starts the process of transmitting arbitrary media content from the client processing device 31 to the base node 36. This process preferably includes screen scraping data from the processing device. Using screen scraping avoids special programs being installed on the base node 36 to carry out graphical commands sent from the processing device 31. When the base node 36 receives the plurality of arbitrary media content, it can allow auto composition of this media content on the central display connected to it.

The present invention will now be described further with reference to certain more specific embodiments.

With reference to Fig. 2, the base node software (6) running on a base node 36 can be adapted to display on the central display a splash screen (21) showing its readiness to receive arbitrary media content over its receiver. This splash screen (21) can also show instructions on how to use the system, as well as the configuration parameters (see later) to reach the base node 36. These configuration parameters are also shown in a transparent canvas at the bottom of the central display (22).

A client processing device 31 that wants to have its arbitrary media content displayed

on the central display connected to the base node 36 is connected to a connection unit 47. The portable application 60 will be executed on the client processing device 31 as a host device. A first user interaction creates a connection between the portable application 60 and the base node 36 using the transmitter in the connection unit 47 and the receiver in the base node 36. The first user interaction can be the connection of the unit 47 to the client processing device 31. A second user interaction, this time on the input device 48, activates screen scraping by the portable application of the arbitrary media content from the client processing device display, which is then sent over the connector unit 47 to the base node.

The base node 36 receives the plurality of arbitrary media content coming from one or more connection units 47, and auto composes this media content for rendering on the central display.

The visual indicator 61 on the connection unit 47 indicates to the user and to other participants in the meeting that media content is being sent by that connection unit 47 to the base node 36 for display.

Repeating the second user interaction on the input device 48 of a connection unit 47 decouples the media content from that connection unit 47 from the base node 36. The base node 36 removes that media content from the composed image on the central display and recomposes the remaining content on the central display.

The content on the central display/projector is auto arranged as shown in figure 2. When user 1 adds content, his/her display will be scaled to fill the available central display canvas as much as possible, but without affecting the aspect ratio. When user 2 adds in, his content is added to the side of the first image. When user 3 adds his content, the arrangement is, for example, triangle wise. Adding user 4, the image becomes a 2 by 2 tiling, which is the maximum available. When an additional user attempts to add content, he will be blocked. When a user initiates action to remove his/her content, his/her media content is removed from the central display and one moves backward in the composition sequence shown in figure 2.

Base node software

The base node software has one or more of the following features:

- First code for providing a means or a method step for correctly configuring the receiver of the base node.
- Second code for providing a means or a method step for listening for output of connection units trying to connect on a specific port.
- Optionally, third code for providing a means or a method step for a GUI for administration purposes, offered for example over a web interface.
- Optionally, fourth code for providing a means or a method step for publishing its presence over the network using the zeroconf protocol.
- Optionally, fifth code for providing a means or a method step for accepting and installing software updates of the base node as well as for the portable application software for the connection units.
- Sixth code for providing a means or a method step for providing facilities for pairing of connection units to the base node.
- Seventh code for providing a means or a method step for auto-composing of different incoming arbitrary media streams and rendering of composited image on display or projector screen.
- Eighth code for providing a means or a method step for receiving, decrypting and decoding incoming arbitrary media content.
- Optionally ninth code for providing a means or a method step for scaling of incoming arbitrary media streams
- Optionally tenth code for providing a means for displaying incoming arbitrary media content in accordance with a set of one or more rules.

Any of the above code may be stored on a non-transitory machine readable storage medium such as an optical disk, a magnetic disk, magnetic tape, solid state memory, USB mass storage device etc.

Portable application for the client processing device

The portable application comprises an algorithm for screen scraping. Screen scraping algorithms include VNC and RDP or similar. The algorithm may include a

combination of algorithms such as VNC and RDP that are optimized for different content, e.g. static text or video. The portable application has one or more of the following features:

- Eleventh code for providing a means or a method step for connecting to a network including the base node.
- Twelfth code for providing a means or a method step for capturing video frame buffers of the client processing device, i.e. computer (C), also called screen scraping.
- Thirteenth code for providing a means or a method step for encoding, compressing and optionally encrypting these video frames and sending them over a secure link to the base node. Only changed areas such as rectangles or triangles of the screen (or other suitable geometrical shapes) need to be transferred, and different types of rectangles or triangles are encoded in different ways (e.g. RLE, JPEG,...) to optimise performance.
- Fourteenth code for providing a means or a method step for handling the connection unit.
- Fifteenth code for providing a means or a method step for initiating connection to base node.
- Sixteenth code for receive inputs from the input device on the connection unit.
- Seventeenth code for providing a means or a method step for sending state changes to the visual indicator on the connection unit.
- Optionally, eighteenth code for providing a means or a method step for presenting the user a GUI (18).
- Optionally, nineteenth code for presenting GUI for administration of the portable application.
- Optionally, twentieth code for providing a means or a method step for displaying and activating a key on the display of the client processing device for allowing a user input to start the transfer of data from the client device to the base node.

Any of the above code may be stored on a non-transitory machine readable storage medium such as an optical disk, a magnetic disk, magnetic tape, solid state memory, nand Flash etc.

In this embodiment the portable application stored on the connection unit, and is executed in an execution context on the client processing device. The portable application does not need to be copied to or installed on the computer. It can be executed directly from the connection unit. It will only be copied temporarily into an execution context on the client processing device. There are also no changes in configuration required or settings in the client processing device. This means that nothing will remain on the client processing device when the connection unit is removed. It also implies that the portable application will run on client processing devices where the user does not have the necessary access rights to install software.

The portable application is designed in such a way that

- No specific drivers need to be installed on the client processing device.
- Pre-installed drivers are used, e.g. for classes of peripheral devices.
- It is independent from vendor specific graphics hardware.
- It runs on at least one and preferably on a variety of different client processing devices, including Windows, Mac OS/X, Linux, Android, iOS and many others.

Advantages

The present application has one or more of the following advantages:

- No need for a master role in the meeting
- Standard plug and play connectivity of connection units to base node
- Simple and well known user actions are employed
- Own networking facilities of client processing devices not blocked
- No configuration changes on the client processing device
- Input devices are easily accessible; e.g. large size
- Program updates of portable application and server program can be performed locally
- Portable applications are used, no installation, multi-platform, no vendor specifics
- Particular implementation of screen scraping done by portable application

avoids vendor specific graphics devices

- Standard drivers are used so no drivers have to be installed
- No configuration changes on the client processing devices
- Zero footprint applications on client processing devices – nothing to clear up or adjust or reset
- Own networking facilities of client processing devices not blocked
- No configuration changes on the user computers
- Low virus, malware and spyware risk

The portable application may be stored on a non-transitory machine readable storage medium such as an optical disk, a magnetic disk, magnetic tape, solid state memory, nand Flash etc.

Second Embodiment

In the second embodiment, referring to Figs. 2 to 5, the base node is a separate physical processing device called base unit (B), comprising permanent storage, memory, a processing engine, a wireless access point (4), a plug and play interface such as a USB port (11), a graphics display output adapter (5) like VGA/DP/DVI/HDMI, and optionally an audio output adapter (27). An input device having an actuator such as a button 13 and a visual indicator 14 are optional.

The connection unit is a physical device in the form of an external peripheral device (shown in the drawings as a "dongle" D) comprising permanent storage storing the portable application (7) and configuration parameters (12), memory, a processing engine (e.g. CPU, FPGA), a wireless transmitter such as WiFi (3) or other wireless transmitters such as LiFi, a plug and play interface such as a USB interface (2), a button as input device (9), an LED ring as visual indicator (10). The portable application is stored on the peripheral device (7).

The client processing device is host device, for example a computer or laptop comprising a display, a plug and play interface such as a USB port (2), memory, and a processing engine such as a microporcessor.

The system thus comprises

- an external peripheral device (D) that has a plug and play interface such as a USB interface (2) on one end and a communications interface such as a wireless interface configured as client (3) on the other end.
- a base unit (B) that has a communications interface such as a wireless interface configured as access point on one end (4) and a video card adapter (5) like VGA, DVI, DP or HDMI on the other end.
- a portable application (7) stored on the peripheral device (D) but executed on the client processing device (C)
- a base node software (6) stored and executed on the base unit (B)

The external peripheral device (D) also preferably has any one or any combination of:

- a large button as actuator for the input device (9) allowing user interaction with the peripheral device. The button preferably has an actuation surface area of between 100 and 14,400 square mm.
- visual indication such as a LED (10) allowing user feedback from the peripheral device. The user feedback can be in the form of a light ring.

An advantage of embodiments of the present invention is to provide data transfer to the peripheral device via a peripheral interface such as a USB interface on any processing device such as a computer in a manner that is largely operating system independent and without leaving a footprint (Zero-Footprint). Installation of drivers and/or applications onto such a processing device as a computer is not necessary wherever pre-installed generic drivers are present. Administrator rights on the processing device such as a computer are preferably not necessary. To avoid the need for administrator rights, embodiments of the present invention use other peripheral device pre-installed drivers such as USB class drivers supported without any extra installation. Embodiments of the present invention route at least screen scraped data presented by client software running on the processing device for transfer to a communications network via a peripheral device such as a USB device. This bypasses any network interface of the processing device C (and hence many firewalls) but only

for the specific client software. Other applications are not affected and can make use of the standard network interfaces, i.e. packets from/to the TCP/IP stack are transferred to a network device as normal. The client software is launched from the peripheral device such as a USB composite device or storage device as a portable application, which can avoid that any traces are left on the host OS.

Basic usage scenario of the second embodiment

The base node software (6) displays on the projector a splash screen – (21) in figure 5 - showing its readiness to receive arbitrary media content over its receiver (4). This splash screen (21) also shows instructions on how to use the system, as well as the configuration parameters (see later) to reach the base node. These configuration parameters can also be shown in a transparent canvas at the bottom of the central display (22).

To avoid user interaction for the configuration of the connection between peripheral device and base unit, a pairing process is used. This pairing process provides the peripheral device, i.e. the connection unit with networks parameters needed to set up the local network. As an example, the peripheral device can be briefly plugged into the USB port (11) of the base unit (B). The base unit then optionally does a software validity check, optionally does a software update of the portable application stored on the peripheral device, and writes the connection parameters on the peripheral device (D) required for the peripheral device and base unit to find each other to the permanent storage (8). For example, when using WiFi, this would be the SSID, WEP/WPA2 keys and IP address of the base unit's receiver, as well as the port number used by the base node software although not all of this data is necessarily exchanged.

A client processing device that wants to have its arbitrary media content displayed on the central display connected to the base node (5) connects a peripheral device (D) to its USB port via (2). The peripheral device presents itself to the computer over interface (2) as a composite device comprising a mass storage device and a keypad. This has the major advantage that no specific driver is required, since all these devices are natively supported in every personal computer system that has a USB port. If

autorun is enabled, then the computer will automatically execute the client software (7) stored in mass storage (8) on the peripheral device. The first user interaction mentioned in the general case is then just the connection of the peripheral device to the USB port. If security measures disabled auto-run, the user needs to explore the mass storage on the mass storage of the peripheral device and start the portable application manually.

The portable application will use the wireless, e.g. WiFi or LiFi interface of the peripheral device (3) to connect to the correct base node. To know the right base unit to connect to, the configuration parameters needed to make this connection are stored in the database (12) on the mass storage device (8) during the pairing process described earlier.

Once the connection is made, the peripheral device goes into connected mode. This means that there is now at least one channel from the peripheral device to the base unit. The content is not shown yet. The LED (10) on the peripheral device now turns white to give a visual indication of this new state.

When the user at the computer (C) wants to show her content, she presses the button (9). When the button was previously in state "connected" (see figure 6), it will check the state of the base unit (P). If the base unit is not in state "full", the peripheral device will send the screen scraped arbitrary media content to the base unit (B), which will add the media content to the composition on the central display. The peripheral device LED (10) now turns red to indicate "showing" state (figure 6).

The button (9) acts as a toggle. When the user presses the button again, that computer displays content will be removed from the projector. The LED (10) goes back to white.

Use of the auto-run feature is optional if possible and enabled on the computer (C) to start the client software (7) as soon as the peripheral device is plugged in. On Windows for example, this means mounting the peripheral device as a mass storage device and using the autorun.inf file stored on the peripheral device.

In many cases however, this auto-run feature will be disabled for security reasons. In that case, we will, if possible and enabled on the computer (C), use the auto-play feature to show the logo of the connected peripheral device on the desktop of the computer. The user then needs to double click on that logo to start the client software. If the auto-play feature as described above is also not possible or enabled, the user must browse to the file system of the connected peripheral device and start the application manually. This means double clicking the client.exe file on Windows, client.app on Mac OS/X or tapping the appropriate application icon on a tablet or any mobile device with touch screen.

Third Embodiment: Portable application stored on standard solid state memory such as a USB stick.

In the third embodiment, the portable application is stored on a solid state memory such as a regular USB memory stick (figure 7).

With a solid state memory such as a regular USB memory stick, there is no input device, visual indicator or transmitter of the kinds described above for the connection unit. This means that the system needs to:

- Use the transmitter/receiver from the client processing device.
- Use as input device a key or button on the client processing device like a physical key on the keyboard, a special mouse press, a button area on a touch screen, a button displayed on the screen to be clicked on with a mouse pointer.
- Present the visual indicator on the client processing device's display.

The client processing device then looks like figure 8.

This embodiment provides a peripheral interface such as the USB interface on any processing device acting as a host device such as a computer in a manner that is largely operating system independent. Installation of drivers and/or applications onto such a processing device as a computer is not necessary wherever pre-installed generic drivers are present. Administrator rights on the processing device such as a computer are preferably

not necessary. To avoid the need for administrator rights, this embodiment uses other peripheral device pre-installed drivers such as USB class drivers supported without any extra installation. This embodiment of the present invention routes at least screen scraped data presented by client software running on the processing device for transfer to a communications network via a network connection of the processing device. The client software is launched from the peripheral device such as the USB device as a portable application.

The first user operation then comprises:

- plugging in the solid state device such as a USB memory stick,
- starting the portable application (if autorun is disabled)
- configuring the transmitter, such as a wired or wireless network interface, on the client processing device to connect to the correct base node, using the configuration parameters (22) shown on the central display
- triggering the connection of the portable application with the base node, for example by interacting with an element on the GUI (18) of the portable application presented on the display of the client processing device.

Presenting visual feedback on user actions is in this embodiment also done using elements in the GUI of the display of the client operating device.

In this embodiment, the advantage of zero footprint is partly realized by the portable application in the sense that no software is installed on or copied to the client operating device, but there is a configuration change needed to connect the transmitter of the client operating device with the base node, which needs to be undone afterwards.

Optionally, the portable application can make the configuration changes to the transmitter for the user automatically in the background.

Advantages lost in this embodiment

- Partial loss of zero footprint nature of portable application
- More complex first user interaction
- More expertise required from user
- GUI needed on client operating device display, which is possibly also shown on

central display

- Need to find free key on client operating device when using physical key for second user action
- Network interface is blocked from other uses by portable application

Optionally, the last point can be avoided by using the base unit as a gateway to the network that the client operating device wanted to connect to through its own interface.

Advantages are:

- tight control of user connectivity to corporate network through settings on the base unit
- keep network connectivity intact even when transmitter is now also used for display purposes

Disadvantage is a higher vulnerability of the system because the display connection is now possible a doorway into the corporate network.

What remains as advantages are

- the availability of a physical medium to distribute the portable application to users
- no need to install or copy software to client operating device
- easy way to maintain software updates on the connection units (here: memory sticks) via the base unit
- possibility to write configuration data on the connection unit by the base unit, for example in the form of a configuration profile that can be read and used by the client operating device

Fourth Embodiment: Software only client installed on the client processing device.

This embodiment is similar to the third embodiment, with as only difference that the software is copied on the client operating device (figure 9). In this case, no plug and play port such as a USB port is required on the client operating device.

This embodiment will typically be used for tablet PC's and mobile devices. In that case

- there is often no USB port available

- application distribution is easy and widely accepted through application stores

Fifth embodiment: Base node software OEM'ed to projector or display equipment

In this embodiment, the base node is not realized as a separate physical box, but integrated into the processing unit inside a display or projector. All other details are as previously described.

Sixth embodiment

In this embodiment, the base node is not realized as a separate physical box, but integrated into the codec of a video conferencing equipment. All other details are as previously described.

Seventh embodiment: Remote meeting participant

In this embodiment, one or multiple client operating devices are not in the direct vicinity of the base node but on a remote location.

To accommodate this case, the following adaptations are needed:

- further compression and or scaling of the arbitrary media content to allow use of low bandwidth connection
- possibility to communicate connection parameters of the base node to a remote user
- connectivity of the base node to the WAN network to which the remote user is connected

All other details are as previously described.

Eighth embodiment: multiple base nodes

In this embodiment, multiple base nodes are used. This can be done for different purposes:

- connectivity of multiple central displays
- extension of real estate of central display

- connectivity of base nodes in different remote locations

This provides the advantage that one can present on multiple base units from a single peripheral device. This is useful for a number of cases:

- personal peripheral device: user can have a personal peripheral device that is paired with multiple meeting rooms that he regularly uses
- use in meeting room with multiple base units each controlling a different display in the same meeting room

The proposal uses a special variant of the peripheral device called a multi base peripheral device. The multi base peripheral device is equipped with a rotating wheel around the circular central "show me" button. This could be a mechanical rotating multi-position switch or something like the touch wheel on the iPod classic.

The pairing of this multi-base variant of the peripheral device:

- the rotation wheel is put in the position of the corresponding base unit.
- the peripheral device is paired to the base node in the regular way
- the configuration parameters are stored in a permanent storage location; every position of the rotating wheel has a corresponding set of connection parameters (e.g. different rows in a table) each corresponding with a particular base

The connection of the peripheral device is as follows:

- multi-base peripheral device X is plugged into a PC
- rotation wheel on peripheral device X is put in position A
- peripheral device X reads configuration parameters in position A of its internal memory
- peripheral device X connects to base node A
- base node A indicates connection of multi-base peripheral device X on central display screen
- rotation wheel on peripheral device X is put in position B
- peripheral device X reads configuration parameters in position B of its internal memory
- peripheral device X connects to base node B
- base node B indicates connection of multi-base peripheral device X on screen
- continue until correct base is selected with rotation wheel
- click the peripheral device input device e.g. button to show content on central display of

base node

- rotating the wheel always first clicks away content from the base of the last position

Ninth embodiment

Fig. 10 shows a peripheral device 47 in accordance with an independent embodiment of the present invention including an input device. This embodiment can be used with any of the embodiments described above.

The peripheral device is configured as a connection unit and is a physical device in the form of a connector for a plug and play interface of a user processing device as a host computer such as a USB connection, a flexible data and power connection connected to the connector and a base, the base having an actuator, e.g. a button configured to be an input device with the functions as described above.

The base and/or the actuator is preferably large in size, e.g. having a surface area between 100 and 14,400 square mm. The base can be square, rectangular, round, hexagonal, oval, polygonal in shape or any other ergonomically suitable shape. The actuator is preferably round but can be square, rectangular, hexagonal, oval, polygonal in shape etc. there can be more than one actuator on one base.

The length of the flexible data and power connection, e.g. cable is preferably adapted to place the peripheral device (when in its connected in its operating position), especially the base and the actuator, in the region between the boundary of the connected user processing device and the ergonomic boundary as defined above. In addition the flexible data and power connection should be adapted so that the base lies flat on the meeting table independent of the orientation of the connector needed to insert the connector into the plug and play interface.

The base preferably includes electronics such as having permanent storage for storing the portable application and the network configuration parameters, memory, a processing engine (e.g. CPU, FPGA), a wireless transmitter/receiver such as for WiFi or LiFi, a plug and play interface such as a USB interface, a LED ring or strip as visual indicator. The portable application can be stored on the peripheral device, i.e. in the base. The visual

indicator is for allowing user feedback from the connection unit of the status of any activity.

- Some examples for activation of the actuator which can be used with any of the embodiments of the present invention:

    - Sound activated (hand clap, voice recognition, computer sound, music, ...)
    - Remote controlled via wireless connected device (IR, Bluetooth, WiFi, LiFi...)
    - Light activated
    - Pressure activated, e.g. depression with a finger or hand.
    - Touch activated
    - Proximity ('near-touch' on the actuator or bringing the actuator close to some object
    - Biometric reader such as Fingerprint reader, Iris scanner, DNA analyser
    - Keypad, e.g. for entering Keycode e.g. a password

Alternative embodiments

In the above embodiments, once the connection is made between the connection device and a host computer, the peripheral device goes into connected mode. This means that there is at least one channel from the peripheral device to the base node. In accordance with any of the embodiments of the present invention a plurality of channels can be set up between the connection device and the base node. These channels may be logical channels.

Some examples for such a multichannel arrangement may include the first and one or more of the additional channels:

- First channel is for the Scraped image stream (XDS)
- Second channel is for GPU commands (OpenGL, DirectX)
- Third channel is for Mouse pointer coordinates (absolute, relative)
- Fourth channel is for Mouse pointer icons
- Fifth channel is for Image data files (JPEG, PNG, GIF, ...)
- Sixth channel is for Multimedia data files or streams (MPEG2, MPEG4, OGG, H.26x, ...)

- Seventh channel is for Audio data files or streams (MP3, MP4, AAC, WMA, ...)
- Eighth channel is for text or Document data files (DOC, DOCX, PPT, PPTX, ODT, ODS, PDF, ...)
- Ninth channel is for transmission of a priority value 1,2, 3... as described above.

The support of audio, as discussed above when providing a seventh channel, in "screen scrape" like applications is non-trivial. When using devices which comprise a Windows OS, a large variety of audio devices exist, each offering a separate API. On devices comprising a Mac OS, special drivers like for instance SoundFlower needs to be installed. SoundFlower is a Mac OS X (10.2 and later) system extension that allows applications to pass audio to other applications. Hence such programs do not meet the zero footprint requirements.

The present invention provides in embodiments a method and a system for connecting a processing device such as a laptop, smartphone, PDA, computer, tablet and suchlike to a communications network, the processing device having a memory, a display and an operating system with pre-installed generic drivers providing a generic communications protocol for communication between processing device and a standard class of peripheral devices. The method and/or system are adapted for:

a) coupling a peripheral device to the processing device, the peripheral device having a transceiver;
b) setting up, by means of the pre-installed generic driver of the operating system, a means for communication between the peripheral device and the processing device;
c) coupling the processing device to a communications network via the peripheral device;
d) routing audio data between the processing device and the communication network via the means for communication, wherein the generic communication protocol is used for transferring the audio data between the processing device and the peripheral device.

In particular the method and/or system can be adapted for:
a) coupling a peripheral device to the processing device, the peripheral device having a transceiver;

b) setting up, by means of a first pre-installed generic audio driver of the operating system, a means for audio communication between the peripheral device and the processing device and by means of a second pre-installed generic driver of the operating system, a means for data communication between the peripheral device and the processing device;

c) coupling the processing device to a communications network via the peripheral device;

d) routing audio data between the processing device and the communication network via the means for audio communication, wherein the first pre-installed generic audio driver is used for transferring the audio data between the processing device and the peripheral device.

Embodiments of the present invention advantageously use the availability of a plug and play interface such as a USB interface. A USB device is connected to a suitable port on the processing device. . For example, on every PC-like platform, there is standard built-in support for a USB audio device. Thus there is a standard generic audio driver available. Using this audio interface is thus possible without special driver installation.

On the peripheral device in embodiment of the present invention one can implement a virtual audio device. This peripheral device can present itself as an audio out device to the processing device such as a laptop, PDA, laptop, smartphone, tablet, PC, etc it is connected to. As soon as the peripheral device is plugged in, the user of the processing device will see an additional audio out interface displayed on the processing device display to which it can stream the audio. Audio configuration advantageously can be done using the standard audio interface GUI on the processing device. The peripheral device can present itself as a USB composite device.

The virtual audio device on the peripheral device is preferably adapted to analyse the incoming signal. If no audio is received, the incoming signal is discarded. If audio is received, the peripheral device preferably will initiate an additional TCP/IP socket connection to the base unit and the communications network. The audio can be then optionally time-stamped synchronous with the video stream for lip synchronization, optionally encoded into for instance Orgg/Vorbis, optionally encrypted using for instance CryptoPP and sent over the TCP/IP link using the RTP/RTCP protocol. If no audio signal is received, then no audio packets will preferably be sent over the network to limit bandwidth usage. The audio channel over TCP/IP is disconnected synchronously with the

video channel.

In an embodiment of the present invention, the base unit is adapted to receive the audio stream packets for instance encoded in RTP and controlled with RTCP over a TCP/IP socket. It will preferably then decrypt and decode the contained encoded audio stream if required, and deliver the resulting signal to the physical audio device in the base unit. The embedded time stamps can be used to synchronize the audio and video streams.

When audio is present on the client processing device to which the peripheral device is connected and made available to the USB audio device presented by the peripheral device, then it will be streamed to the base unit. The base unit is notified that the additional multimedia stream presented to it contains audio. This additional meta-information is used in the auto composition engine on the base unit. Without audio, up to four such streams can be handled for example by the base unit simultaneously.

Thus, instead of "scraping" the audio like e.g. prior art products do, embodiments of the present invention provide a channel, as described above, which is adapted to capture the audio on the peripheral device using only standard drivers and not requiring any software installation in or on the processing device. The peripheral device preferably acts as a composite device comprising for instance a (virtual) audio speaker device. However instead of operating like a speaker the audio is channelled over the communications network. The peripheral device can preferably capture the audio stream with a device driver, for instance a built in ALSA UAC1, and stream the audio to the base unit. In addition, to provide lip synchronisation, embodiments of the present invention further provides a timer or uses a timer present in a processing device that preferably time stamps both the audio and the video stream. This time stamp is encoded in the video frames and passed on in the ALSA communication stream to the peripheral device. The peripheral device then encodes this time stamp into the audio stream (for instance RTP audio stream) that is streamed to the base unit. At the receiving end, the audio and video streams are then preferably recombined taking into account the time stamp to reach lip synchronization.

A detailed embodiment of the present invention for audio capture will be described with reference to Fig. 11.

In this embodiment a peripheral device 32 as described above is used that can be coupled with a processing device 31 such as a laptop, tablet, smartphone, PDA, personal computer etc. The coupling can be by a plug and play interface such as a USB interface that has generic drivers installed on the processing device. For example the peripheral device 32 can be physically inserted into a USB port on the processing device 31. Commercially available processing devices currently support external USB audio devices through a generic built-in USB audio software driver. In the future any modifications, improvements or replacements of universal interfaces will have an equivalent audio solution. The generic drivers installed on the processing device make the audio available at the port 8 to the peripheral device 32. For example, port 8 can be a USB port using a standardized interface, e.g. mostly UAC1. On the peripheral device 32 there is a matching port 11. In accordance with this embodiment audio data is captured at this interface 8-11 internally in the peripheral device 32. This data is then optionally re-encoded and streamed to the communications network to which the peripheral device 32 has access. An example is a wireless communications network such as WiFi or LiFi. The communications network has a base node which can be in the form of a base station or base unit 33. The base unit can be a central base unit for use in meetings. For use in displaying a presentation this base unit is coupled to a display device as described for other embodiments of the present invention. In order to provide lip synchronicity, the audio and video signals captured are provided with a high resolution time stamp upon packaging. By doing so, the combined audio and video signals can be reconstructed at the receiving end regardless of the paths and delays of the different packets.

For the processing of video data from the processing device 31, a software 2 is executed on the processing device 31 e.g. a client PC, i.e. a screen scraping software as described in the other embodiments. This software 2 can be stored as a software program 30 in mass storage 12 on the peripheral device 32 as described in the other embodiments. This software program 30 is loaded onto the processing device 31 when it is coupled thereto, either automatically or by user action as described in the other embodiments. When the software 2 is running on the processing device 31 it is preferred if it leaves zero footprint on termination has been described for other embodiments. That software 30 when executed on the processing device 31 captures the video data that is available on the processing device, e.g. from a presentation or video that is running on the processing device as described in the other embodiments. For example, the software 30 when executed on the

processing device 31, is adapted to screen scrape, e.g. to read one or more video frame buffers 1 from the graphics card in the processing device 31. Generally the processing device 31 will have its own display and hence will have a graphics card or something equivalent with a buffer for storing video data. This read video information is preferably time stamped with a clock 9, to be able to later synchronize the captured video signal with the related audio signal. The video signal is then encoded in a video encoder 3, packetized in a video packetizer 4, prepared in an HID protocol packetizer 5 for transport over the plug and play interface using a generic driver 10, such as over a USB interface using generic pre-installed drivers, e.g. a generic pre-installed Human Interface Driver (HID). The audio data is offered on the plug and play port e.g. the USB port 8.

On the peripheral device 32 the video packets are received at the corresponding plug and play port, e.g. the USB port 11, read by the Human Interface Driver (HID) interface handler 13, unpacked to remove HID protocol headers in an unpacker 20 and then transmitted to the communications network by a transmitter 21. The network can be wireless for example WiFi or LiFi network.

Having been routed over a communications network to the base unit 33, the incoming stream is read from the communications interface such as a WiFi access point 22, unpacked in an unpacker 25, decoded in a decoder 26 and then inserted into a suitable composition such as an OpenGL based composition in the compositor 29 for display on a central display device.

With reference to the audio data on the processing device 31 such as a client PC, the audio is sent over a port using generic drivers such as over a USB port 8 using the standard built-in generic audio driver such as UAC driver 7. On the peripheral device 32, the audio packets are read from the generic port, e.g. USB port 11 by a dedicated audio device 14. These packets are then processed by any of a mixer a rate converter, an echo canceller, noise canceller or similar. Any of the mixing, rate conversion, echo cancelling, noise cancelling can be executed using an ALSA driver 18. The ALSA driver offers the packets to a dummy audio device 16 such as an audio scraper. In this audio device 16 the audio packets can be time stamped from the clock 15 that can be synchronized with clock 9 of the processing device 31. This information is then encoded in an encoder 17 and packetized in a packetizer 19]before being transferred to the communications network. The

network can be a wireless network such as a WiFi or LiFi network For this purpose a suitable transmitter 21 is provided in the peripheral device 32. On the base unit 33 the audio information stream is recovered at a suitable communications interface such as the WiFi access point 22. The audio is then unpacked in an unpacker 23, decoded in a decoder 24 before being before being offered to an audio mixer 28. In oder to synchronise the audio and video streams these are both sent to a synchronizer 27 in which the two streams are synchronized and thus keep lip synchronization.

In the above embodiments, a particular method of pairing the peripheral device with the base node has been described. Any of the embodiments of the present invention may include other pairing mechanisms of which some examples are given below.

- Some examples for pairing
  - Plug in the peripheral device, to a generic peripheral device port such as a USB port of the base node or other USB enabled device. Pairing info is transmitted over the generic peripheral interface such as USB.
  - The Signal strength of the wireless channel to the base node is used to identify which base nod is to be used
  - The Signal strength of the wireless channel or any other channel. Example is an NFC/RFID transmitter can be provided underneath the meeting room table. Putting the user processing device such as a laptop and the peripheral device plugged in on this table automatically pairs the peripheral device with the base of this meeting room
  - Manual pairing (e.g. by entering IP address, hostname, wireless ID (like SSID on WiFi))

What is claimed is

1. A method for connecting a processing device to a communications network, the processing device having a memory, a display and an operating system with pre-installed generic drivers providing a generic communications protocol for communication between processing device and a standard class of peripheral devices, the method comprising:
a) coupling a peripheral device to the processing device, the peripheral device having a transceiver;
b) setting up, by means of a first pre-installed generic audio driver of the operating system, a means for audio communication between the peripheral device and the processing device and by means of a second pre-installed generic driver of the operating system, a means for data communication between the peripheral device and the processing device;
c) coupling the processing device to a communications network via the peripheral device;
d) routing audio data between the processing device and the communication network via the means for audio communication, wherein the first pre-installed generic audio driver is used for transferring the audio data between the processing device and the peripheral device.

2. The method of claim 1 wherein Step b) comprises presenting the peripheral device to the processing device as a human interface device and wherein the pre-installed generic driver is a human interface device driver.

3. The method of claim 1 wherein Step b) comprises presenting the peripheral device to the processing device as a mass storage device and wherein the pre-installed generic driver is a mass storage device driver.

4. The method of claim 1 wherein Step b) comprises presenting the peripheral device to the processing device as a composite device and wherein pre-installed generic drivers drive different device interfaces independently.

5. The method of any of claims 1 to 4 wherein a client application is stored on the peripheral device which when run on the processing device obtains screen scraped data.

6. The method of claim 5 wherein the client application is a portable application.

7. The method of any of the claims 1 to 6 wherein the peripheral device is adapted to analyse an incoming signal from the processing device and if no audio is received, the incoming signal is discarded.

8. The method of claim 7 wherein if audio is received, the peripheral device will initiate an additional connection to the base unit through the communications network.

9. The method of any of claims 1 to 8 further comprising time-stamping synchronously with the audio with the data stream.

10. The method of claim 9 further comprising encoding, optionally encrypting the audio data.

11. A system for connecting a processing device to a communications network, the processing device having a memory, a display and an operating system with pre-installed generic drivers providing a generic communications protocol for communication between processing device and a standard class of peripheral devices, the system comprising:
a) means for coupling a peripheral device to the processing device, the peripheral device having a transceiver;
b) means for setting up, by means of a first pre-installed generic audio driver of the operating system, a means for audio communication between the peripheral device and the processing device and by means of a second pre-installed generic driver of the operating system, a means for data communication between the peripheral device and the processing device;
c) means for coupling the processing device to a communications network via the peripheral device;
d) means for routing audio data between the processing device and the communication network via the means for audio communication, wherein the first pre-installed generic audio driver is used for transferring the audio data between the processing device and the peripheral device.

12. The system of claim 11 further comprising means for presenting the peripheral device to the processing device as a human interface device and wherein the pre-installed generic

driver is a human interface device driver.

13. The system of claim 11 further comprising means for presenting the peripheral device to the processing device as a mass storage device and wherein the pre-installed generic driver is a mass storage device driver.

14. The system of claim 11 further comprising means for presenting the peripheral device to the processing device as a composite device and wherein pre-installed generic drivers drive different device interfaces independently.

15. The system of any of claims 11 to 14 wherein a client application is stored on the peripheral device which when run on the processing device obtains screen scraped data.

16. The system of claim 15 wherein the client application is a portable application.

17. The system of any of the claims 11 to 16 wherein the peripheral device is adapted to analyse an incoming signal from the processing device and if no audio is received, the incoming signal is discarded.

18. The system of claim 17 wherein if audio is received, the peripheral device will initiate an additional connection to the base unit through the communications network.

19. The system of any of claims 11 to 18 further comprising time-stamping synchronously with the audio stream with the data stream.

20. The system of claim 19 further comprising means for encoding, optionally encrypting the audio data.

21. An electronic meeting tool for use with the system according to any of the claims 11 to 20 and for communicating arbitrary media content from users at a meeting comprising:
a node configuration means adapted to operate a display node of a communications network, the display node being coupled to a first display, the node configuration means being adapted to receive user selected arbitrary media content and to control display of the user selected arbitrary media content on the first display; and

at least one peripheral device adapted to communicate the user selected arbitrary media content via the communications network, wherein the peripheral device is a connection unit comprising:

(a) a connector adapted to couple to a port of a processing device having a second display, a memory and an operating system; and
(b) a transmitter for communicating with the communications network,

a program adapted to be loaded onto the processing device and to run on the operating system of the processing device, said program being adapted to obtain user selected arbitrary media content, said program leaving a zero footprint on termination, and an input device to allow the user to carry out a user action that triggers transfer of said user selected arbitrary media content to said transmitter through said port.

22. The electronic meeting tool of claim 21 wherein the program is stored on the peripheral device.

23. The electronic meeting tool of claim 21 or 22 wherein the transmitter is a wireless transmitter or transceiver.

24. The electronic meeting tool of any of the claims 21 to 23wherein the peripheral device is a plug-and-play device.

25. The electronic meeting tool of any of the claims 21 to 24 wherein the program is adapted to screen scrape content of the second display.

26. The electronic meeting tool of any of the claims 21 to 25 wherein the input device is physical actuator coupled to the peripheral device.

27. The electronic meeting tool of claim 26 wherein the physical actuator has a surface area of between 100 and 14,400 square mm.

28. The electronic meeting tool of any of the claims 21 to 27 wherein the input device is a key displayed on the second display.

29. The electronic meeting tool of claim 28 wherein the key displayed on the second display is not screen scraped by the program.

30. A method for connecting a processing device to a communications network and for use with the system according to any of the claims 11 to 20, the processing device having a memory, a display and an operating system with at least one pre-installed generic driver providing a generic communications protocol for communication between processing device and a standard class of peripheral devices, the method comprising the steps of:
a) coupling a peripheral device to the processing device, the peripheral device having a transceiver;
b) setting up, by means of the pre-installed generic driver of the operating system, a means for communication between the peripheral device and the processing device;
c) coupling the processing device to a communications network via the peripheral device;
d) routing screen scraped data between the processing device and the communication network via the means for communication, wherein the generic communication protocol is used for transferring the screen scraped data between the processing device and the peripheral device.

31. The method of claim 30 wherein Step b) comprises presenting the peripheral device to the processing device as a human interface device and wherein the pre-installed generic driver is a human interface device driver.

32. The method of claim 30 wherein Step b) comprises presenting the peripheral device to the processing device as a mass storage device and wherein the pre-installed generic driver is a mass storage device driver.

33. The method of claim 30 wherein Step b) comprises presenting the peripheral device to the processing device as a composite device and wherein pre-installed generic drivers drive different device interfaces independently.

34. The method of any of claims 30 to 33 wherein a client application is stored on the peripheral device which when run on the processing device obtains the screen scraped data.

35. The method of claim 34 wherein the client application is a portable application.

36. A peripheral device for use with the system according to any of the claims 11 to 20 and for providing communication connectivity to a processing device which is provided with memory, a display and an operating system with at least one pre-installed generic driver providing a generic communication protocol for communication between the processing device and a standard class of peripheral devices, the peripheral device comprising a memory in which executable software code is stored for execution on the processing device, said executable software code comprising:
a first software code portion for setting up, by means of the pre-installed generic driver of the operating system, a means for communication between the peripheral device and the processing device;
a second software code portion for connecting the processing device to a communications network via the peripheral device, the peripheral device having a transceiver;
a third software code portion for screen scraping data from the processing device; and
a fourth software code for routing screen scraped data between the processing device and the communications network over the means for communication; wherein the first software code portion is adapted to use the generic communication protocol for transferring the screen scraped data between the processing device and the peripheral device.

37. The peripheral device of claim 36, wherein the first software code portion is adapted to present the peripheral device to the processing device as a human interface device and wherein the pre-installed generic driver is a human interface device driver.

38. The peripheral device of claim 36, wherein the first software code portion is adapted to present the peripheral device to the processing device as a mass storage device and wherein the pre-installed generic driver is a mass storage device driver.

39. The peripheral device of claim 36, wherein the first software code portion is adapted to present the peripheral device to the processing device as a composite device and wherein pre-installed generic drivers drive different device interfaces independently.

40. The peripheral device of any of the claims 36 to 39 wherein said executable software code comprises fifth code for providing a means for connecting to the communications network including a base node.

41. The peripheral device of any of the claims 36 to 40 wherein said executable software code comprises sixth code for providing means for capturing video frame buffers of the processing device.

42. The peripheral device of any of the claims 36 to 41 wherein said executable software code comprises seventh code for providing a means for encoding, compressing and optionally encrypting the screen scraped data and sending the screen scraped data the communication network.

43. The peripheral device of any of the claims 36 to 41 wherein said executable software code comprises eighth code for providing a means for handling the peripheral device.

44. The peripheral device of any of the claims 40 to 43 wherein said executable software code comprises ninth code for providing means for initiating connection to the base node.

45. The peripheral device of any of the claims 36 to 44 wherein said executable software code comprises tenth code for receiving inputs from an input device on the peripheral device.

46. The peripheral device of any of the claims 36 to 45 wherein said executable software code comprises eleventh code for providing a means for sending state changes to the visual indicator on the peripheral device.

47. The peripheral device of any of the claims 36 to 46 wherein said executable software code comprises Twelfth code for providing a means for presenting to the user a GUI.

48. The peripheral device of any of the claims 36 to 47 wherein said executable software code comprises thirteenth code for presenting a GUI for administration of the said executable software code when executed as a portable application.

49. The peripheral device of any of the claims 36 to 48 wherein said executable software code comprises fourteenth code for providing a means for displaying and activating a key on the display of the client processing device for allowing a user to input the start the transfer of data from the processing device to the base node.

50. A peripheral device use with the system according to any of the claims 11 to 20 and for providing communication connectivity to a processing device which is provided with memory, a display and an operating system with at least one pre-installed generic driver providing a generic communication protocol for communication between the processing device and a standard class of peripheral devices, the peripheral device comprising a memory in which executable software code is stored for execution on the processing device, said executable software code comprising:
a first software code portion for setting up, by means of the pre-installed generic driver of the operating system, a means for communication between the peripheral device and the processing device;
a second software code portion for connecting the processing device to a communications network via the peripheral device, the peripheral device having a transceiver; and
a third processing software code for routing data between the processing device and the communications network over the means for communication; wherein the first software code portion is adapted to use the generic communication protocol for transferring the data between the processing device and the peripheral device, and
an input device coupled to the peripheral device, the input device being adapted to react to a user action to trigger the transfer of the data from the processing device to the peripheral device.

51. The peripheral device of claim 50, wherein the first software code portion is adapted to present the peripheral device to the processing device as a human interface device and wherein the pre-installed generic driver is a human interface device driver.

52. The peripheral device of claim 50, wherein the first software code portion is adapted to present the peripheral device to the processing device as a mass storage device and wherein the pre-installed generic driver is a mass storage device driver.

53. The peripheral device of claim 50, wherein the first software code portion is adapted to

present the peripheral device to the processing device as a composite device and wherein pre-installed generic drivers drive different device interfaces independently.

54. The peripheral device of any of the claims 50 to 53 wherein the input device is physical actuator coupled to the peripheral device.

55. The peripheral device of claim 54 wherein the physical actuator has a surface area of between 100 and 14,400 square mm.

56. The peripheral device of any of the claims 50 to 55 wherein the input device is a key for display on the display.

57. The peripheral device of any of the claims 50 to 56 wherein said executable software code comprises fourth code for providing a means for connecting to the communications network including a base node.

58. The peripheral device of any of the claims 50 to 56 wherein said executable software code comprises fifth code for providing a means for capturing video frame buffers of the processing device.

59. The peripheral device of claim 58 wherein said executable software code comprises sixth code for providing a means for encoding, compressing and optionally encrypting the video frames and sending them over a secure link to the base node.

60. The peripheral device of any of the claims 50 to 59 wherein said executable software code comprises seventh code for providing a means for handling the peripheral device.

61. The peripheral device of claim 59 or 60 wherein said executable software code comprises eighth code for providing a means for initiating connection to the base node.

62. The peripheral device of any of the claims 50 to 61 wherein said executable software code comprises ninth code for receive inputs from an input device on the peripheral device.

63. The peripheral device of any of the claims 50 to 62 wherein said executable software code comprises tenth code for providing a means for sending state changes to the visual indicator on the peripheral device.

64. The peripheral device of any of the claims 50 to 63 wherein said executable software code comprises eleventh code for providing a means for presenting the user a GUI.

65. The peripheral device of any of the claims 50 to 64 wherein said executable software code comprises twelfth code for presenting GUI for administration of the executable software code when executed as a portable application.

66. The peripheral device of any of the claims 57 to 65 wherein said executable software code comprises thirteenth code for providing a means for displaying and activating a key on the display of the processing device for allowing a user input to start the transfer of data from the processing device to the base node.

67. A peripheral device use with the system according to any of the claims 11 to 20 and for providing communication connectivity to a processing device which is provided with memory, a display and an operating system with at least one pre-installed generic driver providing a generic communication protocol for communication between the processing device and a standard class of peripheral devices, the peripheral device comprising a memory in which executable software code is stored for execution on the processing device, said executable software code comprising:
a first software code portion for setting up, by means of the pre-installed generic driver of the operating system, a means for communication between the peripheral device and the processing device;
a second software code portion for connecting the processing device to a communications network via the peripheral device, the peripheral device having a transceiver;
a third software code portion for receiving media content from the network and for displaying the media content on the display in accordance with a set of rules; wherein the first software code portion is adapted to use the generic communication protocol for transferring the media content between the peripheral device and the processing device.

68. The peripheral device of claim 67 wherein said executable software code comprises

fourth code for providing a means for correctly configuring a receiver as an access point.

69. The peripheral device of claim 67 or 68 wherein said executable software code comprises fifth code for providing a means for listening for output of connection units trying to connect on a specific port.

70. The peripheral device of any of the claims 67 to 69 wherein said executable software code comprises sixth code for providing a means for a GUI for administration purposes.

71. The peripheral device of any of the claims 67 to 70 wherein said executable software code comprises seventh code for providing a means for publishing its presence over the network using the zeroconf protocol.

72. The peripheral device of any of the claims 67 or 71 wherein said executable software code comprises eighth code for providing a means for accepting and installing software updates.

73. The peripheral device of any of the claims 67 or 72 wherein said executable software code comprises ninth code for providing a means for providing facilities for pairing of connection units to the processing device.

74. The peripheral device of any of the claims 67 or 73 wherein said executable software code comprises tenth code for providing a means for auto-composing of different incoming arbitrary media streams and rendering of composited image on display.

75. The peripheral device of any of the claims 67 or 74 wherein said executable software code comprises eleventh code for providing a means for receiving, decrypting and decoding incoming arbitrary media content.

76. The peripheral device of any of the claims 67 or 75 wherein said executable software code comprises twelfth code for scaling of incoming arbitrary media streams.

77. The peripheral device of any of the claims 67 or 76 wherein said executable software code comprises thirteenth code for providing a means for displaying incoming arbitrary

media content in accordance with a set of rules.

78. A method for use with the system according to any of the claims 11 to 20 and for communicating arbitrary media content from users at a meeting comprising:
operating a display node of a communications network, the display node being coupled to a first display, to receive user selected arbitrary media content and to control display of the user selected arbitrary media content on the first display; and
connecting a peripheral device to a port of a processing device and communicating the user selected arbitrary media content via the communications network,
loading a program onto the processing device and running the program on the operating system of the processing device to obtain user selected arbitrary media content, said program leaving a zero footprint on termination, and
triggering transfer of said user selected arbitrary media content to said transmitter through said port after a user action on an input device.

79. A peripheral device for use with the system according to any of the claims 11 to 20, comprising:
a base
a connector for connection to a plug and play port of a host processing device,
a flexible connection between the base and the connector for transferring data signals and power,
an actuator on the base for actuating a signal and for transferring the signal to the connector for transfer to the port, wherein the base has electronics comprising permanent storage for storing a portable application, a processing engine, a transceiver and a visual indicator.

80. A method for use with the system according to any of the claims 11 to 20 and for providing communication connectivity from a processing device,
setting up a communications network between a base node of the communications network and a peripheral device coupled to the processing device;
transferring media content between the processing device and the peripheral device,
transmitting the media content from the peripheral device to the communications network,
receiving media content from the communications network at the base node and displaying the media content on a display in accordance with a set of rules.

81. Any of the above claims as software code stored on a non-transitory storage medium.

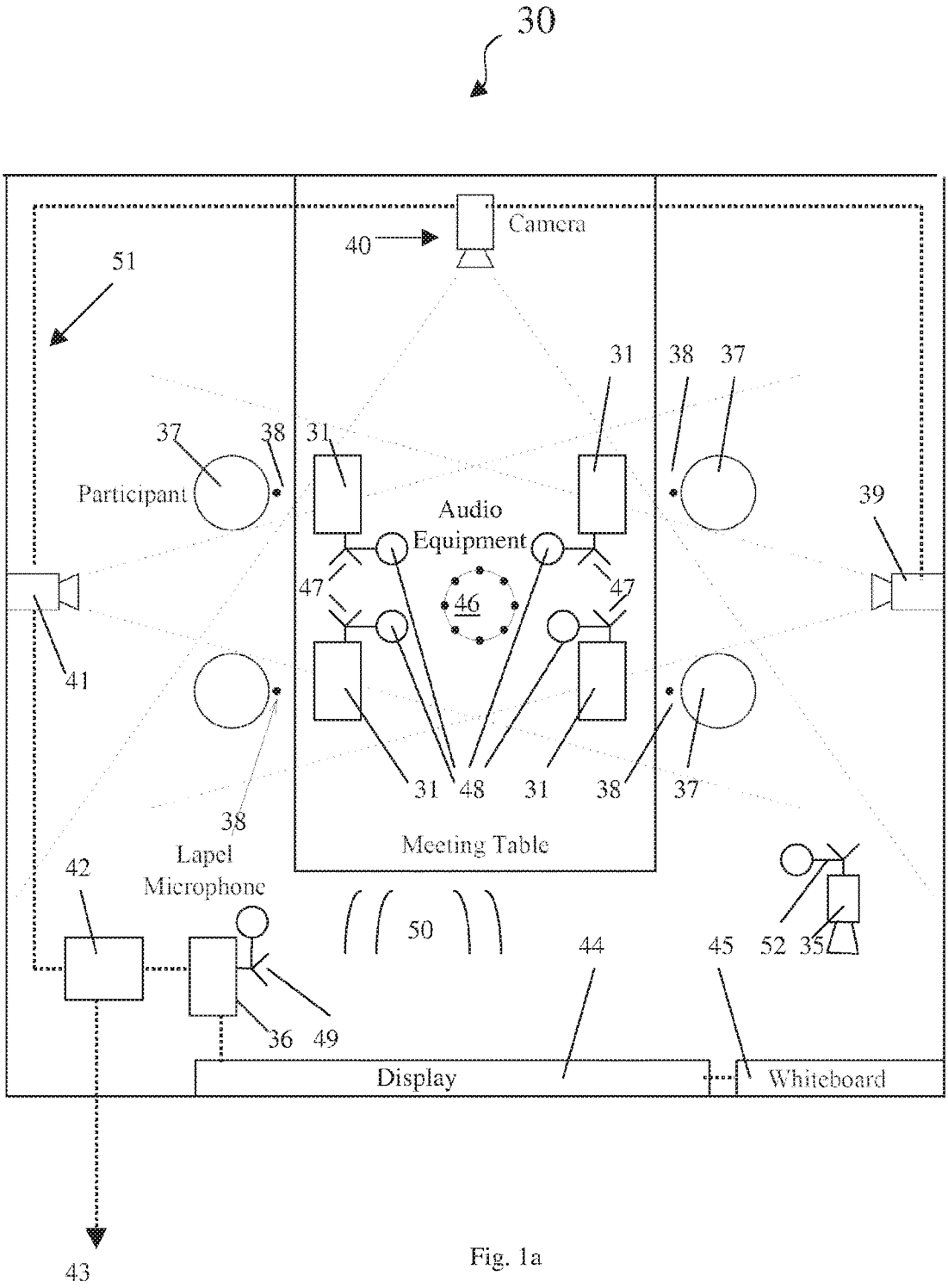

30
Camera
40
51
31
38
37
37
38
31
Participant
39
Audio
Equipment
47
46
47
41
31
48
31
38
37
38
Lapel
Microphone
Meeting Table
42
50
44
45
52
35
36
49
Display
Whiteboard
43

Fig. 1a

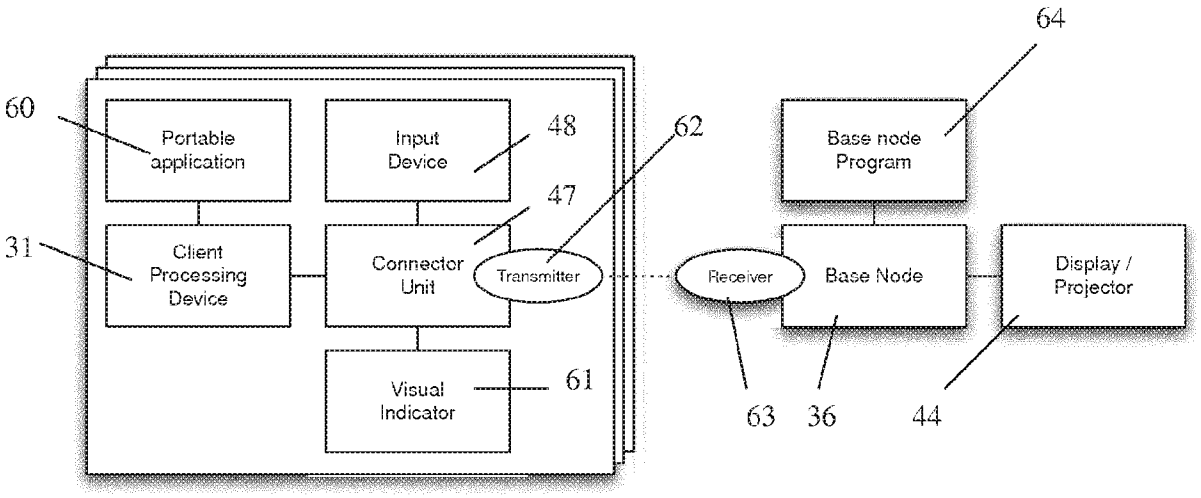

60
Portable application
Input Device
48
62
64
Base node Program
47
31
Client Processing Device
Connector Unit
Transmitter
Receiver
Base Node
Display / Projector
Visual Indicator
61
63
36
44

Fig. 1b

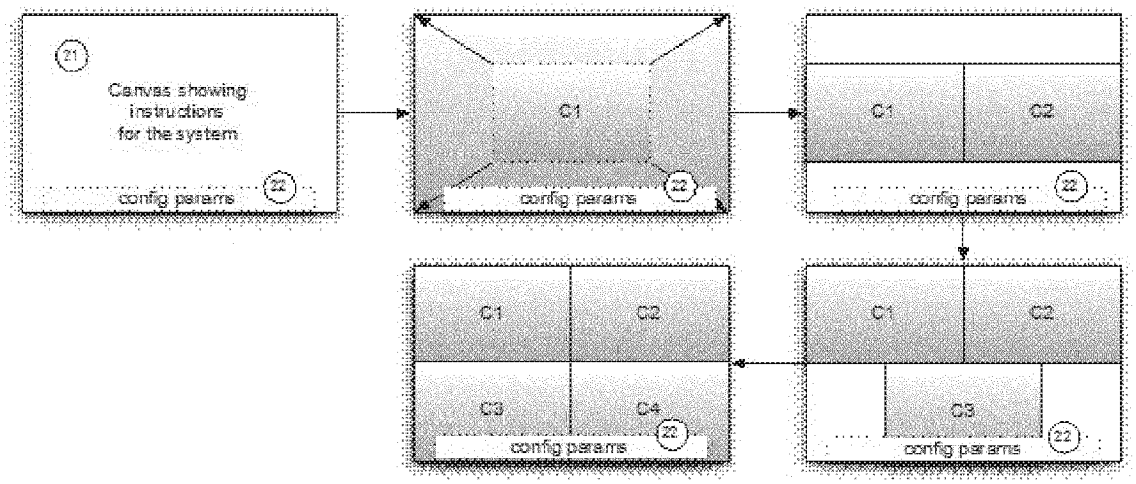

21
Canvas showing instructions for the system
config params
22
C1
C2
C3
C4

Fig. 2

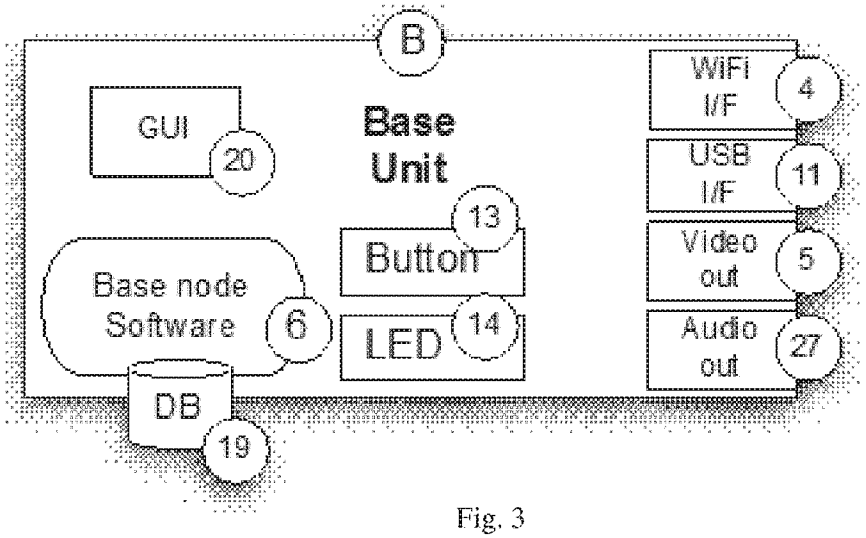


Fig. 3

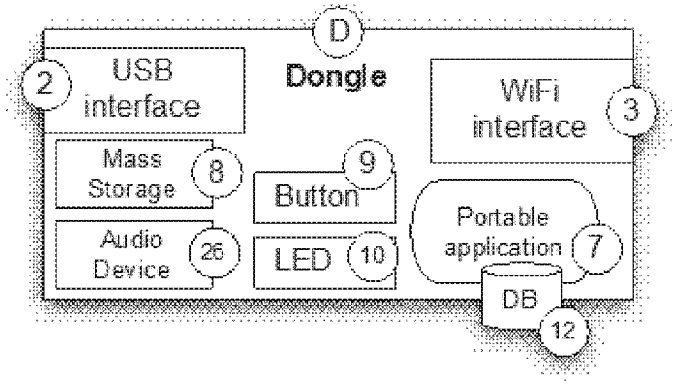


Fig. 4

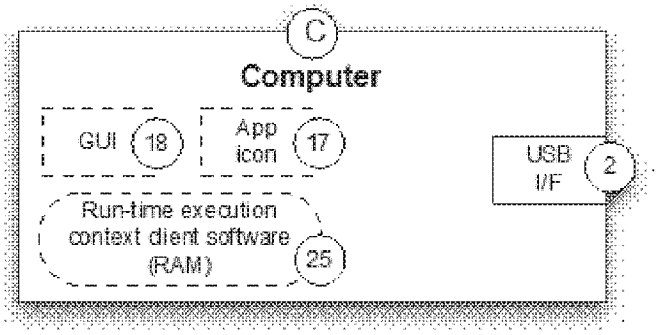


Fig. 5

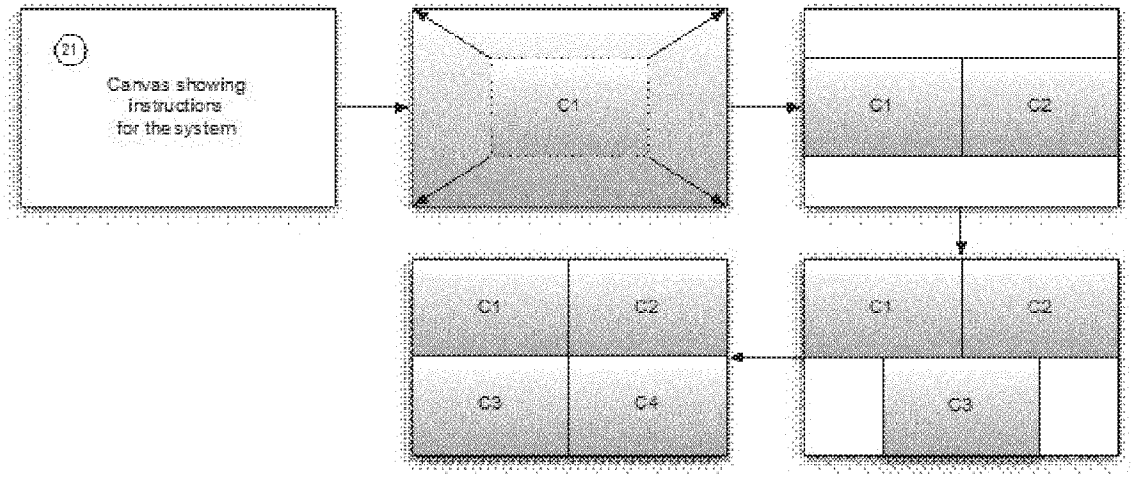


Fig. 6

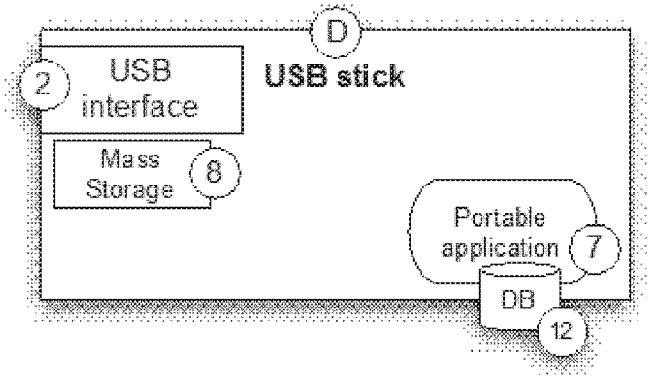


Fig.7

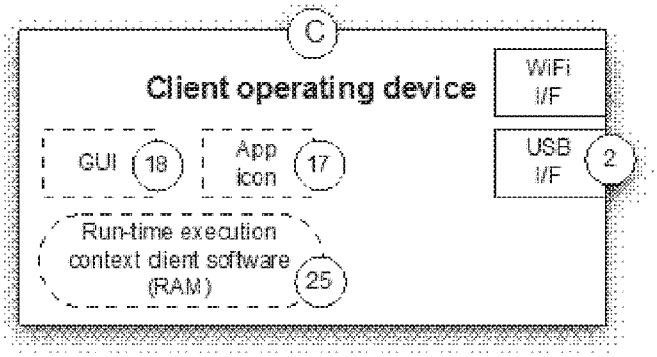


Fig. 8

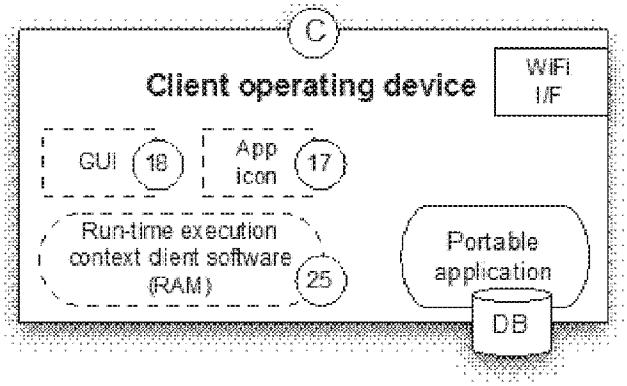

C
Client operating device
WiFi I/F
GUI
18
App icon
17
Run-time execution context client software (RAM)
25
Portable application
DB

Fig. 9

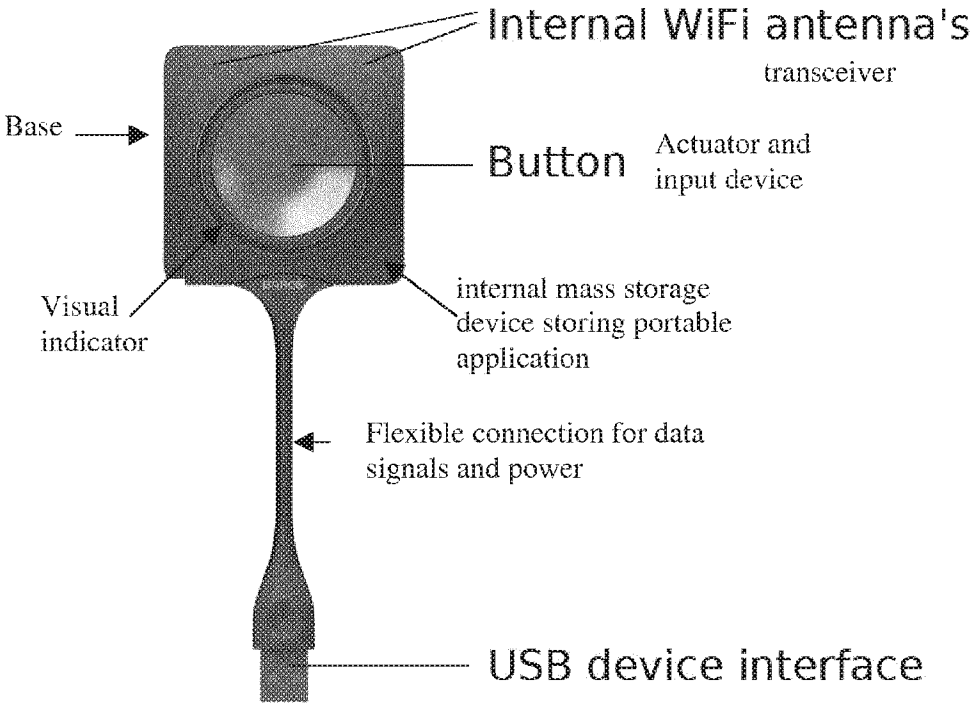

Internal WiFi antenna's
transceiver
Base
Button
Actuator and input device
Visual indicator
internal mass storage device storing portable application
Flexible connection for data signals and power
USB device interface

Fig. 10

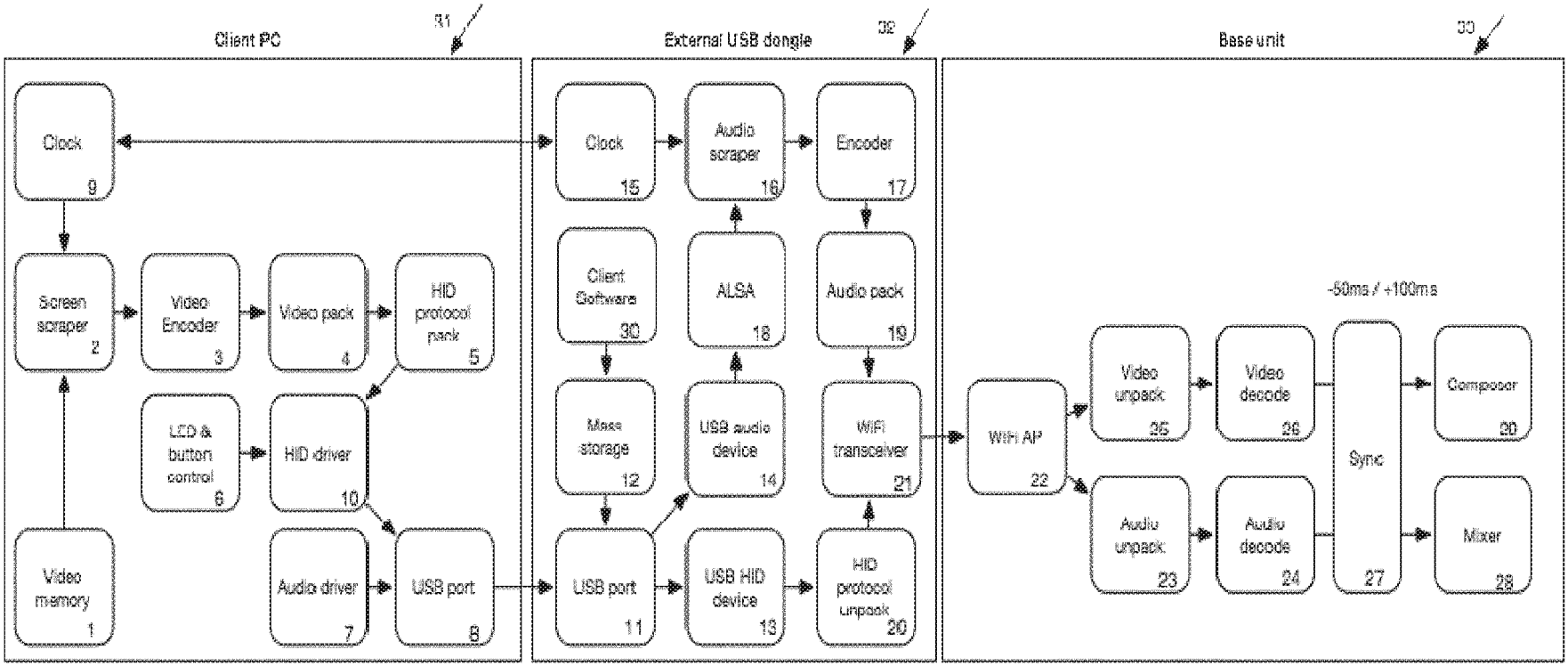

Client PC
31
Clock
9
Screen scraper
2
Video Encoder
3
Video pack
4
HID protocol pack
5
LED & button control
6
HID driver
10
Video memory
1
Audio driver
7
USB port
8
External USB dongle
32
Clock
15
Audio scraper
16
Encoder
17
Client Software
30
ALSA
18
Audio pack
19
Mass storage
12
USB audio device
14
WiFi transceiver
21
USB port
11
USB HID device
13
HID protocol unpack
20
Base unit
33
WiFi AP
22
-50ms / +100ms
Video unpack
25
Video decode
26
Sync
27
Composer
29
Audio unpack
23
Audio decode
24
Mixer
28

FIG. 11

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To:
IPLodge BVBA
Technologielaan 9
3001 Heverlee
BELGIQUE

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Applicant's or agent's file reference BAR4763PCT	Date of mailing *(day/month/year)* 10 April 2019 (10-04-2019) **FOR FURTHER ACTION** See paragraphs 1 and 4 below
International application No. PCT/EP2018/086537	International filing date *(day/month/year)* 21 December 2018 (21-12-2018)
Applicant BARCO N.V.	

1. [X] The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

   Filing of amendments and statement under Article 19:
   The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46):

   When? The time limit for filing such amendments is normally two months from the date of transmittal of the International Search Report.

   How? Directly to the International Bureau of WIPO, 34 chemin des Colombettes 1211 Geneva 20, Switzerland, Fascimile No.: (41-22) 338.82.70

   For more detailed instructions, see *PCT Applicant's Guide*, International Phase, paragraphs 9.004 - 9.011.

2. [ ] The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. [ ] **With regard to any protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

   [ ] the protest together with the decision thereon has been transmitted to the International Bureau together with any applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

   [ ] no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

   The applicant may **submit comments on an informal basis on the written opinion of the International Searching Authority** to the International Bureau. These comments will be made available to the public after international publication. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established.

   Shortly after the expiration of **18 months from the priority date, the international application will be published** by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau before the completion of the technical preparations for international publication (Rules 90*bis*.1 and 90*bis*.3).

   Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for **entry into the national phase** before those designated Offices. In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months. For details about the applicable time limits, Office by Office, see www.wipo.int/pct/en/texts/time_limits.html and the *PCT Applicant's Guide*, National Chapters.

   Within **22 months from the priority date, the applicant may request that a supplementary international search be carried out** by a different International Searching Authority that offers this service (Rule 45*bis*.1). The procedure for requesting supplementary international search is described in the *PCT Applicant's Guide*, International Phase, paragraphs 8.006-8.032.

Name and mailing address of the International Searching Authority European Patent Office, P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk Tel. (+31-70) 340-2040 Fax: (+31-70) 340-3016	Authorized officer TOUYSSERKANI, Tanja Tel: +49 (0)89 2399-2161

Form PCT/ISA/220 (July 2017)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	**FOR FURTHER ACTION**	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
BAR4763PCT		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/EP2018/086537	21 December 2018 (21-12-2018)	29 December 2017 (29-12-2017)
Applicant		
BARCO N.V.		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 4 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**
   a. With regard to the **language,** the international search was carried out on the basis of:
      [X] the international application in the language in which it was filed
      [ ] a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))
   b. [ ] This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).
   c. [ ] With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. [ ] **Certain claims were found unsearchable** (See Box No. II)

3. [ ] **Unity of invention is lacking** (see Box No III)

4. With regard to the **title,**
   [X] the text is approved as submitted by the applicant
   [ ] the text has been established by this Authority to read as follows:

5. With regard to the **abstract,**
   [X] the text is approved as submitted by the applicant
   [ ] the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority

6. With regard to the **drawings,**
   a. the figure of the **drawings** to be published with the abstract is Figure No. 8
      [X] as suggested by the applicant
      [ ] as selected by this Authority, because the applicant failed to suggest a figure
      [ ] as selected by this Authority, because this figure better characterizes the invention
   b. [ ] none of the figures is to be published with the abstract

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2018/086537

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04L12/12
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 3 099 009 A1 (BARCO NV [BE]) 30 November 2016 (2016-11-30) figures 1a, 11 page 2, paragraph 5 page 3, paragraph 13 page 4, paragraph 20 page 5, paragraph 34 page 6, paragraphs 34, 42	1-35
A	US 2006/075100 A1 (STIRBU VLAD [FI]) 6 April 2006 (2006-04-06) figures 3, 6 page 1, paragraph 9 page 2, paragraph 12 page 3, paragraph 32	1-35

-/--

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
3 April 2019	10/04/2019

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Mircescu, Alexander

1

Form PCT/ISA/210 (second sheet) (April 2005)

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 1 879 143 A2 (BALLY GAMING INC [US]) 16 January 2008 (2008-01-16) figures 1, 5C page 3, paragraph 11 page 7, paragraph 64 page 8, paragraph 67 -----	1-35
A	US 2014/148152 A1 (PERIYALWAR SHALINI [CA] ET AL) 29 May 2014 (2014-05-29) figures 1, 2, 4, 5, 11 page 1, paragraph 20 page 3, paragraph 37 page 5, paragraph 51 -----	1-35

1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2018/086537

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 3099009 A1	30-11-2016	BR 112014026147 A2	27-06-2017
		CA 2909672 A1	24-10-2013
		CN 104412542 A	11-03-2015
		EP 2839604 A1	25-02-2015
		EP 3099009 A1	30-11-2016
		GB 2501471 A	30-10-2013
		HK 1207759 A1	05-02-2016
		SG 11201602993U A	30-05-2016
		US 2015121466 A1	30-04-2015
		WO 2013156092 A1	24-10-2013
US 2006075100 A1	06-04-2006	EP 1794931 A2	13-06-2007
		US 2006075100 A1	06-04-2006
		WO 2006035302 A2	06-04-2006
EP 1879143 A2	16-01-2008	AU 2007203223 A1	24-01-2008
		CA 2593336 A1	10-01-2008
		CN 101159078 A	09-04-2008
		CN 103177510 A	26-06-2013
		EP 1879143 A2	16-01-2008
		US 2011230260 A1	22-09-2011
		US 2016171820 A1	16-06-2016
US 2014148152 A1	29-05-2014	CA 2843539 A1	07-02-2013
		EP 2740319 A1	11-06-2014
		US 2014148152 A1	29-05-2014
		WO 2013016798 A1	07-02-2013

Information on Search Strategy - Pilot phase (see OJ 2015, A86)
The type of information contained in this sheet may change during the pilot for improving the usefulness of this new service.

Application Number
PCT/EP2018/086537

TITLE: METHOD AND SYSTEM FOR MAKING FUNCTIONAL DEVICES AVAILALBLE TO PARTICIPANTS OF MEETINGS

APPLICANT: BARCO N.V.

IPC CLASSIFICATION: H04L12/12

EXAMINER: Mircescu, Alexander

CONSULTED DATABASES:

CLASSIFICATION SYMBOLS DEFINING EXTENT OF THE SEARCH:

IPC:

CPC: H04L12/12

FI/F-TERMS:

KEYWORDS OR OTHER ELEMENTS FEATURING THE INVENTION:
Automatic connection of devices

EPO FORM P04A42

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/EP2018/086537	21.12.2018	29.12.2017

International Patent Classification (IPC) or both national classification and IPC
INV. H04L12/12

Applicant
BARCO N.V.

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notifed the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA:	Date of completion of this opinion	Authorized Officer
European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Fax: +49 89 2399 - 4465	see form PCT/ISA/210	Mircescu, Alexander Telephone No. +49 89 2399-0

Form PCT/ISA/237 (Cover Sheet) (January 2015)

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed.

   ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:

   a. ☐ forming part of the international application as filed:

      ☐ in the form of an Annex C/ST.25 text file.

      ☐ on paper or in the form of an image file.

   b. ☐ furnished together with the international application under PCT Rule 13*ter*.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.

   c. ☐ furnished subsequent to the international filing date for the purposes of international search only:

      ☐ in the form of an Annex C/ST.25 text file (Rule 13*ter*.1(a)).

      ☐ on paper or in the form of an image file (Rule 13*ter*.1(b) and Administrative Instructions, Section 713).

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	
	No:	Claims	1-35
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-35
Industrial applicability (IA)	Yes:	Claims	1-35
	No:	Claims	

2. Citations and explanations

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

Reference is made to the following document:

D1 EP 3 099 009 A1 (BARCO NV [BE]) 30 November 2016 (2016-11-30)

Re Item V

1 It appears appropriate, for technical reasons, to discuss method claim 16 first. The subject matter of claim 16 is not novel (Art 33(1),(2) PCT) for the following reasons.

1.1 Document D1 discloses

(a) a method for connecting a processing device to a functional device

(*see D1, page 5, paragraph 34:"connecting a processing device to a communications network ... communication between processing device and a standard class of peripheral devices";*

hence, a processing device is connected to a functional/peripheral device; hence, feature (a) is disclosed)

(b) connected to or in a base unit of a communications network

(*see D1, page 6, paragraph 34:"routing screen scraped data between the processing device and the communication network via the means for communication";*

hence, there is a means of communication coupled to the processing device, and such a means is functionally the same as a base unit of a network, at least in the claimed broad manner; hence, feature (b) is also disclosed),

(c) the processing device having a memory, a display and an operating system, the base unit having a transmitter and the first peripheral device having a receiver the method comprising:

(*see D1, page 5, paragraph 34:"the processing device having a memory, a display and an operating system ... communication between processing device and ... peripheral devices";*

hence, the processing device has a display and an operating system, and the base unit of (b) and the peripheral device of (a) have a transmitter and a receiver; hence, feature (c) is also disclosed)

(d) coupling a first peripheral device to the processing device via a generic communications protocol

(*see D1, page 4, paragraph 34:"providing a generic communications protocol";*

hence, the peripheral device and the processing device discussed above communicate via a generic communications protocol; hence, feature (d) is also disclosed),

(e) providing at least one fixed or a configurable endpoint of the functional device exposed on the first peripheral device

(*see D1, page 6, paragraph 34:"setting up .... a means for communication between the peripheral device and the processing device";*

hence, the functional/peripheral device is provided with an endpoint by setting up the means for communication; hence, feature (e) is also disclosed);

(f) transmitting data from the base unit and receiving the data at the first peripheral device over the communications network from the functional device to the processing device via the at least one fixed or configurable endpoint using the generic communications protocol for communication between the processing device and the first peripheral device

(*see the citations above: the whole structural and functional features (a)-(e) are used for transmitting and receiving data from the functional device to the processing device via the at least one fixed or configurable endpoint using the generic communications protocol for communication between the processing device and the first peripheral device; hence, feature (f) is also disclosed*).

Since all features (a)-(f) of claim 16 are disclosed by document D1, the subject matter of claim 16 is not novel (Art 33(1),(2) PCT).

2 Claim 29 defines an apparatus of broader scope of protection than the method of claim 16. Since the subject matter of claim 16 is not novel (Art 33(1),(2) PCT), the subject matter of claim 29 is a fortiori not novel (Art 33(1), (2) PCT).

3 The subject matter of dependent claims 1-15, 17-28, and 30-33 is also not novel (Art 33(1),(2) PCT) since their subject matter is also disclosed in document D1 (*claim 1 corresponds to claim 16; the software features of claims 2-7, 17-22, and 31-32 are disclosed on page 6, paragraph 42; the hardware features of claims 8-15, 23-28, 30, and 33 are disclosed on page 6, paragraph 37*).

4 Claim 34 defines a computer program corresponding to the method claims 16-28. Since the subject matter of claims 16-28 is not novel (Art 33(1),(2) PCT), the subject matter of claim 34 is also not novel (Art 33(1),(2) PCT).

5 Claim 35 defines a storage device for storing the computer program of claim 34. Since the subject matter of claim 34 is not novel (Art 33(1),(2) PCT), the subject matter of claim 35 is also not novel (Art 33(1),(2) PCT).

Re Item VIII

1 The subject matter of claims 1 and 29 is not clear (Art 6 PCT) for the following reasons.

1.1 Claim 1 defines a system comprising all features of the apparatus of claim 29. Hence, claim 1 defines a dependent claim, being dependent on claim 29. But, contrary to the requirements of Art 6 PCT, claim 1 does not contain a reference to claim 29 in order to explicitly show its dependence on claim 29; instead claim 1 uses the wording of an independent claim.

1.2 Contrary to the requirements of Art 6 PCT, independent claim 29 is put before dependent claim 1. Hence, claim 29 contravenes the clarity requirements of Art 6 PCT.

1.3 The clarity objections could be easily overcome, by formulating claim 29 as the first claim, followed by dependent claims 30-33, followed by dependent claim 1, followed by dependent claims 2-15, followed by method claims 16-28, followed by claim 34, followed by claim 35. The system claim should read: "A system for connecting the peripheral device of claim 1 to ...".

2 The applicant's attention is drawn to the following matters, which should as well be considered:

2.1 To meet the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in document D1 should be acknowledged in the description.

2.2 Reference signs in parentheses should be inserted in all claims to increase their intelligibility (Rule 6.2(b) PCT).

2.3 The attention of the applicant is drawn to the fact that the application may not be amended in such a way that it contains subject matter which extends beyond the content of the application as filed (Art 34(2)(b) PCT).

In his letter of reply, the applicant should indicate the parts of the originally filed application serving as a basis for subject matter newly introduced into the claims.

The applicant is requested to file amendments by way of replacement pages in accordance with Rule 66.8 PCT.

Possible steps after receipt of the international search report (ISR) and written opinion of the International Searching Authority (WO/ISA)

General information

For all international applications, the competent International Searching Authority **(ISA)** will establish an international search report **(ISR)** accompanied by a written opinion of the International Searching Authority **(WO/ISA)**. The **WO/ISA** may be responded to by

- filing informal comments with the **International Bureau of WIPO (IB)** (where no demand for international preliminary examination **(demand)** is filed)
- filing amendments under Art. 19 PCT (this can be done whether or not a **demand** is filed)
- filing amendments under Art. 34 PCT and/or formal observations in response to objections raised in the **WO/ISA** (where a **demand** *is* actually filed)

This document explains these possibilities.

Filing informal comments

After receipt of the **ISR and WO/ISA**, the applicant may file informal comments on the **WO/ISA, directly with the IB** (see International Search and Preliminary Examination Guidelines 2.15). These will be communicated to the designated/elected Offices, together with the International Preliminary Report on Patentability **(IPRP)** at 30 months from the priority date.

Amending claims under Art. 19 PCT

The applicant may file **amended claims** under Art. 19 PCT, **directly with the IB** by the later of the following dates:

- 2 months from the date of mailing of the **ISR** and the **WO/ISA**
- 16 months from the priority date

However, any such amendment received by the **IB** after the expiration of the applicable time limit shall be **considered to have been received on time** by the **IB**, if it reaches it **before** the technical preparations for international publication have been completed (the 15th day prior to the date of publication, see PCT Applicant's Guide, International Phase, 9.013).

For further information, please see Rule 46 PCT as well as form PCT/ISA/220.

Please also note that, when filing amended claims under Art. 19 PCT, such amendments shall be **accompanied by a letter** identifying the amendments made and also the basis for the amendments in the application as originally filed (Rule 46.5(b) PCT). Where a **demand** is filed, failure to comply with this requirement may result in the amendments being ignored in the International Preliminary Examination Report **(IPER)**, see Rule 70.2(c-*bis*) PCT.

BNSDOCID: <XS.....20070401OCK.I..>

PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

IPLodge bvba
Technologielaan 9
3001 Heverlee
BELGIQUE

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(PCT Rule 71.1)

Date of mailing *(day/month/year)* 21.11.2019

Applicant's or agent's file reference
BAR4763PCT

IMPORTANT NOTIFICATION

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/EP2018/086537	21.12.2018	29.12.2017

Applicant
BARCO N.V.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary report on patentability and its annexes, if any, established on the international application.

2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.

3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. **REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary report on patentability. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

The applicant's attention is drawn to Article 33(5), which provides that the criteria of novelty, inventive step and industrial applicability described in Article 33(2) to (4) merely serve the purposes of international preliminary examination and that "any Contracting State may apply additional or different criteria for the purposes of deciding whether, in that State, the claimed inventions is patentable or not" (see also Article 27(5)). Such additional criteria may relate, for example, to exemptions from patentability, requirements for enabling disclosure, clarity and support for the claims.

Name and mailing address of the international preliminary examining authority:

European Patent Office
D-80298 Munich
Tel. +49 89 2399 - 0
Fax: +49 89 2399 - 4465

Authorized Officer

Eich, Martine

Tel. +49 89 2399-7578

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference BAR4763PCT	**FOR FURTHER ACTION**	See Form PCT/IPEA/416
International application No. PCT/EP2018/086537	International filing date *(day/month/year)* 21.12.2018	Priority date *(day/month/year)* 29.12.2017
International Patent Classification (IPC) or national classification and IPC INV. H04L12/12		
Applicant BARCO N.V.		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 7 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. ☐ *(sent to the applicant and to the International Bureau)* a total of sheets, as follows:
      ☐ sheets of the description, claims and/or drawings which have been amended and/or sheets containing rectifications authorized by this Authority, unless those sheets were superseded or cancelled, and any accompanying letters (see Rules 46.5, 66.8, 70.16, 91.2, and Section 607 of the Administrative Instructions).
      ☐ sheets containing rectifications, where the decision was made by this Authority not to take them into account because they were not authorized by or notified to this Authority at the time when this Authority began to draw up this report, and any accompanying letters (Rules 66.4bis, 70.2(e), 70.16 and 91.2).
      ☐ superseded sheets and any accompanying letters, where this Authority either considers that the superseding sheets contain an amendment that goes beyond the disclosure in the international application as filed, or the superseding sheets were not accompanied by a letter indicating the basis for the amendments in the application as filed, as indicated in item 4 of Box No. I and the Supplemental Box (see Rule 70.16(b)).
   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing, in the form of an Annex C/ST.25 text file, as indicated in the Supplemental Box Relating to Sequence Listing (see paragraph 3*ter* of Annex C of the Administrative Instructions).

4. This report contains indications relating to the following items:
   - ☒ Box No. I Basis of the report
   - ☐ Box No. II Priority
   - ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - ☐ Box No. IV Lack of unity of invention
   - ☒ Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - ☐ Box No. VI Certain documents cited
   - ☒ Box No. VII Certain defects in the international application
   - ☐ Box No. VIII Certain observations on the international application

Date of submission of the demand	Date of completion of this report
29.10.2019	21.11.2019
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Fax: +49 89 2399 - 4465	Authorized officer Mircescu, Alexander Telephone No. +49 89 2399-7645

Box No. I Basis of the report

1. With regard to the **language**, this report is based on

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of:
   - ☐ international search (under Rules 12.3(a) and 23.1(b))
   - ☐ publication of the international application (under Rule 12.4(a))
   - ☐ international preliminary examination (under Rules 55.2(a) and/or 55.3(a) and (b))

2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

   Description, Pages

   1-40 as originally filed

   Claims, Numbers

   1-35 as originally filed

   Drawings, Sheets

   1/19-19/19 as originally filed

   ☐ a sequence listing - see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:
   - ☐ the description, pages
   - ☐ the claims, Nos.
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since either they are considered to go beyond the disclosure as filed, or they were not accompanied by a letter indicating the basis for the amendments in the application as filed, as indicated in the Supplemental Box (Rules 70.2(c) and (c-*bis*)):
   - ☐ the description, pages
   - ☐ the claims, Nos.
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:

5. ☐ This report has been established:
   - ☐ taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rules 66.1(d-*bis*) and 70.2(e)).
   - ☐ without taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91(Rules 66.4*bis* and 70.2(e)).

6. ☒ With regard to top-up searches (Rules 66.1*ter* and 70.2(f)):
   - ☒ A top-up search was carried out by this Authority on 13.11.2019 (all discovered documents are listed in the Supplemental Box Relating to Top-up Search).
     - ☐ Additional relevant documents have been discovered during the top-up search.
   - ☐ No top-up search was carried out by this Authority because it would serve no useful purpose.

7. ☐ Supplementary international search report(s) from Authority(ies) has/have been received and taken into account in establishing this report (Rule 45bis.8(b) and (c)).

* *If item 4 applies, some or all of those sheets may be marked "superseded".*

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-35
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-35
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-35
	No:	Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Reference is made to the following document:

D1 EP 3 099 009 A1 (BARCO NV [BE]) 30 November 2016 (2016-11-30)

Re Point V

1 The present invention is in the technical domain of automatic connection of terminals to a network (IPC: H04L12/12). The present invention addresses the problem of operating on peripheral devices.

2 The present invention is defined in claim 1 (system); claim 16 (method); claim 29 (apparatus); claim 34 (computer program); claim 35 (storage device). It appears appropriate, for technical reasons, to discuss claim 29 first.

Claim 29 defines

(a) a peripheral device adapted to be coupled to a processing device via a generic communications protocol,

(b) the peripheral device having a receiver

(c) and at least one fixed or a configurable endpoint of a functional device exposed on the first peripheral device;

(d) the receiver of the first peripheral device being adapted to receive data over a communications network

(e) from the functional device and

(f) for sending the data to the processing device via the at least one fixed or configurable endpoint

(g) using the generic communications protocol for communication between the processing device and the peripheral device.

Claim 1 defines a system comprising at least all features of claim 29.

Claim 16 defines a method comprising method steps at least corresponding to the apparatus means of claim 29.

Claim 34 defines a computer program at least corresponding to the method of claim 16.

Claim 35 defines a storage device adapted to store the program of claim 34.

3 The prior art is given by document EP 3 099 009 A1 (D1).

D1 discloses a method of automatic connection of terminals to a network, and addresses the problem of operating on peripheral devices. A peripheral device is adapted to automatically connect to a processing device of a network. In

order to achieve said automatic connection, the peripheral device uses a generic communication protocol understood by the network and the processing device. By this method, the peripheral device is able to configure itself and to start communication with all devices connected to the network. Hence, the features (a), (b), (d), and (g) are disclosed by the prior art.

4 Contrary to the present invention, D1 does not teach that there is at least one fixed or a configurable endpoint of a functional device exposed on the peripheral device. Consequently, D1 does also not teach that the receiver of the peripheral device is adapted to receive data over the communication network from the functional device, and is also adapted to send data to the processing device via the at least one fixed or configurable endpoint. Hence, the features (c), (e), and (f) are not disclosed by the prior art. Therefore, said features are defining the distinguishing technical features of the invention, leading to the novelty (Art 33(1),(2) PCT) of the subject matter of claims 1, 16, 29, 34, and 35.

5 Document D1 is, like the present invention, in the technical domain of automatic connection of terminals to a network (IPC: H04L12/12). Document D1 addresses, like the present invention, the problem of operating on peripheral devices. Hence, document D1 defines the closest prior art.

6 The distinguishing technical features (c), (e), and (f) have the technical effect that peripheral devices can also be connected to complex networks where a generic communication protocol is necessary but not sufficient, since the configurable endpoint of a functional device present at the peripheral device can perform necessary operations of complex networks.

7 Hence, the objective technical problem to be solved by the present invention is the optimization of the method for automatically connecting peripheral devices to a network, with respect to allowing the automatic connection also in cases where the network is complex such that the use of a generic communication protocol is necessary but not sufficient.

8 The distinguishing technical features (c), (e), and (f) solve the objective technical problem for the following reasons.

(1) The approach of the closest prior art teaches that the peripheral device uses a generic communication protocol understood by the network and the processing device in order to connect to the network. Since the generic communication protocol is sufficient if the network complexity is small, the peripheral device is able to configure itself and to start communication with all devices connected to the network. But when the network complexity becomes

big, a generic communication protocol cannot be sufficient any more, since a communication protocol cannot handle complex network functions coupled to the communication protocol. Hence, in such cases, the approach of the closest prior art does not work any more.

(2) The approach of the present invention teaches to implement a fixed or a configurable endpoint of a functional device exposed on the peripheral device. Hence, the peripheral device is now adapted to process complex network functions. This functional module can now be used by the receiver of the peripheral device for receiving data over the communication network via the functional device in combination with the generic communication protocol. Also, this functional module can now be used by the sender of the peripheral device for sending data to the processing device via the at least one fixed or configurable endpoint in combination with the generic communication protocol. Hence, even in cases where the network functionality is complex, the approach of the present invention allows to automatically connect the peripheral device to the network, by using the configurable endpoint of a functional device in combination with the generic communication protocol. This clearly shows that the distinguishing technical features (c), (e), and (f) lead to the technical effect and solve the objective technical problem.

9 The closest prior art does not possess a hint pointing towards any methodology for allowing the automatic connection of peripheral devices to a network also in cases where the network is complex such that the use of a generic communication protocol is necessary but not sufficient. Hence, the special way for achieving this effect, defined in the present invention by implementing a fixed or a configurable endpoint of a functional device exposed on the peripheral device, by using this endpoint by the receiver of the peripheral device for receiving data over the communication network via the functional device in combination with the generic communication protocol, and by using this endpoint by the sender of the peripheral device for sending data to the processing device via the at least one fixed or configurable endpoint in combination with the generic communication protocol, is not obvious for a person skilled in the art. Therefore, the inventive step (Art 33(1),(3) PCT) of the subject matter of claims 1, 16, 29, 34, and 35 is acknowledged.

Re Point VII

1 Claim 1 defines a system comprising at least all features of claim 29. Hence, claim 1 defines a dependent claim, being dependent on claim 29. Hence, claim 29 should have been placed before claim 1, and claim 1 should have contained a reference to claim 29.

2 To meet the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in document D1 should have been acknowledged in the description.

3 Reference signs in parentheses should have been inserted in all claims to increase their intelligibility (Rule 6.2(b) PCT).

Box No. VIII (iv) DECLARATION: INVENTORSHIP (only for the purposes of the designation of the United States of America)

The declaration must conform to the following standardized wording provided for in Section 214; see Notes to Boxes Nos. VIII, VIII (i) to (v) (in general) and the specific Notes to Box No. VIII (iv). If this Box is not used, this sheet should not be included in the request.

Declaration of inventorship (Rules 4.17(iv) and 51*bis*.1(a)(iv))
for the purposes of the designation of the United States of America:

I hereby declare that I believe I am the original inventor or an original joint inventor of a claimed invention in the application.

This declaration is directed to the international application of which it forms a part (if filing declaration with application).

This declaration is directed to international application No. PCT/ EP2018/086537 (if furnishing declaration pursuant to Rule 26*ter*).

I hereby declare that the above-identified international application was made or authorized to be made by me.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

Name: RENARD, Gauthier

Residence: Oudenaarde, Belgium
(city and either US state, if applicable, or country)

Mailing Address: Broekstraat 282 bus 3

B-9700 Oudenaarde

Belgium

Inventor's Signature: Date: 12/03/2019
(The signature must be that of the inventor, not that of the agent)

Name: DEGRAEF, Johan Peter Frans

Residence: Gent, Belgium
(city and either US state, if applicable, or country)

Mailing Address: Twaalfkameren 46

B-9000 GENT

Belgium

Inventor's Signature: Date:
(The signature must be that of the inventor, not that of the agent)

Name:

Residence:
(city and either US state, if applicable, or country)

Mailing Address:

Inventor's Signature: Date:
(The signature must be that of the inventor, not that of the agent)

☐ This declaration is continued on the following sheet, "Continuation of Box No. VIII (iv)".

Box No. VIII (iv) DECLARATION: INVENTORSHIP (only for the purposes of the designation of the United States of America)

The declaration must conform to the following standardized wording provided for in Section 214; see Notes to Boxes Nos. VIII, VIII (i) to (v) (in general) and the specific Notes to Box No. VIII (iv). If this Box is not used, this sheet should not be included in the request.

Declaration of inventorship (Rules 4.17(iv) and 51*bis*.1(a)(iv))
for the purposes of the designation of the United States of America:

I hereby declare that I believe I am the original inventor or an original joint inventor of a claimed invention in the application.

This declaration is directed to the international application of which it forms a part (if filing declaration with application).

This declaration is directed to international application No. PCT/ EP2018/086537 (if furnishing declaration pursuant to Rule 26*ter*).

I hereby declare that the above-identified international application was made or authorized to be made by me.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

Name: RENARD, Gauthier

Residence: Oudenaarde, Belgium
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Mailing Address: Broekstraat 282 bus 3

B-9700 Oudenaarde

Belgium

Inventor's Signature: ..... Date: .....
(The signature must be that of the inventor, not that of the agent)

Name: DEGRAEF, Johan Peter Frans

Residence: Gent, Belgium
(city and either US state, if applicable, or country)

Mailing Address: Twaalfkameren 45

B-9000 GENT

Belgium

Inventor's Signature: ..... Date: September 10, 2019
(The signature must be that of the inventor, not that of the agent)

Name: .....

Residence: .....
(city and either US state, if applicable, or country)

Mailing Address: .....

.....

.....

Inventor's Signature: ..... Date: .....
(The signature must be that of the inventor, not that of the agent)

☐ This declaration is continued on the following sheet, "Continuation of Box No. VIII (iv)".

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	METHOD AND SYSTEM FOR MAKING FUNCTIONAL DEVICES AVAILABLE TO PARTICIPANTS OF MEETINGS
First Named Inventor/Applicant Name:	Gauthier RENARD
Filer:	Thomas Lee/Shelly Darrenkamp
Attorney Docket Number:	RENA3002-2/TL

Filed as Large Entity

Filing Fees for U.S. National Stage under 35 USC 371

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
NATIONAL STAGE FEE	1631	1	300	300
NATL STAGE SEARCH FEE - REPORT PROVIDED	1642	1	520	520
NATIONAL STAGE EXAM - ALL OTHER CASES	1633	1	760	760
Pages:				
Claims:				
CLAIMS IN EXCESS OF 20	1615	2	100	200
Miscellaneous-Filing:				
Petition:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**1780**

Electronic Acknowledgement Receipt

EFS ID:	39666833
Application Number:	16771068
International Application Number:	PCT/EP2018/086537
Confirmation Number:	1088
Title of Invention:	METHOD AND SYSTEM FOR MAKING FUNCTIONAL DEVICES AVAILABLE TO PARTICIPANTS OF MEETINGS
First Named Inventor/Applicant Name:	Gauthier RENARD
Customer Number:	23364
Filer:	Thomas Lee/Shelly Darrenkamp
Filer Authorized By:	Thomas Lee
Attorney Docket Number:	RENA3002-2/TL
Receipt Date:	09-JUN-2020
Filing Date:	
Time Stamp:	14:29:38
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$1780
RAM confirmation Number	E202069E30272614
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal of New Application	RENA3002-2_Transmittal.pdf	665243 93763cd1ecaf8b5882e2e208ae7eada59552d92c	no	4
Warnings:					
Information:					
2	Application Data Sheet	RENA3002_2_ADS.pdf	1256198 e1397686e007cc7922adc44f9b048bffb00efd54	no	8
Warnings:					
Information:					
3	Power of Attorney	Barco_General_POA_filing.pdf	163870 6ee7693948dc3721e99d614263d5563988e768cf	no	1
Warnings:					
Information:					
4		RENA3002_2_Prelim_Amnd_filing.pdf	56010 24fcc83442f984cfd2504d69965fc43e331b2e8d	yes	10

Multipart Description/PDF files in .zip description

Document Description	Start	End
Applicant Arguments/Remarks Made in an Amendment	10	10
Claims	6	9
Specification	5	5
Abstract	3	4
Preliminary Amendment	1	2

Warnings:

Information:

5		WO2019129696A1.pdf	3346978 7e27ca80d25cd52554ff480883dc518ab94220d1	yes	65
	Multipart Description/PDF files in .zip description				
	Document Description		**Start**	**End**	
	Drawings-only black and white line drawings		47	65	
	Claims		42	46	
	Specification		2	41	
	Abstract		1	1	
Warnings:					
Information:					
6	Information Disclosure Statement (IDS) Form (SB08)	RENA3002_2_SB08.pdf	1035530 8351d76ed1646b03a158f6e101ee7b392cf1e829	no	6
Warnings:					
Information:					
7	Foreign Reference	EP1879143A2.pdf	2961566 a722914a399014deff5f7ff6151b4871059e1015	no	48
Warnings:					
Information:					
8	Foreign Reference	EP3099009A1.pdf	3597762 115a37a7f0954be4a6b6a86f8f57d51f863bcf55	no	42
Warnings:					
Information:					
9	Foreign Reference	WO2013037980A2.pdf	5603643 4f710d51bbc81c8737cae5809a941c65e1c2d3eb	no	74
Warnings:					
Information:					

10	Non Patent Literature	ISR.pdf	175513 4b1e44b003f3922f9a1762e43148e30dcb30f9c4	no	6
Warnings:					
The page size in the PDF is too large. The pages should be 8.5 x 11 or A4. If this PDF is submitted, the pages will be resized upon entry into the Image File Wrapper and may affect subsequent processing					
Information:					
11	Non Patent Literature	Written_Opinion.pdf	289935 2e49bc66fbdad468d7069a0066f11a747f5b40a5	no	7
Warnings:					
The page size in the PDF is too large. The pages should be 8.5 x 11 or A4. If this PDF is submitted, the pages will be resized upon entry into the Image File Wrapper and may affect subsequent processing					
Information:					
12	Non Patent Literature	IPRP.pdf	359698 379aece171dbbca2641c50e981a94d00fd8a9ed2	no	8
Warnings:					
Information:					
13	Non Patent Literature	NPL4_Clickshare.pdf	7093163 e83d3a36f4d1d324b5df16cd00a7d5117345318b	no	20
Warnings:					
Information:					
14	Oath or Declaration filed	Declaration_Gauthier_Renard2.pdf	331696 8e2e9d366e81c7fc2ebd6f40e56a0120a8b98820	no	1
Warnings:					
Information:					
15	Oath or Declaration filed	Declaration_Johan_Degraef2.pdf	329293 dc8afb9a2a48ad0326748d892bea4ddd215c73ed	no	1
Warnings:					
Information:					
16	Fee Worksheet (SB06)	fee-info.pdf	36872 cce80250a13160114def9b1c1f9756b43bbc4123	no	2

Warnings:	
Information:	
Total Files Size (in bytes):	27302970

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference BAR4763PCT	**FOR FURTHER ACTION**	See Form PCT/IPEA/416
International application No. PCT/EP2018/086537	International filing date *(day/month/year)* 21.12.2018	Priority date *(day/month/year)* 29.12.2017
International Patent Classification (IPC) or national classification and IPC INV. H04L12/12		
Applicant BARCO N.V.		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 7 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. ☐ *(sent to the applicant and to the International Bureau)* a total of sheets, as follows:
      ☐ sheets of the description, claims and/or drawings which have been amended and/or sheets containing rectifications authorized by this Authority, unless those sheets were superseded or cancelled, and any accompanying letters (see Rules 46.5, 66.8, 70.16, 91.2, and Section 607 of the Administrative Instructions).
      ☐ sheets containing rectifications, where the decision was made by this Authority not to take them into account because they were not authorized by or notified to this Authority at the time when this Authority began to draw up this report, and any accompanying letters (Rules 66.4bis, 70.2(e), 70.16 and 91.2).
      ☐ superseded sheets and any accompanying letters, where this Authority either considers that the superseding sheets contain an amendment that goes beyond the disclosure in the international application as filed, or the superseding sheets were not accompanied by a letter indicating the basis for the amendments in the application as filed, as indicated in item 4 of Box No. I and the Supplemental Box (see Rule 70.16(b)).
   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing, in the form of an Annex C/ST.25 text file, as indicated in the Supplemental Box Relating to Sequence Listing (see paragraph 3*ter* of Annex C of the Administrative Instructions).

4. This report contains indications relating to the following items:
   - ☒ Box No. I Basis of the report
   - ☐ Box No. II Priority
   - ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - ☐ Box No. IV Lack of unity of invention
   - ☒ Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - ☐ Box No. VI Certain documents cited
   - ☒ Box No. VII Certain defects in the international application
   - ☐ Box No. VIII Certain observations on the international application

Date of submission of the demand	Date of completion of this report
29.10.2019	21.11.2019
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Fax: +49 89 2399 - 4465	Authorized officer Mircescu, Alexander Telephone No. +49 89 2399-7645

Box No. I Basis of the report

1. With regard to the **language**, this report is based on

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of:
   - ☐ international search (under Rules 12.3(a) and 23.1(b))
   - ☐ publication of the international application (under Rule 12.4(a))
   - ☐ international preliminary examination (under Rules 55.2(a) and/or 55.3(a) and (b))

2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

   Description, Pages

   1-40 as originally filed

   Claims, Numbers

   1-35 as originally filed

   Drawings, Sheets

   1/19-19/19 as originally filed

   ☐ a sequence listing - see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:
   - ☐ the description, pages
   - ☐ the claims, Nos.
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since either they are considered to go beyond the disclosure as filed, or they were not accompanied by a letter indicating the basis for the amendments in the application as filed, as indicated in the Supplemental Box (Rules 70.2(c) and (c-*bis*)):
   - ☐ the description, pages
   - ☐ the claims, Nos.
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:

5. ☐ This report has been established:
   - ☐ taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rules 66.1(d-*bis*) and 70.2(e)).
   - ☐ without taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91(Rules 66.4*bis* and 70.2(e)).

6. ☒ With regard to top-up searches (Rules 66.1*ter* and 70.2(f)):
   ☒ A top-up search was carried out by this Authority on 13.11.2019 (all discovered documents are listed in the Supplemental Box Relating to Top-up Search).
   ☐ Additional relevant documents have been discovered during the top-up search.
   ☐ No top-up search was carried out by this Authority because it would serve no useful purpose.

7. ☐ Supplementary international search report(s) from Authority(ies) has/have been received and taken into account in establishing this report (Rule 45bis.8(b) and (c)).

* *If item 4 applies, some or all of those sheets may be marked "superseded".*

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-35
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-35
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-35
	No:	Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Reference is made to the following document:

D1 EP 3 099 009 A1 (BARCO NV [BE]) 30 November 2016 (2016-11-30)

Re Point V

1 The present invention is in the technical domain of automatic connection of terminals to a network (IPC: H04L12/12). The present invention addresses the problem of operating on peripheral devices.

2 The present invention is defined in claim 1 (system); claim 16 (method); claim 29 (apparatus); claim 34 (computer program); claim 35 (storage device). It appears appropriate, for technical reasons, to discuss claim 29 first.

Claim 29 defines

(a) a peripheral device adapted to be coupled to a processing device via a generic communications protocol,

(b) the peripheral device having a receiver

(c) and at least one fixed or a configurable endpoint of a functional device exposed on the first peripheral device;

(d) the receiver of the first peripheral device being adapted to receive data over a communications network

(e) from the functional device and

(f) for sending the data to the processing device via the at least one fixed or configurable endpoint

(g) using the generic communications protocol for communication between the processing device and the peripheral device.

Claim 1 defines a system comprising at least all features of claim 29.

Claim 16 defines a method comprising method steps at least corresponding to the apparatus means of claim 29.

Claim 34 defines a computer program at least corresponding to the method of claim 16.

Claim 35 defines a storage device adapted to store the program of claim 34.

3 The prior art is given by document EP 3 099 009 A1 (D1).

D1 discloses a method of automatic connection of terminals to a network, and addresses the problem of operating on peripheral devices. A peripheral device is adapted to automatically connect to a processing device of a network. In

order to achieve said automatic connection, the peripheral device uses a generic communication protocol understood by the network and the processing device. By this method, the peripheral device is able to configure itself and to start communication with all devices connected to the network. Hence, the features (a), (b), (d), and (g) are disclosed by the prior art.

4 Contrary to the present invention, D1 does not teach that there is at least one fixed or a configurable endpoint of a functional device exposed on the peripheral device. Consequently, D1 does also not teach that the receiver of the peripheral device is adapted to receive data over the communication network from the functional device, and is also adapted to send data to the processing device via the at least one fixed or configurable endpoint. Hence, the features (c), (e), and (f) are not disclosed by the prior art. Therefore, said features are defining the distinguishing technical features of the invention, leading to the novelty (Art 33(1),(2) PCT) of the subject matter of claims 1, 16, 29, 34, and 35.

5 Document D1 is, like the present invention, in the technical domain of automatic connection of terminals to a network (IPC: H04L12/12). Document D1 addresses, like the present invention, the problem of operating on peripheral devices. Hence, document D1 defines the closest prior art.

6 The distinguishing technical features (c), (e), and (f) have the technical effect that peripheral devices can also be connected to complex networks where a generic communication protocol is necessary but not sufficient, since the configurable endpoint of a functional device present at the peripheral device can perform necessary operations of complex networks.

7 Hence, the objective technical problem to be solved by the present invention is the optimization of the method for automatically connecting peripheral devices to a network, with respect to allowing the automatic connection also in cases where the network is complex such that the use of a generic communication protocol is necessary but not sufficient.

8 The distinguishing technical features (c), (e), and (f) solve the objective technical problem for the following reasons.

(1) The approach of the closest prior art teaches that the peripheral device uses a generic communication protocol understood by the network and the processing device in order to connect to the network. Since the generic communication protocol is sufficient if the network complexity is small, the peripheral device is able to configure itself and to start communication with all devices connected to the network. But when the network complexity becomes

big, a generic communication protocol cannot be sufficient any more, since a communication protocol cannot handle complex network functions coupled to the communication protocol. Hence, in such cases, the approach of the closest prior art does not work any more.

(2) The approach of the present invention teaches to implement a fixed or a configurable endpoint of a functional device exposed on the peripheral device. Hence, the peripheral device is now adapted to process complex network functions. This functional module can now be used by the receiver of the peripheral device for receiving data over the communication network via the functional device in combination with the generic communication protocol. Also, this functional module can now be used by the sender of the peripheral device for sending data to the processing device via the at least one fixed or configurable endpoint in combination with the generic communication protocol. Hence, even in cases where the network functionality is complex, the approach of the present invention allows to automatically connect the peripheral device to the network, by using the configurable endpoint of a functional device in combination with the generic communication protocol. This clearly shows that the distinguishing technical features (c), (e), and (f) lead to the technical effect and solve the objective technical problem.

9 The closest prior art does not possess a hint pointing towards any methodology for allowing the automatic connection of peripheral devices to a network also in cases where the network is complex such that the use of a generic communication protocol is necessary but not sufficient. Hence, the special way for achieving this effect, defined in the present invention by implementing a fixed or a configurable endpoint of a functional device exposed on the peripheral device, by using this endpoint by the receiver of the peripheral device for receiving data over the communication network via the functional device in combination with the generic communication protocol, and by using this endpoint by the sender of the peripheral device for sending data to the processing device via the at least one fixed or configurable endpoint in combination with the generic communication protocol, is not obvious for a person skilled in the art. Therefore, the inventive step (Art 33(1),(3) PCT) of the subject matter of claims 1, 16, 29, 34, and 35 is acknowledged.

Re Point VII

1 Claim 1 defines a system comprising at least all features of claim 29. Hence, claim 1 defines a dependent claim, being dependent on claim 29. Hence, claim 29 should have been placed before claim 1, and claim 1 should have contained a reference to claim 29.

2 To meet the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in document D1 should have been acknowledged in the description.

3 Reference signs in parentheses should have been inserted in all claims to increase their intelligibility (Rule 6.2(b) PCT).

PCT REQUEST

Print Out (Original in Electronic Form)

0	**For receiving Office use only**	
0-1	International Application No.	**PCT/EP2018/086537**
0-2	International Filing Date	**21 DEC 2018 (21.12.2018)**
0-3	Name of receiving Office and "PCT International Application"	**RO/EP**

0-4	**Form PCT/RO/101 PCT Request**	
0-4-1	Prepared Using	PCT Online Filing Version 3.51.000.259e MT/FOP 20141031/0.20.5.20
0-5	**Petition** The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty	
0-6	**Receiving Office (specified by the applicant)**	European Patent Office (EPO) (RO/EP)
0-7	**Applicant's or agent's file reference**	BAR4763PCT
I	**Title of Invention**	METHOD AND SYSTEM FOR MAKING FUNCTIONAL DEVICES AVAILALBLE TO PARTICIPANTS OF MEETINGS
II	**Applicant**	
II-1	This person is	Applicant only
II-2	Applicant for	All designated States
II-4	Name	Barco N.V.
II-5	Address	President Kennedypark 35 B-8500 Kortrijk Belgium
II-6	State of nationality	BE
II-7	State of residence	BE
II-11	Applicant's registration No. with the Office	1.8
III-1	**Applicant and/or inventor**	
III-1-1	This person is	Inventor only
III-1-3	Inventor for	All designated States
III-1-4	Name (LAST, First)	RENARD, Gauthier
III-1-5	Address	Broekstraat 282 bus 3 B-9700 Oudenaarde Belgium

PCT REQUEST

Print Out (Original in Electronic Form)

III-2	**Applicant and/or inventor**	
III-2-1	This person is	Inventor only
III-2-3	Inventor for	All designated States
III-2-4	Name (LAST, First)	DEGRAEF, Johan Peter Frans
III-2-5	Address	Twaalfkameren 45 B-9000 Gent Belgium
IV-1	**Agent or common representative; or address for correspondence**	
	The person identified below is hereby/ has been appointed to act on behalf of the applicant(s) before the competent International Authorities as:	Agent
IV-1-1	Name	IPLodge bvba
IV-1-2	Address	Technologielaan 9 B-3001 Heverlee Belgium
IV-1-3	Telephone No.	+32 16 40 98 10
IV-1-4	Facsimile No.	+32 16 20 06 21
IV-1-5	e-mail	info@iplodge.be
IV-1-5(a)	E-mail authorization The receiving Office, the International Searching Authority, the International Bureau and the International Preliminary Examining Authority are authorized to use this e-mail address, if the Office or Authority so wishes, to send notifications issued in respect of this international application:	as advance copies followed by paper notifications
V	**DESIGNATIONS**	
V-1	**The filing of this request constitutes under Rule 4.9(a), the designation of all Contracting States bound by the PCT on the international filing date, for the grant of every kind of protection available and, where applicable, for the grant of both regional and national patents.**	
VI-1	**Priority claim of earlier national application**	
VI-1-1	Filing date	29 December 2017 (29.12.2017)
VI-1-2	Number	15/858,668
VI-1-3	Country or Member of WTO	US
VI-2	**Priority document request**	
	The International Bureau is requested to obtain from a digital library a certified copy of the earlier application(s) identified above as item(s), using, where applicable, the access code(s) indicated:	VI-1 Access code: 6421

PCT REQUEST

Print Out (Original in Electronic Form)

VI-3	**Incorporation by reference :** where an element of the international application referred to in Article 11(1)(iii)(d) or (e) or a part of the description, claims or drawings referred to in Rule 20.5(a) is not otherwise contained in this international application but is completely contained in an earlier application whose priority is claimed on the date on which one or more elements referred to in Article 11(1)(iii) were first received by the receiving Office, that element or part is, subject to confirmation under Rule 20.6, incorporated by reference in this international application for the purposes of Rule 20.6.		
VII-1	**International Searching Authority Chosen**	European Patent Office (EPO) (ISA/EP)	
VIII	**Declarations**	Number of declarations	
VIII-1	Declaration as to the identity of the inventor	–	
VIII-2	Declaration as to the applicant's entitlement, as at the international filing date, to apply for and be granted a patent	–	
VIII-3	Declaration as to the applicant's entitlement, as at the international filing date, to claim the priority of the earlier application	–	
VIII-4	Declaration of inventorship (only for the purposes of the designation of the United States of America)	–	
VIII-5	Declaration as to non-prejudicial disclosures or exceptions to lack of novelty	–	
IX	**Check list**	Number of sheets	Electronic file(s) attached
IX-1	Request (including declaration sheets)	4	✓
IX-2	Description	40	✓
IX-3	Claims	5	✓
IX-4	Abstract	1	✓
IX-5	Drawings	19	✓
IX-7	TOTAL	69	
	Accompanying Items	Paper document(s) attached	Electronic file(s) attached
IX-8	Fee calculation sheet	–	✓
IX-19	Other	Pre-conversion archive	✓
IX-20	**Figure of the drawings which should accompany the abstract**	8	
IX-21	**Language of filing of the international application**	English	

PCT REQUEST

Print Out (Original in Electronic Form)

X-1	**Signature of applicant, agent or common representative**	/Ariane Bird/
X-1-1	Name	IPLodge bvba
X-1-2	Name of signatory	Ariane Bird
X-1-3	Capacity (if such capacity is not obvious from reading the request)	(Representative)

FOR RECEIVING OFFICE USE ONLY

10-1	**Date of actual receipt of the purported international application**	21 DEC 2018 (21.12.2018)
10-2	**Drawings:**	Received
10-2-1	Received	
10-2-2	Not received	
10-3	**Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application**	
10-4	**Date of timely receipt of the required corrections under PCT Article 11(2)**	
10-5	**International Searching Authority**	ISA/EP
10-6	**Transmittal of search copy delayed until search fee is paid**	

FOR INTERNATIONAL BUREAU USE ONLY

11-1	**Date of receipt of the record copy by the International Bureau**	

ADVANCE E-MAIL

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF THE RECORDING OF A CHANGE

(PCT Rule 92*bis*.1 and Administrative Instructions, Section 422)

To:

IPLODGE BVBA
Technologielaan 9
3001 Heverlee
BELGIQUE

Date of mailing *(day/month/year)*
28 October 2019 (28.10.2019)

Applicant's or agent's file reference
BAR4763PCT

IMPORTANT NOTIFICATION

International application No.
PCT/EP2018/086537

International filing date *(day/month/year)*
21 December 2018 (21.12.2018)

1. The following indications appeared on record concerning:

☐ the applicant ☒ the inventor ☐ the agent ☐ the common representative

Name and Address
RENARD, Gauthier
Broekstraat 282 bus 3
9700 Oudenaarde
Belgium

State of Nationality | State of Residence

Telephone No.

Facsimile No.

E-mail address

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

☐ the person ☐ the name ☒ the address ☐ the nationality ☐ the residence

Name and Address
RENARD, Gauthier
Watertorenstraat 21
B-8520 Kuurne
Belgium

State of Nationality | State of Residence

Telephone No.

Facsimile No.

E-mail address
☐ Notifications by e-mail authorized

3. Further observations, if necessary:

4. A copy of this notification has been sent to:

☒ the receiving Office
☒ the International Searching Authority
☐ the Authority(ies) specified for supplementary search
☐ the International Preliminary Examining Authority
☒ the designated Offices concerned
☐ the elected Offices concerned
☐ other:

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Authorized officer
Bouvier Alexandre
e-mail pct.team5@wipo.int
Telephone No. +41 22 338 74 05

Box No. VIII (iv) DECLARATION: INVENTORSHIP (only for the purposes of the designation of the United States of America)

The declaration must conform to the following standardized wording provided for in Section 214; see Notes to Boxes Nos. VIII, VIII (i) to (v) (in general) and the specific Notes to Box No. VIII (iv). If this Box is not used, this sheet should not be included in the request.

Declaration of inventorship (Rules 4.17(iv) and 51*bis*.1(a)(iv)) for the purposes of the designation of the United States of America:

I hereby declare that I believe I am the original inventor or an original joint inventor of a claimed invention in the application.

This declaration is directed to the international application of which it forms a part (if filing declaration with application).

This declaration is directed to international application No. PCT/ EP2018/086537 (if furnishing declaration pursuant to Rule 26*ter*).

I hereby declare that the above-identified international application was made or authorized to be made by me.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

Name: RENARD, Gauthier

Residence: Oudenaarde, Belgium
(city and either US state, if applicable, or country)

Mailing Address: Broekstraat 282 bus 3
B-9700 Oudenaarde
Belgium

Inventor's Signature: ..... Date: 12/03/2019
(The signature must be that of the inventor, not that of the agent)

Name: DEGRAEF, Johan Peter Frans

Residence: Gent, Belgium
(city and either US state, if applicable, or country)

Mailing Address: Twaalfkameren 45
B-9000 GENT
Belgium

Inventor's Signature: ..... Date: .....
(The signature must be that of the inventor, not that of the agent)

Name: .....

Residence: .....
(city and either US state, if applicable, or country)

Mailing Address: .....

Inventor's Signature: ..... Date: .....
(The signature must be that of the inventor, not that of the agent)

☐ This declaration is continued on the following sheet, "Continuation of Box No. VIII (iv)".

Box No. VIII (iv) DECLARATION: INVENTORSHIP (only for the purposes of the designation of the United States of America)

The declaration must conform to the following standardized wording provided for in Section 214; see Notes to Boxes Nos. VIII, VIII (i) to (v) (in general) and the specific Notes to Box No. VIII (iv). If this Box is not used, this sheet should not be included in the request.

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I hereby declare that I believe I am the original inventor or an original joint inventor of a claimed invention in the application.

This declaration is directed to the international application of which it forms a part (if filing declaration with application).

This declaration is directed to international application No. PCT/ EP2018/086537 (if furnishing declaration pursuant to Rule 26*ter*).

I hereby declare that the above-identified international application was made or authorized to be made by me.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

Name: RENARD, Gauthier

Residence: Oudenaarde, Belgium
(city and either US state, if applicable, or country)

Mailing Address: Broekstraat 282 bus 3

B-9700 Oudenaarde

Belgium

Inventor's Signature: ..... Date: .....
(The signature must be that of the inventor, not that of the agent)

Name: DEGRAEF, Johan Peter Frans

Residence: Gent, Belgium
(city and either US state, if applicable, or country)

Mailing Address: Twaalfkameren 45

B-9000 GENT

Belgium

Inventor's Signature: ..... Date: September 13, 2019
(The signature must be that of the inventor, not that of the agent)

Name: .....

Residence: .....
(city and either US state, if applicable, or country)

Mailing Address: .....

.....

.....

Inventor's Signature: ..... Date: .....
(The signature must be that of the inventor, not that of the agent)

☐ This declaration is continued on the following sheet, "Continuation of Box No. VIII (iv)".

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
04 July 2019 (04.07.2019)

WIPO | PCT

(10) International Publication Number
WO 2019/129696 A1

(51) International Patent Classification:
H04L 12/12 (2006.01)

(21) International Application Number:
PCT/EP2018/086537

(22) International Filing Date:
21 December 2018 (21.12.2018)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
15/858,668 29 December 2017 (29.12.2017) US

(71) Applicant: **BARCO N.V.** [BE/BE]; President Kennedypark 35, 8500 Kortrijk (BE).

(72) Inventors: **RENARD, Gauthier**; Broekstraat 282 bus 3, 9700 Oudenaarde (BE). **DEGRAEF, Johan Peter Frans**; Twaalfkameren 45, 9000 Gent (BE).

(74) Agent: **IPLODGE BVBA**; Technologielaan 9, 3001 Heverlee (BE).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

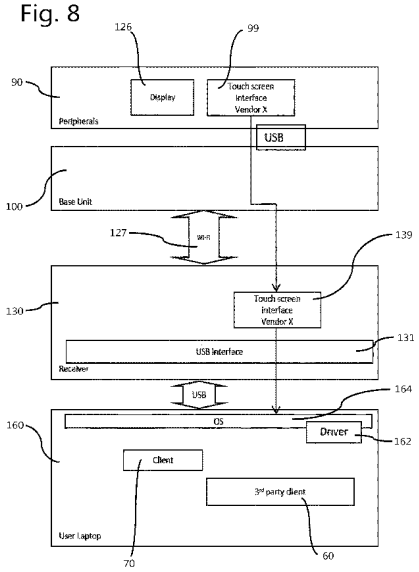
Declarations under Rule 4.17:
— *of inventorship (Rule 4.17(iv))*

Published:
— *with international search report (Art. 21(3))*

(54) Title: METHOD AND SYSTEM FOR MAKING FUNCTIONAL DEVICES AVAILALBLE TO PARTICIPANTS OF MEETINGS

(57) Abstract: A system and method are described for connecting a processing device to a functional device connected to or in a base unit of a communications network, the base unit having a transmitter and the processing device having a memory, a display and an operating system. A first peripheral device is adapted to be coupled to the processing device via a generic communications protocol, the first peripheral device having a receiver and at least one fixed or configurable endpoint of the functional device exposed on the first peripheral device. The base unit and the first peripheral device is adapted to transmit and receive data respectively over the communications network from the functional device to the processing device via the at least one fixed or configurable endpoint using the generic communications protocol for communication between the processing device and the first peripheral device.

Fig. 8



WO 2019/129696 A1

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Document details: Country/Office: US
Filing date: 29 Dec 2017 (29.12.2017)
Application number: 15858668

Date of availability of document: 26 Jan 2018 (26.01.2018)

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THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

January 16, 2019

THIS IS TO CERTIFY THAT ANNEXED HERETO IS A TRUE COPY FROM THE RECORDS OF THE UNITED STATES PATENT AND TRADEMARK OFFICE OF THOSE PAPERS OF THE BELOW IDENTIFIED PATENT APPLICATION THAT MET THE REQUIREMENTS TO BE GRANTED A FILING DATE UNDER 35 USC 111.

APPLICATION NUMBER: *15/858,668*
FILING DATE: *December 29, 2017*

THE COUNTRY CODE AND NUMBER OF YOUR PRIORITY APPLICATION, TO BE USED FOR FILING ABROAD UNDER THE PARIS CONVENTION, IS *US15/858,668*

Certified by

Under Secretary of Commerce
for Intellectual Property
and Director of the United States
Patent and Trademark Office

DocCode – SCORE

SCORE Placeholder Sheet for IFW Content

Application Number: 15858668 Document Date: 12/29/2017

The presence of this form in the IFW record indicates that the following document type was received in electronic format on the date identified above. This content is stored in the SCORE database.

Since this was an electronic submission, there is no physical artifact folder, no artifact folder is recorded in PALM, and no paper documents or physical media exist. The TIFF images in the IFW record were created from the original documents that are stored in SCORE.

- Drawing

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Form Revision Date: August 26, 2013

PTO/AIA/15 (03-13)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995 no persons are required to respond to a collection of information unless it displays a valid OMB control number

UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No.	RENA3002/TJM/TL
First Named Inventor	Gauthier RENARD
Title	METHOD AND SYSTEM FOR MAKING FUNCTIONAL DEVICES...
Express Mail Label No.	

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

1. [✔] **Fee Transmittal Form** (PTO/SB/17 or equivalent)
2. [ ] **Applicant asserts small entity status.** See 37 CFR 1.27
3. [ ] **Applicant certifies micro entity status.** See 37 CFR 1.29. Applicant must attach form PTO/SB/15A or B or equivalent.
4. [✔] **Specification** [*Total Pages* 38] Both the claims and abstract must start on a new page. *(See MPEP § 608.01(a) for information on the preferred arrangement)*
5. [✔] **Drawing(s)** (35 U.S.C. 113) [*Total Sheets* 19]
6. **Inventor's Oath or Declaration** [*Total Pages* ____] *(including substitute statements under 37 CFR 1.64 and assignments serving as an oath or declaration under 37 CFR 1.63(e))*
   a. [ ] Newly executed (original or copy)
   b. [ ] A copy from a prior application (37 CFR 1.63(d))
7. [✔] **Application Data Sheet** ** See note below.* See 37 CFR 1.76 (PTO/AIA/14 or equivalent)
8. **CD-ROM or CD-R** in duplicate, large table, or Computer Program (*Appendix*)
   [ ] Landscape Table on CD
9. **Nucleotide and/or Amino Acid Sequence Submission** (*if applicable, items a. – c. are required*)
   a. [ ] Computer Readable Form (CRF)
   b. [ ] Specification Sequence Listing on:
      i. [ ] CD-ROM or CD-R (2 copies); or
      ii. [ ] Paper
   c. [ ] Statements verifying identity of above copies

ADDRESS TO: **Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450**

ACCOMPANYING APPLICATION PAPERS

10. [ ] **Assignment Papers** (cover sheet & document(s)) Name of Assignee ____
11. [ ] **37 CFR 3.73(c) Statement** (*when there is an assignee*) [ ] **Power of Attorney**
12. [ ] **English Translation Document** (*if applicable*)
13. [ ] **Information Disclosure Statement** (PTO/SB/08 or PTO-1449) [ ] Copies of citations attached
14. [ ] **Preliminary Amendment**
15. [ ] **Return Receipt Postcard** (*MPEP § 503*) (*Should be specifically itemized*)
16. [ ] **Certified Copy of Priority Document(s)** (*if foreign priority is claimed*)
17. [ ] **Nonpublication Request** Under 35 U.S.C. 122(b)(2)(B)(i). Applicant must attach form PTO/SB/35 or equivalent.
18. [ ] **Other:** ____

***Note**: (1) Benefit claims under 37 CFR 1.78 and foreign priority claims under 1.55 **must** be included in an Application Data Sheet (ADS).
(2) For applications filed under 35 U.S.C. 111, the application must contain an ADS specifying the applicant if the applicant is an assignee, person to whom the inventor is under an obligation to assign, or person who otherwise shows sufficient proprietary interest in the matter. See 37 CFR 1.46(b).

19. CORRESPONDENCE ADDRESS

[✔] The address associated with Customer Number: 23364 **OR** [ ] Correspondence address below

Name					
Address					
City		State		Zip Code	
Country		Telephone		Email	

Signature	/Thomas J. Moore/	Date	December 29, 2017
Name (Print/Type)	THOMAS J. MOORE	Registration No. (Attorney/Agent)	28,974

This collection of information is required by 37 CFR 1.53(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PTO/SB/17 (03-13)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995 no persons are required to respond to a collection of information unless it displays a valid OMB control number

FEE TRANSMITTAL

Complete if known	
Application Number	
Filing Date	
First Named Inventor	Gauthier RENARD
Examiner Name	
Art Unit	
Practitioner Docket No.	RENA3002/TJM/TL

☐ Applicant asserts small entity status. See 37 CFR 1.27.

☐ Applicant certifies micro entity status. See 37 CFR 1.29. Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously.

TOTAL AMOUNT OF PAYMENT ($) 1740.00

METHOD OF PAYMENT (check all that apply)

☐ Check ☐ Credit Card ☐ Money Order ☐ None ☑ Other (please identify): EFS Web

☑ Deposit Account Deposit Account Number: 02-0200 Deposit Account Name: _____

For the above-identified deposit account, the Director is hereby authorized to (check all that apply):

☑ Charge fee(s) indicated below ☐ Charge fee(s) indicated below, **except for the filing fee**

☑ Charge any additional fee(s) or underpayment of fee(s) under 37 CFR 1.16 and 1.17 ☑ Credit any overpayment of fee(s)

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

FEE CALCULATION

1. BASIC FILING, SEARCH, AND EXAMINATION FEES (U = undiscounted fee; S = small entity fee; M = micro entity fee)

	FILING FEES			SEARCH FEES			EXAMINATION FEES			
Application Type	**U ($)**	**S ($)**	**M ($)**	**U ($)**	**S ($)**	**M ($)**	**U ($)**	**S ($)**	**M ($)**	**Fees Paid ($)**
Utility	280	140*	70	600	300	150	720	360	180	1600.00
Design	180	90	45	120	60	30	460	230	115	
Plant	180	90	45	380	190	95	580	290	145	
Reissue	280	140	70	600	300	150	2,160	1,080	540	
Provisional	260	130	65	0	0	0	0	0	0	

* The $140 small entity status filing fee for a utility application is further reduced to $70 for a small entity status applicant who files the application via EFS-Web.

2. EXCESS CLAIM FEES

Fee Description	**Undiscounted Fee ($)**	**Small Entity Fee ($)**	**Micro Entity Fee ($)**
Each claim over 20 (including Reissues)	80	40	20
Each independent claim over 3 (including Reissues)	420	210	105
Multiple dependent claims	780	390	195

Total Claims		**Extra Claims**		**Fee ($)**		**Fee Paid ($)**
20	-20 or HP =		x		=	

HP = highest number of total claims paid for, if greater than 20.

Indep. Claims		**Extra Claims**		**Fee ($)**		**Fee Paid ($)**
3	-3 or HP =		x		=	

HP = highest number of independent claims paid for, if greater than 3.

Multiple Dependent Claims	
Fee ($)	**Fee Paid ($)**

3. APPLICATION SIZE FEE

If the specification and drawings exceed 100 sheets of paper (excluding electronically filed sequence or computer listings under 37 CFR 1.52(e)), the application size fee due is $400 ($200 for small entity) ($100 for micro entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

Total Sheets		**Extra Sheets**		**Number of each additional 50 or fraction thereof**		**Fee ($)**		**Fee Paid ($)**
57	- 100 =		/ 50 =		(round **up** to a whole number) x		=	

4. OTHER FEE(S) **Fees Paid ($)**

Non-English specification, $130 fee (no small or micro entity discount)

Non-electronic filing fee under 37 CFR 1.16(t) for a utility application, $400 fee ($200 small or micro entity)

Other (e.g., late filing surcharge): Late Declaration surcharge 140.00

SUBMITTED BY

Signature	/Thomas J. Moore/	Registration No. (Attorney/Agent) 28974	Telephone 703-683-0500
Name (Print/Type)	THOMAS J. MOORE		Date December 29, 2017

This collection of information is required by 37 CFR 1.136. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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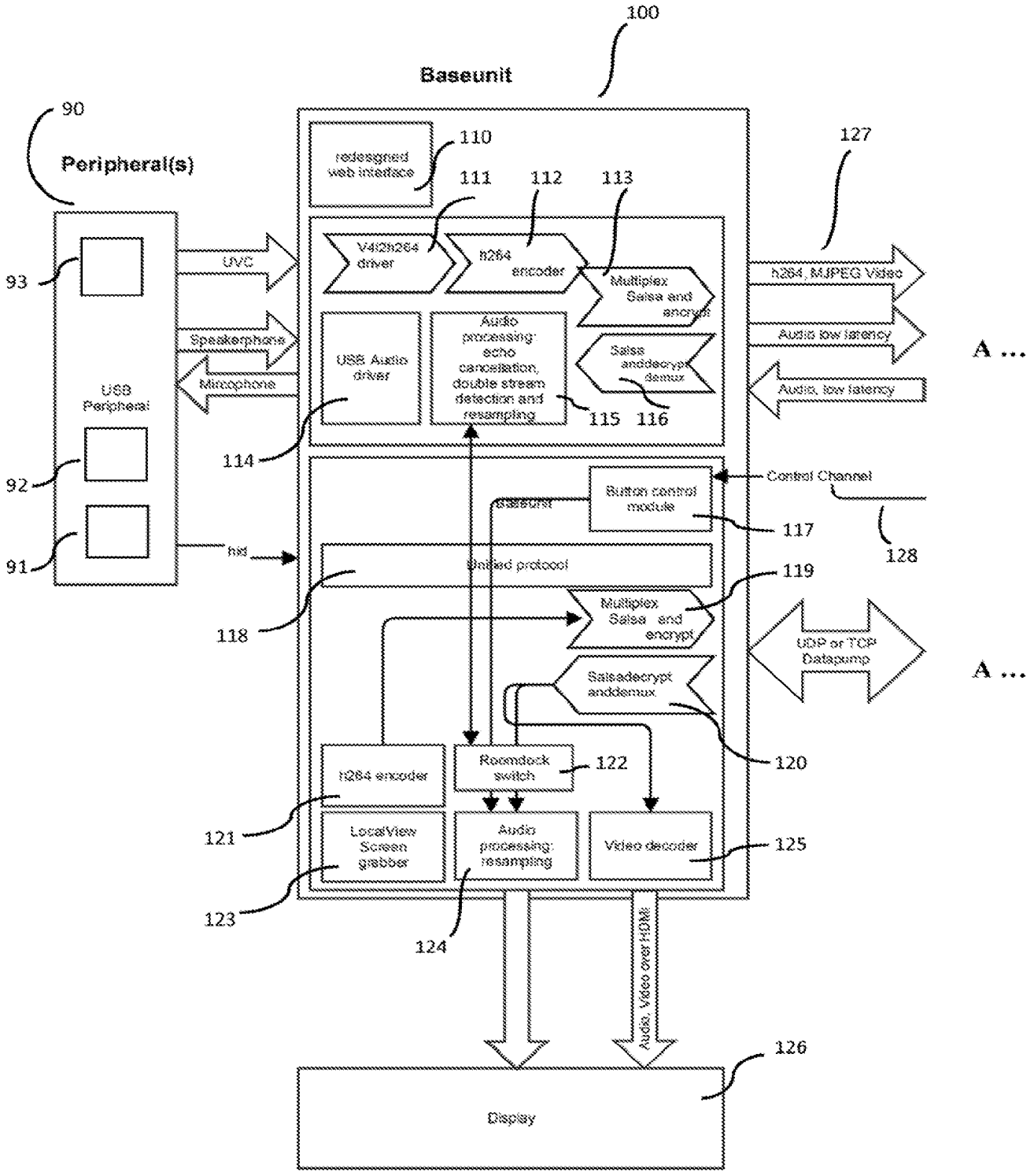

100
Baseunit
90
Peripheral(s)
93
92
91
USB Peripheral
UVC
Speakerphone
Microphone
hid
redesigned web interface
110
111
112
113
V4l2h264 driver
h264 encoder
Multiplex Salsa and encrypt
USB Audio driver
Audio processing: echo cancellation, double stream detection and resampling
115
116
114
Salsa anddecrypt demux
127
h264, MJPEG Video
Audio low latency
Audio, low latency
A ...
Control Channel
128
Button control module
117
baseunit
Unified protocol
118
119
Multiplex Salsa and encrypt
UDP or TCP Datapump
A ...
Salsadecrypt anddemux
120
h264 encoder
Roomdock switch
122
121
LocalView Screen grabber
Audio processing: resampling
Video decoder
125
123
124
Audio, Video over HDMI
126
Display

Fig. 1A

Fig. 1

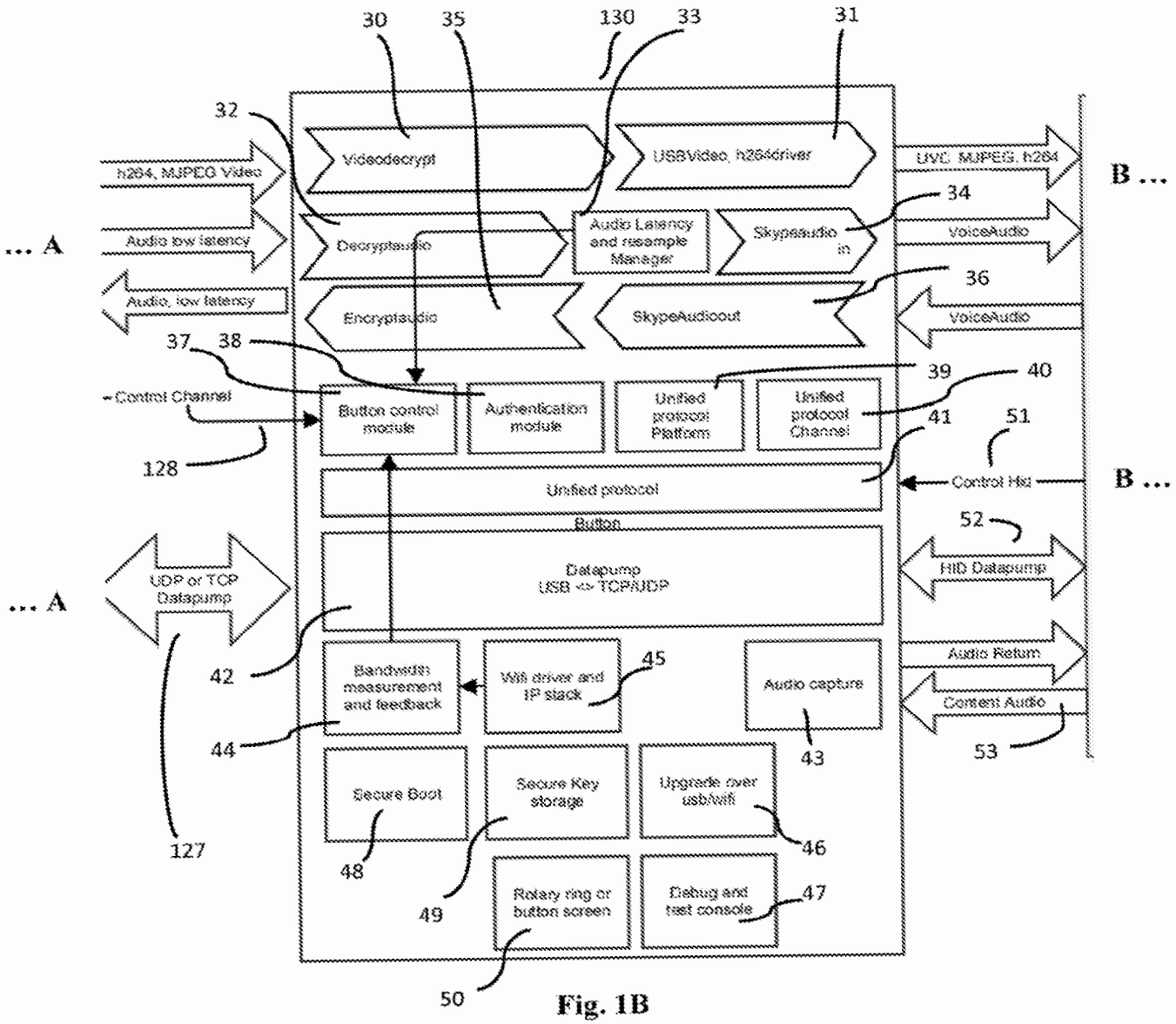


Fig. 1B

Fig. 1 continued

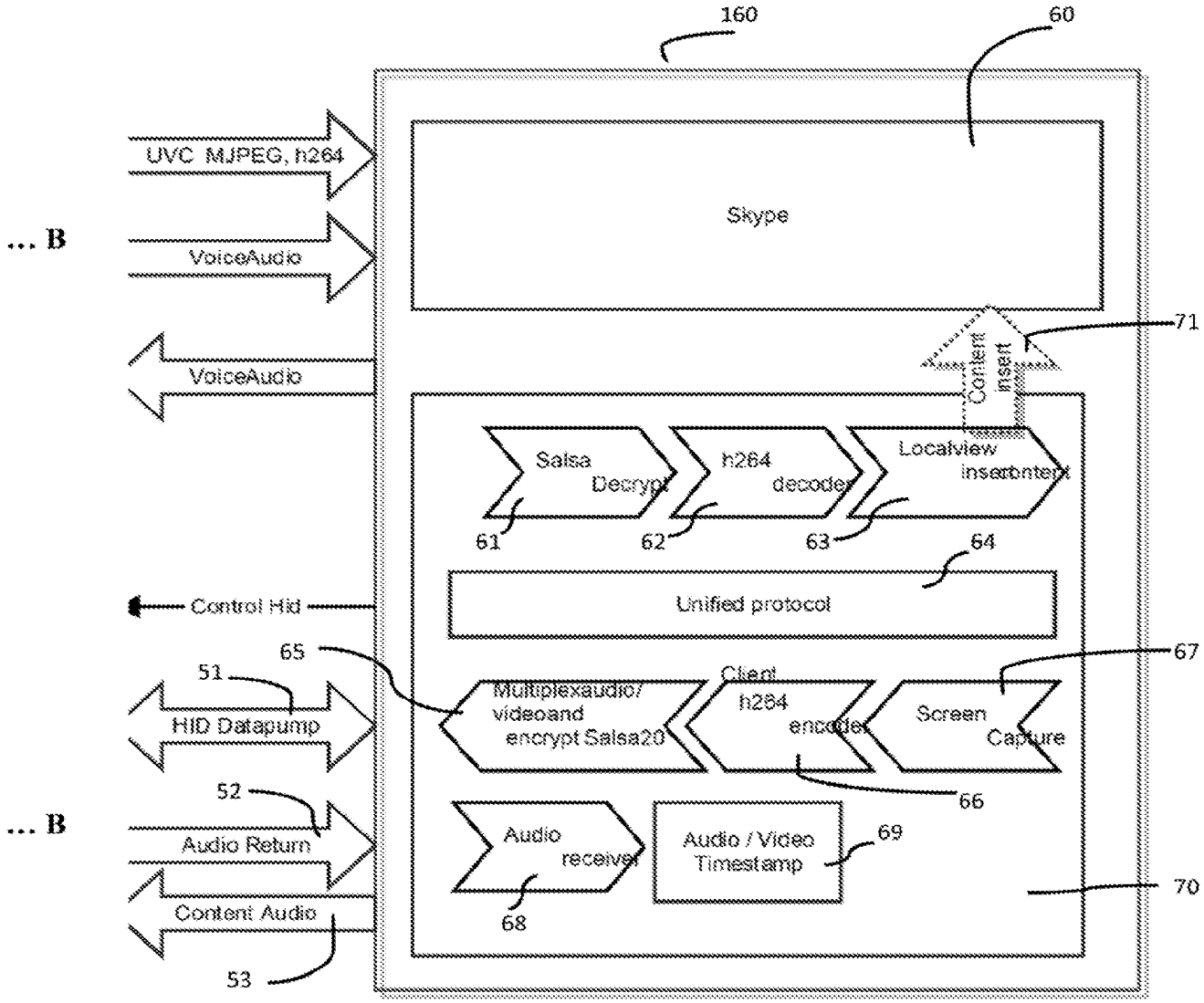


Fig. 1C

Fig. 1 continued

300
User actions
System actions
Plug-in Button
301
Kernel boot finished
302
Initialization scripts
303
Start loading USB stack
304
Start loading Wi-Fi stack
305
Discovered as USB drive
306
WiFi association completed
307
Launch Client
308
USB Reset request received from Client
309
Ready to share on screen
310
A
B
C
D

Fig.2

Fig. 3

Current average timing for A+B+D ≈ 28 seconds – in stand-alone mode with launcher

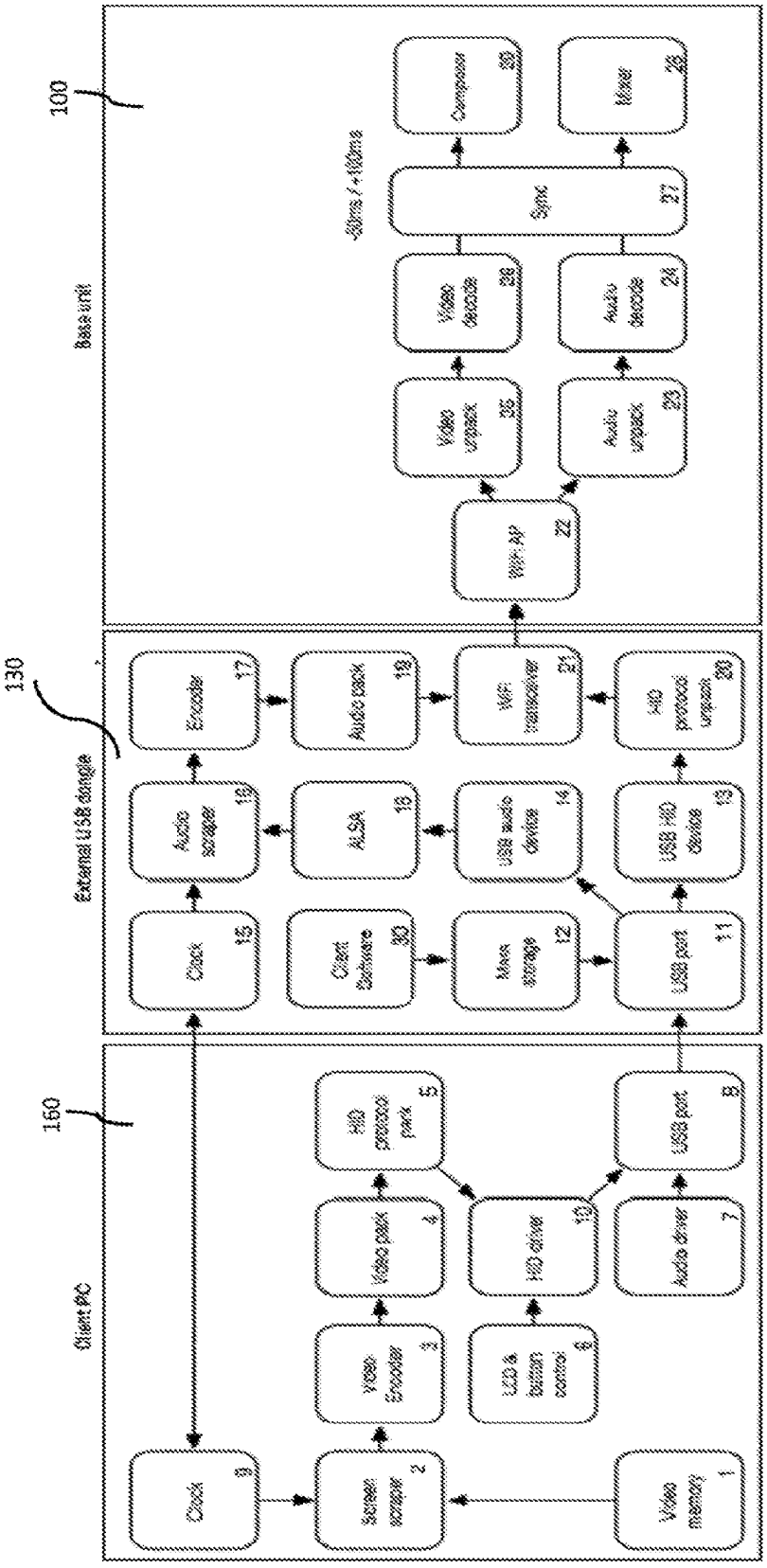

100
Base unit
130
External USB dongle
160
Client PC
Clock 9
Screen scraper 2
Video memory 1
Video Encoder 3
Video pack 4
HID protocol pack 5
LED & button control 6
HID driver 10
Audio driver 7
USB port 8
Clock 15
Audio scrape 16
Encoder 17
Client Software 30
ALSA 18
Audio pack 19
Mass storage 12
USB audio device 14
WiFi transceiver 21
USB port 11
USB HID device 13
HID protocol unpack 20
WiFi AP 22
Video unpack 26
Audio unpack 23
Video decode 28
Audio decode 24
~50ms / ~100ms
Sync 27
Compose 29
Mixer 25

Fig. 4

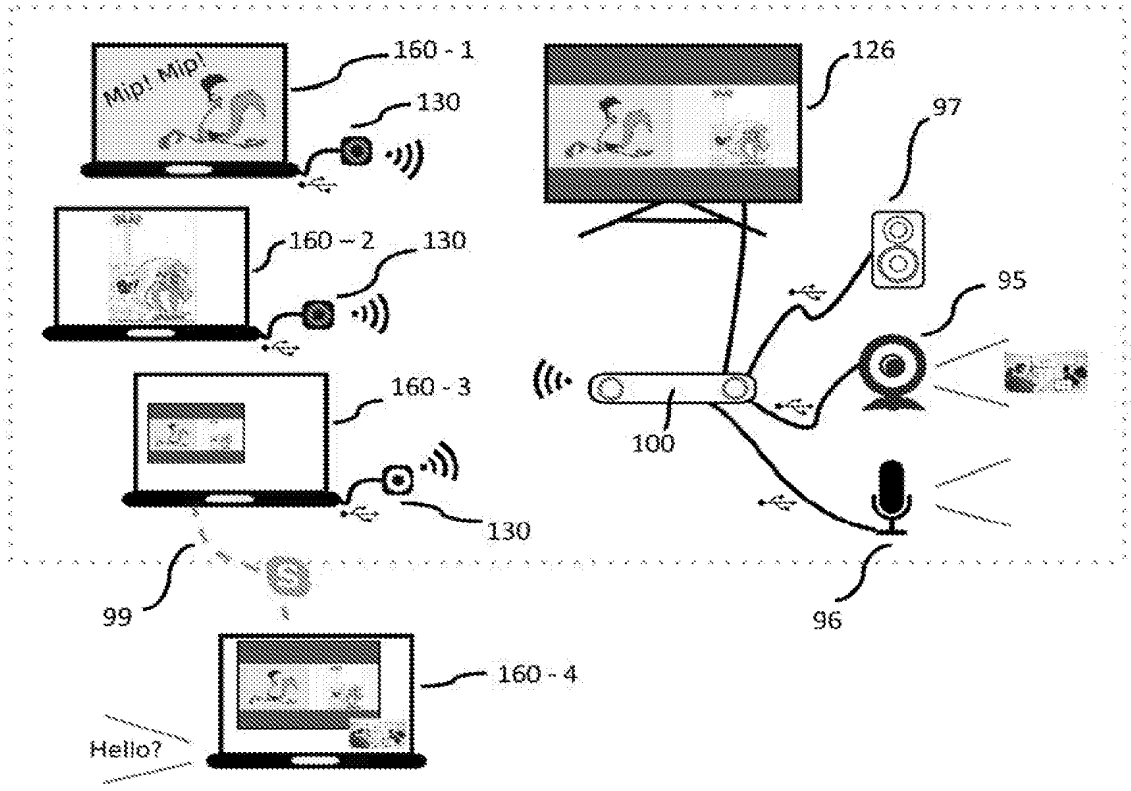

Mip! Mip!
160 - 1
130
160 – 2
130
160 - 3
130
99
160 - 4
Hello?
126
97
95
100
96

Fig. 5

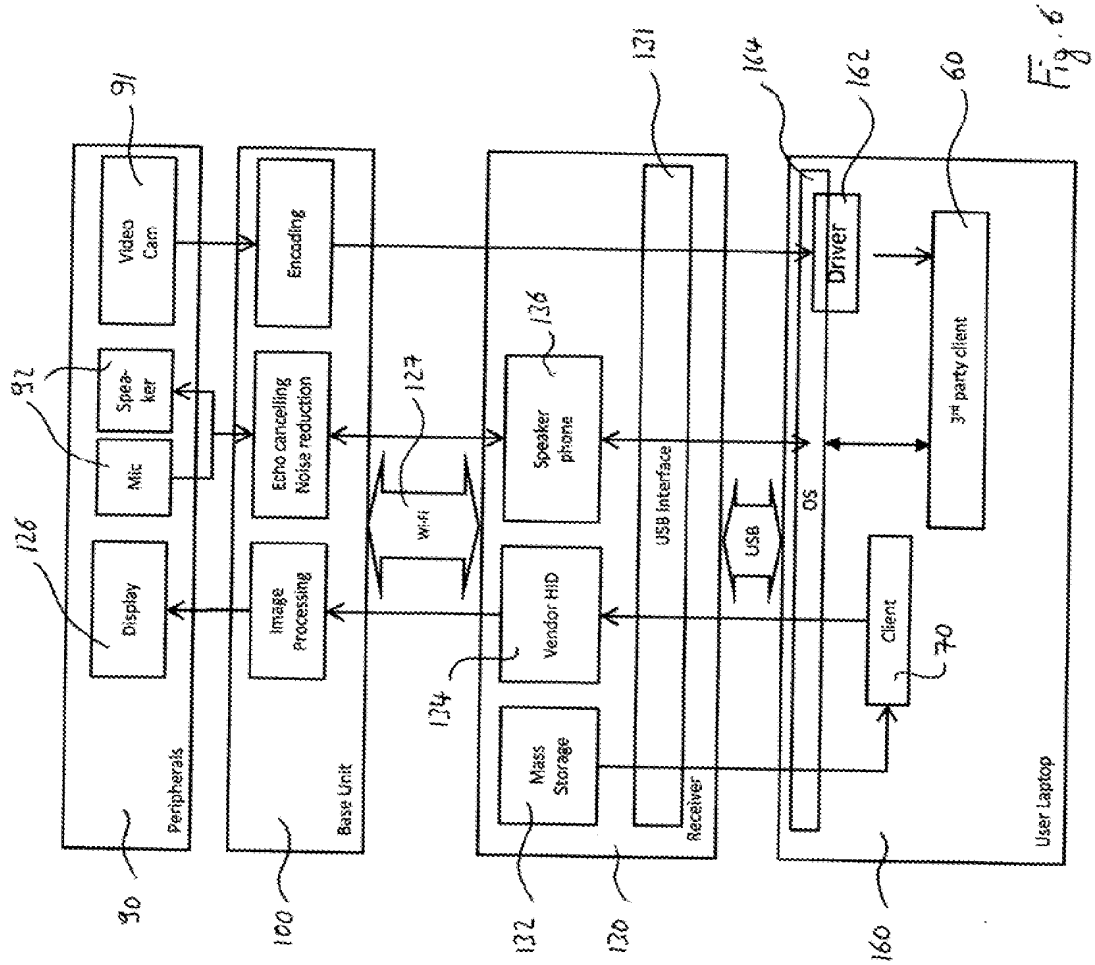

Video Cam
Encoding
Driver
3rd party client
Speaker
Mic
Echo cancelling Noise reduction
Wi-Fi
Speaker phone
USB Interface
OS
Display
Image Processing
Vendor HID
USB
Client
Mass Storage
Peripherals
Base Unit
Receiver
User Laptop
91
92
126
127
136
131
164
162
60
134
70
90
100
132
120
160

Fig. 6

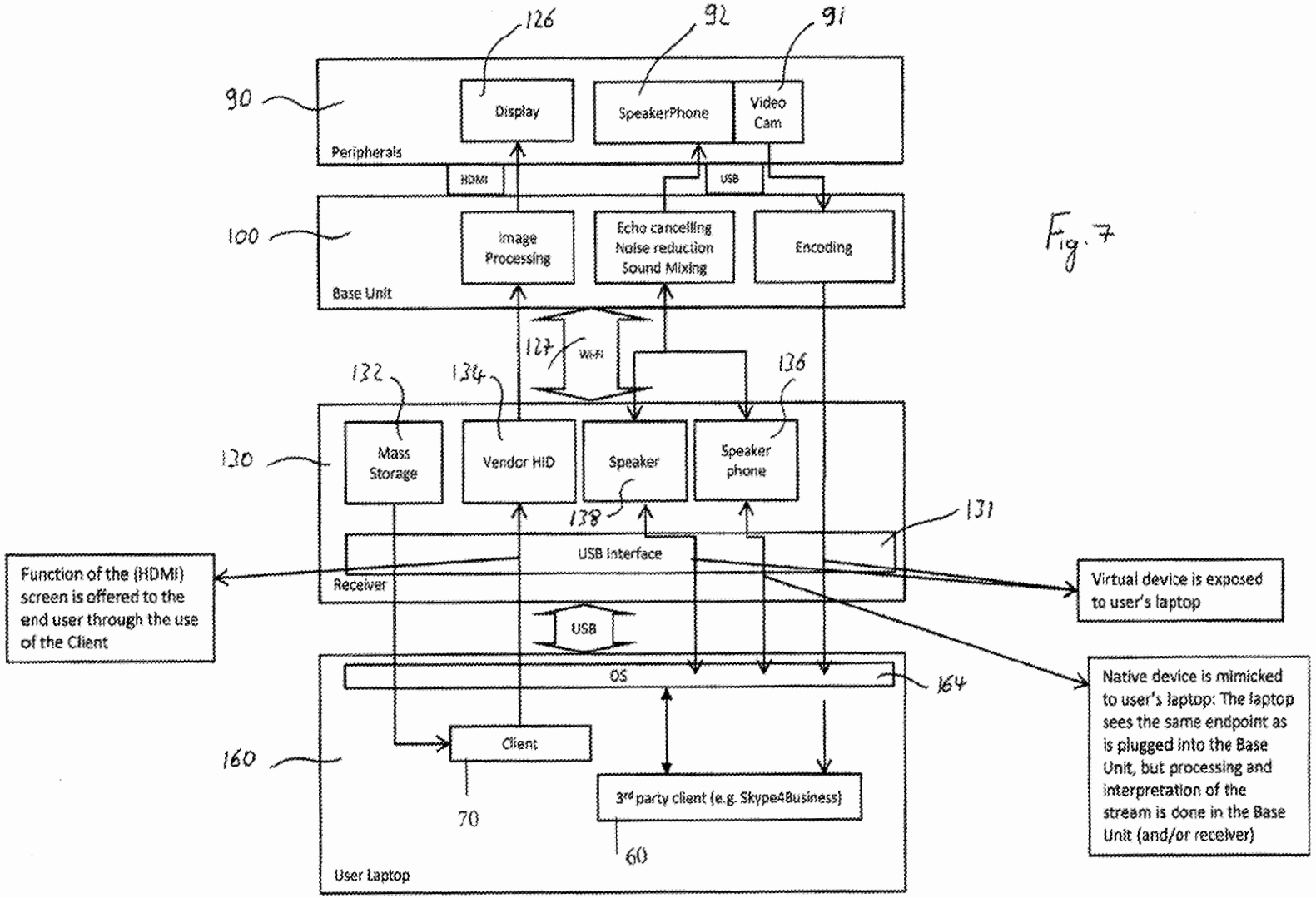

126
92
91
90
Display
SpeakerPhone
Video Cam
Peripherals
HDMI
USB
100
Image Processing
Echo cancelling Noise reduction Sound Mixing
Encoding
Base Unit
127
Wi-Fi
132
134
136
130
Mass Storage
Vendor HID
Speaker
Speaker phone
138
131
USB Interface
Receiver
Function of the (HDMI) screen is offered to the end user through the use of the Client
Virtual device is exposed to user's laptop
USB
OS
164
Native device is mimicked to user's laptop: The laptop sees the same endpoint as is plugged into the Base Unit, but processing and interpretation of the stream is done in the Base Unit (and/or receiver)
160
Client
70
3rd party client (e.g. Skype4Business)
60
User Laptop

Fig. 7

6/16

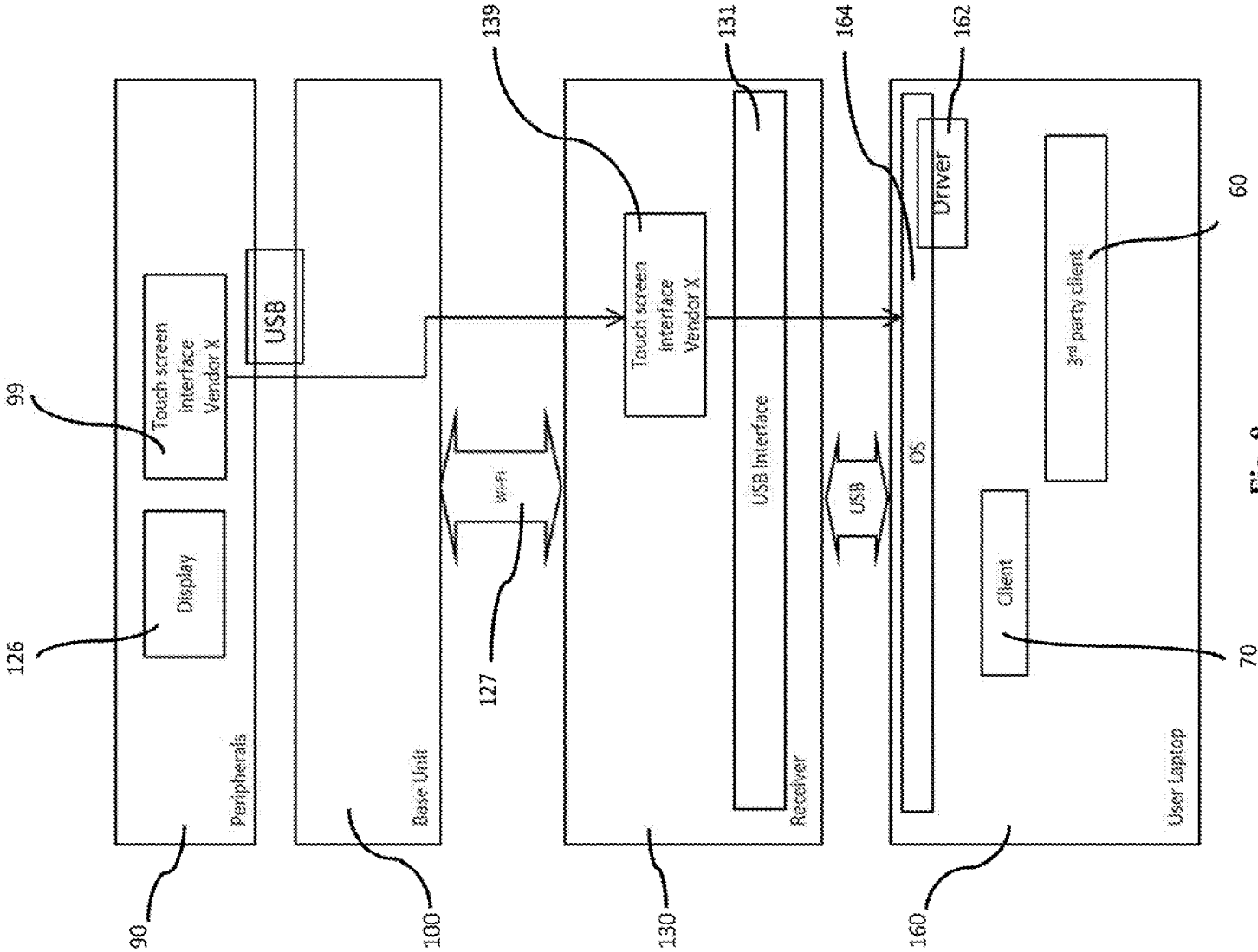

Peripherals
Display
Touch screen Interface Vendor X
USB
Base Unit
wire
Receiver
Touch screen Interface Vendor X
USB Interface
User Laptop
USB
OS
Driver
3rd party client
Client
90
99
126
100
127
130
139
131
160
164
162
60
70

Fig. 8

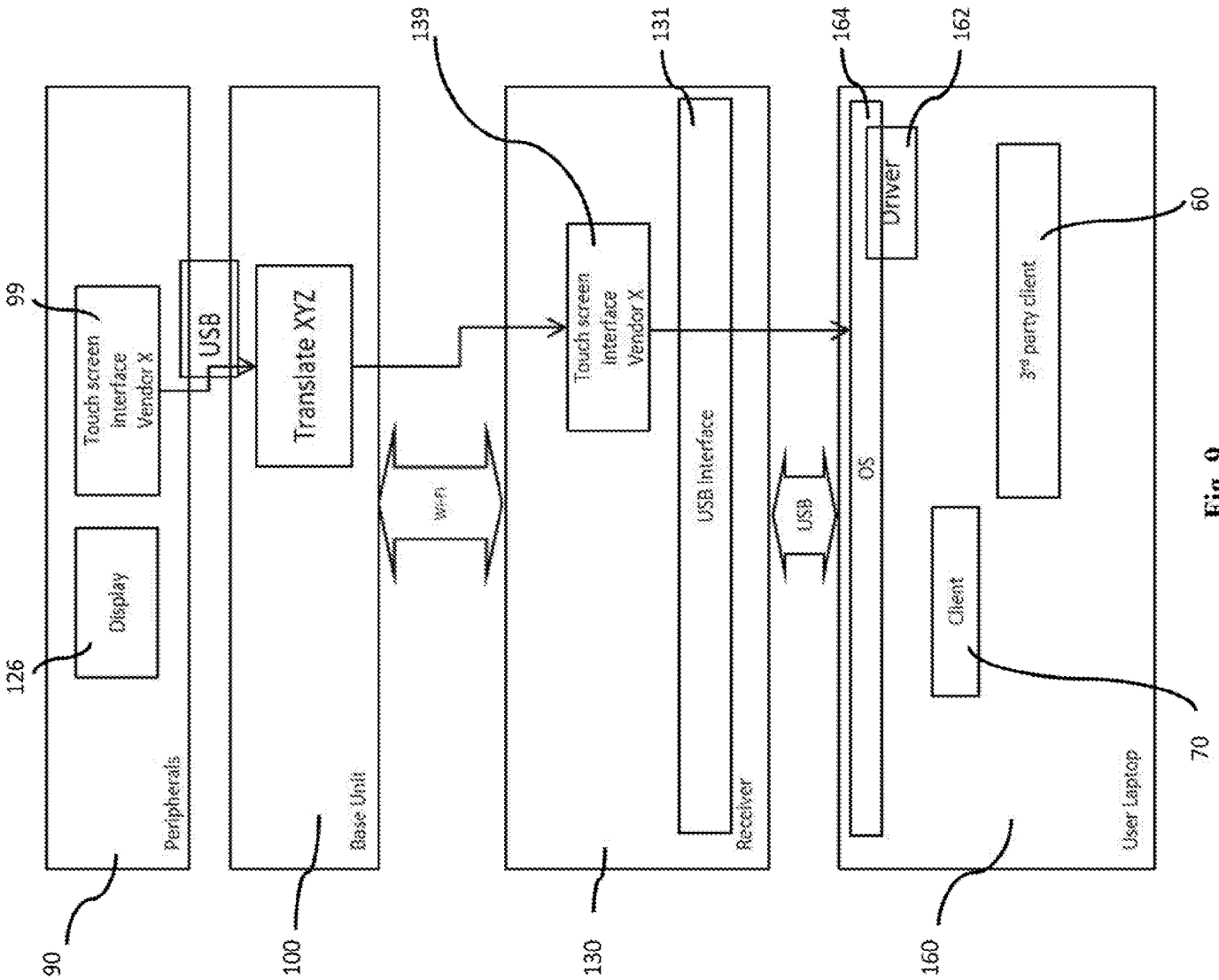

90
Peripherals
126
Display
99
Touch screen Interface Vendor X
USB
100
Base Unit
Translate XYZ
wire
130
Receiver
139
Touch screen Interface Vendor X
131
USB Interface
USB
160
User Laptop
OS
164
Driver
162
3rd party client
60
Client
70

Fig. 9

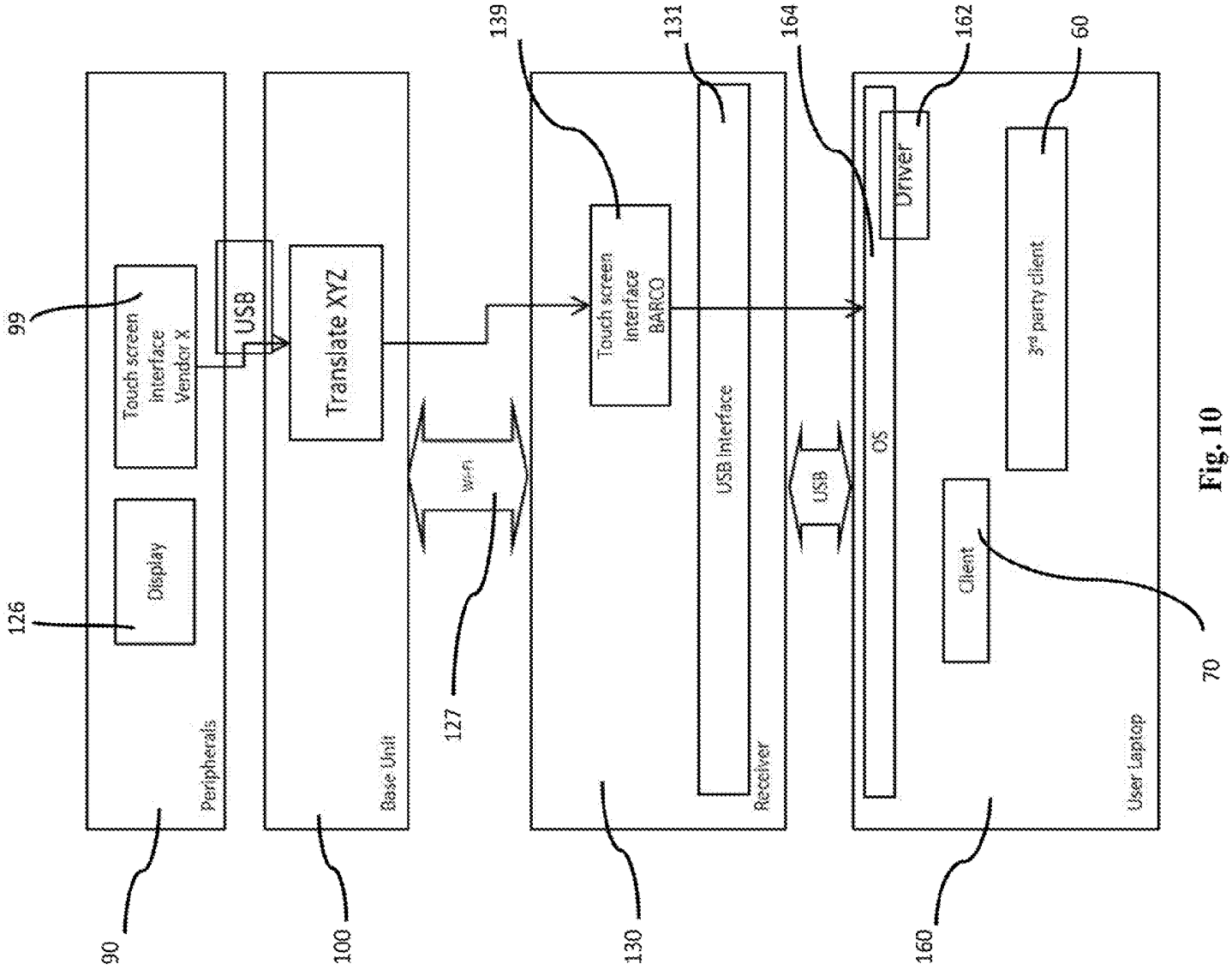

Peripherals
Display
Touch screen interface Vendor X
USB
Base Unit
Translate XYZ
wire
Receiver
Touch screen interface BARCO
USB interface
User Laptop
OS
Driver
USB
Client
3rd party client
99
126
90
100
127
139
130
131
164
160
162
60
70

Fig. 10

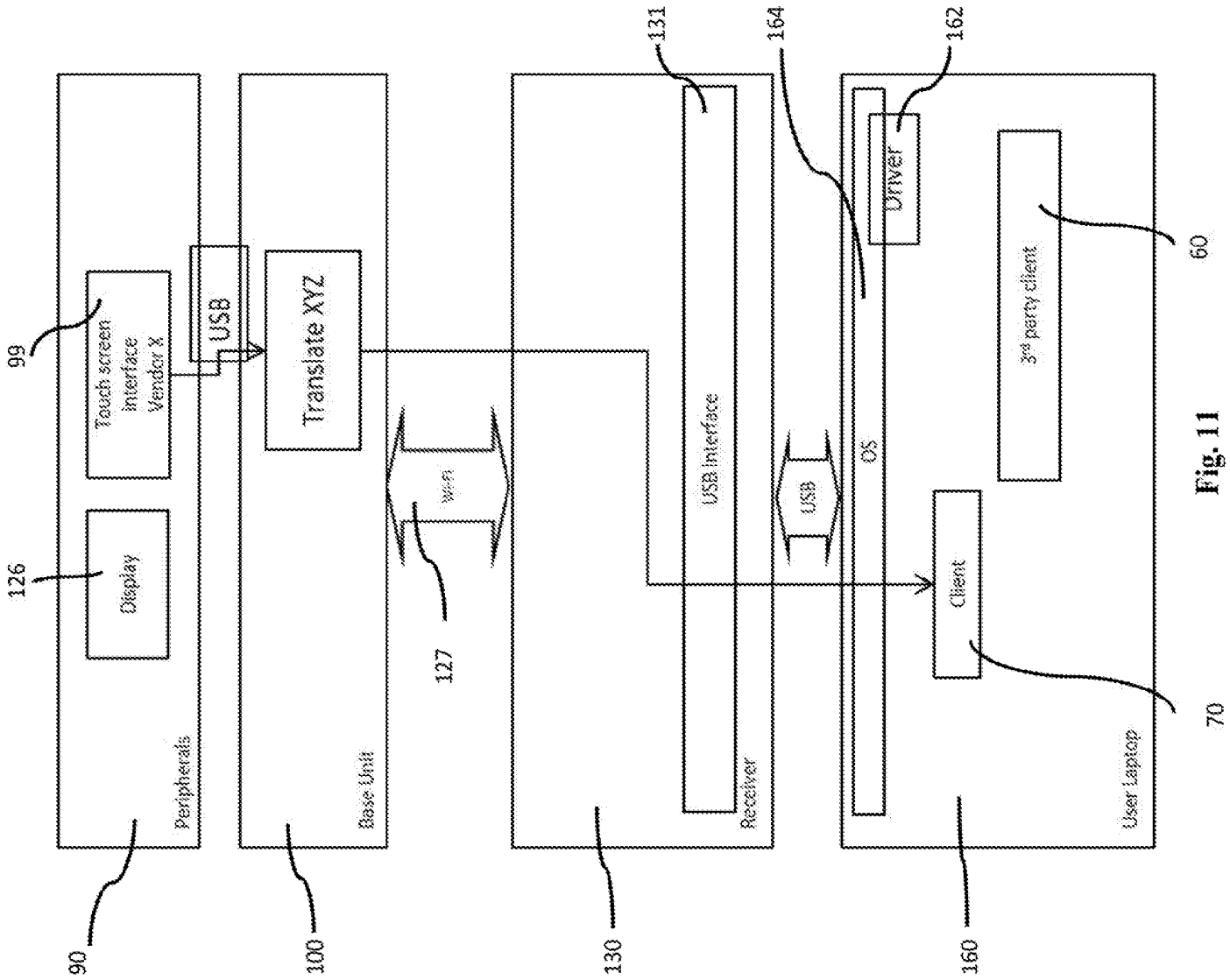

90
Peripherals
99
Touch screen interface Vendor X
126
Display
USB
100
Base Unit
Translate XYZ
127
Wifi
130
131
USB Interface
Receiver
164
USB
160
OS
162
Driver
Client
70
User Laptop
60
3rd party client

Fig. 11

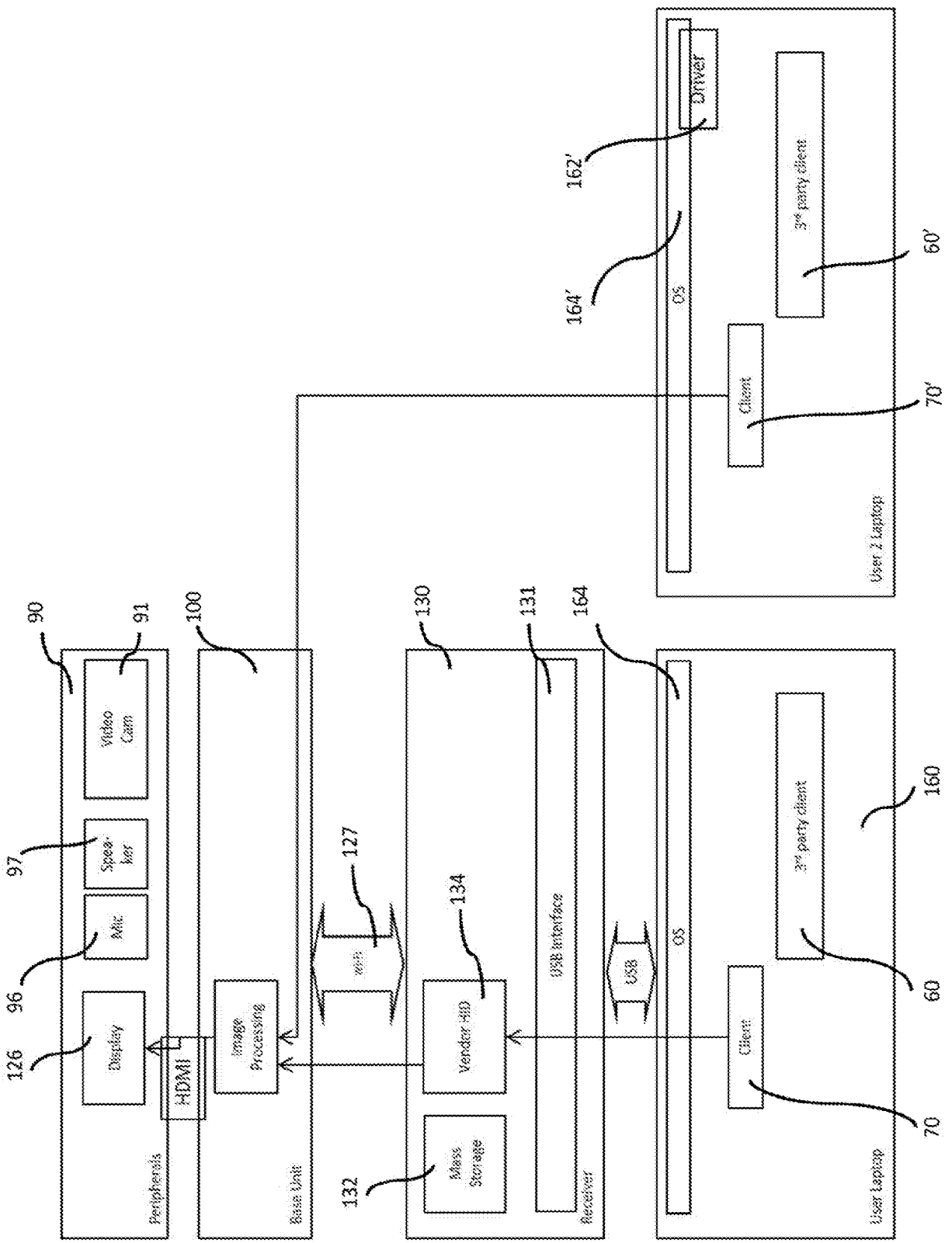

Peripherals
Video Cam
Speaker
Mic
Display
HDMI
Base Unit
Image Processing
WiFi
Receiver
Vendor HID
Mass Storage
USB interface
USB
User Laptop
OS
Client
3rd party client
User 2 Laptop
Driver
90
91
97
96
126
100
127
130
131
132
134
164
160
60
70
162'
164'
60'
70'

Fig. 12

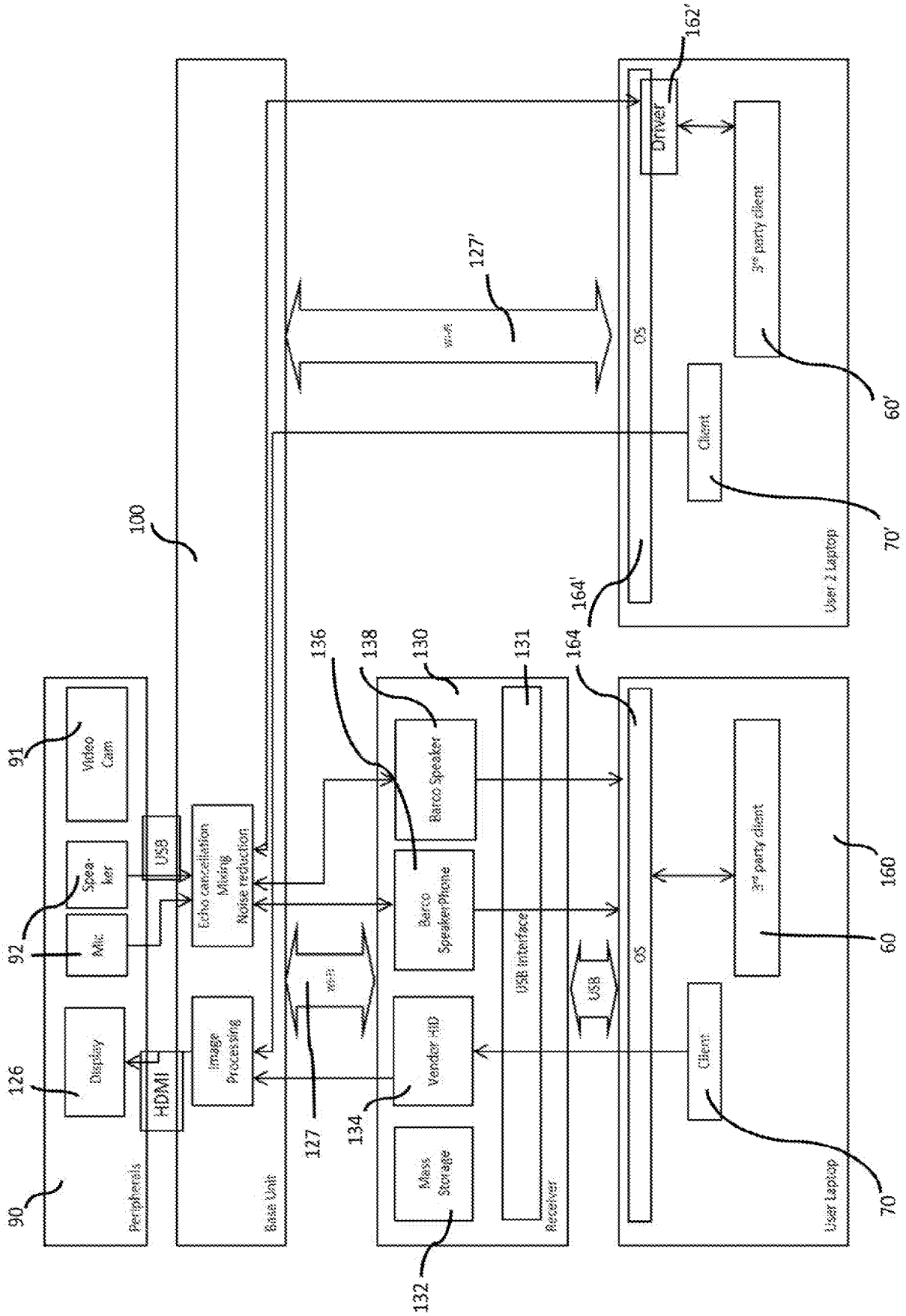

90
Peripherals
91
Video Cam
92
Spea-ker
Mic.
126
Display
HDMI
USB
Base Unit
100
Echo cancellation Mixing Noise reduction
Image Processing
127
video
134
Vendor HID
Mass Storage
132
Receiver
136
138
130
Barco Speaker
Barco SpeakerPhone
131
USB interface
USB
164
164'
OS
Client
User Laptop
70
160
3rd party client
60
162'
Driver
127'
70'
60'
User 2 Laptop

Fig. 13

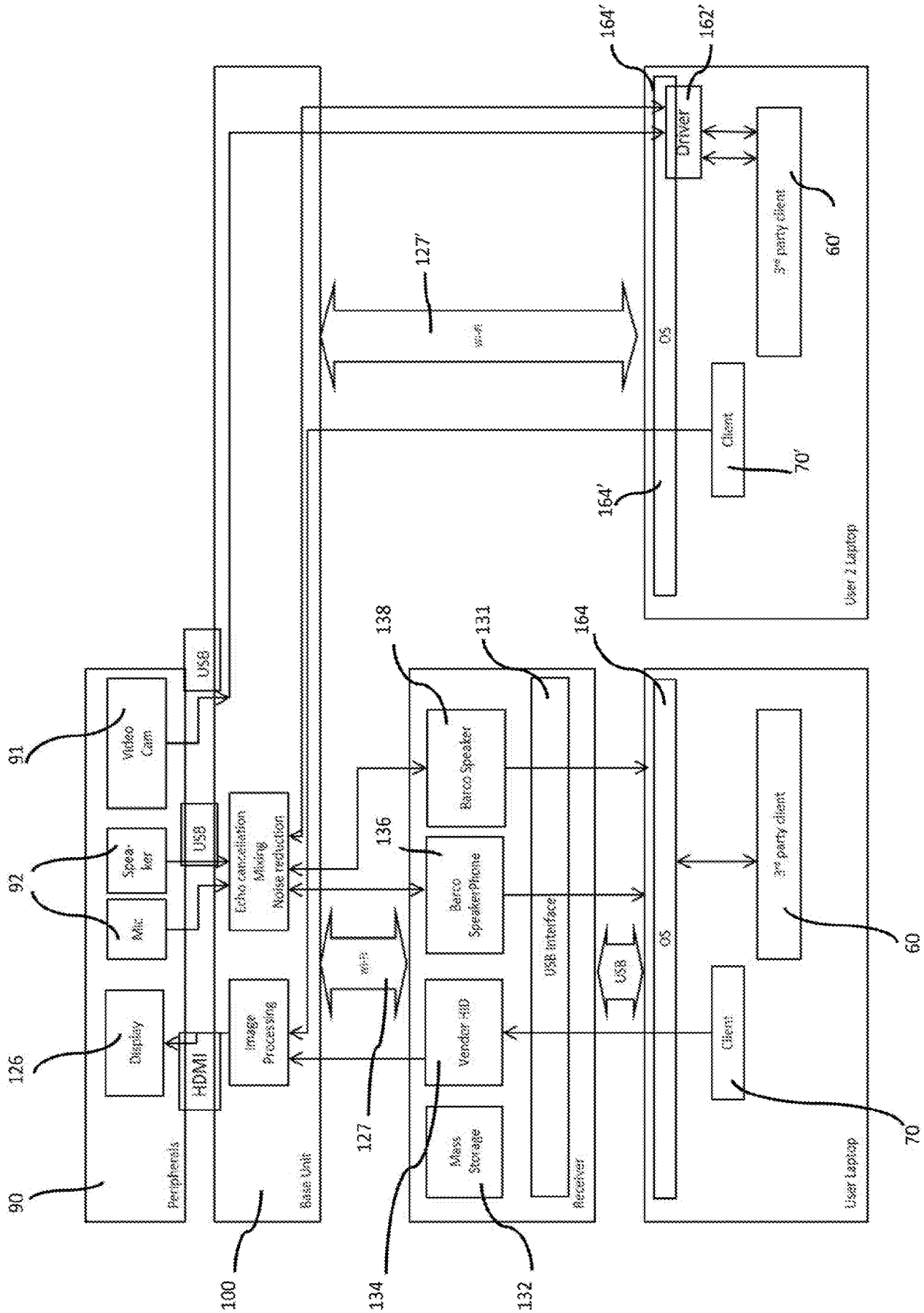

90
Peripherals
91
Video Cam
92
Spea-ker
Mic.
USB
126
Display
HDMI
Base Unit
Echo cancellation Mixing Noise reduction
Image Processing
100
127
wire
134
Vendor HID
Mass Storage
132
138
Barco Speaker
136
Barco SpeakerPhone
131
USB interface
Receiver
164
USB
OS
Client
70
3rd party client
60
User Laptop
127'
wire
164'
OS
Client
70'
3rd party client
60'
User 2 Laptop
164'
162'
Driver

Fig. 14

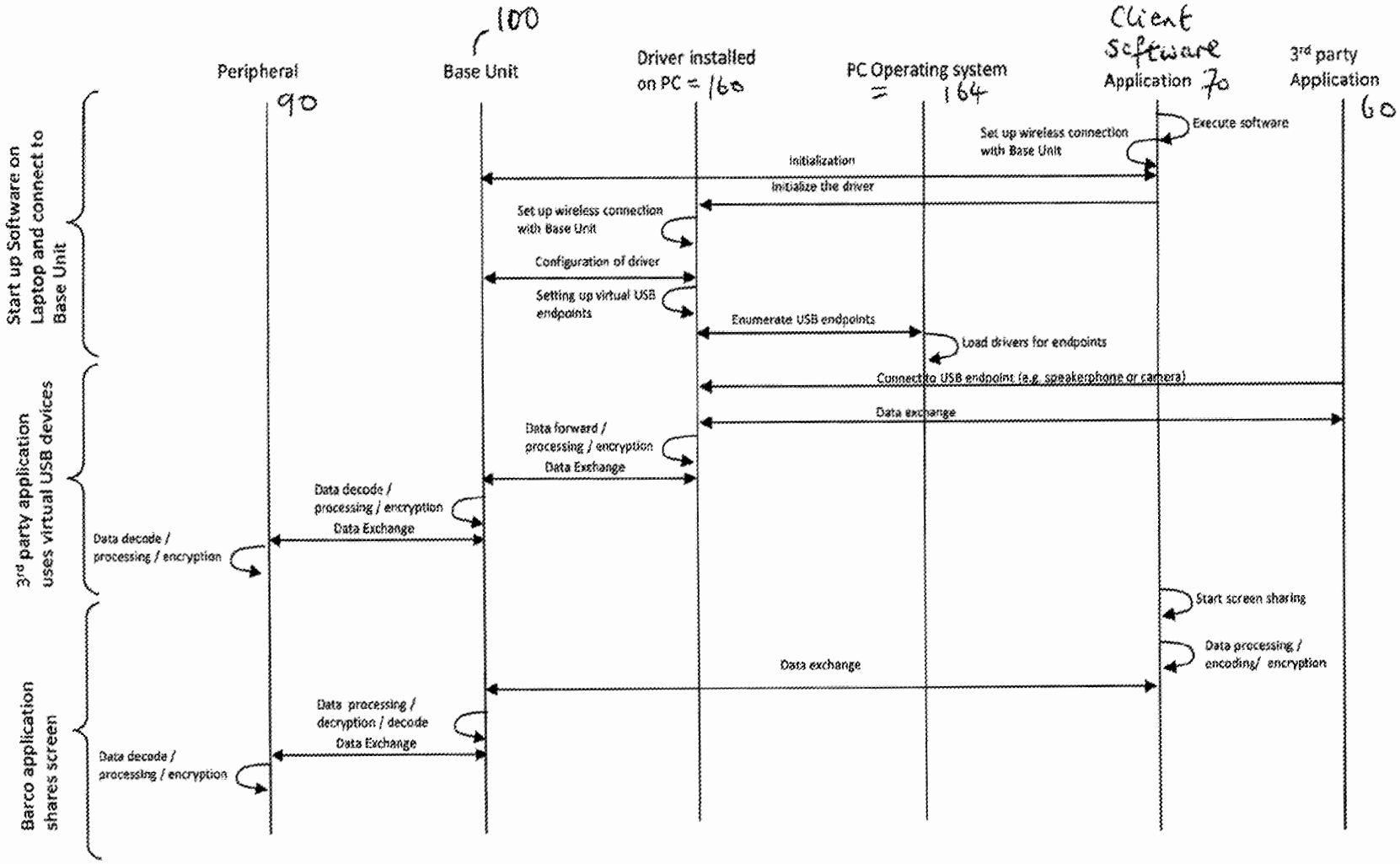

Peripheral
90
Base Unit
100
Driver installed on PC = 160
PC Operating system = 164
Client Software Application 70
3rd party Application 60
Start up Software on Laptop and connect to Base Unit
3rd party application uses virtual USB devices
Barco application shares screen
Execute software
Set up wireless connection with Base Unit
Initialization
Initialize the driver
Set up wireless connection with Base Unit
Configuration of driver
Setting up virtual USB endpoints
Enumerate USB endpoints
Load drivers for endpoints
Connect to USB endpoint (e.g. speakerphone or camera)
Data exchange
Data forward / processing / encryption
Data Exchange
Data decode / processing / encryption
Data Exchange
Data decode / processing / encryption
Start screen sharing
Data processing / encoding/ encryption
Data exchange
Data processing / decryption / decode
Data Exchange
Data decode / processing / encryption

Fig. 15

17/19

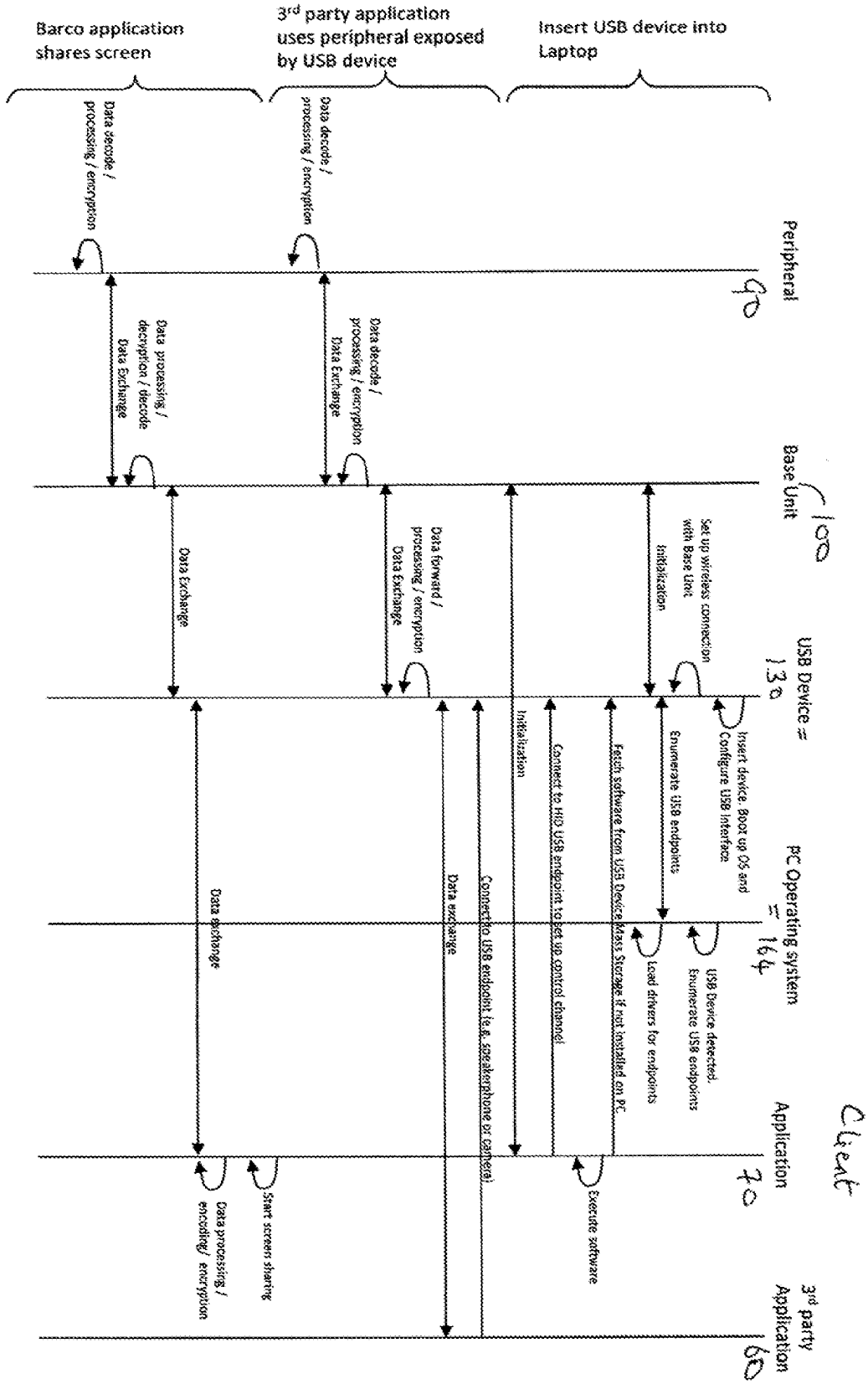

Barco application shares screen
3rd party application uses peripheral exposed by USB device
Insert USB device into Laptop
Peripheral
90
Base Unit
100
USB Device
130
PC Operating system
164
Application
70
3rd party Application
60
Client
Data decode / processing / encryption
Data decode / processing / encryption
Data processing / decryption / decode
Data Exchange
Data decode / processing / encryption
Data Exchange
Data Exchange
Data forward / processing / encryption
Data Exchange
Set up wireless connection with Base Unit
Initialization
Insert device. Boot up OS and Configure USB interface
Enumerate USB endpoints
Fetch software from USB Device/Mass Storage if not installed on PC
Load drivers for endpoints
USB Device detected. Enumerate USB endpoints
Initialization
Connect to HID USB endpoint to set up control channel
Connection USB endpoint (e.g. speakerphone or camera)
Data exchange
Data exchange
Execute software
Start screen sharing
Data processing / encoding/ encryption

Fig. 16

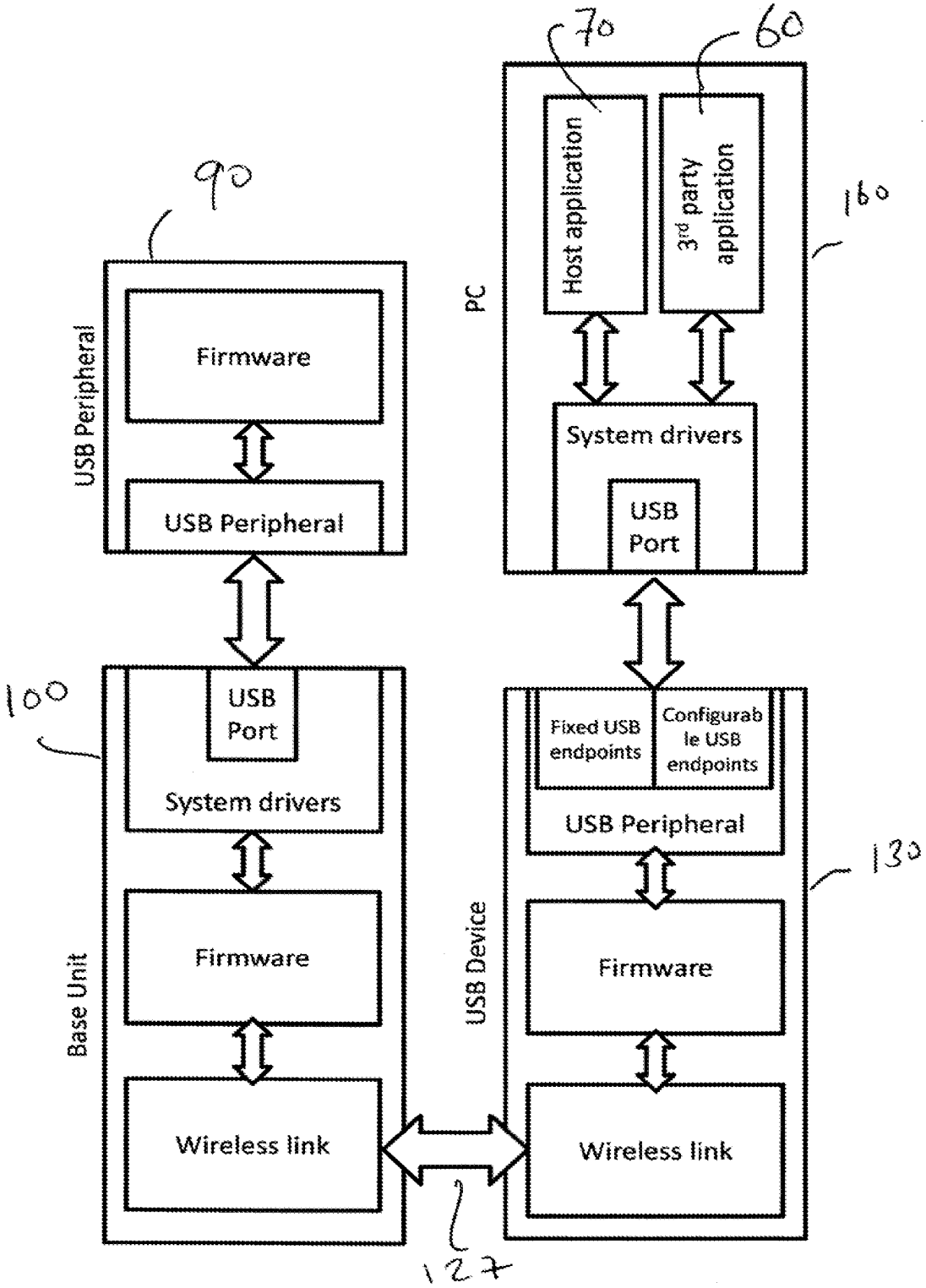

70
60
90
160
Host application
3rd party application
PC
Firmware
USB Peripheral
USB Peripheral
System drivers
USB Port
100
USB Port
Fixed USB endpoints
Configurable USB endpoints
System drivers
USB Peripheral
130
Base Unit
Firmware
USB Device
Firmware
Wireless link
Wireless link
127

Fig. 17

Method and System for making functional devices available to participants of meetings

The present invention relates to methods, devices and systems for making functional devices available to participants of meetings, as well as software for carrying out such methods.

Background of the Invention

Allowing ad hoc groups of persons to communicate with each other is one of the fundamental aspects of collaboration, problem solving, negotiation, teaching and education, etc. To assist in communication, there has been an explosion of electronic communication tools such as electronic conferencing tools, e.g. synchronous and asynchronous conferencing, online chat, Instant Messaging, audio conferencing, videoconferencing, data conferencing, application sharing, remote desktop sharing, electronic meeting systems, collaborative management (coordination) tools, project management systems, knowledge management systems, and social software systems.

One classic approach is the lecture or seminar often involving a presentation using presentation software. To a large extent the traditional single person presentation or lecture has been maintained with the audience being in a rather passive mode as far as determining, constructing, augmenting or modifying the information to be presented is concerned.

As with other business processes, meetings are going digital. Increasingly, people are using computer technology alone and in conjunction with broadband networks to support their meeting objectives prior to and during an actual meeting. For example, e-mail is used to pass around files for people to read prior to a meeting.

However, certain functionalities such as microphones and load speakers tend to have a low quality if these are provided by portable devices such as laptops and mobile phones. As meetings get larger in size there is a need for high quality audio as well as visual signals to be made available to participants at a meeting.

Summary of the Invention.

Embodiments of the present invention relate to methods, devices and systems for making functional devices available to participants of meetings, as well as software for carrying out such methods.

Embodiments of the present invention provide a system for connecting a processing device to a functional device connected to or in a base unit of a communications network, the processing device having a memory, a display and an operating system, the system comprising :

a first peripheral device being adapted to be coupled to the processing device via a generic communications protocol, the base unit having a transmitter and the first peripheral device having a receiver and at least one fixed or configurable endpoint of the functional device exposed on the first peripheral device;
the base unit and the first peripheral device being adapted to transmit and receive data respectively over the communications network from the functional device to the processing device via the at least one fixed or configurable endpoint using the generic communications protocol for communication between the processing device and the first peripheral device.

The functional device can be a data generating device such as any one or more of a microphone, a speakerphone, a speaker, a display, a touchscreen, a projector, a camera, a video camera, a webcamera.

The at least one fixed or configurable endpoint of the functional device exposed on the first peripheral device can be a human interface device.

The processing device can be adapted to communicate with the at least one fixed or configurable endpoint with the pre-installed generic driver being a human interface device driver.

The at least one fixed or configurable endpoint of the functional device exposed on the first peripheral device can be a mass storage device.

The processing device can be adapted to communicate with the at least one fixed or configurable endpoint with a pre-installed generic driver being a mass storage device driver.

The at least one fixed or a configurable endpoint of the functional device exposed on the first peripheral device can be a composite device.

The processing device can be adapted to communicate with the at least one fixed or configurable endpoint with a pre-installed generic driver being a composite device driver.

The system can comprise means for encoding, optionally encrypting the data.

The processing device can be adapted to host a unified communication between two or more processing devices. The unified communication can be a Skype™ call or a Skype™ for Business call. The first peripheral device can be adapted to present the functional device to the unified communication between two or more processing devices. For example the functional device can be a speaker phone, a microphone, a speaker, a videocamera, a webcam, a camera, or other audio source.

The system can be adapted to share data from other processing devices in a meeting in the call. A manual action can be used to activate this sharing to be performed by the person sharing or the host via local view window.

The system can be adapted to select of a camera, e.g. via a manual action in UC clients. The system can be adapted to synchronize the sharing state of the first peripheral device with the sharing state of the UC client.

The system can be adapted to provide a multiuser wireless speakerphone. The speakerphone can be made accessible to every processing device in a meeting with a first peripheral device connected to each of the processing devices. There is no moderation or need to perform an action to get access to this device.

The system can be adapted to provide separate controls, e.g. on the peripheral device to control a volume of an audio output of the Base Unit and to mute a room microphone. When muted, a microphone can also be muted for all other first peripheral devices connected to processing devices in a meeting.

Audio signals should be picked up by a microphone or the Base Unit can be adapted to have to inject audio signals in any audio feed such as in a microphone signal to a first peripheral device connected to a processing device.

The system can be adapted to expose the same type of functional device to the user as is connected to the Base Unit so that a user can use drivers provided by a vendor of the functional device installed on the processing device.

The system can be adapted such that for a plurality of processing devices communicating with the Base Unit, a functional device connected to the base unit will be exposed to all the plurality of processing devices. The functional device can be exposed natively.

The system can be adapted to allow any processing device connected to the communications network through the first peripheral device the ability to view any audiovisual content that is displayed, provided or projected in the meeting room on that processing device called "local view".

A processing device which is a receiver of the local view can have, but is not limited to, following functionality:

- The ability to open a window and view the meeting room content in there.
- The ability to zoom into the content.
- The local view can allow the user to start and/or participate in a blackboard or annotation session from his/her own processing device

The system can be adapted provide alternative methods and systems if there are too few first peripheral devices in a certain meeting room.

The system can be adapted to provide a warning if a first peripheral device is attempting to connect to the wrong base unit.

In another aspect the present invention provides a method for connecting a processing device to a functional device connected to or in a base unit of a communications network, the processing device having a memory, a display and an operating system, the base unit having a transmitter and the first peripheral device having a receiver the method comprising :

coupling a first peripheral device being to the processing device via a generic communications protocol, providing at least one fixed or a configurable endpoint of the functional device exposed on the first peripheral device;
transmitting data from the base unit and receiving the data at the first peripheral device over the communications network from the functional device to the processing device via the at least one fixed or configurable endpoint using the generic communications protocol for communication between the processing device and the first peripheral device.

The functional device can provide any one or more of a microphone, a speakerphone, a speaker, a display, a touchscreen, a projector, a camera, a video camera, a webcamera.

The method can include presenting the at least one fixed or a configurable endpoint of the functional device exposed on the first peripheral device as one of a human interface device, a mass storage device, a composite device, a microphone, a speakerphone, a speaker, a display, a touchscreen, a projector, a camera, a video camera, or a webcamera.

The data can be encoded, and/or optionally encrypted.

A unified communication between two or more further processing devices can be hosted on the processing device.

The first peripheral device can present a functional device to the unified communication between two or more processing devices.

The method can include exposing the same type of functional device to the processing device as is connected to the Base Unit and using at least one driver for the functional device installed on the processing device.

In another aspect a peripheral device adapted to be coupled to a processing device via a generic communications protocol is provided, the peripheral device having a receiver and at least one fixed or a configurable endpoint of a functional device exposed on the first peripheral device;

the receiver of the first peripheral device being adapted to receive data over the communications network from the functional device and for sending the data to the processing device via the at least one fixed or configurable endpoint using the generic communications protocol for communication between the processing device and the peripheral device.

The at least one fixed or a configurable endpoint of the functional device exposed on the first peripheral device can be one of a human interface device, a mass storage device, a composite device, a microphone, a speakerphone, a speaker, a display, a touchscreen, a projector, a camera, a video camera, or a webcamera.

In another aspect a computer program product is provided for carrying out any of the method steps of claim 10 when executed on a processor. A non-transitory signal storage means can be used to store the computer program. The non-transitory signal storage means can be an optical disk such as a CD-ROM or a DVD-ROM, a magnetic disk such as a hard disk, a solid state memory such as a flash memory, a magnetic tape or similar.

Brief Description of the drawings

Figure 1 shows in Figures 1A to C an embodiment of the present invention.

Figures 2 and 3 show message flows of how a peripheral device is connected to a processing device in embodiments of the present invention.

Figure 4 shows an arrangement of components that can be used in embodiments of the present invention. This figure is Figure 11 of WO 2013/037980 entitled "Electronic tools and methods with audio for meetings" which is incorporated herein by reference with respect to Figure 11 thereof and also in its entirety.

Figure 5 shows an arrangement of processing devices as used in a meeting with a unified communication in progress according to an embodiment of the present invention.

Figures 6 to 11 show embodiments of the present invention where a peripheral device is coupled to a processing device.

Figures 12 to 14 show embodiments of the present invention where a peripheral device is not coupled to a processing device.

Figure 15 shows a message flow for use with any of the embodiments 1 to 11 and 17 according to an embodiment of the present invention.

Figure 16 shows a message flow for use with any of the embodiments 12 to 14 according to an embodiment of the present invention.

Figure 17 shows a further embodiment of the present invention.

Definitions

"**Plug and play**" is a term used to describe the characteristic of a computer bus, or device specification, which facilitates the discovery of a hardware component in a system, without the need for physical device configuration, or user intervention in resolving resource conflicts. Plug and play devices can be added to a bus of a computing system (while running or when shut down), and the newly added device and possibly the rest of the computing system is automatically configured to make the newly added device work, both from hardware and from software perspective.

Plug and play interfaces include for example (not an exhaustive list): Firewire (IEEE-1394), PCI, Mini PCI, PCI Express, Mini PCI Express, PCMCIA, PC Card, Universal Serial Bus (USB), SDIO cards, HDMI, DisplayPort, Bluetooth etc.

"**Auto-configuration**" is the automatic configuration of devices without manual intervention, without setting any switches or jumpers, and without any need for software configuration. An example of auto-configuring devices: USB devices. Examples of auto-configuring protocols: DHCP, Zeroconf, Bonjour.

A plug and play device has auto-configuration software by default to make it plug and play. Example: USB devices are made to be plug and play by including the correct auto-configuration software (e.g. host driver, host stack, application software). Autoconfiguration can also refer to a software alone and is not restricted to a physical device.

"**Hot swapping and hot plugging**" are terms used to describe the functions of replacing computer system components without shutting down the system. More specifically, hot swapping describes replacing components without significant interruption to the system, while hot plugging describes the addition of components that would expand the system without significant interruption to the operation of the system. A well-known example of this functionality is the Universal Serial Bus (USB) that allows users to add or remove peripheral components such as a mouse, keyboard, or printer. Other examples are eSATA, PCIe, FireWire, for example.

A "**portable application**" (portable app), sometimes also called standalone, is a computer software program designed to run without installation on the target machine. This type of application is stored on a removable storage device such as a CD, USB flash drive, flash card, or floppy disk—storing its program files, configuration information and data on the storage medium alone. It is a program that can be stored on an electronic device such as a USB flash drive, iPod, memory card, portable hard drive or other portable electronic device and runs on a computer or other processing device coupled to the electronic device without making permanent configuration changes to the host computer. All such programs have a zero-footprint, meaning all temporary files, registry entries, and any other changes to the machine exist only while the program is running.

To be considered a portable application, for purpose of this invention, a software program must:

Not require any kind of formal installation onto a computer's permanent storage device to be executed, and can be stored on a removable storage device such as USB flash drive, iPod, memory card, portable hard drive or other portable electronic storage device thus enabling it to be used on multiple computers.

Settings are stored with, and can be preferably carried around with, the software (i.e., they are written to the electronic device such as a USB drive). Settings are not stored to the registry or any other central system database of the computer.

Leaves a zero (or near-zero) "footprint" on any PC it is run on after being used. i.e., all temporary files/registry settings should be either avoided or at least removed once the program has exited, and files created by the user can be saved directly to the same removable media as the application is stored on.

A portable application does not leave its files or settings on the host computer on which it runs. For example, the application does not write to the Windows registry or store its configuration files (such as an INI file) in the user's profile; instead, it stores its configuration files in the program's directory. Another requirement, since file paths will often differ on changing computers due to variation in Windows drive letter assignments, is the need for applications to store them in a relative format. Preferably, such a program does not require a launcher program to copy necessary settings and files to the host computer when the application starts and move them back to the application's directory when it closes as this may leave a residue on the hard drive in case of power failure.

"**Electronic meeting systems**" (EMS) need to be distinguished on the one hand from classic groupware, on the other from web conferencing systems. In reality, there is some overlap between minor features of products of the named categories. The main difference from groupware is the intensity of collaboration. EMS should be distinguished from systems with which it is possible to show the contents of an individual computer screen on a remote display with multiple users at the same time.

"**Groupware**" supports collaboration within groups where the individual contributions remain identifiable. In contrast, EMS enables the group to cooperatively produce a result for which the group is responsible as a whole. In a business process, groupware and electronic meeting systems complement each other: Groupware supports teams when researching and creating documents in the run up to an EMS session or when implementing the results of such a session.

"**Web conferencing systems**" and "electronic meeting systems" complement each other

in the online meeting or workshop: EMS extends the web conferencing system by providing interactive tools for producing and documenting group results. On the other hand, "web conferencing systems" complement EMS with the screen sharing and voice conferencing functionality required in synchronous online meetings and not present in EMS.

"**Data conferencing**" refers to a communication session among two or more participants sharing computer data in real time. Interaction and presentation devices such as a screen, keyboard, mouse, camera, etc. can be shared. It is a term used to distinguish from video conferencing and audio conferencing. The data can include screen, documents, graphics, drawings and applications that can be seen by the participants of the meeting.

"**Application sharing**" is an element of remote access, falling under the collaborative software umbrella, that enables two or more users to access a shared application or document from their respective computers simultaneously in real time. Generally, the shared application or document will be running on a host computer, and remote access to the shared content will be provided to other users by the host user. Application sharing should be distinguished from systems in which collaboration on the applications between different users is not possible but the contents of individual computer screens can be projected onto a remote display with multiple users at the same time.

The term "**arbitrary media content**" refers to the fact that a user may generate, create or select any media content that is appropriate to display. This differs from client voting on, or selecting of media content that is displayed by another in a meeting or presentation. This term refers to client oriented, distributed rights and privileges for the display of content rather than a central presenter providing content which is presented to the members of the meeting.

"**Unified Communications system or tools**" refers to audio or audio visual communications such as provided by "Skype™" or "Skype™ for business". Such software can take over audio and/or visual data provided from a host processing device. Unified communication tool can be described as a collection of tools to do VOIP, (web) conferencing, shared whiteboarding, message exchange (e.g. chat), file transfer, or presence. Unified Communications system or tools can make use of a protocol- or

standard defined or specific communication session or interaction, such as Voice-Over-Internet-Protocol ("VoIP), text or instant messaging (e.g., AIM, Blauk, eBuddy, Gadu-Gadu, IBM Lotus Sametime, ICQ, iMessage, IMVU, Lync, MXit, Paltalk, Skype, Tencent QQ, Windows Live Messenger™ or MSN Messenger™, Wireclub, Xfire, and Yahoo! Messenger™ email, Twitter (e.g., tweeting), Digital Service Protocol (DSP), and the like. Unified Communications system or tools can make use of video conferencing cloud service including a video conferencing node to allow one or more users located at the first video conferencing endpoint to communicate with one or more users located at the second video conferencing endpoint in a video conference.

"**Screen scraping**" in the sense of the present invention refers to reading the video frame buffers and processing them, rather than just rendering them on a display. Screen scraping for presentations is described in US2002/0196378 to Slobodin et al which is included herein by reference.

"**Auto composition**" or "**auto layout**" refers to the automatic nature in which multiple graphics/video sources are rendered on a central display, without user intervention and in a way that a user would intuitively expect it to happen.

"**Wireless**" and "**wireless communication network**" can be any network that does not use cable links between nodes, e.g. uses RF, optical or InfraRed for communication purposes, such as IrDA, diffuse infra-red, WLAN, WiMax, WiFi, WiFi Direct, LiFi, ultrasound, ZigBee, or Bluetooth or any other wireless communication network known to the person skilled in the art.

"**Computer**" generally refers to a processing device, i.e. having a processing engine capable of various types of digital processing, such as rendering graphics images for display. A computer can be in the form of a work station, a personal computer, a laptop, a palm top, a PDA, a smartphone, a tablet etc. Generally a computer has memory such as volatile RAM. Non-volatile memory such as a hard disc, optical disk or solid state memory can be included in the computer or can be a peripheral device. Currently most computers are electronic but the term "computer" also includes optics based computing devices.

The term "**pre-installed generic driver**" is intended to mean a driver which is installed on a processing device such as a computer as a standard driver, e.g. is installed with the installation of the operating system. Such a driver is standard for the operating system and can drive a standard class of peripheral devices coupled to or connected to the processing device. The installation of a specific driver for such a peripheral device is not required. Such a generic driver can be a human interface driver (HID) or a mass storage device driver, which has predetermined software components configured for driving mass storage, a CD-ROM, a keyboard etc. or combinations of these. Such devices can be readable and writable computer peripheral memory devices such as USB memory sticks, flash memories, external hard drives, or more.

"Host device" is a processing device that wants to share using a first peripheral device or dongle.

"**Functional device**" is a second peripheral device connected in some way to a base unit. The system has the ability to expose second peripheral devices connected to the Base Unit to the first peripheral device transparently as if it were attached to the processing device to which the first peripheral device is connected.

"Endpoints" can be described as data sources or sinks and are defined for USB Devices which can be physical devices or virtual devices. In the present invention endpoints should be interpreted broadly as data sources or sinks. Hence data can be stored at an endpoint or emitted. An endpoint can act as a kind of buffer can be defined for physical devices or virtual devices. The data stored at an endpoint may either be received from or waiting for being sent to the host such as a USB Host. An endpoint is defined by a number of descriptive fields. For example, an endpoint can be configured to support different transfer types such as four transfer types. These transfer can be as defined in the USB specification, e.g. Control Transfers, Interrupt Transfers, Isochronous Transfers, and Bulk Transfers. The skilled person can use these transfer types as required in the present invention. Within the limits of the hardware, endpoints can be configured using middleware, e.g. USB Middleware. An endpoint can be limited to a certain transfer type. A USB Host's client may send data to an Endpoint 1 for example. Coming from the USB Host, the data will be sent to the OUT Endpoint 1. The software running will then read the data as soon as it is ready to do so. Returning data has to be written to the IN Endpoint

1, as the software cannot access the USB bus freely as the USB bus is controlled by the USB Host. The data in IN Endpoint 1 stays there until the host sends an IN packet to Endpoint 1 requesting the data.

A limit can be placed on the number of endpoints. Each endpoint can have one transfer direction. A specific endpoint can be defined, for example, for control transfers only and cannot be assigned to any other function.

Control Transfers can be bi-directional transfers reserved for the host to send and request configuration information to and from a device using a specific IN and OUT Endpoint.

Each Control Transfer can comprise a number of transactions. Control Transfers can have several stages:

1. The **SETUP** stage carries a Setup packet, defining the request, and specifying how many data should be transferred in the DATA stage.
2. The **DATA** stage is optional. If present, it always starts with a transaction containing a DATA1 packet. Then, the transaction type alternates between DATA0 and DATA1 until all required data have been transferred.
3. The **STATUS** stage is a transaction containing a zero-length DATA1 packet. If the DATA stage was IN, then the STATUS stage is OUT, and vice-versa.

Interrupt Transfers have a limited latency to or from a device. In USB, an Interrupt Transfer, or Interrupt Pipe, has a defined polling rate. Typically, Interrupt Transfer data consists of event notifications, characters, or coordinates from a pointing device.

Isochronous Transfers are used for transmitting real-time information such as audio and video data, can be sent at a constant rate. USB isochronous data streams are allocated a dedicated portion of USB bandwidth to ensure that data can be delivered at the desired rate. An Isochronous pipe sends a new data packet in every frame, regardless of the success or failure of the last packet. Isochronous Transfers need not have error detection. Any error in electrical transmission is not corrected.

Bulk Transfers are used for data which are not of the type Control, Interrupt, or Isochronous. Reliable exchange of data is ensured at the hardware level using error detection.

Bulk Transfers take up all the bandwidth that is available after the other transfers have finished. If the bus is very busy, then a Bulk Transfer may be delayed.

"**A specific device exposes a peripheral device or other device**" means that the specific device configures one or more endpoints with specific descriptor fields.

Detailed Description of the Invention

Embodiments of the present invention allow a wireless connection between a user processing device such as a laptop, computer, PDA, smartphone etc. and a base unit of a wireless network. The wireless connection may be made by an integrated wireless transceiver in the user processing device such as the laptop, the computer, the PDA, or the smartphone etc. Alternatively, in some embodiments of the present invention the wireless connection is made via a first peripheral device plugged into, coupled, connected or attached in some way to the user processing device or is provided by other hardware or software.

Embodiments of the present invention allow users, e.g. participants in a meeting room, to make use of at least one functional device, some functional devices or all functional equipment attached to the base unit whereby the at least one functional device has an electronic output such as a digital electronic output and can co-operate with other devices plugged into, coupled, connected or attached in some way to the base unit or is provided by other hardware or software. The at least one functional device can be provided by either plugging in a second peripheral device e.g. a dongle or by a wireless connected second peripheral device or by connecting to the at least one functional device with some software which can be downloaded or pre-installed. The at least one functional device can have an electronic output such as provided by a touch screen, a microphone, a speakerphone, a camera and can function with devices which have an electronic input such as a display or a speaker. Embodiments of the present invention provide the functional device for shared use by participants in a classroom or meeting room.

The at least one functional device coupled or connected or attached to the base unit, e.g. via a serial connection such as a serial plug-and-play connection e.g. USB or via a wireless connection such as a Near Field Communication (NFC) connection, e.g. a

Bluetooth connection, an IR connection etc. is made accessible and usable to one or more users in the meeting room or classroom. Preferably this is done in a transparent and standard way. In different cases, the system can behave as a wireless (e.g. USB) hub, in another case, the first peripheral device or other hardware or software exposes a virtual device that has the same functionality or more as the combined functionalities of the functional devices e.g. second peripherals which are coupled or connected or attached to the base unit.

Embodiments of the present invention make use of a base unit, the base unit comprising at least a transmitting function and usually a transmitting and receiving function such as a transceiver function. The base unit is a base unit of a network such as a wireless network and hence can have a transmitter, a receiver or a transceiver. The base unit can be a hardware box comprising a digital processing engine such as an FPGA, a CPU, a GPU etc. as well as memory and input/output ports and which is adapted for connection to e.g. by plugging it in, any functional device such as one or more second peripheral devices that can be used in a meeting room or classroom with or without visual or audio capabilities. Functional devices, such as the one or more second peripheral devices, for use with the base unit can include one, some or all of a television or other video provider e.g. providing images such as video over an HDMI, DVI, USB or other connection, an image capturing device such as a camera, e.g. for providing captured images like video over a USB or HDMI or other connection, audio devices such as speakerphones providing audio such as speech or music over a USB connection or other connection, or speakers over a USB connection, making use for example of a 3.5mm audio jack, SPDIF or other connection, or one or more microphones making use for example of a 3.5mm jack, USB or other connection, display devices such as touchscreens making use for example of a USB or other connection, all-in-ones over a USB connection and any other functional device or first peripheral device that can be connected to e.g. plugged into the first device such as the base unit and which have, for example, an electronic output such as a digital electronic output.

Embodiments of the present invention comprise a device such as a first peripheral device comprising at least a receiving function and usually a transmitting and receiving function such as a transceiver function. The first peripheral device (being at least a receiver device) can be hardware e.g. having a wireless or wired connection capability, software or a

combination of both that can be connected to the base unit over a wireless connection such as a Wi-Fi, Bluetooth, Wi-Gig, Li-Fi, NFC or similar connection, or a wired link e.g. a USB, Ethernet, etc. connection. This allows the base unit to expose and make available any functional device such as a second peripheral device that is connected to the base unit, to one or more first peripheral devices (e.g. receiver devices) such as to expose and make available simultaneously with a plurality of first peripheral device (e.g. receiver devices) in one of following ways:

1. By exposing the or each functional device (such as the or each second peripheral device) connected to the base unit in a one-on-one manner or in a one to more of the first peripheral devices or user processing devices manner, e.g. to one or more first peripheral devices or user processing devices, preferably without interpretation or processing the electronic signals from each functional device e.g. the second peripheral device e.g. by tunneling the packets from the base unit to the endpoints of the one to more of the first peripheral devices or user processing devices.
2. By interpreting, processing and translating the electronic signal coming from the at least one functional device, e.g. the second peripheral device and, for example mimicking the at least one functional device, e.g. the second peripheral device at the first peripherals' end (e.g. receiver devices' end), either in software or hardware or both. With mimicking is meant that the same device is exposed in the endpoints as the second peripheral device connected with the base unit although the communication is not simply being tunneled as in the first and second methods described above.
3. By combining one or more functional devices, e.g. second peripheral devices or part of a second peripheral device and exposing it to the one or more first peripheral devices, e.g. receiver devices through a custom device in hardware, software or both.
4. By combining one or more functional devices e.g. second peripheral device(s) or part of a second peripheral device and exposing its functionality to the end user through proprietary software.
5. By combining any of the above methods to provide the function of the functional device e.g. the second peripheral device to the one or more first peripheral devices such as receiver devices.

When a functional device, e.g. a second peripheral device is exposed natively or as a mimic of such a device in hardware, use can be made of endpoints such as USB endpoints on the first peripheral device or the user processing device which can expose the corresponding second peripheral devices such as USB devices connected to or plugged into the base unit (as is done in a hub), so no proprietary software or drivers need to be installed to support this.

When exposing custom devices, i.e. specifically developed to work with the present invention use is made of these same endpoints of the first peripheral devices such as the receiver's hardware or it can be done in software with a driver.

A first peripheral device can be used to set up a connection such as a wireless or wired connection between a first peripheral device and base unit, e.g. by acting as a hub such as a wireless hub of which a wireless USB-hub is one example. Whatever second peripheral device is connected to or plug into the base unit e.g. a second peripheral device selected from the non-exhaustive list given above of a TV, video device, audio device, speakerphone, camera, display ..., is exposed to the first peripheral device in any of the 5 ways described above.

Advantages of embodiments of the present invention can be one, some or all of the following:

- In one implementation, all second peripheral devices which can be USB devices are mirrored one on one, needing no additional drivers or software to be installed on the users' processing devices other than the second peripheral's vendor's drivers. The second peripheral devices can be exposed to the user's processing device either by the hardware of the first peripheral device directly, or by using a software virtual hub on the first peripheral device or on the user's processing device.
- In another implementation, different second peripheral devices (e.g. speakers, microphones,...e.g. with electronic outputs and/or inputs) can be combined and connected to the same base unit. Additional functionality such as echo cancellation, translation, encoding/decoding, etc) can be provided in the base unit.

Only one second peripheral needs to be exposed through the first peripheral device to the user's processing device.

- A combination of previous two methods can be provided for one or a combination of devices or functions. Different approaches can be used within one final solution, depending on if the device or function needs to be available to multiple users at once, the technical feasibility of simply mirroring of the device etc.
- By adding some software to the client software running on the user processing device, configuration for these devices can be made easier (e.g. set as default devices) and some custom controls (mute, pan/tilt/zoom,...) can be added.
    - Some controls can be added to the first peripheral device
    - Some processing can be done on the base unit to make such controls obsolete (e.g. automatic gain control on an audio signal, framing of participants to remove the need for ptz)
- Multiple users can use the functional devices in contrast to regular hub, with which only one person can plug in only one cable. Each user processing device to which a first peripheral device is plugged in can use these functional devices and the base unit will make sure all streams are correctly captured, played, processed, combined and/or enhanced.
- Different streams can be given different priority (speed, throughput,...) to adjust to the unpredictable nature of the wireless communication channel. E.g. to prioritize audio streams over video streams to enhance the call experience.
- When having a VOIP call such as a Skype™ call in a meeting, the first peripheral device is connected to, e.g. plugged into a user processing device and all the functional devices connected to the base unit can be used, e.g. a better camera that gives a wide a room view, a better microphone and better speakers). This is especially beneficial when there are multiple people in the room that want to attend the conference call such as a VOIP or skype™ call.

With reference to Figure 1 group 90 is a microprocessor or FPGA based device comprising one or more peripheral devices 91-93 which can be connected to, e.g. plugged into a base unit 100. The peripheral devices 91-93 may be connected to the base unit100 by means of standard connections such as serial connection of which Firewire (IEEE-1394), PCI, Mini PCI, PCI Express, Mini PCI Express, PCMCIA, PC Card, Universal

Serial Bus (USB), SDIO cards, HDMI, DisplayPort, Bluetooth etc.

Group 90 can be used to expose for example the peripheral devices

- A webcam 91
- A speakerphone 92
- A number of HID endpoints 93

The Base Unit 100 has an electronic digital processor such as a microprocessor or FPGA based device and comprises for example:

- A Web interface 110 which is an interface for the base unit 100 in which one can configure the system
- One or more drivers 111, e.g. two specific drivers for webcam 91 and speakerphone 92 running on the base unit 100 to receive or send data from/to the group 90 and USB peripherals 91-93.
- Additional processing is done in blocks 112, 114, 115 for both audio and webcam encoding, mixing, (de)multiplexing and other processing.
- Data can be encrypted or decrypted in decrypters/encryptors 113, 116 before being sent to the first peripheral device 130 over a wireless link 127.
- The control modules 117 in base unit 100, and 37 in the first peripheral device 130 use a control channel 128 between the base unit 100 and the first peripheral device 130 to perform various functions such as keep alive, identification, crypto key exchange etc.
- Unified protocol block 118 is a functional block abstracting primary functions of the system: screen sharing and other non-media streaming (e.g. mouse pointer)
- Encryption and decryption modules 119, 120 are provided for the main communication with the first peripheral device 130 and other applications.
- A encoder such as H264 encoder 121 provides and local view block 123 (which is a functional device or functional devices as it/they emit a signal from the base unit 100 towards the user processing device 160) are provided to capture the rendered image on the main display 126, encode it and send it back to the first peripheral device130 and other clients
- Audio processing blocks 124 are provided for audio content.

- Video decoder 125 is provided to decode and render the screen content to the display 126.

First peripheral device 130 is a microprocessor or FPGA based device comprising for example

- Webcam video coming from webcam 91 of base unit 100 is decrypted in block 30 and exposed to processing device 160 through a USB video endpoint via USB video and drivers such as H264 drivers 31.
- Audio signals from speakerphone 92 connected to the base unit 100 are decrypted in block 32, processed and exposed as microphone signal from the USB speakerphone endpoint 92.
- Audio signals from processing device 160 coming through a Speakerphone USB endpoint is encrypted in block 35 and sent to the Base Unit 100 via wireless connection 127.
- Control HID (Human Interface Device) 51 is a mirror of additional HID USB endpoints that the Group 90 and the second peripheral devices 91-93 have exposed to the Base Unit 100.
- A vendor specific HID endpoint indicated as datapump 42 is used for a channel 52 which can be a high bandwidth data channel between vendor specific software such as software 70 running on processing device 160 and the Base Unit 100 over the first peripheral device 130. Screen video and audio signals for display 126 can be sent over this channel 52. This is preferred compared with doing this over a control HID endpoint in the first peripheral device 130. Also the screen input of display 126 which is captured (block 123) and encoded (block 121) in the Base Unit 100, is sent to the vendor specific software running on the processing device 160 to allow other users such as a plurality of users or participants in a meeting each of which has got a processing device 160 and optionally a first peripheral device 130 plugged in, to view what is on the display 126 on a display (not shown) on their own processing device 160.
- A number of basic components such as the operating system (OS) and the drivers to control optical indicators such as an LED ring on the first peripheral device 130, bandwidth measurement module and other the wi-fi modules, update/upgrade modules e.g. over wireless, secure boot module, secure key storage, debug and test module, etc. are provided in blocks 45 to 50.

- The audio capture module 43 exposes speakers' endpoint to the processing device 160. The module 43 captures this audio and sends it back to the vendor software 70 running on the processing device 160 where it can be timestamped (block 69) and aligned with the video data and then sent, for example, to the Base Unit 100 through the datapump 42. This allows better timestamping and lipsync.
- In a less preferred embodiment the audio can be captured and processed on the first peripheral device 130 and sent immediately to the Base Unit 100.

A microprocessor or FPGA processing device 160 such as a computer, laptop, smart phone, personal assistant (PDA) etc. runs proprietary software 60, 70 including for example 3rd party software (e.g. Skype) 60.

- 3rd party software 60 is running on processing device 160 (e.g. communications software such as Skype™) which uses the video endpoint from the at least one functional device 91-93 (e.g. the webcam 91 that was attached to the Base Unit 100) and/or the speakerphone endpoints (both speakerphone microphone and speakerphone speakers)
- Block 70 comprises software developed and dedicated to the present invention to:
  - Decrypt (61) and decode (62) a pipeline which will then show the screen data of display 126 from the Base Unit 100 in a window of the software. The data following the arrow 71 going out of the last stage (local view 63) is captured by the communications software such as Skype™ client software 60.
  - The unified protocol block 64 is a module that handles the control layer and controls the media paths, the connection to the first peripheral device 130 and (indirectly) the connection to the Base Unit 100.
  - Pipeline 65-67 is for screen capture (67), encoding (66) and encryption (65) for the screen sharing to the Base Unit 100.
  - Pipeline 68, 69 receives the speaker's audio signals (block 68) back from the first peripheral device 130, does processing (e.g. timestamping, block 69) and sends it out through the HID endpoint (the "datapump" 52).
- Endpoints not used by the software in this case are the control HID from the second peripheral devices. If some software were running from the vendor of a second peripheral device, this software can communicate with the relevant second peripheral device over these HID endpoints (e.g. camera pan/tilt/zoom).

- Speakers endpoint (the content audio arrow 53) is used by the operating system (OS) of the processing device 160 to send all (non-speakerphone) sounds/audio signals.

Connecting a first peripheral device to a user processing device

A first peripheral device 130 can be connected to a user processing device 160 by a method 300 as indicated in Figure 2. The connection can be a serial connection such as a USB connection for example, such as USB 1, 2, 3 or -C etc. and the peripheral device 130 is connected to, e.g. plugged into a plug-and-play serial port such as provided for a USB connection. The first peripheral device 130 may include a user input device, e.g. anactuator. The first peripheral device 130 can be configured as a connection unit and can be a physical device in the form of a connector for a plug and play interface of a user processing device. It can have a base and a flexible data and power connection attached to the base. The base can have the actuator, e.g. a button configured to be an input device which can be activated by a user.

The flexible data and power connection should be adapted so that the base lies flat on the meeting table independent of the orientation of the connector needed to insert the connector into the plug and play interface. The base preferably includes electronics and optionally has permanent storage for storing an application such as a portable application. Network configuration parameters for the WiFi connection to the base unit 100 can also be stored in a memory. The first peripheral unit may have a processing engine (e.g. CPU, GPU, FPGA), a wireless transmitter/receiver such as for WiFi or LiFi, a plug and play interface such as a USB interface, a light ring such as an LED ring or strip as visual indicator. The portable application can be stored on the first peripheral device 160, i.e. in the base or it can be downloaded, obtained from on another pluggable device like a flash drive, be downloaded from the base unit 100 etc. The visual indicator is for allowing user feedback from the connection unit of the status of any activity.

Some examples for activation of the actuator which can be used with any of the embodiments of the present invention: Sound activated (hand clap, voice recognition, computer sound, music, ...) Remote controlled via wireless connected device (IR, Bluetooth, WiFi, LiFi...), Light activated, Pressure activated, e.g. depression with a finger

or hand, Touch activated, Proximity ('near-touch' on the actuator or bringing the actuator close to some object, Biometric reader such as Fingerprint reader, Iris scanner, DNA analyser, Keypad, e.g. for entering Keycode e.g. a password.

The method 300 comprises in step 301 connecting the first peripheral device 130 to a processing device 160, e.g. by plugging in. This results in a kernel boot step 302 and exchange of initialization scripts in step 303. The first peripheral device 130 is discovered to be a USB device in step 306 and the USB protocol stack is loaded in step 304 followed by loading the wireless connection protocol stack in step 305. The parameters for the wireless connection are input e.g. from a memory on the first peripheral device 130 or by the user and the wireless connection association completed in step 307. Any client software that needs to be loaded onto the processing device 160 is now loaded and launched in step 308, e.g. by user action. The first peripheral device 130 is now ready in step 310 to share data with a display screen 126 attached to the base unit 100.

As show in Figure 3 if a launcher program is available e.g. stored on the first peripheral device 130 or stored on the processing device 160, or retrievable from a remote location such as a URL on the Internet, or form a LAN server, this can launch the client software in step 328 automatically. Steps 321 to 327 and 329 and 330 are the same as steps 301 to 307 and 309 and 310 of Figure 2.

For example the client software can be the software 70 of Figure 1 running on processing device 160. Other software such as communications software 60 e.g. Skype™ can be pre-installed on processing device 160. Client software 70 can be for the processing of video data from the processing device 160, and this client software is executed on the processing device 160 e.g. using a processing engine such as a CPU, GPU or FPGA. The client software 60 can be screen scraping software that screen scrapes the screen of the processing device 160. This client software 60 can be stored as a software program in memory such as mass storage on the first peripheral device 130. This software program is executed such as loaded onto the processing device 160 when it is coupled thereto, either automatically or by user action as described above. When the software 60 is running on the processing device 160 it is preferred that it leaves zero footprint on termination. The software 60 when executed on the processing device 160 captures the video data that is available on the processing device 160, e.g. from a presentation or video that is running

on the processing device 160. For example, the software 70 when executed on the processing device 160, is adapted to screen scrape, e.g. to read one or more video frame buffers from a graphics card in the processing device 160. Generally the processing device 160 will have its own display and hence will have a graphics card or something equivalent with a buffer for storing video data. This read video information can be time stamped (in block 69) with a clock time, to be able to later synchronize the captured video signal with a related audio signal. The video signal is then encoded in a video encoder (block 66), for transport (arrow 53) over the plug and play interface using a generic driver, such as over a USB interface using generic pre-installed drivers, e.g. a generic pre-installed Human Interface Driver (HID). The data is transmitted to the wireless communications network 127 such as a WiFi or LiFi network and routed over the communications network 127 to the base unit 100, inserted into a suitable composition such as an OpenGL based composition in a compositor for display on the display device 126.

Sending data from the processing device to the base unit

With reference to Figure 4 the audio data on the processing device 160 such as a computer, laptop, smartphone, PDA, tablet etc, the audio is sent over a port using generic drivers such as over a USB port 8 using the standard built- in generic audio driver such as UAC driver 7. On the first peripheral device 130, the audio packets are read from the generic port, e.g. USB port 11 by a dedicated audio device 14. These packets are then processed by any of a mixer a rate converter, an echo canceller, noise canceller or similar. Any of the mixing, rate conversion, echo cancelling, noise cancelling can be executed using an ALSA driver 18. The ALSA driver offers the packets to a dummy audio device 16 such as an audio scraper. In this audio device 16 the audio packets can be time stamped from the clock 15 that can be synchronized with clock 9 of the processing device 31. This information is then encoded in an encoder 17 and packetized in a packetizer 19] before being transferred to the communications network between the first peripheral device 130 and the base unit 100. The network can be a wireless network such as a WiFi or LiFi network. For this purpose a suitable transmitter 21 is provided in the first peripheral device 130. On the base unit 100 the audio information stream is recovered at a suitable communications interface such as the WiFi access point 22. The audio is then unpacked in an unpacker 23, decoded in a decoder 24 before being before being offered

to an audio mixer 28. In order to synchronise the audio and video streams these are both sent to a synchronizer 27 in which the two streams are synchronized and thus keep lip synchronization.

Sending data from the processing device to the base unit

Embodiments of the present invention can capture data such as visual or audio signals and bring these to one or more processing devices 160 so that this captured data can be shared with other participants. These visual or audio signals are captured from, provided by, obtained from functional devices such as a webcam 91 a speakerphone 92, but also captured from display 126. For example, a functional device could be a microphone which located at an appropriate position in a meeting to give good reception of audio data. This can be used with a central speaker system which can be of higher quality than is provided in the processing devices 160 of meeting participants. Such a speaker system could be a quadrophonic surround speaker system for example. This can also avoid the difficulties with multiple microphones and speakers which can result in annoying positive feedback.

Embodiments of the present invention can include the features discussed with respect to Figures 1 to 4 to provide additional functionality which can be shared, for example, by all participants of a meeting who have a processing device 160 optionally with a plug-in first peripheral device 130. In embodiments of the present invention, fixed USB endpoints on the first peripheral device 130 are provided for the basic functionality. These are fixed and are a combination of vendor specific endpoints and a number of standard endpoints and can be interpreted or understood as a custom Driver, a default OS driver and/or a host application as has been described with reference to Figure 4 do screen sharing and audio.

The configurable USB endpoints are configured either when pairing a first peripheral device 130 device with a base unit 100 or over the wireless connection 127 between the processing device 130 and the base unit 100. Once configured, the USB endpoints will expose second peripherals devices 91-93 which can be interpreted as custom drivers, vendor specific drivers or default OS drivers. These can be used by either a host application or third party applications. These endpoints can be an exact copy of the ones of the second peripheral device 91-93 connected to the Base Unit 100 or can be dedicated specified endpoints.

Communication of these USB endpoints with the processing device 160 can be done through standard enumeration of the USB endpoints when connecting, such as plugging in, the first peripheral device 130 to the processing device 160. All information on how to communicate with the Base Unit 100 and which endpoints to expose can be stored on the first peripheral device 130 and can be be set up by firmware of the first peripheral device 130.

The decision of which endpoints the first peripheral device 130 should expose can be determined by the Base Unit 100, which can be adapted to analyze which second peripheral devices are connected to the Base Unit 100 (which connection can be through a USB connection or other) and create a configuration for the relevant USB endpoint on the first peripheral device 130.

As indicated above, for embodiments of the present invention, during operations, data can flow in both directions, i.e. to or from the processing device 160:

1. Data from a second peripheral device connected to the Base Unit 100 can flow into the Base Unit 100, or can be captured in the base unit 100 such as data for display 126. Any such data can be interpreted and possibly processed, enhanced, encoded and/or encrypted using firmware of the base unit 100 to generate processed data. In some embodiments this processed data will then be sent to the first peripheral device 130 device through a wireless link 127. This first peripheral device 130 will, if necessary, decode, decrypt, process and/or interpret the data and make it available through one or more of the USB endpoints of this first peripheral device 130 (e.g. either the fixed or the configured ones). This data will then be captured by the operating system of the processing device 160 and will be made available through a custom or standard driver to either the host application or a 3rd party application running on the processing device 160 or to other processing devices 160 of other participants of the meeting.
2. Data, which might be coming from the host application and/or one or more 3rd party applications running on the processing device 160 can be sent through a handle which is made available by the system. The data will then be sent to the appropriate USB endpoint of the first peripheral device 130 through the system

(standard generic) drivers and the USB port. The first peripheral device 130 will then receive this data via firmware of the first peripheral device 130, where it will process, enhance, encode and/or encrypt the data and send it through the wireless link 127 to the Base Unit 100. The Base Unit 100 will receive the data via firmware on the base unit 100, will decrypt, process, decode and/or enhance the data and forward it to the appropriate first peripheral device, which can be connected or attached to the Base Unit 100 through a serial connection such as USB, HDMI or other interface.

Such a meeting of multiple participants is shown schematically in Figure 6 with four processing devices 160 (160-1, 160-2, 160-3, 160-4) which can be laptops. Three of the processing devices (160-1, 160-2, 160-3) each are connected to a first peripheral device 130, e.g. by inserting in a USB connection. One processing device 160-4 can be the host of a Unified Communication (UC) call such as a Skype call or a Skype for Business call. The first peripheral devices of two of the processing devices (160-1, 160-2) have completed connection to a WiFi connection with a base unit 100 and are sharing media to the main screen 126.The processing devices 160-3 and 160-4 are sharing the Unified Communication (UC) call such as the Skype call or a Skype for Business call.

Connected to the Base Unit 100 is or are any of the following:

- Webcam 91
- A 4K touch screen 94
- A camera 95, connected through USB or HDMI
- A USB speakerphone 92
- USB microphone 96 and a speaker set 97 (connected through an audio jack, s/pdif, USB, HDMI, etc.)

The host processing device 160-4 has pre-installed UC client software. This software interacts with USB endpoints on the first peripheral device 130 connected to e.g. plugged into the host. This type of client software will use speakerphone USB endpoints as a default audio device (e.g. microphone plus speaker). Embodiments of the present invention are in control of all audio or visual signals emitted from and injected in the processing device 160.

The speakerphone 92 can be used by any of the users at least with a first peripheral device 130 connected and functioning. There is no need to perform an action to get access to this device. Separate controls can be made available on a first peripheral device for example to control the volume of the audio output of the Base Unit 100 and to mute the room microphone 96 if necessary. When muted, the microphone 96 is also muted for all other Buttons or apps using this device.

The UC client software 60 running on the host processing device 160-4 does not inject the audio content. The microphone 96 can pick up this signal, or the Base Unit 100 can inject it in the microphone signal to the first peripheral device 130 connected to the host 160-4. There is no need for lip-sync with the content video (even if sharing) as the latency is low.

The same type of second peripheral device is exposed to a user as is plugged in into the Base Unit 100 so that the user can use the drivers provided by the vendor.
If one of the processing devices 130 is sharing in the room, the content audio is shared in the room too.

A processing device with functioning first peripheral device can access the room camera 96 wirelessly. All other devices connected to the Base Unit 100 (e.g. HID control devices 93) will be exposed natively.

Any user connected to the system e.g. through a first peripheral device has the ability to view the content that is projected in the meeting room on a display of the user's processing device, i.e. "local view". The receiver of the local view can have, but is not limited to, one some or all of the following functionality:

The ability to open a window and view the meeting room content in that window independently of whether it is the stream itself, the annotation or a blackboard session.

The ability to zoom into the content.

Additional measures to assure the picture quality when zooming in can be added to the feature

The local view could allow the user to start and/or participate in a blackboard or annotation session from his/her own device
The ability to take screenshots and/or pause the local view.

Figures 6 to 15 and 17 show ways of making various functions available to participants in a room, e.g. a meeting. There are four basic methods each of which is an embodiment of the present invention:

a) to use a generic driver of the OS 164 of the host processing device 160 and endpoints like mass storage or HID endpoints to allow transfer of data using client software running on the host processing device 160 without the host processing device 160 being aware that the final device is a functional device like a camera, touchscreen, microphone, loudspeaker, speakerphone etc. which is connected in or with the base unit 100.
b) to have an endpoint on the first peripheral device of a functional device connected with or in the base unit 100 which means that the host processing device 160 detects that it is connected to the functional device and interacts with it as if it were such a device.
c) to have an endpoint on the first peripheral device of a functional device connected with or in the base unit 100 which means that the host processing device 160 detects that it is connected to the functional device but client software needs to have the vendor specific drivers to be able to interact with the functional device.
d) to have an endpoint on the first peripheral device of a functional device connected with or in the base unit 100 which means that the host processing device 160 detects that it is connected to the functional device but pre-processing is made on the base unit 100 so that the processing device 160 can interact with the functional device. One method is to make a common endpoint on the first peripheral device so that the processing device can work with any functional device for which preprocessing exists in the base unit 100.

Figure 6 shows the processing device 160 in communication with a first peripheral device 130 connected thereto, base unit 100 in wireless communication 127 with the first peripheral device 130. Various functional devices such as a display 126, a speakerphone 92 (or microphone and speaker set 96, 97) and a videocam 91 (or other camera 95) are connected to the base unit 100.

A generic driver allows the client software 70 to transfer data to and receive data from a

mass storage device 132 on the first peripheral device 130 via a USB interface 131. The client software 70 also has a USB endpoint 134 which can be a USB HID endpoint and if necessary a vendor specific endpoint. This endpoint 134 is the endpoint for the client software 70 for transmitting the data for the display 126 to the base unit 100 where the data can be image processed (blocks 124, 125 of Figure 1) before being transmitted to the group 90 e.g. via an HDMI connection or similar. Thus the HID endpoint 134 makes the HDMI display 126 and its audiovisual signals available to any processing device 160 with a first peripheral device attached thereto, when in a meeting room. However the display 126 is not exposed on the processing device 160, i.e. it is not presented as a display but as an HID endpoint. The videocam 91 can be exposed on the first peripheral device 130 as an endpoint (in a way as described for Figure 1), the video data being encoded e.g. in block 122 of Figure 1. Alternatively, as shown in Figure 6, the video data is encoded in the base unit 100 and is sent via the first peripheral device 130 to a driver 162 of the operating system 164 of the processing device 60 which exposes the encoded data from the videocam 91 on the processing device 160 and makes the video data available to the UC call, e.g. Skype™.

Data from the speakerphone 92 can be processed on the base unit 100 and/or on the first peripheral device 130 and can be mimicked to the processing device 160. The microphone of the speakerphone 92 generates a signal that is transmitted to the processing device 160 via a USB speakerphone endpoint 136 on the first peripheral device whereby any noise reduction or echo cancellation can be carried out in the base unit 100 as described with respect to Figure 1 (block 115). The microphone data is made available to the UC call as the speakerphone endpoint 136 is recognized by the processing device 160 as a speakerphone as if the speakerphone were plugged into the processing device 160. Also the microphone data is made available to all other users who have a processing device 10 with a connected first peripheral device. In this embodiment the speaker of the speakerphone has its USB endpoint 136 on the first peripheral device 130.

Figure 7 shows a similar configuration to that of Figure 6 except there are two USB endpoints 136 and 138 for a speakerphone and a speaker respectively. As previously, the HID endpoint 134 makes the HDMI display 126 available to any processing device 160 with a first peripheral device 130 attached thereto when in a meeting room for providing audiovisual signals to the display 16. However the display 126 is not exposed on the

processing device 160, i.e. it is not presented as a display but as an HID endpoint.

The two endpoints 136, 138 receive audio signals from two different sources. The sound from the UC call can be dealt with as described for Figure 6 via the speakerphone endpoint 136 and processing on the base unit. But if there is additional audio data which is not part of the UC call, this data is sent via the speaker endpoint 138. As there is no second peripheral device in the group 90 which is a standalone speaker, the base unit 100 mixes the audio signals for the speakerphone and the speaker before sending all audio data to the speaker of the speakerphone 92. If there were a separate speaker 97 in group 90, then the base unit 100 could send this audio data to the speaker. The result is that a virtual speaker has been exposed on the processing device 160.

Figures 8 to 11 and 17 describe various embodiments of the present invention with the example of how a touchscreen 99 is made available in a meeting room. When a touchscreen is touched it generates a signal related to the co-ordinates of the touch position. This needs to be conveyed to processing devices 160 in a meeting whereby the actual signals must be interpreted if they are to be applied to a different screen on the processing device 160. If there is a meeting with a variety of processing devices being used by participants, then a method needs to be found of presenting the touch co-ordinates to all the different processing devices. Figures 8 to 11 disclose the four basic methods mentioned above.

In the embodiment of Figure 8, there is a group 90, base unit 100, first peripheral device 130 and processing device 160. There are two functional devices connected to or in the base unit 100, namely a display 126 and a touchscreen 99. The touch screen 99 has a touchscreen endpoint 139 in the first peripheral device 130. The processing device 160 recognises this endpoint and can interact with it if the OS 164 has the relevant driver 162. This driver can be downloaded if required. This embodiment requires that each processing device 160 in a meeting downloads or has installed the relevant driver 162.

In the embodiment of Figure 9, there is a group 90, base unit 100, first peripheral device 130 and processing device 160. There are two functional devices connected to or in the base unit 100, namely a display 126 and a touchscreen 99. The touch screen 99 has a touchscreen endpoint 139 in the first peripheral device 130. The processing device 160

recognises this endpoint and can interact with it if the base unit 100 is adapted to translate the co-ordinates of the touch to ones that can be used by the processing device 160, i.e. the OS 164 has the relevant driver 162. This driver can be downloaded if required. This embodiment requires that each processing device 160 in a meeting downloads or has installed the relevant driver 162 but the translation function of the base unit 100 can reduce the number of different drivers that might be required.

In the embodiment of Figure 10, there is a group 90, base unit 100, first peripheral device 130 and processing device 160. There are two functional devices connected to or in the base unit 100, namely a display 126 and a touchscreen 99. The touch screen 99 has a touchscreen endpoint 139 in the first peripheral device 130. The processing device 160 recognises this endpoint and can interact with it if the base unit 100 is adapted to translate the co-ordinates of the touch to ones that can be used by the processing device 160, i.e. the OS 164 has the relevant driver 162. This driver is a standard driver which can be distributed, e.g. this driver can be downloaded if required. This embodiment requires that each processing device 160 in a meeting downloads or has installed the relevant driver 162 but the translation function of the base unit 100 can reduce the number of different drivers that might be required even more than with the previous embodiment of Figure 9.

In the embodiment of Figure 11, there is a group 90, base unit 100, first peripheral device 130 and processing device 160. There are two functional devices connected to or in the base unit 100, namely a display 126 and a touchscreen 99. The touch screen 99 is now dealt with by the client software 70 as has been described previously, namely that the client software running on the first peripheral device 130 is adapted to interact with the touchscreen 99 through the USB interface 131 and to interact with the OS164 of the processing device 160. This means that the touchscreen 99 is not exposed to the processing device 160. The client software 70 is adapted to simulate a touch event and to provide the correct co-ordinates to the OS164 of the processing device 160. This is therefore a proprietary solution which requires the client software 70 to be adapted to interact with each type of touchscreen 99 through a USB interface 131.

Figures 12 to 14 relate to embodiments of the present invention in which there are multiple users. First of all each participant in a meeting can make use of any of the

embodiments described in Figures 8 to 11. Thus the present invention provides multiuser solutions.

In Figure 12 the processing device 60' has no first peripheral device 130, e.g. none is available. In such a case client software 70' can be adapted to interact directly with base unit 100 over a wireless connection 127' and the client software 70' is adapted to provide any simulations, or translations as required to present the display device 126 to the processing unit 160' and to allow interaction therewith. The client software 70' can be adapted to simulate any of the embodiments described with respect to Figures 1 to 11 without however using a first peripheral device 130. The client software 70' can simulate for example a UB interface of the type used in any of the embodiments of Figures 1 to 11. For the processing device 160, the methods described with respect to any of Figures 1 to 11 can be used.

In Figure 13 the processing device 60' has no first peripheral device 130, e.g. none is available. In such a case client software 70' can be adapted to interact directly with base unit 100 over a wireless connection 127' and the client software 70' is adapted to provide any simulations, or translations as required to present the display device 126 to the processing unit 160' and to allow interaction therewit exactly as described with respect to Figure 12. However group 90 has a microphone and speaker combination such as a speakerphone 92 or a microphone and speaker combination 96, 97. Processing device 160 can make use of any of the embodiments of Figures 1 to 11. The client software 70' of processing device 160' can be adapted to provide video data directly to the base unit 100 where it is processed, e.g. decoded and composited and provided to display 126 over a suitable connection such as an HDMI connection.

For the processing device 160' the client software 70' and a driver 162' can present a simulated speakerphone 92 to the OS 164' thus creating a virtual microphone and a virtual speaker. The third party software 60' for the Unified Communication such as the Skype™ call will be presented with these virtual devices which it then uses for the call.

In Figure 14 the processing device 60' has no first peripheral device 130, e.g. none is available. In such a case client software 70' can be adapted to interact directly with base unit 100 over a wireless connection 127' and the client software 70' is adapted to provide

any simulations, or translations as required to present the display device 126 to the processing unit 160' and to allow interaction therewith exactly as described with respect to Figure 13. However group 90 has a videocam 91 connected e.g. via a USB connection to the base unit 100. Processing device 160 can make use of any of the embodiments of Figures 1 to 11. The client software 70' of processing device 160' can be adapted to receive video data directly from the base unit 100.

For the processing device 160' the client software 70' and a driver 162' can present a simulated videocam 91 to the OS 164' thus creating a virtual videocam device. The third party software 60' for the Unified Communication such as the Skype™ call will be presented with all of the virtual devices which it then uses for the call.

Figure 15 shows a messaging flow diagram applicable to any of the embodiments described with respect to figures 1 to 11.

Figure 16 shows a messaging flow applicable to any of the embodiments described with respect to figures 12 to 14 where no first peripheral device is used.

Figure 17 shows a further embodiment of the present invention comprising a processing device 160 with a processor and memory and executing and optionally storing a client software 70 comprising also a host application as well as a third party application 60 which can be adapted to execute a unified communications call such as a Skype™ call or a Skype™ for business call. The processing device 130 has a serial port such as a USB port and generic or custom drivers for communicating across the port with a first peripheral device 130. The peripheral device 130 has a processor and memory and executes and optionally stores firmware which provides a wireless link 127 to a base unit 100 as well as providing at least one configurable or fixed endpoint of a functional device 90 which is connected to or is connected in the base unit 100. The base unit has a processor and a memory for executing and optionally storing firmware for providing a connection to the wireless link 127 and also to provide a port to the functional device 90. The functional device 90 has a processor and memory and executes and optionally stores firmware for providing the link and interface to the base unit 100 and for providing data to be sent to the at least one configurable or fixed endpoints on the peripheral device 130.

What is claimed is:

1. A system for connecting a processing device to a functional device connected to or in a base unit of a communications network, the processing device having a memory, a display and an operating system, the system comprising :

a first peripheral device being adapted to be coupled to the processing device via a generic communications protocol, the base unit having a transmitter and the first peripheral device having a receiver and at least one fixed or a configurable endpoint of the functional device exposed on the first peripheral device;
the base unit and the first peripheral device being adapted to transmit and receive data respectively over the communications network from the functional device to the processing device via the at least one fixed or configurable endpoint using the generic communications protocol for communication between the processing device and the first peripheral device.

2. The system of claim 1 wherein the functional device is any one or more of a microphone, a speakerphone, a speaker, a display, a touchscreen, a projector, a camera, a video camera, a webcamera.

3. The system of claim 1 wherein the at least one fixed or a configurable endpoint of the functional device exposed on the first peripheral device is one of a human interface device, a mass storage device, a composite device, a microphone, a speakerphone, a speaker, a display, a touchscreen, a projector, a camera, a video camera, or a webcamera.

4. The system of claim 1 further comprising means for encoding, optionally encrypting the data.

5. The system of claim 1 wherein the processing device is adapted to host a unified communication between two or more further processing devices.

6. The system of claim 5 wherein the first peripheral device is adapted to present a functional device to the unified communication between two or more processing devices.

7. The system of claim 1 adapted to expose the same type of functional device to the processing device as is connected to the Base Unit further comprising at least one driver for the functional device installed on the processing device.

8. The system of claim 1 wherein the functional device is a second peripheral device.

9. The system of claim 1 wherein the functional device is a data capturing device.

10. A method for connecting a processing device to a functional device connected to or in a base unit of a communications network, the processing device having a memory, a display and an operating system, the base unit having a transmitter and the first peripheral device having a receiver the method comprising :

coupling a first peripheral device being to the processing device via a generic communications protocol, providing at least one fixed or a configurable endpoint of the functional device exposed on the first peripheral device;
transmitting data from the base unit and receiving the data at the first peripheral device over the communications network from the functional device to the processing device via the at least one fixed or configurable endpoint using the generic communications protocol for communication between the processing device and the first peripheral device.

11. The method of claim 10 wherein the functional device provides any one or more of a microphone, a speakerphone, a speaker, a display, a touchscreen, a projector, a camera, a video camera, a webcamera.

12. The method of claim 10 further comprising presenting the at least one fixed or a configurable endpoint of the functional device exposed on the first peripheral device as one of a human interface device, a mass storage device, a composite device, a microphone, a speakerphone, a speaker, a display, a touchscreen, a projector, a camera, a video camera, or a webcamera.

13. The method of claim 10 further comprising encoding, and/or optionally encrypting the data.

14. The method of claim 10 further comprising hosting a unified communication between two or more further processing devices on the processing device.

15. The method of claim 14 further comprising the first peripheral device presenting a functional device to the unified communication between two or more processing devices.

16. The method of claim 10 comprising exposing the same type of functional device to the processing device as is connected to the Base Unit and using at least one driver for the functional device installed on the processing device.

17. A peripheral device adapted to be coupled to a processing device via a generic communications protocol, the peripheral device having a receiver and at least one fixed or a configurable endpoint of a functional device exposed on the first peripheral device; the receiver of the first peripheral device being adapted to receive data over the communications network from the functional device and for sending the data to the processing device via the at least one fixed or configurable endpoint using the generic communications protocol for communication between the processing device and the peripheral device.

18. The peripheral device of claim 17 wherein the at least one fixed or a configurable endpoint of the functional device exposed on the first peripheral device is one of a human interface device, a mass storage device, a composite device, a microphone, a speakerphone, a speaker, a display, a touchscreen, a projector, a camera, a video camera, or a webcamera.

19. A computer program product for carrying out any of the method steps of claim 10 when executed on a processor.

20. A non-transitory signal storage means storing the computer program product of claim 19.

Abstract

A system and method for connecting a processing device to a functional device connected to or in a base unit of a communications network, the base unit having a transmitter and the processing device having a memory, a display and an operating system. A first peripheral device is adapted to be coupled to the processing device via a generic communications protocol, the first peripheral device having a receiver and at least one fixed or configurable endpoint of the functional device exposed on the first peripheral device. The base unit and the first peripheral device is adapted to transmit and receive data respectively over the communications network from the functional device to the processing device via the at least one fixed or configurable endpoint using the generic communications protocol for communication between the processing device and the first peripheral device.

Electronic Acknowledgement Receipt	
EFS ID:	31368735
Application Number:	15858668
International Application Number:	
Confirmation Number:	6421
Title of Invention:	METHOD AND SYSTEM FOR MAKING FUNCTIONAL DEVICES AVAILABLE TO PARTICIPANTS OF MEETINGS
First Named Inventor/Applicant Name:	Gauthier RENARD
Customer Number:	23364
Filer:	Thomas J. Moore/Kaitlyn Miller
Filer Authorized By:	Thomas J. Moore
Attorney Docket Number:	RENA3002/TJM/TL
Receipt Date:	29-DEC-2017
Filing Date:	
Time Stamp:	16:11:43
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	$1740
RAM confirmation Number	010218INTEFSW00004348020200
Deposit Account	020200
Authorized User	Kaitlyn Miller
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.17 (Patent application and reexamination processing fees) 37 CFR 1.19 (Document supply fees)	

37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	RENA3002_ADS_AIA.pdf	1822909 4505181e76ceba462b1f5f0ed2ccb8096ef50ba7	no	8
Warnings:					
Information:					
2	Transmittal of New Application	RENA3002_App_Transmittal.pdf	277221 9e349962b7c5d27c7b3d5a0a905cba3679a91957	no	2
Warnings:					
Information:					
3	Fee Worksheet (SB06)	RENA3002_Fee_Transmittal.pdf	257055 febd525d2bb161975ee836c43726519f1385ea85	no	2
Warnings:					
Information:					
4	Drawings-only black and white line drawings	RENA3002_Drawings_filing.pdf	2686234 e713cf84839a065239c1775f098387b5b41343dd	no	19
Warnings:					
Information:					
5		RENA3002_Application_filing.pdf	361669 d0b09bb82dd26fa3c4a20f0c768f6609522dc680	yes	38

Multipart Description/PDF files in .zip description

Document Description	Start	End
Specification	1	34
Claims	35	37
Abstract	38	38

Warnings:					
Information:					
6	Fee Worksheet (SB06)	fee-info.pdf	36767 b24b458f2ebfded40b201bc09012c66bd00499d3	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	5441855	

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	RENA3002/TJM/TL
	Application Number	
Title of Invention	METHOD AND SYSTEM FOR MAKING FUNCTIONAL DEVICES AVAILABLE TO PARTICIPANTS OF MEETINGS	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2:

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Gauthier		RENARD	

Residence Information (Select One) US Residency ● Non US Residency Active US Military Service

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Address 2	

City	Oudenaarde	State/Province	
Postal Code	B-9700	Country [i]	BE

Inventor 2 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Johan	Peter Frans	DEGRAEF	

Residence Information (Select One) US Residency ◉ Non US Residency Active US Military Service

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Mailing Address of Inventor:

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Address 2	

City	Gent	State/Province	
Postal Code	B-9000	Country [i]	BE

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	RENA3002/TJM/TL
	Application Number	
Title of Invention	METHOD AND SYSTEM FOR MAKING FUNCTIONAL DEVICES AVAILABLE TO PARTICIPANTS OF MEETINGS	

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	23364		
Email Address	mail@baconthomas.com	Add Email	Remove Email

Application Information:

Title of the Invention	METHOD AND SYSTEM FOR MAKING FUNCTIONAL DEVICES AVAILABLE TO PARTICIPANTS OF MEETINGS		
Attorney Docket Number	RENA3002/TJM/TL	**Small Entity Status Claimed**	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	19	**Suggested Figure for Publication (if any)**	

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	● Customer Number	US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	23364		

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	RENA3002/TJM/TL
	Application Number	
Title of Invention	METHOD AND SYSTEM FOR MAKING FUNCTIONAL DEVICES AVAILABLE TO PARTICIPANTS OF MEETINGS	

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status			Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button. Add

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)[i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Remove

Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[i] (if applicable)

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button. Add

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	RENA3002/TJM/TL
	Application Number	
Title of Invention	METHOD AND SYSTEM FOR MAKING FUNCTIONAL DEVICES AVAILABLE TO PARTICIPANTS OF MEETINGS	

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	RENA3002/TJM/TL
	Application Number	
Title of Invention	METHOD AND SYSTEM FOR MAKING FUNCTIONAL DEVICES AVAILABLE TO PARTICIPANTS OF MEETINGS	

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1 — Remove

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

● Assignee	Legal Representative under 35 U.S.C. 117	Joint Inventor
Person to whom the inventor is obligated to assign.	Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor:

If the Applicant is an Organization check here. ☒

Organization Name	BARCO NV		
Mailing Address Information For Applicant:			
Address 1	President Kennedypark 35		
Address 2			
City	Kortrijk	**State/Province**	
Country	BE	Postal Code	B-8500
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button. Add

Assignee Information including Non-Applicant Assignee Information:

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	RENA3002/TJM/TL
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Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

Remove

If the Assignee or Non-Applicant Assignee is an Organization check here. ☒

Organization Name	BARCO NV

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1	President Kennedypark 35		
Address 2			
City	Kortrijk	**State/Province**	
Country i	BE	Postal Code	B-8500
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button. Add

Signature:

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NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). **However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).**

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/Thomas J. Moore/			Date (YYYY-MM-DD)	2017-12-29
First Name	THOMAS	Last Name	MOORE	Registration Number	28974

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	RENA3002/TJM/TL
	Application Number	
Title of Invention	METHOD AND SYSTEM FOR MAKING FUNCTIONAL DEVICES AVAILABLE TO PARTICIPANTS OF MEETINGS	

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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The information provided by you in this form will be subject to the following routine uses:

1 The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3 A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent CooperationTreaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

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Method and System for making functional devices available to participants of meetings

The present invention relates to methods, devices and systems for making functional devices available to participants of meetings, as well as software for carrying out such methods.

Background

Allowing ad hoc groups of persons to communicate with each other is one of the fundamental aspects of collaboration, problem solving, negotiation, teaching and education, etc. To assist in communication, there has been an explosion of electronic communication tools such as electronic conferencing tools, e.g. synchronous and asynchronous conferencing, online chat, Instant Messaging, audio conferencing, videoconferencing, data conferencing, application sharing, remote desktop sharing, electronic meeting systems, collaborative management (coordination) tools, project management systems, knowledge management systems, and social software systems.

One classic approach is the lecture or seminar often involving a presentation using presentation software. To a large extent the traditional single person presentation or lecture has been maintained with the audience being in a rather passive mode as far as determining, constructing, augmenting or modifying the information to be presented is concerned.

As with other business processes, meetings are going digital. Increasingly, people are using computer technology alone and in conjunction with broadband networks to support their meeting objectives prior to and during an actual meeting. For example, e- mail is used to pass around files for people to read prior to a meeting.

However, certain functionalities such as microphones and load speakers tend to have a low quality if these are provided by portable devices such as laptops and mobile phones. As meetings get larger in size there is a need for high quality audio as well as visual signals to be made available to participants at a meeting.

Summary of the Invention.

Embodiments of the present invention relate to methods, devices and systems for making functional devices available to participants of meetings, as well as software for carrying out such methods.

Embodiments of the present invention provide a system for connecting a processing device to a functional device connected to or in a base unit of a communications network, the processing device having a memory, a display and an operating system, the system comprising :

a first peripheral device being adapted to be coupled to the processing device via a generic communications protocol, the base unit having a transmitter and the first peripheral device having a receiver and at least one fixed or configurable endpoint of the functional device exposed on the first peripheral device;
the base unit and the first peripheral device being adapted to transmit and receive data respectively over the communications network from the functional device to the processing device via the at least one fixed or configurable endpoint using the generic communications protocol for communication between the processing device and the first peripheral device.

The communications network is preferably a wireless network. This enables the **sharing or combining** of at least a selection of functionalities/endpoints of the secondary peripheral devices, i.e. the one-to-many scenario.

The data that is transmitted or received, i.e. streaming data carrying images, audio, etc. can be in a raw or unaltered format.

There can be more than one first peripheral device. For example, the data can be transmitted from the functional device to at least two processing devices using at least two first peripheral devices.

A functional device can be run with a vendor specific driver alone.

The functional device can be a data generating device such as any one or more of a

microphone, a speakerphone, a speaker, a display, a touchscreen, a projector, a camera, a video camera, a webcamera.

The at least one fixed or configurable endpoint of the functional device exposed on the first peripheral device can be a human interface device.

The processing device can be adapted to communicate with the at least one fixed or configurable endpoint with the pre-installed generic driver being a human interface device driver.

The at least one fixed or configurable endpoint of the functional device exposed on the first peripheral device can be a mass storage device.

The processing device can be adapted to communicate with the at least one fixed or configurable endpoint with a pre-installed generic driver being a mass storage device driver.

The at least one fixed or a configurable endpoint of the functional device exposed on the first peripheral device can be a composite device.

The processing device can be adapted to communicate with the at least one fixed or configurable endpoint with a pre-installed generic driver being a composite device driver.

Embodiments of the present invention include the combining of endpoints: the present invention includes a system wherein two endpoints are combined and exposed to the processing device as one endpoint.

An **exposure** or **enumeration** feature determines which endpoints the first peripheral (e.g. button) sees. With respect to **exposure** this can be done with **descriptor fields.** A specific device can expose a peripheral device or other device. This means that the specific device configures one or more endpoints with specific descriptor fields or **descriptive field**. An endpoint is defined by a number of descriptive fields.

A basic form of descriptive fields can be “USB over IP”, and the actual transfer of the

unaltered data can be done with tunneling.

The exposure can be implemented with **descriptor fields**. The Endpoints are the **capabilities/functionalities** of the **physical devices** (second peripherals, or functional device), e.g. a telephone device is a second peripheral while it can have several endpoints, e.g. a microphone or a loudspeaker or an IP connection, etc.

The **differentiation** between endpoints and second peripherals/functional devices defines endpoints.

Embodiments of the present invention provide a system that enables the use of the original vendor's driver for each functional device (and related endpoint), e.g. in the context of mirroring. Hence the functional devices can be run with the vendor specific driver alone.

The system can comprise means for encoding, optionally encrypting the data. Hence the system may comprise an encoder for encoding, optionally encrypting the data.

The processing device can be adapted to host a unified communication between two or more processing devices. The unified communication can be a Skype™ call or a Skype™ for Business call. The first peripheral device can be adapted to present the functional device to the unified communication between two or more processing devices. For example, the functional device can be a speaker phone, a microphone, a speaker, a videocamera, a webcam, a camera, or other audio source.

The system can be adapted to share data from other processing devices in a meeting in the call. A manual action can be used to activate this sharing to be performed by the person sharing or the host via local view window.

The system can be adapted to select of a camera, e.g. via a manual action in UC clients. The system can be adapted to synchronize the sharing state of the first peripheral device with the sharing state of the UC client.

Sharing of functionalities/endpoints can be sharing of a room display. Combining of resources can be using two room loudspeakers (e.g. to increase quality) but the user only

sees "one room loudspeaker". The latter case would also comprise the combining feature if there are more than one participant/user in the room. Sharing is also envisioned as a selection of functionalities/endpoints of a certain functional device.

Embodiments of the present invention can use multiple endpoints, at least one fixed or configurable endpoint and the sharing can be to multiple processing devices, i.e. the use of **multiple first peripherals** (e.g. buttons) is also supported.

The system can be adapted to provide a multiuser wireless speakerphone. The speakerphone can be made accessible to every processing device in a meeting with a first peripheral device connected to each of the processing devices. There is no moderation or need to perform an action to get access to this device.

The system can be adapted to provide separate controls, e.g. on the peripheral device to control a volume of an audio output of the Base Unit and to mute a room microphone. When muted, a microphone can also be muted for all other first peripheral devices connected to processing devices in a meeting.

Audio signals should be picked up by a microphone or the Base Unit can be adapted to have to inject audio signals in any audio feed such as in a microphone signal to a first peripheral device connected to a processing device.

The system can be adapted to expose the same type of functional device to the user as is connected to the Base Unit so that a user can use drivers provided by a vendor of the functional device installed on the processing device.
The system can be adapted such that for a plurality of processing devices communicating with the Base Unit, a functional device connected to the base unit will be exposed to all the plurality of processing devices. The functional device can be exposed natively.

Exposure can be implemented with **descriptor fields**.

The system can be adapted to allow any processing device connected to the communications network through the first peripheral device the ability to view any audiovisual content that is displayed, provided or projected in the meeting room on that

processing device called “local view”.

A processing device which is a receiver of the local view can have, but is not limited to, following functionality:

- The ability to open a window and view the meeting room content in there.
- The ability to zoom into the content.
- The local view can allow the user to start and/or participate in a blackboard or annotation session from his/her own processing device

The system can be adapted provide alternative methods and systems if there are too few first peripheral devices in a certain meeting room.

The system can be adapted to provide a warning if a first peripheral device is attempting to connect to the wrong base unit.

In another aspect the present invention provides a method for connecting a processing device to a functional device connected to or in a base unit of a communications network, the processing device having a memory, a display and an operating system, the base unit having a transmitter and the first peripheral device having a receiver the method comprising :

coupling a first peripheral device being to the processing device via a generic communications protocol, providing at least one fixed or a configurable endpoint of the functional device exposed on the first peripheral device;

transmitting data from the base unit and receiving the data at the first peripheral device over the communications network from the functional device to the processing device via the at least one fixed or configurable endpoint using the generic communications protocol for communication between the processing device and the first peripheral device.

The communications network is preferably a wireless network. This enables the **sharing or combining** of at least a selection of functionalities/endpoints of the secondary peripheral devices, i.e. the one-to-many scenario.

The data that is transmitted or received, i.e. streaming data carrying images, audio, etc. can be in a raw or unaltered format.

There can be more than one first peripheral device. The data can be transmitted from the functional device to at least two processing devices using at least two first peripheral devices.

A functional device can be run with a vendor specific driver alone.

The functional device can provide any one or more of a microphone, a speakerphone, a speaker, a display, a touchscreen, a projector, a camera, a video camera, a webcamera.

The method can include presenting the at least one fixed or a configurable endpoint of the functional device exposed on the first peripheral device as one of a human interface device, a mass storage device, a composite device, a microphone, a speakerphone, a speaker, a display, a touchscreen, a projector, a camera, a video camera, or a webcamera.

The data can be encoded, and/or optionally encrypted.

A unified communication between two or more further processing devices can be hosted on the processing device.

The first peripheral device can present a functional device to the unified communication between two or more processing devices.

The method can include exposing the same type of functional device to the processing device as is connected to the Base Unit and using at least one driver for the functional device installed on the processing device.

Exposure can be implemented with **descriptor fields**.

In another aspect a peripheral device adapted to be coupled to a processing device via a generic communications protocol is provided, the peripheral device having a receiver and at least one fixed or a configurable endpoint of a functional device exposed on the first peripheral device;
the receiver of the first peripheral device being adapted to receive data over the

communications network from the functional device and for sending the data to the processing device via the at least one fixed or configurable endpoint using the generic communications protocol for communication between the processing device and the peripheral device.

The communications network is preferably a wireless network. This enables the **sharing or combining** of at least a selection of functionalities/endpoints of the secondary peripheral devices, i.e. the one-to-many scenario.

The at least one fixed or a configurable endpoint of the functional device exposed on the first peripheral device can be one of a human interface device, a mass storage device, a composite device, a microphone, a speakerphone, a speaker, a display, a touchscreen, a projector, a camera, a video camera, or a webcamera. The exposure can be implemented with **descriptor fields**.

A functional device can be run with a vendor specific driver alone.

In another aspect, a computer program product is provided for carrying out any of the method steps of claim 10 when executed on a processor. A non-transitory signal storage means can be used to store the computer program. The non-transitory signal storage means can be an optical disk such as a CD-ROM or a DVD-ROM, a magnetic disk such as a hard disk, a solid state memory such as a flash memory, a magnetic tape or similar.

Brief Description of the drawings

Figure 1 shows in Figures 1A to C an embodiment of the present invention.

Figures 2 and 3 show message flows of how a peripheral device is connected to a processing device in embodiments of the present invention.

Figure 4 shows an arrangement of components that can be used in embodiments of the present invention. This figure is Figure 11 of WO 2013/037980 entitled “Electronic tools and methods with audio for meetings” which is incorporated herein by reference with respect to Figure 11 thereof and also in its entirety.

Figure 5 shows an arrangement of processing devices as used in a meeting with a unified communication in progress according to an embodiment of the present invention.

Figures 6 to 11 show embodiments of the present invention where a peripheral device is coupled to a processing device.

Figures 12 to 14 show embodiments of the present invention where a peripheral device is not coupled to a processing device.

Figure 15 shows a message flow for use with any of the embodiments 1 to 11 and 17 according to an embodiment of the present invention.

Figure 16 shows a message flow for use with any of the embodiments 12 to 14 according to an embodiment of the present invention.

Figure 17 shows a further embodiment of the present invention.

Definitions

"**Plug and play**" is a term used to describe the characteristic of a computer bus, or device specification, which facilitates the discovery of a hardware component in a system, without the need for physical device configuration, or user intervention in resolving resource conflicts. Plug and play devices can be added to a bus of a computing system (while running or when shut down), and the newly added device and possibly the rest of the computing system is automatically configured to make the newly added device work, both from hardware and from software perspective.

Plug and play interfaces include for example (not an exhaustive list): Firewire (IEEE-1394), PCI, Mini PCI, PCI Express, Mini PCI Express, PCMCIA, PC Card, Universal Serial Bus (USB), SDIO cards, HDMI, DisplayPort, Bluetooth etc.

"**Auto-configuration**" is the automatic configuration of devices without manual intervention, without setting any switches or jumpers, and without any need for software configuration. An example of auto-configuring devices: USB devices. Examples of auto-

configuring protocols: DHCP, Zeroconf, Bonjour.

A plug and play device has auto-configuration software by default to make it plug and play. Example: USB devices are made to be plug and play by including the correct auto-configuration software (e.g. host driver, host stack, application software). Autoconfiguration can also refer to a software alone and is not restricted to a physical device.

"**Hot swapping and hot plugging**" are terms used to describe the functions of replacing computer system components without shutting down the system. More specifically, hot swapping describes replacing components without significant interruption to the system, while hot plugging describes the addition of components that would expand the system without significant interruption to the operation of the system. A well-known example of this functionality is the Universal Serial Bus (USB) that allows users to add or remove peripheral components such as a mouse, keyboard, or printer. Other examples are eSATA, PCIe, FireWire, for example.

A "**portable application**" (portable app), sometimes also called standalone, is a computer software program designed to run without installation on the target machine. This type of application is stored on a removable storage device such as a CD, USB flash drive, flash card, or floppy disk—storing its program files, configuration information and data on the storage medium alone. It is a program that can be stored on an electronic device such as a USB flash drive, iPod, memory card, portable hard drive or other portable electronic device and runs on a computer or other processing device coupled to the electronic device without making permanent configuration changes to the host computer. All such programs have a zero-footprint, meaning all temporary files, registry entries, and any other changes to the machine exist only while the program is running.

To be considered a portable application, for purpose of this invention, a software program must:

Not require any kind of formal installation onto a computer's permanent storage device to be executed, and can be stored on a removable storage device such as USB flash drive, iPod, memory card, portable hard drive or other portable electronic storage device thus

enabling it to be used on multiple computers.

Settings are stored with, and can be preferably carried around with, the software (i.e., they are written to the electronic device such as a USB drive). Settings are not stored to the registry or any other central system database of the computer.

Leaves a zero (or near-zero) "footprint" on any PC it is run on after being used. i.e., all temporary files/registry settings should be either avoided or at least removed once the program has exited, and files created by the user can be saved directly to the same removable media as the application is stored on.

A portable application does not leave its files or settings on the host computer on which it runs. For example, the application does not write to the Windows registry or store its configuration files (such as an INI file) in the user's profile; instead, it stores its configuration files in the program's directory. Another requirement, since file paths will often differ on changing computers due to variation in Windows drive letter assignments, is the need for applications to store them in a relative format. Preferably, such a program does not require a launcher program to copy necessary settings and files to the host computer when the application starts and move them back to the application's directory when it closes as this may leave a residue on the hard drive in case of power failure.

"**Electronic meeting systems**" (EMS) need to be distinguished on the one hand from classic groupware, on the other from web conferencing systems. In reality, there is some overlap between minor features of products of the named categories. The main difference from groupware is the intensity of collaboration. EMS should be distinguished from systems with which it is possible to show the contents of an individual computer screen on a remote display with multiple users at the same time.

"**Groupware**" supports collaboration within groups where the individual contributions remain identifiable. In contrast, EMS enables the group to cooperatively produce a result for which the group is responsible as a whole. In a business process, groupware and electronic meeting systems complement each other: Groupware supports teams when researching and creating documents in the run up to an EMS session or when implementing the results of such a session.

"**Web conferencing systems**" and "electronic meeting systems" complement each other in the online meeting or workshop: EMS extends the web conferencing system by providing interactive tools for producing and documenting group results. On the other hand, "web conferencing systems" complement EMS with the screen sharing and voice conferencing functionality required in synchronous online meetings and not present in EMS.

"**Data conferencing**" refers to a communication session among two or more participants sharing computer data in real time. Interaction and presentation devices such as a screen, keyboard, mouse, camera, etc. can be shared. It is a term used to distinguish from video conferencing and audio conferencing. The data can include screen, documents, graphics, drawings and applications that can be seen by the participants of the meeting.

"**Application sharing**" is an element of remote access, falling under the collaborative software umbrella, that enables two or more users to access a shared application or document from their respective computers simultaneously in real time. Generally, the shared application or document will be running on a host computer, and remote access to the shared content will be provided to other users by the host user. Application sharing should be distinguished from systems in which collaboration on the applications between different users is not possible, but the contents of individual computer screens can be projected onto a remote display with multiple users at the same time.

The term "**arbitrary media content**" refers to the fact that a user may generate, create or select any media content that is appropriate to display. This differs from client voting on or selecting of media content that is displayed by another in a meeting or presentation. This term refers to client oriented, distributed rights and privileges for the display of content rather than a central presenter providing content which is presented to the members of the meeting.

"**Unified Communications system or tools**" refers to audio or audio visual communications such as provided by "Skype™" or "Skype™ for business". Such software can take over audio and/or visual data provided from a host processing device. Unified communication tool can be described as a collection of tools to do VOIP, (web) conferencing, shared whiteboarding, message exchange (e.g. chat), file transfer, or presence. Unified Communications system or tools can make use of a protocol- or standard

defined or specific communication session or interaction, such as Voice-Over-Internet-Protocol ("VoIP), text or instant messaging (e.g., AIM, Blauk, eBuddy, Gadu-Gadu, IBM Lotus Sametime, ICQ, iMessage, IMVU, Lync, MXit, Paltalk, Skype, Tencent QQ, Windows Live Messenger™ or MSN Messenger™, Wireclub, Xfire, and Yahoo! Messenger™ email, Twitter (e.g., tweeting), Digital Service Protocol (DSP), and the like. Unified Communications system or tools can make use of video conferencing cloud service including a video conferencing node to allow one or more users located at the first video conferencing endpoint to communicate with one or more users located at the second video conferencing endpoint in a video conference.

"**Screen scraping**" in the sense of the present invention refers to reading the video frame buffers and processing them, rather than just rendering them on a display. Screen scraping for presentations is described in US2002/0196378 to Slobodin et al which is included herein by reference.

"**Auto composition**" or "**auto layout**" refers to the automatic nature in which multiple graphics/video sources are rendered on a central display, without user intervention and in a way that a user would intuitively expect it to happen.

"**Wireless**" and "**wireless communication network**" can be any network that does not use cable links between nodes, e.g. uses RF, optical or InfraRed for communication purposes, such as IrDA, diffuse infra-red, WLAN, WiMax, WiFi, WiFi Direct, LiFi, ultrasound, ZigBee, or Bluetooth or any other wireless communication network known to the person skilled in the art. Any communications network disclosed below can be and preferably is a wireless network. This enables the **sharing or combining** of at least a selection of functionalities/endpoints of the secondary peripheral devices, i.e. the one-to-many scenario.

"**Computer**" generally refers to a processing device, i.e. having a processing engine capable of various types of digital processing, such as rendering graphics images for display. A computer can be in the form of a work station, a personal computer, a laptop, a palm top, a PDA, a smartphone, a tablet etc. Generally, a computer has memory such as volatile RAM. Non-volatile memory such as a hard disc, optical disk or solid state memory can be included in the computer or can be a peripheral device. Currently most computers are electronic, but the term "computer" also includes optics based computing devices.

The term "**pre-installed generic driver**" is intended to mean a driver which is installed on a processing device such as a computer as a standard driver, e.g. is installed with the installation of the operating system. Such a driver is standard for the operating system and can drive a standard class of peripheral devices coupled to or connected to the processing device. The installation of a specific driver for such a peripheral device is not required. Such a generic driver can be a human interface driver (HID) or a mass storage device driver, which has predetermined software components configured for driving mass storage, a CD-ROM, a keyboard etc. or combinations of these. Such devices can be readable and writable computer peripheral memory devices such as USB memory sticks, flash memories, external hard drives, or more.

"Host device" is a processing device that wants to share using a first peripheral device or dongle.

"**Functional device**" is a second peripheral device connected in some way to a base unit. The system has the ability to expose second peripheral devices connected to the Base Unit to the first peripheral device transparently as if it were attached to the processing device to which the first peripheral device is connected. The exposure can be implemented with **descriptor fields**. A functional device can be run with a vendor specific driver alone.

"Endpoints" can be described as data sources or sinks and are defined for USB Devices which can be physical devices or virtual devices. In the present invention endpoints should be interpreted broadly as data sources or sinks. Hence data can be stored at an endpoint or emitted. An endpoint can act as a kind of buffer can be defined for physical devices or virtual devices. The data stored at an endpoint may either be received from or waiting for being sent to the host such as a USB Host. An endpoint is defined by a number of descriptive fields. For example, an endpoint can be configured to support different transfer types such as four transfer types. These transfers can be as defined in the USB specification, e.g. Control Transfers, Interrupt Transfers, Isochronous Transfers, and Bulk Transfers. The skilled person can use these transfer types as required in the present invention. Within the limits of the hardware, endpoints can be configured using middleware, e.g. USB Middleware. An endpoint can be limited to a certain transfer type. A USB Host's client may send data to an Endpoint 1 for example. Coming from the USB

Host, the data will be sent to the OUT Endpoint 1. The software running will then read the data as soon as it is ready to do so. Returning data has to be written to the IN Endpoint 1, as the software cannot access the USB bus freely as the USB bus is controlled by the USB Host. The data in IN Endpoint 1 stays there until the host sends an IN packet to Endpoint 1 requesting the data.

A limit can be placed on the number of endpoints. Each endpoint can have one transfer direction. A specific endpoint can be defined, for example, for control transfers only and cannot be assigned to any other function.

Control Transfers can be bi-directional transfers reserved for the host to send and request configuration information to and from a device using a specific IN and OUT Endpoint.

Each Control Transfer can comprise a number of transactions. Control Transfers can have several stages:

1. The **SETUP** stage carries a Setup packet, defining the request, and specifying how many data should be transferred in the DATA stage.
2. The **DATA** stage is optional. If present, it always starts with a transaction containing a DATA1 packet. Then, the transaction type alternates between DATA0 and DATA1 until all required data have been transferred.
3. The **STATUS** stage is a transaction containing a zero-length DATA1 packet. If the DATA stage was IN, then the STATUS stage is OUT, and vice-versa.

Interrupt Transfers have a limited latency to or from a device. In USB, an Interrupt Transfer, or Interrupt Pipe, has a defined polling rate. Typically, Interrupt Transfer data consists of event notifications, characters, or coordinates from a pointing device.

Isochronous Transfers are used for transmitting real-time information such as audio and video data, can be sent at a constant rate. USB isochronous data streams are allocated a dedicated portion of USB bandwidth to ensure that data can be delivered at the desired rate. An Isochronous pipe sends a new data packet in every frame, regardless of the success or failure of the last packet. Isochronous Transfers need not have error detection. Any error in electrical transmission is not corrected.

Bulk Transfers are used for data which are not of the type Control, Interrupt, or

Isochronous. Reliable exchange of data is ensured at the hardware level using error detection.

Bulk Transfers take up all the bandwidth that is available after the other transfers have finished. If the bus is very busy, then a Bulk Transfer may be delayed.

"**A specific device exposes a peripheral device or other device**" means that the specific device configures one or more endpoints with specific descriptor fields.

Description of the preferred embodiments

Embodiments of the present invention allow a wireless connection between a user processing device such as a laptop, computer, PDA, smartphone etc. and a base unit of a wireless network. The wireless connection may be made by an integrated wireless transceiver in the user processing device such as the laptop, the computer, the PDA, or the smartphone etc. Alternatively, in some embodiments of the present invention the wireless connection is made via a first peripheral device plugged into, coupled, connected or attached in some way to the user processing device or is provided by other hardware or software.

Embodiments of the present invention allow users, e.g. participants in a meeting room, to make use of at least one functional device, some functional devices or all functional equipment attached to the base unit whereby the at least one functional device has an electronic output such as a digital electronic output and can co-operate with other devices plugged into, coupled, connected or attached in some way to the base unit or is provided by other hardware or software. The at least one functional device can be provided by either plugging in a second peripheral device e.g. a dongle or by a wireless connected second peripheral device or by connecting to the at least one functional device with some software which can be downloaded or pre-installed. The at least one functional device can have an electronic output such as provided by a touch screen, a microphone, a speakerphone, a camera and can function with devices which have an electronic input such as a display or a speaker. Embodiments of the present invention provide the functional device for shared use by participants in a classroom or meeting room.

The at least one functional device coupled or connected or attached to the base unit, e.g. via a serial connection such as a serial plug-and-play connection e.g. USB or via a wireless connection such as a Near Field Communication (NFC) connection, e.g. a Bluetooth connection, an IR connection etc. is made accessible and usable to one or more users in the meeting room or classroom. Preferably this is done in a transparent and standard way. In different cases, the system can behave as a wireless (e.g. USB) hub, in another case, the first peripheral device or other hardware or software exposes a virtual device that has the same functionality or more as the combined functionalities of the functional devices e.g. second peripherals which are coupled or connected or attached to the base unit.

Embodiments of the present invention make use of a base unit, the base unit comprising at least a transmitting function and usually a transmitting and receiving function such as a transceiver function. The base unit is a base unit of a network such as a wireless network and hence can have a transmitter, a receiver or a transceiver. The base unit can be a hardware box comprising a digital processing engine such as an FPGA, a CPU, a GPU etc. as well as memory and input/output ports and which is adapted for connection to e.g. by plugging it in, any functional device such as one or more second peripheral devices that can be used in a meeting room or classroom with or without visual or audio capabilities. Functional devices, such as the one or more second peripheral devices, for use with the base unit can include one, some or all of a television or other video provider e.g. providing images such as video over an HDMI, DVI, USB or other connection, an image capturing device such as a camera, e.g. for providing captured images like video over a USB or HDMI or other connection, audio devices such as speakerphones providing audio such as speech or music over a USB connection or other connection, or speakers over a USB connection, making use for example of a 3.5mm audio jack, SPDIF or other connection, or one or more microphones making use for example of a 3.5mm jack, USB or other connection, display devices such as touchscreens making use for example of a USB or other connection, all-in-ones over a USB connection and any other functional device or first peripheral device that can be connected to e.g. plugged into the first device such as the base unit and which have, for example, an electronic output such as a digital electronic output.

Embodiments of the present invention comprise a device such as a first peripheral device comprising at least a receiving function and usually a transmitting and receiving function such as a transceiver function. The first peripheral device (being at least a receiver device)

can be hardware e.g. having a wireless or wired connection capability, software or a combination of both that can be connected to the base unit over a wireless connection such as a Wi-Fi, Bluetooth, Wi-Gig, Li-Fi, NFC or similar connection, or a wired link e.g. a USB, Ethernet, etc. connection. This allows the base unit to expose and make available any functional device such as a second peripheral device that is connected to the base unit, to one or more first peripheral devices (e.g. receiver devices) such as to expose and make available simultaneously with a plurality of first peripheral device (e.g. receiver devices) in one of following ways:

1. By exposing the or each functional device (such as the or each second peripheral device) connected to the base unit in a one-on-one manner or in a one to more of the first peripheral devices or user processing devices manner, e.g. to one or more first peripheral devices or user processing devices, preferably without interpretation or processing the electronic signals from each functional device e.g. the second peripheral device e.g. by tunneling the packets from the base unit to the endpoints of the one to more of the first peripheral devices or user processing devices.
2. By interpreting, processing and translating the electronic signal coming from the at least one functional device, e.g. the second peripheral device and, for example mimicking the at least one functional device, e.g. the second peripheral device at the first peripherals' end (e.g. receiver devices' end), either in software or hardware or both. With mimicking is meant that the same device is exposed in the endpoints as the second peripheral device connected with the base unit although the communication is not simply being tunneled as in the first and second methods described above.
3. By combining one or more functional devices, e.g. second peripheral devices or part of a second peripheral device and exposing it to the one or more first peripheral devices, e.g. receiver devices through a custom device in hardware, software or both.
4. By combining one or more functional devices e.g. second peripheral device(s) or part of a second peripheral device and exposing its functionality to the end user through proprietary software.
5. By combining any of the above methods to provide the function of the functional device e.g. the second peripheral device to the one or more first peripheral devices such as receiver devices.

When a functional device, e.g. a second peripheral device is exposed natively or as a mimic of such a device in hardware, use can be made of endpoints such as USB endpoints on the first peripheral device or the user processing device which can expose the corresponding second peripheral devices such as USB devices connected to or plugged into the base unit (as is done in a hub), so no proprietary software or drivers need to be installed to support this.

When exposing custom devices, i.e. specifically developed to work with the present invention use is made of these same endpoints of the first peripheral devices such as the receiver's hardware or it can be done in software with a driver.

A first peripheral device can be used to set up a connection such as a wireless or wired connection between a first peripheral device and base unit, e.g. by acting as a hub such as a wireless hub of which a wireless USB-hub is one example. Whatever second peripheral device is connected to or plug into the base unit e.g. a second peripheral device selected from the non-exhaustive list given above of a TV, video device, audio device, speakerphone, camera, display …, is exposed to the first peripheral device in any of the 5 ways described above.

Advantages of embodiments of the present invention can be one, some or all of the following:

- In one implementation, all second peripheral devices, which can be USB devices, are mirrored one on one, needing no additional drivers or software to be installed on the users' processing devices other than the second peripheral's vendor's drivers. The second peripheral devices can be exposed to the user's processing device either by the hardware of the first peripheral device directly, or by using a software virtual hub on the first peripheral device or on the user's processing device.
- In another implementation, different second peripheral devices (e.g. speakers, microphones, e.g. with electronic outputs and/or inputs) can be combined and connected to the same base unit. Additional functionality such as echo cancellation, translation, encoding/decoding, etc) can be provided in the base unit. Only one second peripheral needs to be exposed through the first peripheral device to the user's processing device.

- A combination of previous two methods can be provided for one or a combination of devices or functions. Different approaches can be used within one final solution, depending on if the device or function needs to be available to multiple users at once, the technical feasibility of simply mirroring of the device etc.
- By adding some software to the client software running on the user processing device, configuration for these devices can be made easier (e.g. set as default devices) and some custom controls (mute, pan/tilt/zoom,…) can be added.
    - Some controls can be added to the first peripheral device
    - Some processing can be done on the base unit to make such controls obsolete (e.g. automatic gain control on an audio signal, framing of participants to remove the need for PTZ)
- Multiple users can use the functional devices in contrast to regular hub, with which only one person can plug in only one cable. Each user processing device to which a first peripheral device is plugged in can use these functional devices and the base unit will make sure all streams are correctly captured, played, processed, combined and/or enhanced.
- Different streams can be given different priority (speed, throughput,…) to adjust to the unpredictable nature of the wireless communication channel. E.g. to prioritize audio streams over video streams to enhance the call experience.
- When having a VOIP call such as a Skype™ call in a meeting, the first peripheral device is connected to, e.g. plugged into a user processing device and all the functional devices connected to the base unit can be used, e.g. a better camera that gives a wide a room view, a better microphone and better speakers). This is especially beneficial when there are multiple people in the room that want to attend the conference call such as a VOIP or skype™ call.

With reference to Figure 1 group 90 is a microprocessor or FPGA based device comprising one or more peripheral devices 91-93 which can be connected to, e.g. plugged into a base unit 100. The peripheral devices 91-93 may be connected to the base unit100 by means of standard connections such as serial connection of which Firewire (IEEE-1394), PCI, Mini PCI, PCI Express, Mini PCI Express, PCMCIA, PC Card, Universal Serial Bus (USB), SDIO cards, HDMI, DisplayPort, Bluetooth etc.

Group 90 can be used to expose for example the peripheral devices

- A webcam 91
- A speakerphone 92
- A number of HID endpoints 93

The Base Unit 100 has an electronic digital processor such as a microprocessor or FPGA based device and comprises for example:

- A Web interface 110 which is an interface for the base unit 100 in which one can configure the system
- One or more drivers 111, e.g. two specific drivers for webcam 91 and speakerphone 92 running on the base unit 100 to receive or send data from/to the group 90 and USB peripherals 91-93.
- Additional processing is done in blocks 112, 114, 115 for both audio and webcam encoding, mixing, (de)multiplexing and other processing.
- Data can be encrypted or decrypted in decrypters/encryptors 113, 116 before being sent to the first peripheral device 130 over a wireless link 127.
- The control modules 117 in base unit 100, and 37 in the first peripheral device 130 use a control channel 128 between the base unit 100 and the first peripheral device 130 to perform various functions such as keep alive, identification, crypto key exchange etc.
- Unified protocol block 118 is a functional block abstracting primary functions of the system: screen sharing and other non-media streaming (e.g. mouse pointer)
- Encryption and decryption modules 119, 120 are provided for the main communication with the first peripheral device 130 and other applications.
- An encoder such as H264 encoder 121 provides and local view block 123 (which is a functional device or functional devices as it/they emit a signal from the base unit 100 towards the user processing device 160) are provided to capture the rendered image on the main display 126, encode it and send it back to the first peripheral device130 and other clients
- Audio processing blocks 124 are provided for audio content.
- Video decoder 125 is provided to decode and render the screen content to the display 126.

First peripheral device 130 is a microprocessor or FPGA based device comprising for example

- Webcam video coming from webcam 91 of base unit 100 is decrypted in block 30 and exposed to processing device 160 through a USB video endpoint via USB video and drivers such as H264 drivers 31.
- Audio signals from speakerphone 92 connected to the base unit 100 are decrypted in block 32, processed and exposed as microphone signal from the USB speakerphone endpoint 92.
- Audio signals from processing device 160 coming through a Speakerphone USB endpoint is encrypted in block 35 and sent to the Base Unit 100 via wireless connection 127.
- Control HID (Human Interface Device) 51 is a mirror of additional HID USB endpoints that the Group 90 and the second peripheral devices 91-93 have exposed to the Base Unit 100.
- A vendor specific HID endpoint indicated as datapump 42 is used for a channel 52 which can be a high bandwidth data channel between vendor specific software such as software 70 running on processing device 160 and the Base Unit 100 over the first peripheral device 130. Screen video and audio signals for display 126 can be sent over this channel 52. This is preferred compared with doing this over a control HID endpoint in the first peripheral device 130. Also the screen input of display 126 which is captured (block 123) and encoded (block 121) in the Base Unit 100, is sent to the vendor specific software running on the processing device 160 to allow other users such as a plurality of users or participants in a meeting each of which has got a processing device 160 and optionally a first peripheral device 130 plugged in, to view what is on the display 126 on a display (not shown) on their own processing device 160.
- A number of basic components such as the operating system (OS) and the drivers to control optical indicators such as an LED ring on the first peripheral device 130, bandwidth measurement module and other the wi-fi modules, update/upgrade modules e.g. over wireless, secure boot module, secure key storage, debug and test module, etc. are provided in blocks 45 to 50.
- The audio capture module 43 exposes speakers' endpoint to the processing device 160. The module 43 captures this audio and sends it back to the vendor software 70 running on the processing device 160 where it can be timestamped (block 69) and

aligned with the video data and then sent, for example, to the Base Unit 100 through the datapump 42. This allows better timestamping and lipsync.

- In a less preferred embodiment the audio can be captured and processed on the first peripheral device 130 and sent immediately to the Base Unit 100.

A microprocessor or FPGA processing device 160 such as a computer, laptop, smart phone, personal assistant (PDA) etc. runs proprietary software 60, 70 including for example 3rd party software (e.g. Skype) 60.

- 3rd party software 60 is running on processing device 160 (e.g. communications software such as Skype™) which uses the video endpoint from the at least one functional device 91-93 (e.g. the webcam 91 that was attached to the Base Unit 100) and/or the speakerphone endpoints (both speakerphone microphone and speakerphone speakers)
- Block 70 comprises software developed and dedicated to the present invention to:
  - Decrypt (61) and decode (62) a pipeline which will then show the screen data of display 126 from the Base Unit 100 in a window of the software. The data following the arrow 71 going out of the last stage (local view 63) is captured by the communications software such as Skype™ client software 60.
  - The unified protocol block 64 is a module that handles the control layer and controls the media paths, the connection to the first peripheral device 130 and (indirectly) the connection to the Base Unit 100.
  - Pipeline 65-67 is for screen capture (67), encoding (66) and encryption (65) for the screen sharing to the Base Unit 100.
  - Pipeline 68, 69 receives the speaker's audio signals (block 68) back from the first peripheral device 130, does processing (e.g. timestamping, block 69) and sends it out through the HID endpoint (the "datapump" 52).
- Endpoints not used by the software in this case are the control HID from the second peripheral devices. If some software were running from the vendor of a second peripheral device, this software can communicate with the relevant second peripheral device over these HID endpoints (e.g. camera pan/tilt/zoom).
- Speakers endpoint (the content audio arrow 53) is used by the operating system (OS) of the processing device 160 to send all (non-speakerphone) sounds/audio signals.

Connecting a first peripheral device to a user processing device

A first peripheral device 130 can be connected to a user processing device 160 by a method 300 as indicated in Figure 2. The connection can be a serial connection such as a USB connection for example, such as USB 1, 2, 3 or -C etc. and the peripheral device 130 is connected to, e.g. plugged into a plug-and-play serial port such as provided for a USB connection. The first peripheral device 130 may include a user input device, e.g. an actuator. The first peripheral device 130 can be configured as a connection unit and can be a physical device in the form of a connector for a plug and play interface of a user processing device. It can have a base and a flexible data and power connection attached to the base. The base can have the actuator, e.g. a button configured to be an input device which can be activated by a user.

The flexible data and power connection should be adapted so that the base lies flat on the meeting table independent of the orientation of the connector needed to insert the connector into the plug and play interface. The base preferably includes electronics and optionally has permanent storage for storing an application such as a portable application. Network configuration parameters for the WiFi connection to the base unit 100 can also be stored in a memory. The first peripheral unit may have a processing engine (e.g. CPU, GPU, FPGA), a wireless transmitter/receiver such as for WiFi or LiFi, a plug and play interface such as a USB interface, a light ring such as an LED ring or strip as visual indicator. The portable application can be stored on the first peripheral device 160, i.e. in the base or it can be downloaded, obtained from on another pluggable device like a flash drive, be downloaded from the base unit 100 etc. The visual indicator is for allowing user feedback from the connection unit of the status of any activity.

Some examples for activation of the actuator which can be used with any of the embodiments of the present invention: Sound activated (hand clap, voice recognition, computer sound, music, ...) Remote controlled via wireless connected device (IR, Bluetooth, WiFi, LiFi...), Light activated, Pressure activated, e.g. depression with a finger or hand, Touch activated, Proximity ('near-touch' on the actuator or bringing the actuator close to some object, Biometric reader such as Fingerprint reader, Iris scanner, DNA analyser, Keypad, e.g. for entering Keycode e.g. a password.

The method 300 comprises in step 301 connecting the first peripheral device 130 to a processing device 160, e.g. by plugging in. This results in a kernel boot step 302 and exchange of initialization scripts in step 303. The first peripheral device 130 is discovered to be a USB device in step 306 and the USB protocol stack is loaded in step 304 followed by loading the wireless connection protocol stack in step 305. The parameters for the wireless connection are input e.g. from a memory on the first peripheral device 130 or by the user and the wireless connection association completed in step 307. Any client software that needs to be loaded onto the processing device 160 is now loaded and launched in step 308, e.g. by user action. The first peripheral device 130 is now ready in step 310 to share data with a display screen 126 attached to the base unit 100.

As show in Figure 3 if a launcher program is available e.g. stored on the first peripheral device 130 or stored on the processing device 160, or retrievable from a remote location such as a URL on the Internet, or form a LAN server, this can launch the client software in step 328 automatically. Steps 321 to 327 and 329 and 330 are the same as steps 301 to 307 and 309 and 310 of Figure 2.

For example, the client software can be the software 70 of Figure 1 running on processing device 160. Other software such as communications software 60 e.g. Skype™ can be pre-installed on processing device 160. Client software 70 can be for the processing of video data from the processing device 160, and this client software is executed on the processing device 160 e.g. using a processing engine such as a CPU, GPU or FPGA. The client software 60 can be screen scraping software that screen scrapes the screen of the processing device 160. This client software 60 can be stored as a software program in memory such as mass storage on the first peripheral device 130. This software program is executed such as loaded onto the processing device 160 when it is coupled thereto, either automatically or by user action as described above. When the software 60 is running on the processing device 160 it is preferred that it leaves zero footprint on termination. The software 60 when executed on the processing device 160 captures the video data that is available on the processing device 160, e.g. from a presentation or video that is running on the processing device 160. For example, the software 70 when executed on the processing device 160, is adapted to screen scrape, e.g. to read one or more video frame buffers from a graphics card in the processing device 160. Generally, the processing device 160 will have its own display

and hence will have a graphics card or something equivalent with a buffer for storing video data. This read video information can be time stamped (in block 69) with a clock time, to be able to later synchronize the captured video signal with a related audio signal. The video signal is then encoded in a video encoder (block 66), for transport (arrow 53) over the plug and play interface using a generic driver, such as over a USB interface using generic pre-installed drivers, e.g. a generic pre-installed Human Interface Driver (HID). The data is transmitted to the wireless communications network 127 such as a WiFi or LiFi network and routed over the communications network 127 to the base unit 100, inserted into a suitable composition such as an OpenGL based composition in a compositor for display on the display device 126.

Sending data from the processing device to the base unit

With reference to Figure 4 the audio data on the processing device 160 such as a computer, laptop, smartphone, PDA, tablet, etc, the audio is sent over a port using generic drivers such as over a USB port 8 using the standard built- in generic audio driver such as UAC driver 7. On the first peripheral device 130, the audio packets are read from the generic port, e.g. USB port 11 by a dedicated audio device 14. These packets are then processed by any of a mixer a rate converter, an echo canceller, noise canceller or similar. Any of the mixing, rate conversion, echo cancelling, noise cancelling can be executed using an ALSA driver 18. The ALSA driver offers the packets to a dummy audio device 16 such as an audio scraper. In this audio device 16 the audio packets can be time stamped from the clock 15 that can be synchronized with clock 9 of the processing device 31. This information is then encoded in an encoder 17 and packetized in a packetizer 19 before being transferred to the communications network between the first peripheral device 130 and the base unit 100. The network can be a wireless network such as a WiFi or LiFi network. For this purpose, a suitable transmitter 21 is provided in the first peripheral device 130. On the base unit 100 the audio information stream is recovered at a suitable communications interface such as the WiFi access point 22. The audio is then unpacked in an unpacker 23, decoded in a decoder 24 before being before being offered to an audio mixer 28. In order to synchronise the audio and video streams these are both sent to a synchronizer 27 in which the two streams are synchronized and thus keep lip synchronization.

Sending data from the processing device to the base unit

Embodiments of the present invention can capture data such as visual or audio signals and bring these to one or more processing devices 160 so that this captured data can be shared with other participants. These visual or audio signals are captured from, provided by, obtained from functional devices such as a webcam 91 a speakerphone 92, but also captured from display 126. For example, a functional device could be a microphone which located at an appropriate position in a meeting to give good reception of audio data. This can be used with a central speaker system which can be of higher quality than is provided in the processing devices 160 of meeting participants. Such a speaker system could be a quadrophonic surround speaker system for example. This can also avoid the difficulties with multiple microphones and speakers which can result in annoying positive feedback.

Embodiments of the present invention can include the features discussed with respect to Figures 1 to 4 to provide additional functionality which can be shared, for example, by all participants of a meeting who have a processing device 160 optionally with a plug-in first peripheral device 130. In embodiments of the present invention, fixed USB endpoints on the first peripheral device 130 are provided for the basic functionality. These are fixed and are a combination of vendor specific endpoints and a number of standard endpoints and can be interpreted or understood as a custom Driver, a default OS driver and/or a host application as has been described with reference to Figure 4 do screen sharing and audio.

The configurable USB endpoints are configured either when pairing a first peripheral device 130 device with a base unit 100 or over the wireless connection 127 between the processing device 130 and the base unit 100. Once configured, the USB endpoints will expose second peripherals devices 91-93 which can be interpreted as custom drivers, vendor specific drivers or default OS drivers. These can be used by either a host application or third party applications. These endpoints can be an exact copy of the ones of the second peripheral device 91-93 connected to the Base Unit 100 or can be dedicated specified endpoints.

Communication of these USB endpoints with the processing device 160 can be done through standard enumeration of the USB endpoints when connecting, such as plugging in, the first peripheral device 130 to the processing device 160. All information on how to

communicate with the Base Unit 100 and which endpoints to expose can be stored on the first peripheral device 130 and can be set up by firmware of the first peripheral device 130.

The decision of which endpoints the first peripheral device 130 should expose can be determined by the Base Unit 100, which can be adapted to analyze which second peripheral devices are connected to the Base Unit 100 (which connection can be through a USB connection or other) and create a configuration for the relevant USB endpoint on the first peripheral device 130.

As indicated above, for embodiments of the present invention, during operations, data can flow in both directions, i.e. to or from the processing device 160:

1. Data from a second peripheral device connected to the Base Unit 100 can flow into the Base Unit 100 or can be captured in the base unit 100 such as data for display 126. Any such data can be interpreted and possibly processed, enhanced, encoded and/or encrypted using firmware of the base unit 100 to generate processed data. In some embodiments this processed data will then be sent to the first peripheral device 130 device through a wireless link 127. This first peripheral device 130 will, if necessary, decode, decrypt, process and/or interpret the data and make it available through one or more of the USB endpoints of this first peripheral device 130 (e.g. either the fixed or the configured ones). This data will then be captured by the operating system of the processing device 160 and will be made available through a custom or standard driver to either the host application or a 3rd party application running on the processing device 160 or to other processing devices 160 of other participants of the meeting.
2. Data, which might be coming from the host application and/or one or more 3rd party applications running on the processing device 160 can be sent through a handle which is made available by the system. The data will then be sent to the appropriate USB endpoint of the first peripheral device 130 through the system (standard generic) drivers and the USB port. The first peripheral device 130 will then receive this data via firmware of the first peripheral device 130, where it will process, enhance, encode and/or encrypt the data and send it through the wireless link 127 to the Base Unit 100. The Base Unit 100 will receive the data via firmware on the base unit 100, will decrypt, process, decode and/or enhance the data and forward it

to the appropriate first peripheral device, which can be connected or attached to the Base Unit 100 through a serial connection such as USB, HDMI or other interface.

Such a meeting of multiple participants is shown schematically in Figure 6 with four processing devices 160 (160-1, 160-2, 160-3, 160-4) which can be laptops. Three of the processing devices (160-1, 160-2, 160-3) each are connected to a first peripheral device 130, e.g. by inserting in a USB connection. One processing device 160-4 can be the host of a Unified Communication (UC) call such as a Skype call or a Skype for Business call. The first peripheral devices of two of the processing devices (160-1, 160-2) have completed connection to a WiFi connection with a base unit 100 and are sharing media to the main screen 126.The processing devices 160-3 and 160-4 are sharing the Unified Communication (UC) call such as the Skype call or a Skype for Business call.

Connected to the Base Unit 100 is or are any of the following:

- Webcam 91
- A 4K touch screen 94
- A camera 95, connected through USB or HDMI
- A USB speakerphone 92
- USB microphone 96 and a speaker set 97 (connected through an audio jack, s/pdif, USB, HDMI, etc.)

The host processing device 160-4 has pre-installed UC client software. This software interacts with USB endpoints on the first peripheral device 130 connected to e.g. plugged into the host. This type of client software will use speakerphone USB endpoints as a default audio device (e.g. microphone plus speaker). Embodiments of the present invention are in control of all audio or visual signals emitted from and injected in the processing device 160.

The speakerphone 92 can be used by any of the users at least with a first peripheral device 130 connected and functioning. There is no need to perform an action to get access to this device. Separate controls can be made available on a first peripheral device for example to control the volume of the audio output of the Base Unit 100 and to mute the room microphone 96 if necessary. When muted, the microphone 96 is also muted for all other Buttons or apps using this device.

The UC client software 60 running on the host processing device 160-4 does not inject the audio content. The microphone 96 can pick up this signal, or the Base Unit 100 can inject it in the microphone signal to the first peripheral device 130 connected to the host 160-4. There is no need for lip-sync with the content video (even if sharing) as the latency is low.

The same type of second peripheral device is exposed to a user as is plugged in into the Base Unit 100 so that the user can use the drivers provided by the vendor.
If one of the processing devices 130 is sharing in the room, the content audio is shared in the room too.

A processing device with functioning first peripheral device can access the room camera 96 wirelessly. All other devices connected to the Base Unit 100 (e.g. HID control devices 93) will be exposed natively.

Any user connected to the system e.g. through a first peripheral device has the ability to view the content that is projected in the meeting room on a display of the user's processing device, i.e. "local view". The receiver of the local view can have, but is not limited to, one some or all of the following functionality:

The ability to open a window and view the meeting room content in that window independently of whether it is the stream itself, the annotation or a blackboard session.

The ability to zoom into the content.

Additional measures to assure the picture quality when zooming in can be added to the feature

The local view could allow the user to start and/or participate in a blackboard or annotation session from his/her own device

The ability to take screenshots and/or pause the local view.

Figures 6 to 15 and 17 show ways of making various functions available to participants in a room, e.g. a meeting. There are four basic methods each of which is an embodiment of the present invention:

a) to use a generic driver of the OS 164 of the host processing device 160 and endpoints

like mass storage or HID endpoints to allow transfer of data using client software running on the host processing device 160 without the host processing device 160 being aware that the final device is a functional device like a camera, touchscreen, microphone, loudspeaker, speakerphone etc. which is connected in or with the base unit 100.

b) to have an endpoint on the first peripheral device of a functional device connected with or in the base unit 100 which means that the host processing device 160 detects that it is connected to the functional device and interacts with it as if it were such a device.

c) to have an endpoint on the first peripheral device of a functional device connected with or in the base unit 100 which means that the host processing device 160 detects that it is connected to the functional device but client software needs to have the vendor specific drivers to be able to interact with the functional device.

d) to have an endpoint on the first peripheral device of a functional device connected with or in the base unit 100 which means that the host processing device 160 detects that it is connected to the functional device but pre-processing is made on the base unit 100 so that the processing device 160 can interact with the functional device. One method is to make a common endpoint on the first peripheral device so that the processing device can work with any functional device for which preprocessing exists in the base unit 100.

Figure 6 shows the processing device 160 in communication with a first peripheral device 130 connected thereto, base unit 100 in wireless communication 127 with the first peripheral device 130. Various functional devices such as a display 126, a speakerphone 92 (or microphone and speaker set 96, 97) and a videocam 91 (or other camera 95) are connected to the base unit 100.

A generic driver allows the client software 70 to transfer data to and receive data from a mass storage device 132 on the first peripheral device 130 via a USB interface 131. The client software 70 also has a USB endpoint 134 which can be a USB HID endpoint and if necessary, a vendor specific endpoint. This endpoint 134 is the endpoint for the client software 70 for transmitting the data for the display 126 to the base unit 100 where the data can be image processed (blocks 124, 125 of Figure 1) before being transmitted to the group 90 e.g. via an HDMI connection or similar. Thus, the HID endpoint 134 makes the HDMI display 126 and its audiovisual signals available to any processing device 160 with a first peripheral device attached thereto, when in a meeting room. However, the display 126 is not exposed on the processing device 160, i.e. it is not presented as a display but as an HID

endpoint. The videocam 91 can be exposed on the first peripheral device 130 as an endpoint (in a way as described for Figure 1), the video data being encoded e.g. in block 122 of Figure 1. Alternatively, as shown in Figure 6, the video data is encoded in the base unit 100 and is sent via the first peripheral device 130 to a driver 162 of the operating system 164 of the processing device 60 which exposes the encoded data from the videocam 91 on the processing device 160 and makes the video data available to the UC call, e.g. Skype™.

Data from the speakerphone 92 can be processed on the base unit 100 and/or on the first peripheral device 130 and can be mimicked to the processing device 160. The microphone of the speakerphone 92 generates a signal that is transmitted to the processing device 160 via a USB speakerphone endpoint 136 on the first peripheral device whereby any noise reduction or echo cancellation can be carried out in the base unit 100 as described with respect to Figure 1 (block 115). The microphone data is made available to the UC call as the speakerphone endpoint 136 is recognized by the processing device 160 as a speakerphone as if the speakerphone were plugged into the processing device 160. Also, the microphone data is made available to all other users who have a processing device 10 with a connected first peripheral device. In this embodiment the speaker of the speakerphone has its USB endpoint 136 on the first peripheral device 130.

Figure 7 shows a similar configuration to that of Figure 6 except there are two USB endpoints 136 and 138 for a speakerphone and a speaker respectively. As previously, the HID endpoint 134 makes the HDMI display 126 available to any processing device 160 with a first peripheral device 130 attached thereto when in a meeting room for providing audiovisual signals to the display 16. However, the display 126 is not exposed on the processing device 160, i.e. it is not presented as a display but as a HID endpoint.

The two endpoints 136, 138 receive audio signals from two different sources. The sound from the UC call can be dealt with as described for Figure 6 via the speakerphone endpoint 136 and processing on the base unit. But if there is additional audio data which is not part of the UC call, this data is sent via the speaker endpoint 138. As there is no second peripheral device in the group 90 which is a standalone speaker, the base unit 100 mixes the audio signals for the speakerphone and the speaker before sending all audio data to the speaker of the speakerphone 92. If there were a separate speaker 97 in group 90, then the base unit 100 could send this audio data to the speaker. The result is that a virtual speaker

has been exposed on the processing device 160.

Figures 8 to 11 and 17 describe various embodiments of the present invention with the example of how a touchscreen 99 is made available in a meeting room. When a touchscreen is touched it generates a signal related to the co-ordinates of the touch position. This needs to be conveyed to processing devices 160 in a meeting whereby the actual signals must be interpreted if they are to be applied to a different screen on the processing device 160. If there is a meeting with a variety of processing devices being used by participants, then a method needs to be found of presenting the touch co-ordinates to all the different processing devices. Figures 8 to 11 disclose the four basic methods mentioned above.

In the embodiment of Figure 8, there is a group 90, base unit 100, first peripheral device 130 and processing device 160. There are two functional devices connected to or in the base unit 100, namely a display 126 and a touchscreen 99. The touch screen 99 has a touchscreen endpoint 139 in the first peripheral device 130. The processing device 160 recognises this endpoint and can interact with it if the OS 164 has the relevant driver 162. This driver can be downloaded if required. This embodiment requires that each processing device 160 in a meeting downloads or has installed the relevant driver 162.

In the embodiment of Figure 9, there is a group 90, base unit 100, first peripheral device 130 and processing device 160. There are two functional devices connected to or in the base unit 100, namely a display 126 and a touchscreen 99. The touch screen 99 has a touchscreen endpoint 139 in the first peripheral device 130. The processing device 160 recognises this endpoint and can interact with it if the base unit 100 is adapted to translate the co-ordinates of the touch to ones that can be used by the processing device 160, i.e. the OS 164 has the relevant driver 162. This driver can be downloaded if required. This embodiment requires that each processing device 160 in a meeting downloads or has installed the relevant driver 162 but the translation function of the base unit 100 can reduce the number of different drivers that might be required.

In the embodiment of Figure 10, there is a group 90, base unit 100, first peripheral device 130 and processing device 160. There are two functional devices connected to or in the base unit 100, namely a display 126 and a touchscreen 99. The touch screen 99 has a touchscreen endpoint 139 in the first peripheral device 130. The processing device 160

recognises this endpoint and can interact with it if the base unit 100 is adapted to translate the co-ordinates of the touch to ones that can be used by the processing device 160, i.e. the OS 164 has the relevant driver 162. This driver is a standard driver which can be distributed, e.g. this driver can be downloaded if required. This embodiment requires that each processing device 160 in a meeting downloads or has installed the relevant driver 162 but the translation function of the base unit 100 can reduce the number of different drivers that might be required even more than with the previous embodiment of Figure 9.

In the embodiment of Figure 11, there is a group 90, base unit 100, first peripheral device 130 and processing device 160. There are two functional devices connected to or in the base unit 100, namely a display 126 and a touchscreen 99. The touch screen 99 is now dealt with by the client software 70 as has been described previously, namely that the client software running on the first peripheral device 130 is adapted to interact with the touchscreen 99 through the USB interface 131 and to interact with the OS164 of the processing device 160. This means that the touchscreen 99 is not exposed to the processing device 160. The client software 70 is adapted to simulate a touch event and to provide the correct co-ordinates to the OS164 of the processing device 160. This is therefore a proprietary solution which requires the client software 70 to be adapted to interact with each type of touchscreen 99 through a USB interface 131.

Figures 12 to 14 relate to embodiments of the present invention in which there are multiple users. First of all, each participant in a meeting can make use of any of the embodiments described in Figures 8 to 11. Thus, the present invention provides multiuser solutions.

In Figure 12 the processing device 60' has no first peripheral device 130, e.g. none is available. In such a case client software 70' can be adapted to interact directly with base unit 100 over a wireless connection 127' and the client software 70' is adapted to provide any simulations, or translations as required to present the display device 126 to the processing unit 160' and to allow interaction therewith. The client software 70' can be adapted to simulate any of the embodiments described with respect to Figures 1 to 11 without however using a first peripheral device 130. The client software 70' can simulate for example a UB interface of the type used in any of the embodiments of Figures 1 to 11. For the processing device 160, the methods described with respect to any of Figures 1 to 11 can be used.

In Figure 13 the processing device 60' has no first peripheral device 130, e.g. none is available. In such a case client software 70' can be adapted to interact directly with base unit 100 over a wireless connection 127' and the client software 70' is adapted to provide any simulations, or translations as required to present the display device 126 to the processing unit 160' and to allow interaction therewith exactly as described with respect to Figure 12. However, group 90 has a microphone and speaker combination such as a speakerphone 92 or a microphone and speaker combination 96, 97. Processing device 160 can make use of any of the embodiments of Figures 1 to 11. The client software 70' of processing device 160' can be adapted to provide video data directly to the base unit 100 where it is processed, e.g. decoded and composited and provided to display 126 over a suitable connection such as an HDMI connection.

For the processing device 160' the client software 70' and a driver 162' can present a simulated speakerphone 92 to the OS 164' thus creating a virtual microphone and a virtual speaker. The third party software 60' for the Unified Communication such as the Skype™ call will be presented with these virtual devices which it then uses for the call.

In Figure 14 the processing device 60' has no first peripheral device 130, e.g. none is available. In such a case client software 70' can be adapted to interact directly with base unit 100 over a wireless connection 127' and the client software 70' is adapted to provide any simulations, or translations as required to present the display device 126 to the processing unit 160' and to allow interaction therewith exactly as described with respect to Figure 13. However, group 90 has a videocam 91 connected e.g. via a USB connection to the base unit 100. Processing device 160 can make use of any of the embodiments of Figures 1 to 11. The client software 70' of processing device 160' can be adapted to receive video data directly from the base unit 100.

For the processing device 160' the client software 70' and a driver 162' can present a simulated videocam 91 to the OS 164' thus creating a virtual videocam device. The third party software 60' for the Unified Communication such as the Skype™ call will be presented with all of the virtual devices which it then uses for the call.

Figure 15 shows a messaging flow diagram applicable to any of the embodiments described

with respect to figures 1 to 11.

Figure 16 shows a messaging flow applicable to any of the embodiments described with respect to figures 12 to 14 where no first peripheral device is used.

Figure 17 shows a further embodiment of the present invention comprising a processing device 160 with a processor and memory and executing and optionally storing a client software 70 comprising also a host application as well as a third party application 60 which can be adapted to execute a unified communications call such as a Skype™ call or a Skype™ for business call. The processing device 130 has a serial port such as a USB port and generic or custom drivers for communicating across the port with a first peripheral device 130. The peripheral device 130 has a processor and memory and executes and optionally stores firmware which provides a wireless link 127 to a base unit 100 as well as providing at least one configurable or fixed endpoint of a functional device 90 which is connected to or is connected in the base unit 100. The base unit has a processor and a memory for executing and optionally storing firmware for providing a connection to the wireless link 127 and also to provide a port to the functional device 90. The functional device 90 has a processor and memory and executes and optionally stores firmware for providing the link and interface to the base unit 100 and for providing data to be sent to the at least one configurable or fixed endpoints on the peripheral device 130.

Methods according to the present invention can be performed by a computer system. The present invention can use a processing engine to carry out functions. The processing engine preferably has digital processing capability such as provided by one or more microprocessors, FPGA's, or a central processing unit (CPU) and/or a Graphics Processing Unit (GPU), and which is adapted to carry out the respective functions by being programmed with software, i.e. one or more computer programs. References to software can encompass any type of programs in any language executable directly or indirectly by a processor, either via a compiled or interpretative language. The implementation of any of the methods of the present invention can be performed by logic circuits, electronic hardware, processors or circuitry which can encompass any kind of logic or analog circuitry, integrated to any degree, and not limited to general purpose processors, digital signal processors, ASICs, FPGAs, discrete components or transistor logic gates and similar.

A processing device may have memory (such as non-transitory computer readable medium, RAM and/or ROM), an operating system, optionally a display such as a fixed format display, ports for data entry devices such as a keyboard, a pointer device such as a "mouse", serial or parallel ports to communicate other devices, network cards and connections to connect to any of the networks.

The software can be embodied in a computer program product adapted to carry out the functions of any of the methods of the present invention, e.g. as itemised below when the software is loaded onto a computer and executed on one or more processing engines such as microprocessors, ASIC's, FPGA's etc. Hence any of the embodiments of the present invention can incorporate a computer system capable of running one or more computer applications in the form of computer software.

The methods described with respect to embodiments of the present invention above can be performed by one or more computer application programs running on the computer system by being loaded into a memory and run on or in association with an operating system such as WindowsTM supplied by Microsoft Corp, USA, Linux, Android or similar. The computer system can include a main memory, preferably random access memory (RAM), and may also include a non-transitory hard disk drive and/or a removable non-transitory memory, and/or a non-transitory solid state memory. Non-transitory removable memory can be an optical disk such as a compact disc (CD-ROM or DVD-ROM), a magnetic tape, which is read by and written to by a suitable reader. The removable non-transitory memory can be a computer readable medium having stored therein computer software and/or data. The non-volatile storage memory can be used to store persistent information that should not be lost if the computer system is powered down. The application programs may use and store information in the non-volatile memory.

The software embodied in the computer program product is adapted to carry out the following functions when the software is loaded onto the respective device or devices and executed on one or more processing engines such as microprocessors, ASIC's, FPGA's etc.:

connecting a processing device to a functional device connected to or in a base unit of a communications network, the processing device having a memory, a display and an operating system, the base unit having a transmitter and the first peripheral device having a receiver;

coupling a first peripheral device to the processing device via a generic communications protocol, providing at least one fixed or a configurable endpoint of the functional device exposed on the first peripheral device;

transmitting data from the base unit and receiving the data at the first peripheral device over the communications network from the functional device to the processing device via the at least one fixed or configurable endpoint using the generic communications protocol for communication between the processing device and the first peripheral device.

The software embodied in the computer program product is adapted to carry out the following functions when the software is loaded onto the respective device or devices and executed on one or more processing engines such as microprocessors, ASIC's, FPGA's etc.:

Transmitting or receiving data, i.e. streaming data carrying images, audio, etc. in a raw or unaltered format;

Connecting the functional device to or in a base unit of a wireless communications network;

Running the functional device with the vendor specific driver alone.

The software embodied in the computer program product is adapted to carry out the following functions when the software is loaded onto the respective device or devices and executed on one or more processing engines such as microprocessors, ASIC's, FPGA's etc.:

exposure implemented with **descriptor fields**;

transmitting the data from the functional device to at least two processing devices using at least two first peripheral devices;

combining and exposing two endpoints to the processing device as one endpoint.

The software embodied in the computer program product is adapted to carry out the following functions when the software is loaded onto the respective device or devices and executed on one or more processing engines such as microprocessors, ASIC's, FPGA's etc.:

the functional device enables one or more of a microphone, a speakerphone, a speaker, a display, a touchscreen, a projector, a camera, a video camera, a webcamera;

presenting the at least one fixed or a configurable endpoint of the functional device exposed on the first peripheral device as one of a human interface device, a mass storage device, a composite device, a microphone, a speakerphone, a speaker, a display, a touchscreen, a projector, a camera, a video camera, or a webcamera.

The software embodied in the computer program product is adapted to carry out the following functions when the software is loaded onto the respective device or devices and executed on one or more processing engines such as microprocessors, ASIC's, FPGA's etc.:

encoding, and/or optionally encrypting the data;

hosting a unified communication between two or more further processing devices on the processing device;

the first peripheral device presenting a functional device to the unified communication between two or more processing devices; or

exposing the same type of functional device to the processing device as is connected to the Base Unit and using at least one driver for the functional device installed on the processing

device.

Any of the above software may be implemented as a computer program product which has been compiled for a processing engine in any of the servers or nodes of the network. The computer program product may be stored on a non-transitory signal storage medium such as an optical disk (CD-ROM or DVD-ROM), a digital magnetic tape, a magnetic disk, a solid state memory such as a USB flash memory, a ROM, etc.

Claims:

1. A system for connecting a processing device to a functional device connected to or in a base unit of a communications network, the processing device having a memory, a display and an operating system, the system comprising :

a first peripheral device being adapted to be coupled to the processing device via a generic communications protocol, the base unit having a transmitter and the first peripheral device having a receiver and at least one fixed or a configurable endpoint of the functional device exposed on the first peripheral device;
the base unit and the first peripheral device being adapted to transmit and receive data respectively over the communications network from the functional device to the processing device via the at least one fixed or configurable endpoint using the generic communications protocol for communication between the processing device and the first peripheral device.

2. The system according to claim 1, wherein data that is transmitted or received, optionally streaming data carrying images, audio, or similar can be in a raw or unaltered format.

3. The system according to claim 1 or 2, wherein the functional device is connected to or in a base unit of a wireless communications network.

4. The system according to any previous claim, wherein exposure is implemented with descriptor fields.

5. The system according to any previous claim, wherein the functional device can be run with the vendor specific driver alone.

6. The system according to any previous claim adapted to transmit the data from the functional device to at least two processing devices using at least two first peripheral devices.

7. The system according to any previous claim, wherein two endpoints are combined and exposed to the processing device as one endpoint.

8. The system according to any previous claim, wherein the functional device is any one or more of a microphone, a speakerphone, a speaker, a display, a touchscreen, a projector, a camera, a video camera, a webcamera.

9. The system according to any previous claim, wherein the at least one fixed or a configurable endpoint of the functional device exposed on the first peripheral device is one of a human interface device, a mass storage device, a composite device, a microphone, a speakerphone, a speaker, a display, a touchscreen, a projector, a camera, a video camera, or a webcamera.

10. The system according to any previous claim, further comprising means for encoding, optionally encrypting the data.

11. The system according to any previous claim, wherein the processing device is adapted to host a unified communication between two or more further processing devices.

12. The system according to claim 11, wherein the first peripheral device is adapted to present a functional device to the unified communication between two or more processing devices.

13. The system according to any previous claim adapted to expose the same type of functional device to the processing device as is connected to the Base Unit further comprising at least one driver for the functional device installed on the processing device.

14. The system according to any previous claim, wherein the functional device is a second peripheral device.

15. The system according to any previous claim, wherein the functional device is a data capturing device.

16. A method for connecting a processing device to a functional device connected to or in a base unit of a communications network, the processing device having a memory, a display and an operating system, the base unit having a transmitter and the first peripheral device having a receiver the method comprising :

coupling a first peripheral device to the processing device via a generic communications protocol, providing at least one fixed or a configurable endpoint of the functional device exposed on the first peripheral device;

transmitting data from the base unit and receiving the data at the first peripheral device over the communications network from the functional device to the processing device via the at least one fixed or configurable endpoint using the generic communications protocol for communication between the processing device and the first peripheral device.

17. The method according to claim 16, wherein data that is transmitted or received, i.e. streaming data carrying images, audio, etc. can be in a raw or unaltered format.

18. The method according to claim 16 or 17, wherein the functional device being connected to or in a base unit of a wireless communications network.

19. The method according to any of the claims 16 to 18, wherein the functional devices are run with the vendor specific driver alone.

20. The method according to any of the claims 16 to 19, wherein exposure can be implemented with descriptor fields.

21. The method according to any of the claims 16 to 20, comprising transmitting the data from the functional device to at least two processing devices using at least two first peripheral devices.

22. The method according to any of the claims 16 to 21, wherein two endpoints are combined and exposed to the processing device as one endpoint.

23. The method according to any of the claims 16 to 22, wherein the functional device provides any one or more of a microphone, a speakerphone, a speaker, a display, a touchscreen, a projector, a camera, a video camera, a webcamera.

24. The method according to any of the claims 16 to 23, further comprising presenting the at least one fixed or a configurable endpoint of the functional device exposed on the first

peripheral device as one of a human interface device, a mass storage device, a composite device, a microphone, a speakerphone, a speaker, a display, a touchscreen, a projector, a camera, a video camera, or a webcamera.

25. The method according to any of the claims 16 to 24, further comprising encoding, and/or optionally encrypting the data.

26. The method according to any of the claims 16 to 25, further comprising hosting a unified communication between two or more further processing devices on the processing device.

27. The method according to claim 26, further comprising the first peripheral device presenting a functional device to the unified communication between two or more processing devices.

28. The method according to any of the claims 16 to 27, comprising exposing the same type of functional device to the processing device as is connected to the Base Unit and using at least one driver for the functional device installed on the processing device.

29. A peripheral device adapted to be coupled to a processing device via a generic communications protocol, the peripheral device having a receiver and at least one fixed or a configurable endpoint of a functional device exposed on the first peripheral device; the receiver of the first peripheral device being adapted to receive data over a communications network from the functional device and for sending the data to the processing device via the at least one fixed or configurable endpoint using the generic communications protocol for communication between the processing device and the peripheral device.

30. The peripheral device according to claim 29, wherein the communications network is a wireless communications network

31. The peripheral device according to claim 29 or 30, wherein data that is transmitted or received, i.e. streaming data carrying images, audio, etc. can be in a raw or unaltered format.

32. The peripheral device according to any of the claims 29 to 31, wherein the functional

device can be run with the vendor specific driver alone.

33. The peripheral device according to any of the claims 29 to 32, wherein the at least one fixed or a configurable endpoint of the functional device exposed on the first peripheral device is one of a human interface device, a mass storage device, a composite device, a microphone, a speakerphone, a speaker, a display, a touchscreen, a projector, a camera, a video camera, or a webcamera.

34. A computer program product for carrying out any of the method steps of any of the claims 16 to 28 when executed on a processor.

35. A non-transitory signal storage means storing the computer program product of claim 34.

Fig. 1A (Fig.1)

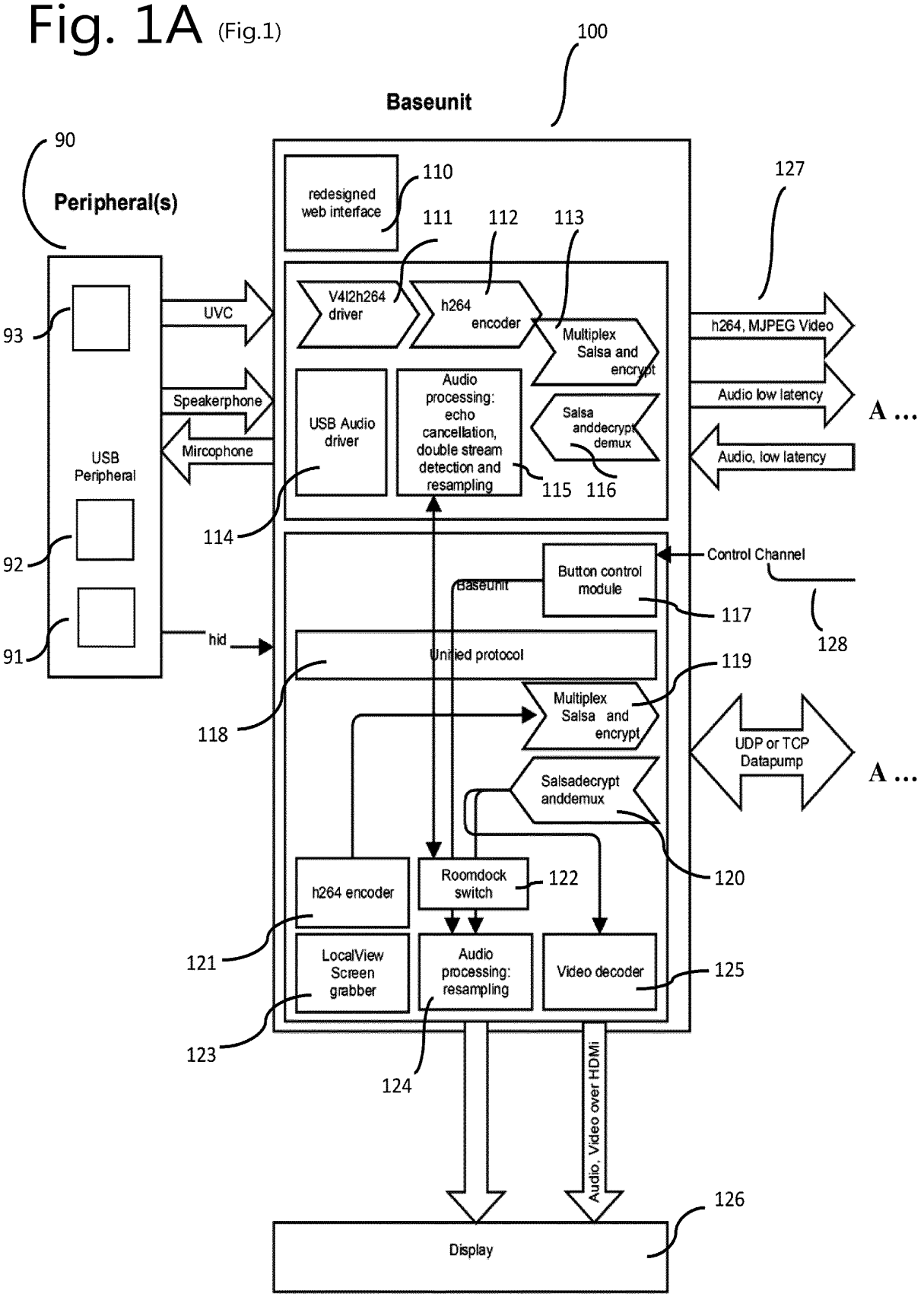

100
Baseunit
90
Peripheral(s)
redesigned web interface
110
111
112
113
127
V4l2h264 driver
h264 encoder
Multiplex Salsa and encrypt
h264, MJPEG Video
93
UVC
Speakerphone
Mircophone
USB Peripheral
USB Audio driver
Audio processing: echo cancellation, double stream detection and resampling
Salsa anddecrypt demux
Audio low latency
Audio, low latency
A ...
114
115
116
92
91
hid
Control Channel
Button control module
Baseunit
117
128
Unified protocol
119
Multiplex Salsa and encrypt
UDP or TCP Datapump
A ...
118
Salsadecrypt anddemux
120
h264 encoder
Roomdock switch
122
121
LocalView Screen grabber
Audio processing: resampling
Video decoder
125
123
124
Audio, Video over HDMi
126
Display

Fig. 1B
(Fig.1 continued)

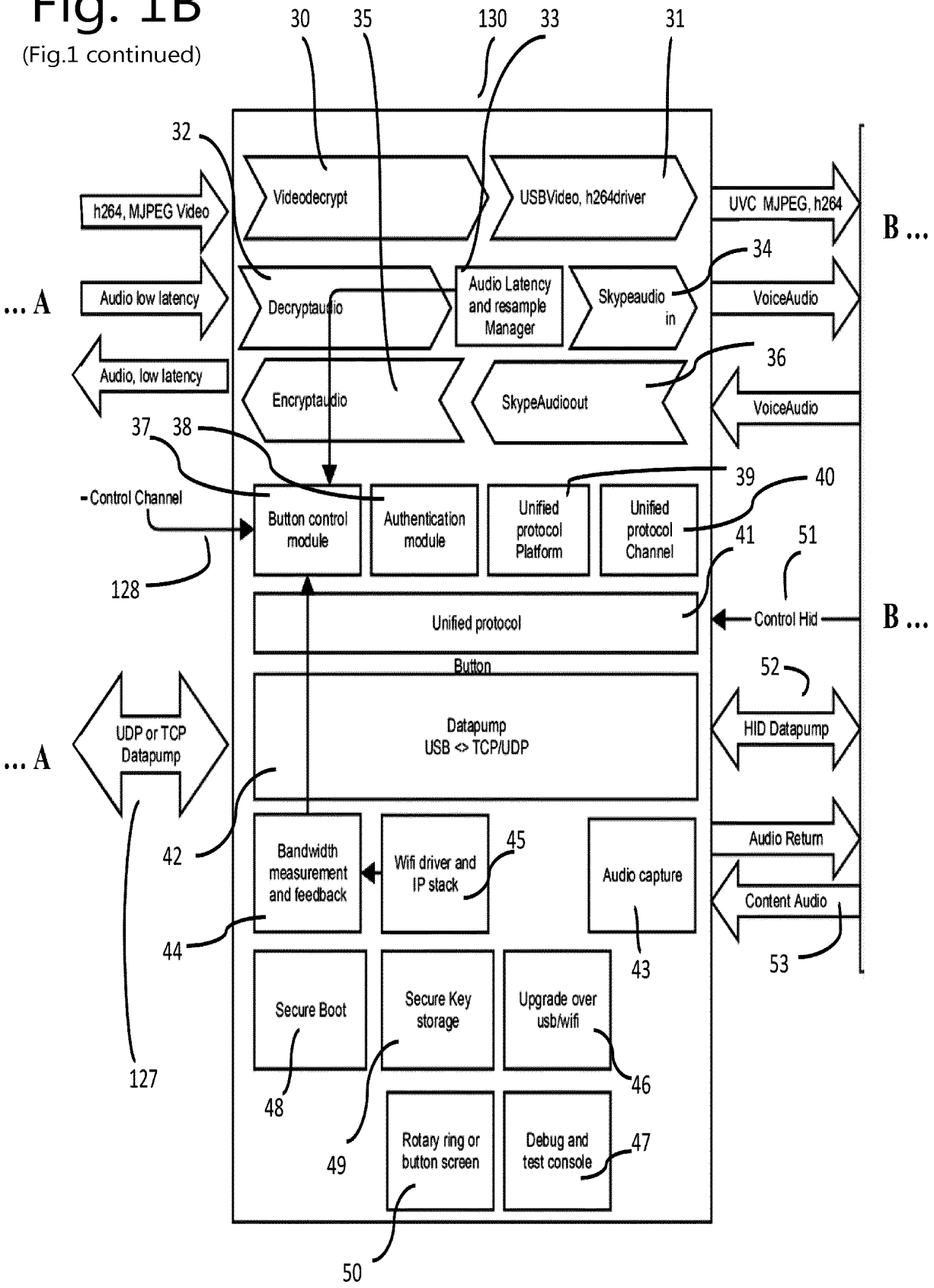
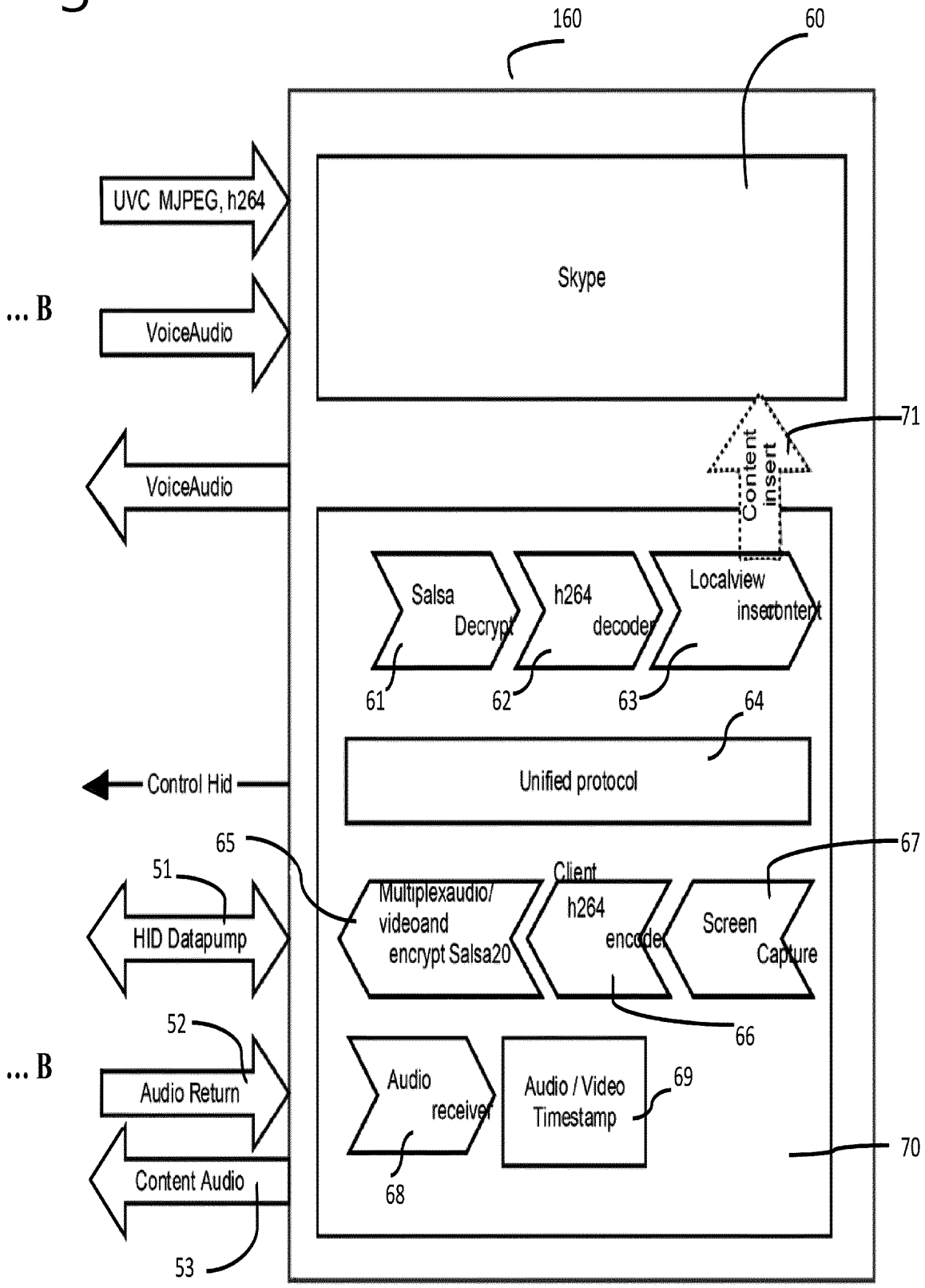


Fig. 1C (Fig.1 continued)



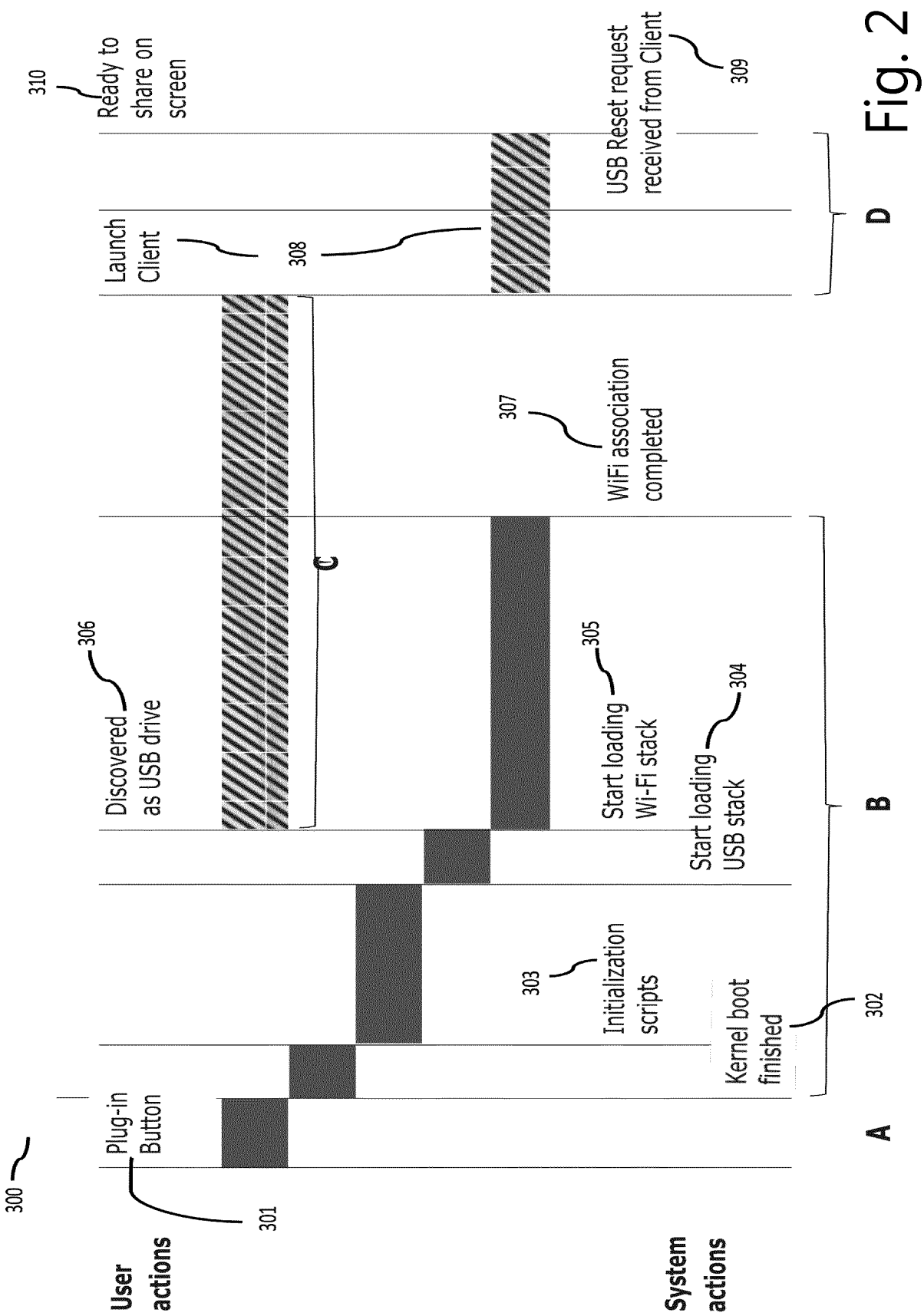
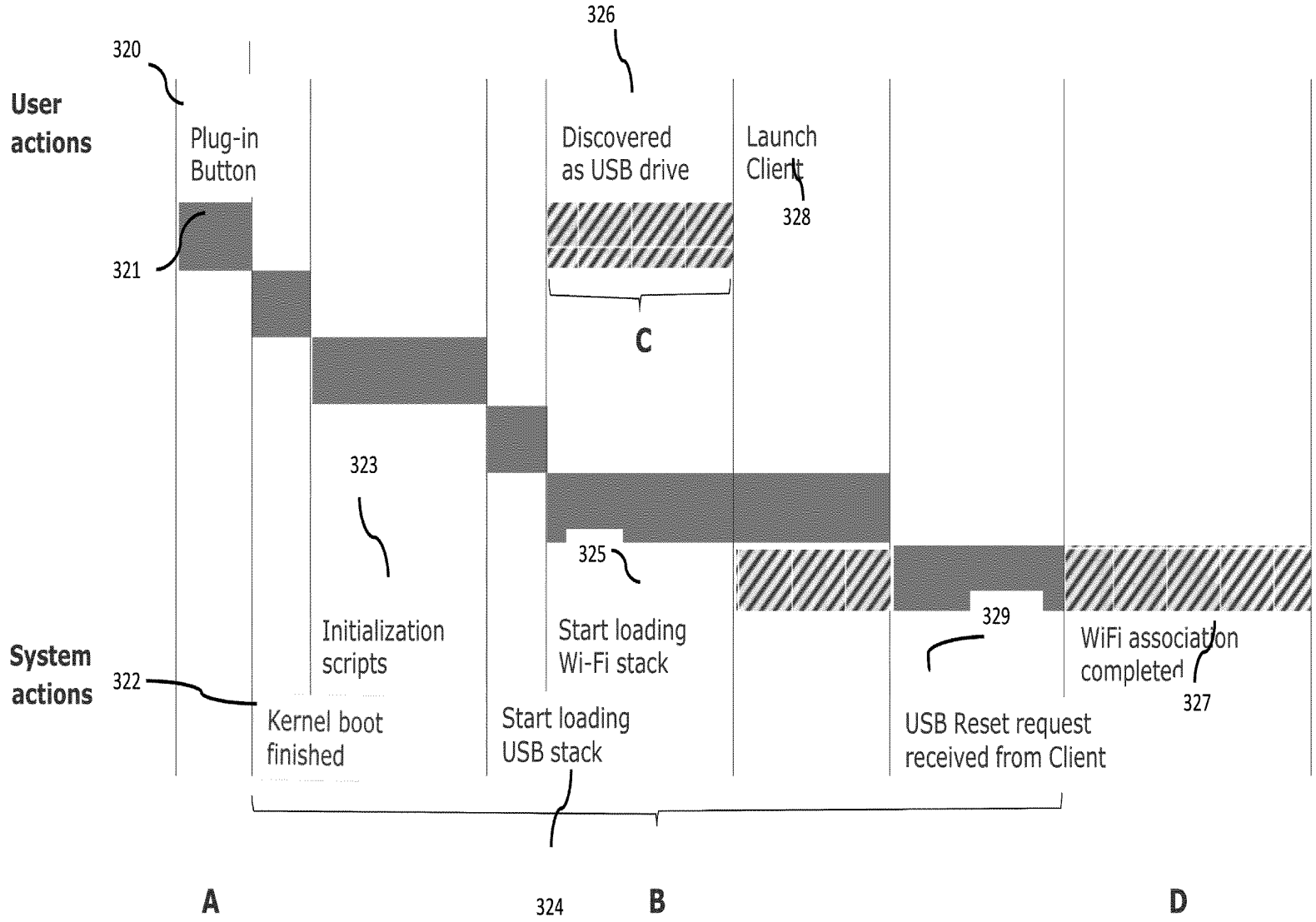

300
User actions
System actions
Plug-in Button
301
Kernel boot finished
302
Initialization scripts
303
Start loading USB stack
304
Start loading Wi-Fi stack
305
Discovered as USB drive
306
WiFi association completed
307
Launch Client
308
USB Reset request received from Client
309
Ready to share on screen
310
A
B
C
D

Fig. 2

SUBSTITUTE SHEET (RULE 26)

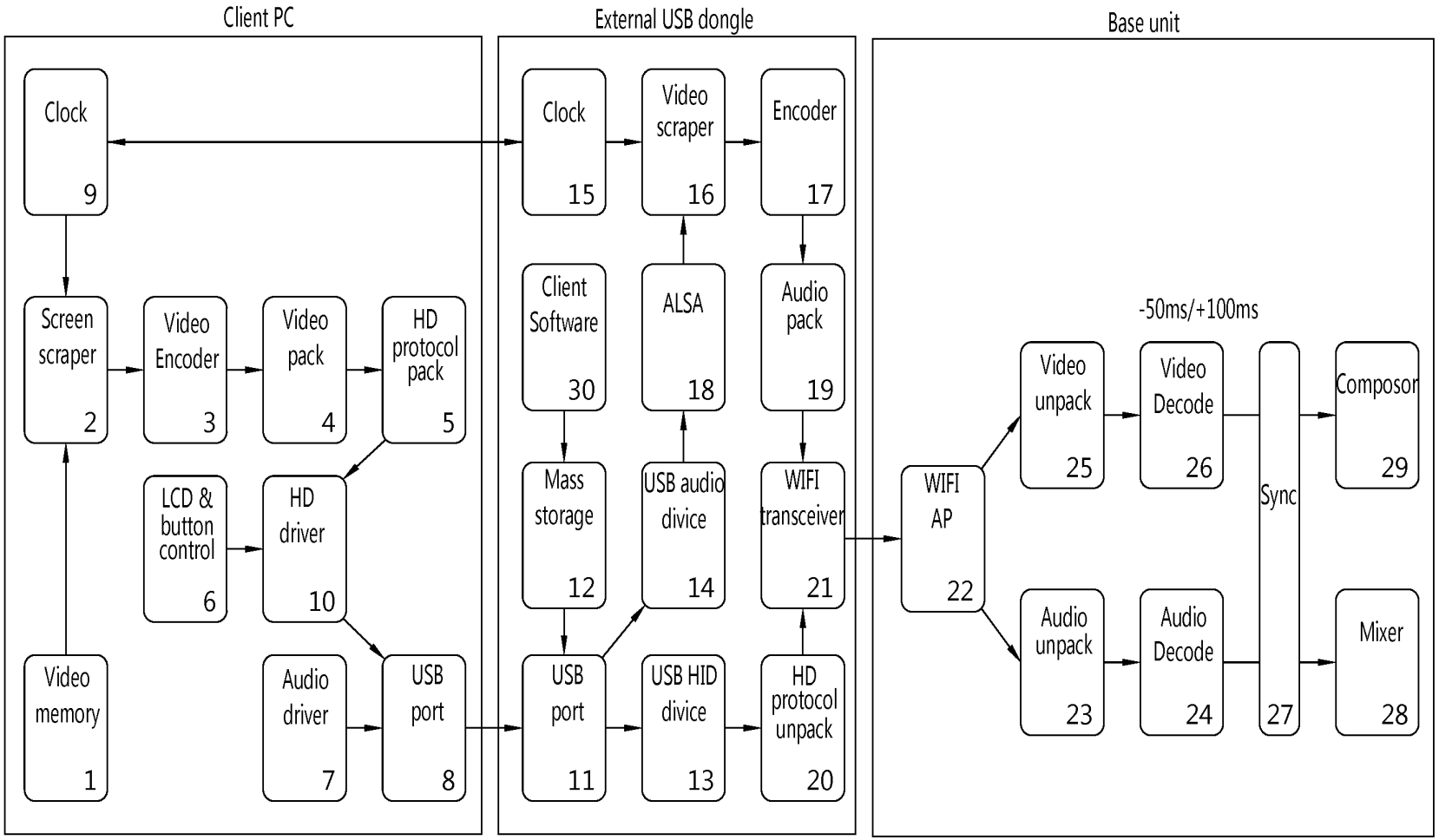


Current average timing for A+B+D ≈ 28 seconds – in stand-alone mode with launcher

Fig. 3

SUBSTITUTE SHEET (RULE 26)

Fig. 4



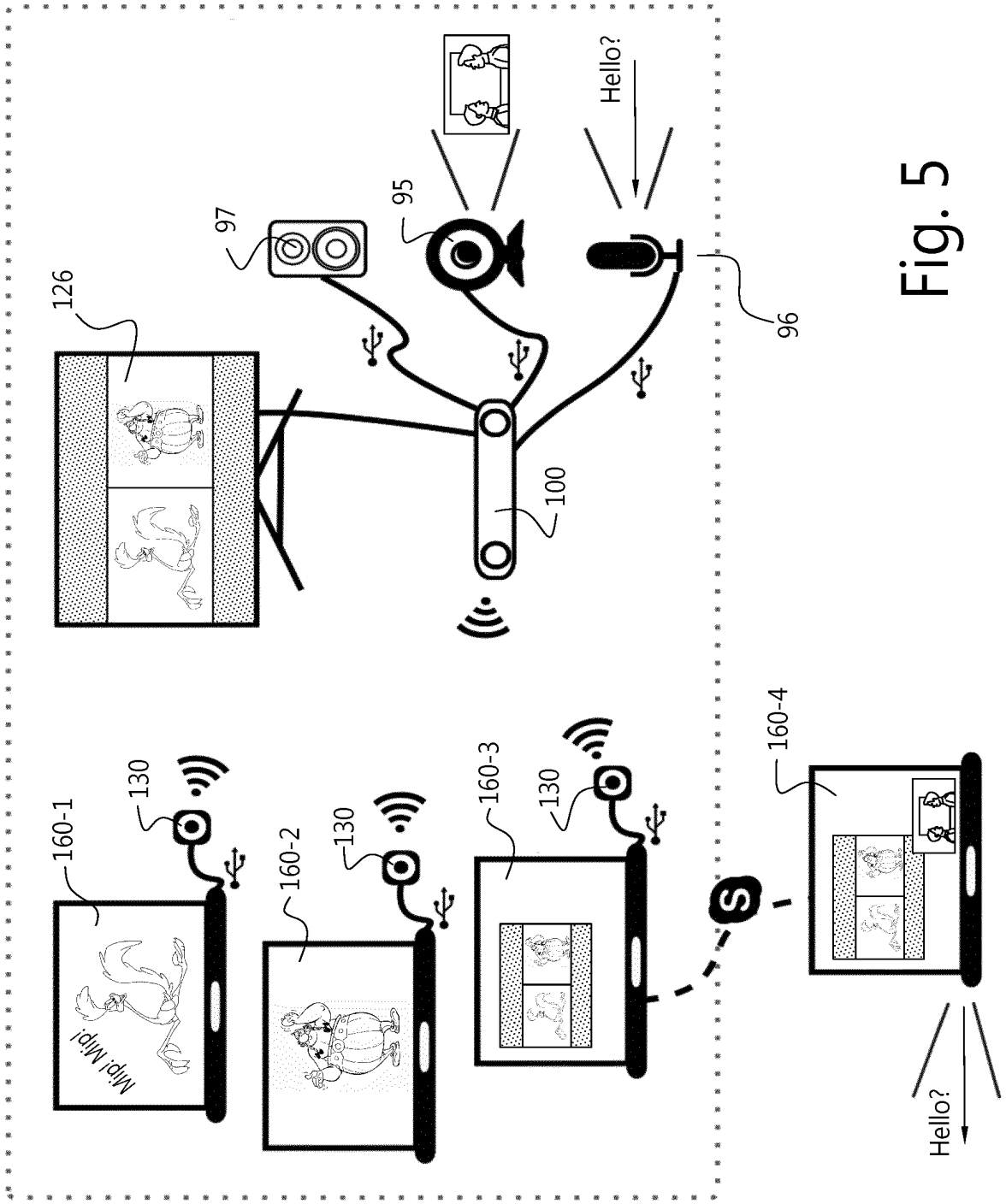

126
97
95
Hello?
96
100
160-1
130
Mip! Mip!
160-2
130
160-3
130
160-4
Hello?

Fig. 5

Fig. 6

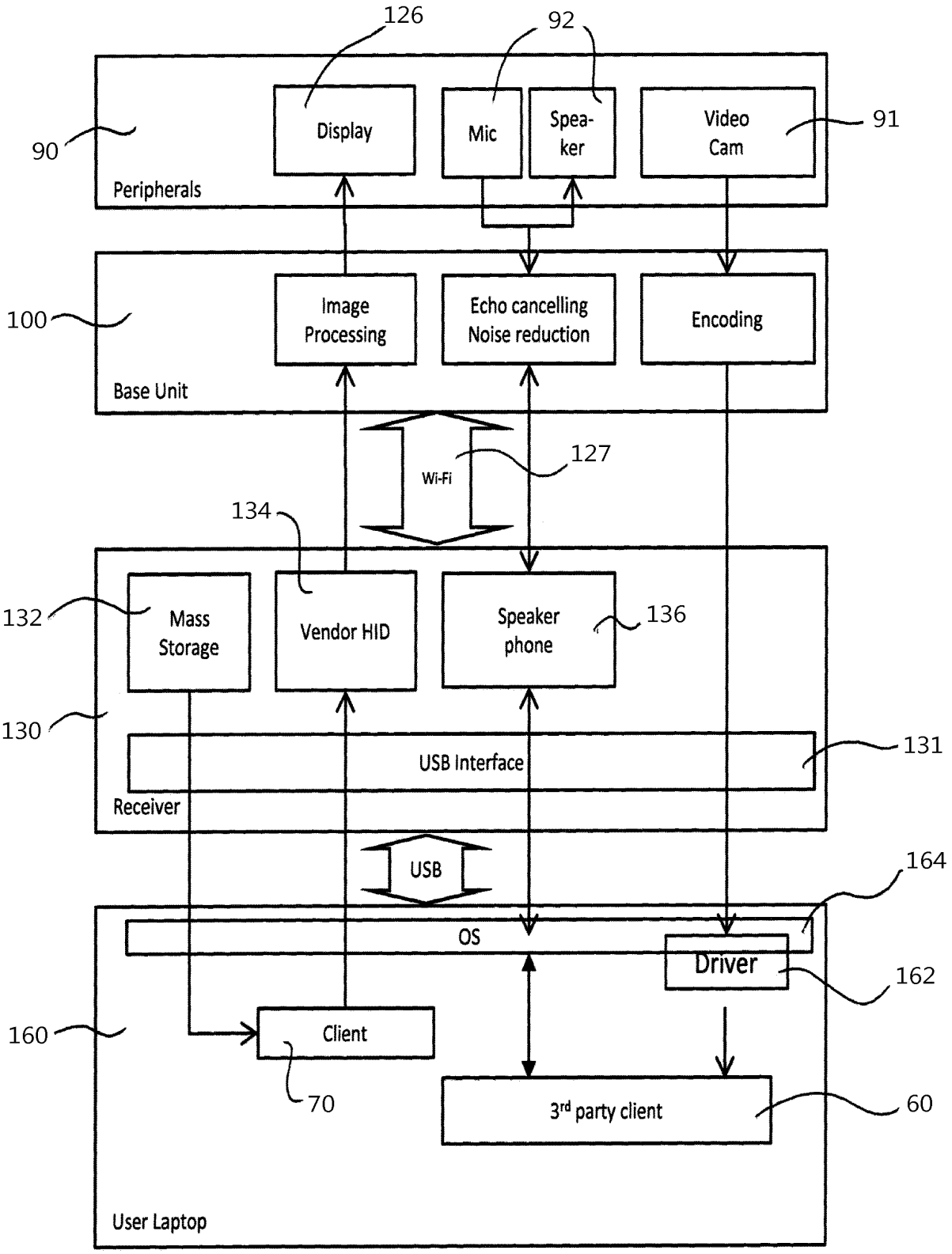

126
92
Display
Mic
Spea-
ker
Video
Cam
91
90
Peripherals
Image
Processing
Echo cancelling
Noise reduction
Encoding
100
Base Unit
Wi-Fi
127
134
132
Mass
Storage
Vendor HID
Speaker
phone
136
130
USB Interface
131
Receiver
USB
164
OS
Driver
162
160
Client
70
3rd party client
60
User Laptop

Fig. 7

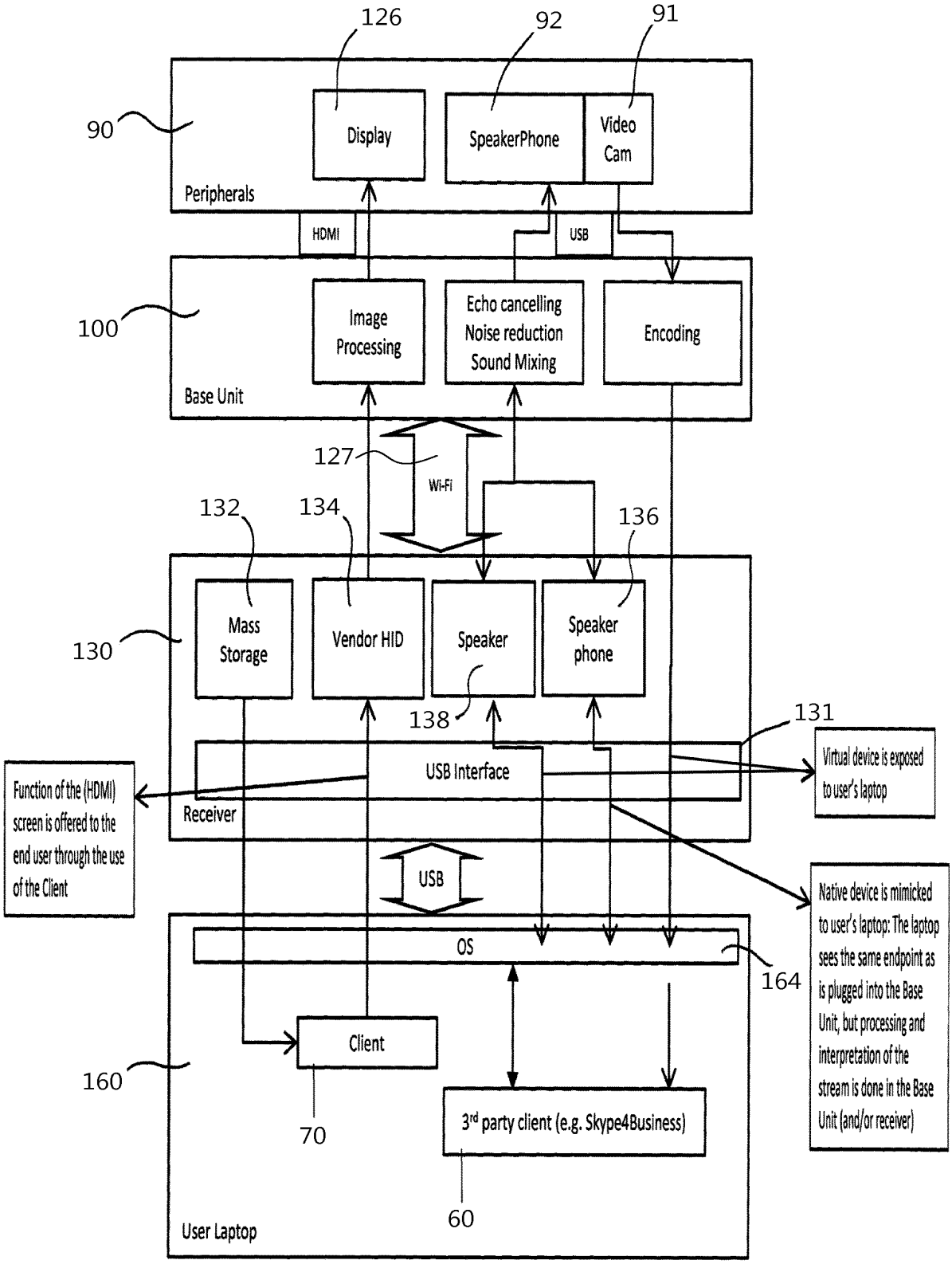

126
92
91
90
Display
SpeakerPhone
Video Cam
Peripherals
HDMI
USB
100
Image Processing
Echo cancelling
Noise reduction
Sound Mixing
Encoding
Base Unit
127
Wi-Fi
132
134
136
130
Mass Storage
Vendor HID
Speaker
Speaker phone
138
131
Virtual device is exposed to user's laptop
Function of the (HDMI) screen is offered to the end user through the use of the Client
USB Interface
Receiver
USB
Native device is mimicked to user's laptop: The laptop sees the same endpoint as is plugged into the Base Unit, but processing and interpretation of the stream is done in the Base Unit (and/or receiver)
OS
164
Client
160
70
3rd party client (e.g. Skype4Business)
60
User Laptop

Fig. 8

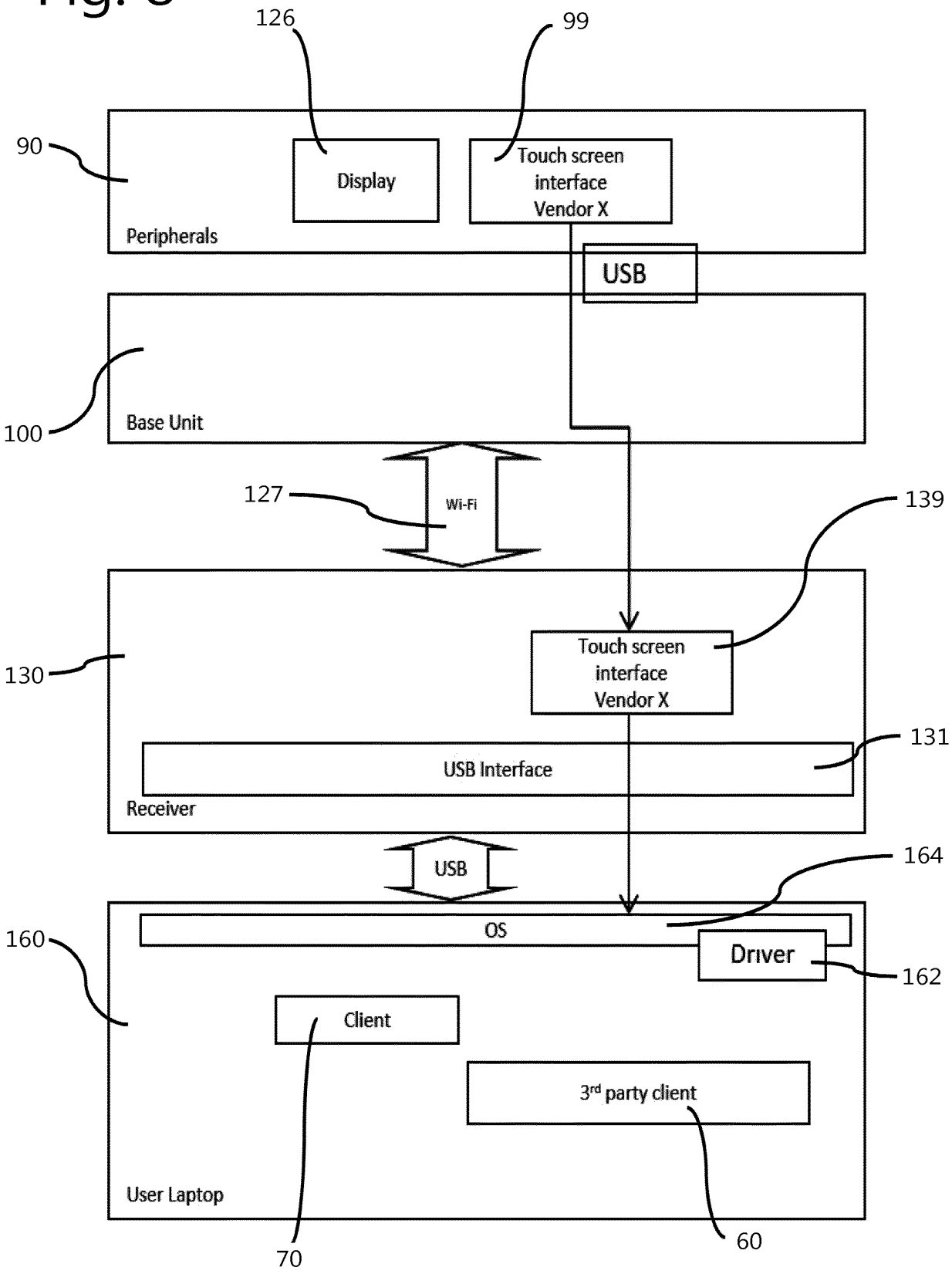

126
99
90
Display
Touch screen interface Vendor X
Peripherals
USB
100
Base Unit
127
Wi-Fi
139
130
Touch screen interface Vendor X
131
USB Interface
Receiver
USB
164
160
OS
Driver
162
Client
3rd party client
User Laptop
70
60

Fig. 9

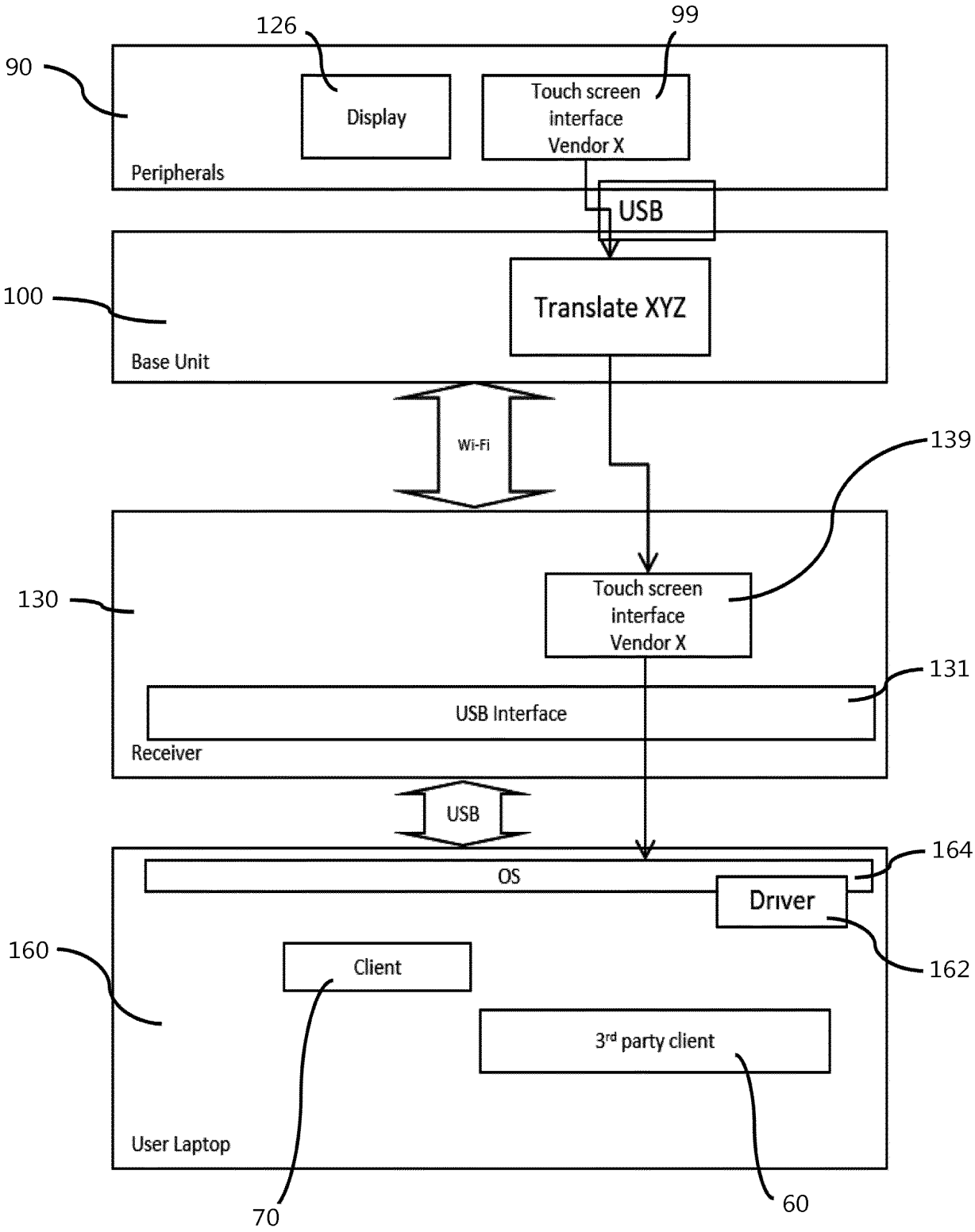

126
99
90
Display
Touch screen interface Vendor X
Peripherals
USB
100
Translate XYZ
Base Unit
Wi-Fi
139
130
Touch screen interface Vendor X
131
USB Interface
Receiver
USB
164
OS
Driver
160
162
Client
3rd party client
User Laptop
70
60

Fig. 10

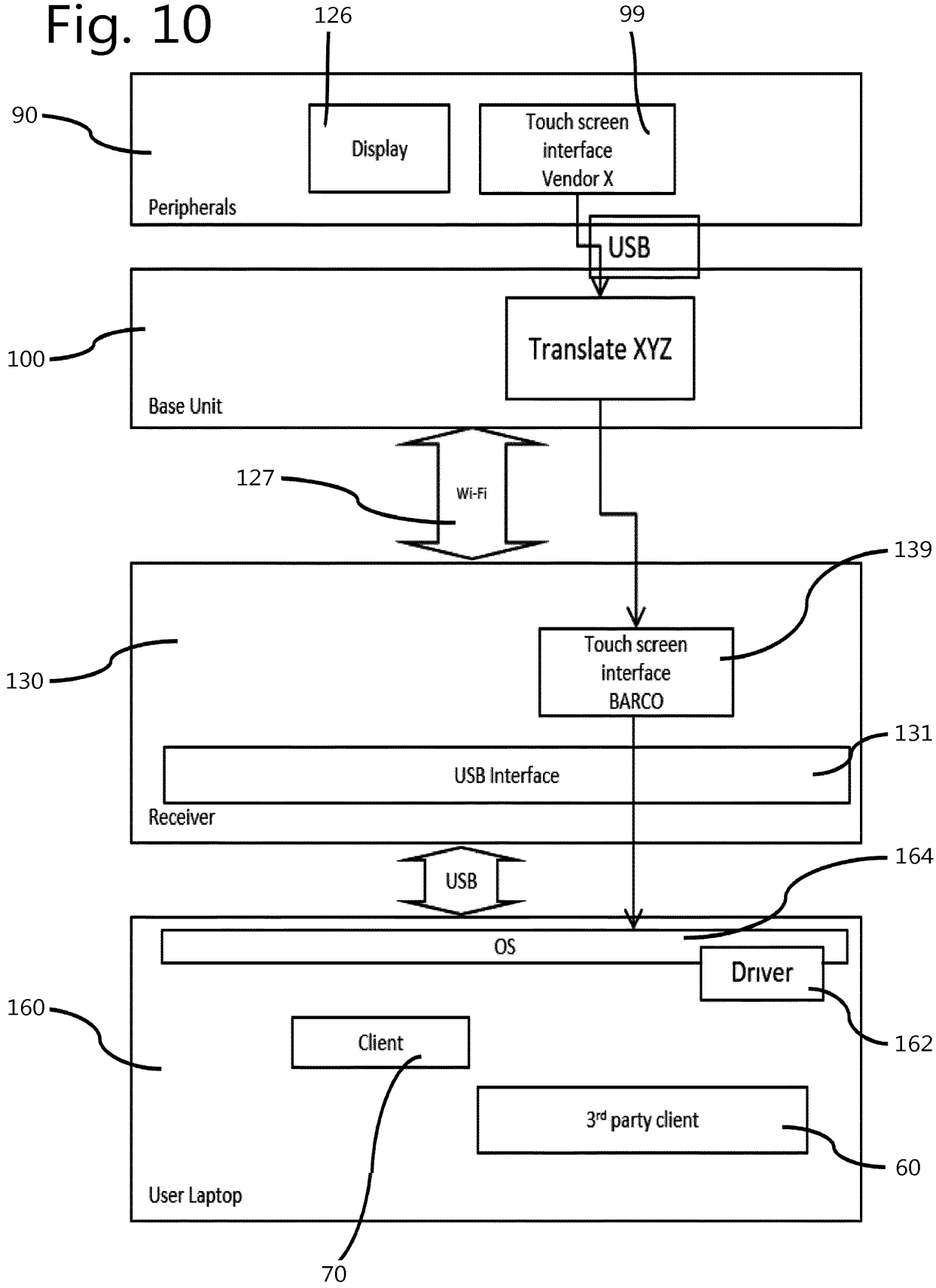

126
99
90
Display
Touch screen interface Vendor X
Peripherals
USB
Translate XYZ
100
Base Unit
127
Wi-Fi
139
Touch screen interface BARCO
130
131
USB Interface
Receiver
USB
164
OS
Driver
160
162
Client
3rd party client
60
User Laptop
70

Fig. 11

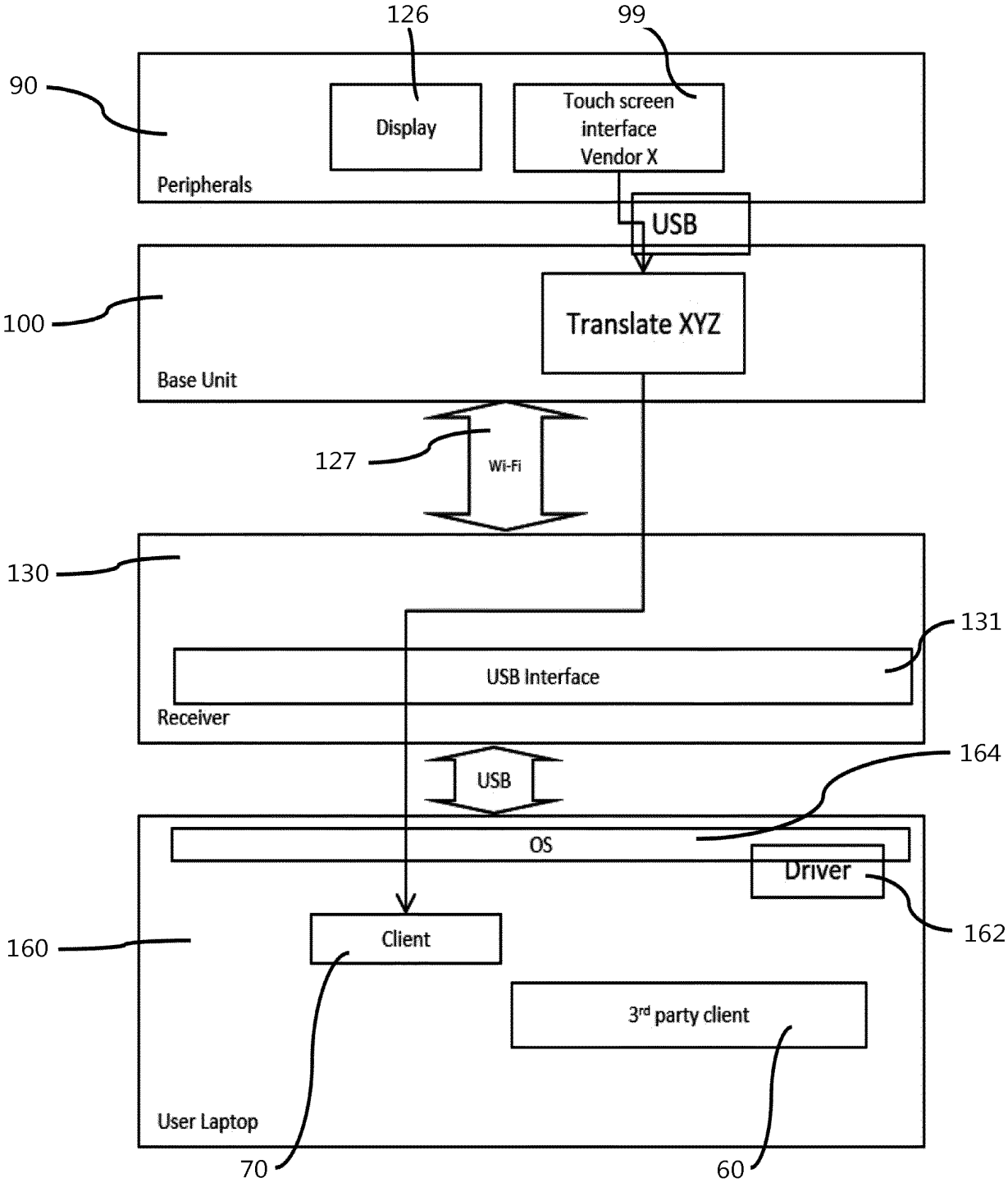
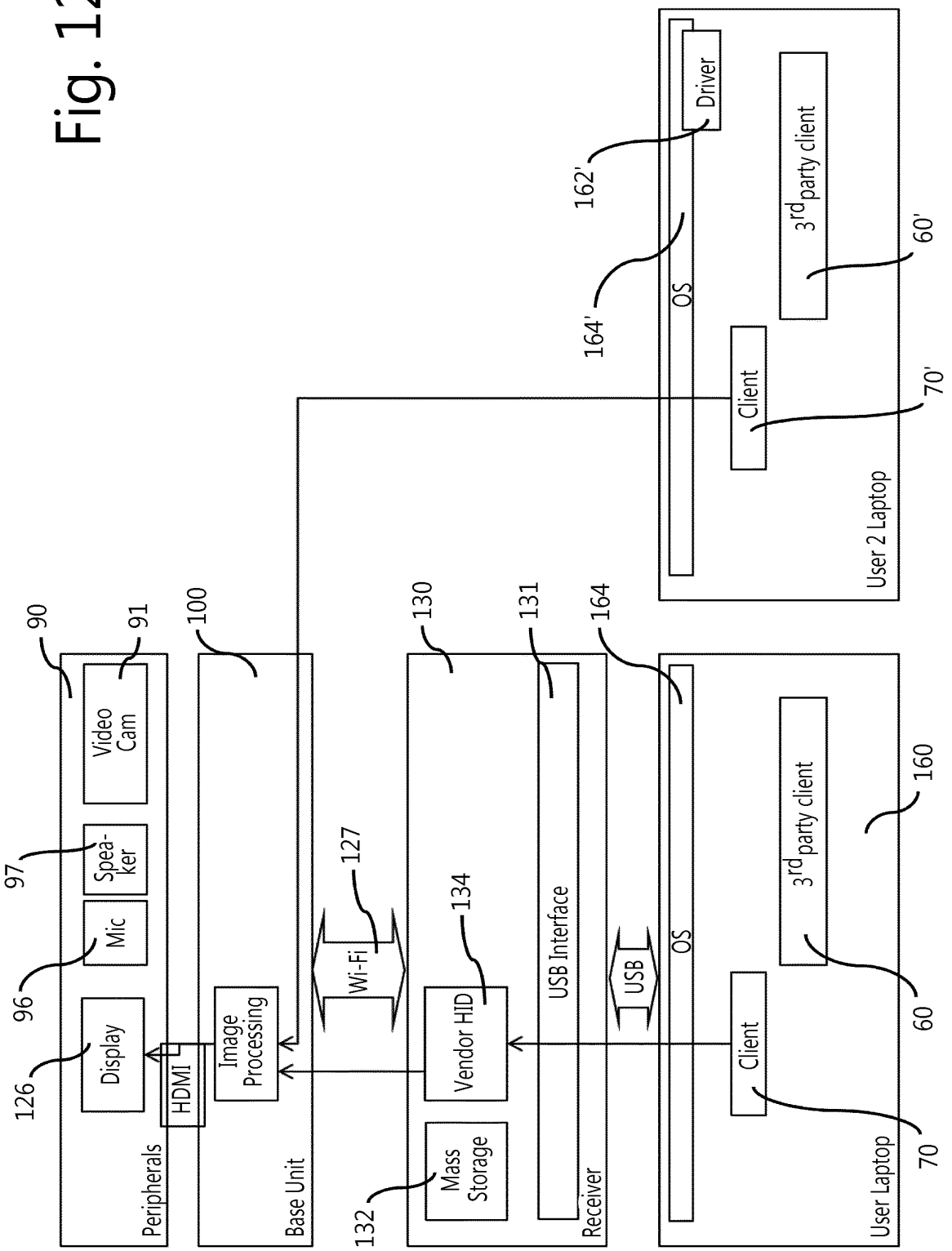
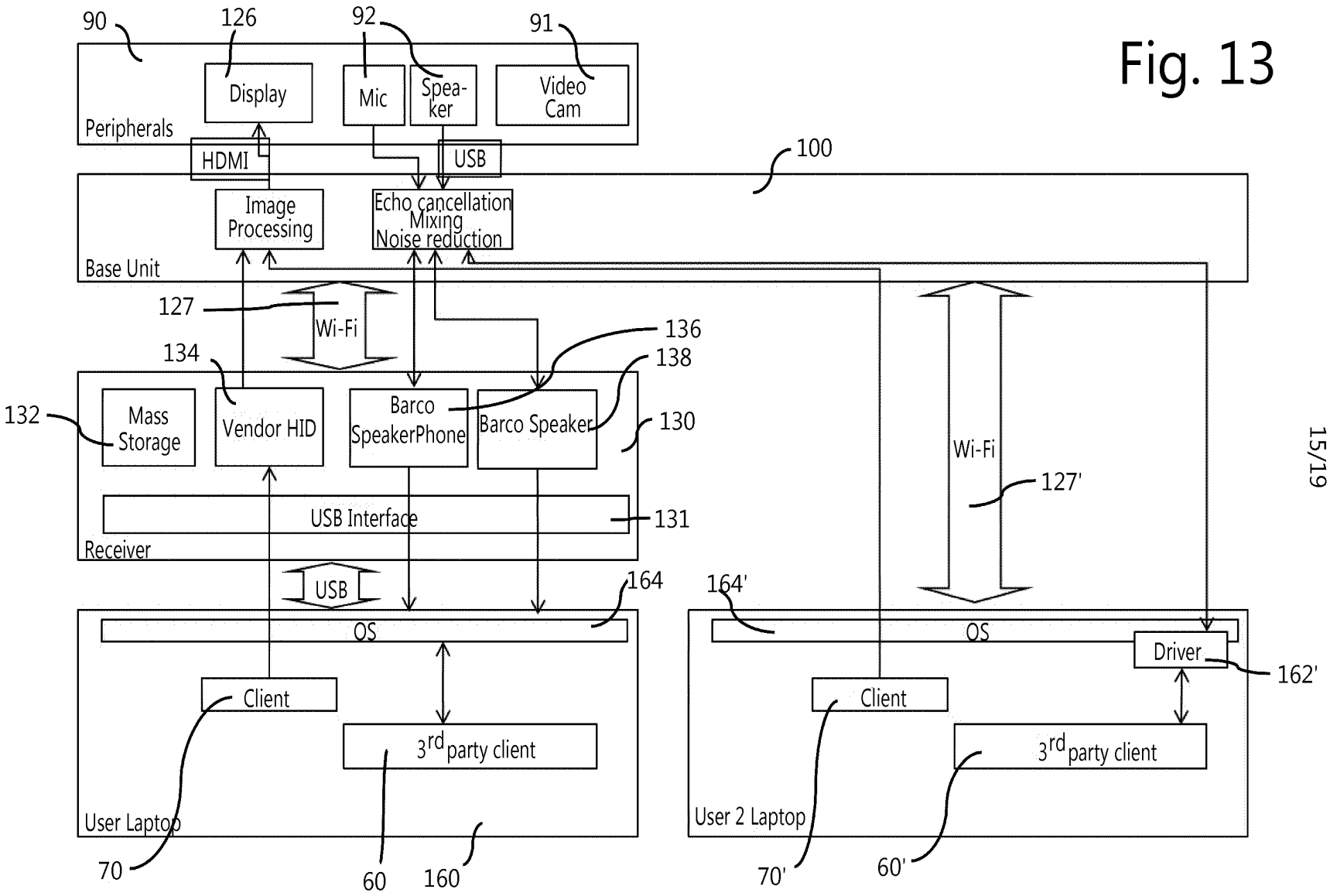

126
99
90
Display
Touch screen interface Vendor X
Peripherals
USB
100
Translate XYZ
Base Unit
127
Wi-Fi
130
131
USB Interface
Receiver
USB
164
OS
Driver
162
160
Client
3rd party client
User Laptop
70
60

Fig. 12


Peripherals
Display
Mic
Spea-ker
Video Cam
HDMI
Base Unit
Image Processing
Wi-Fi
Receiver
Vendor HID
USB Interface
Mass Storage
USB
OS
Client
3rd party client
User Laptop
Driver
User 2 Laptop
90
91
96
97
100
126
127
130
131
132
134
160
162'
164
164'
60
60'
70
70'

SUBSTITUTE SHEET (RULE 26)

Fig. 13



SUBSTITUTE SHEET (RULE 26)

Fig. 14

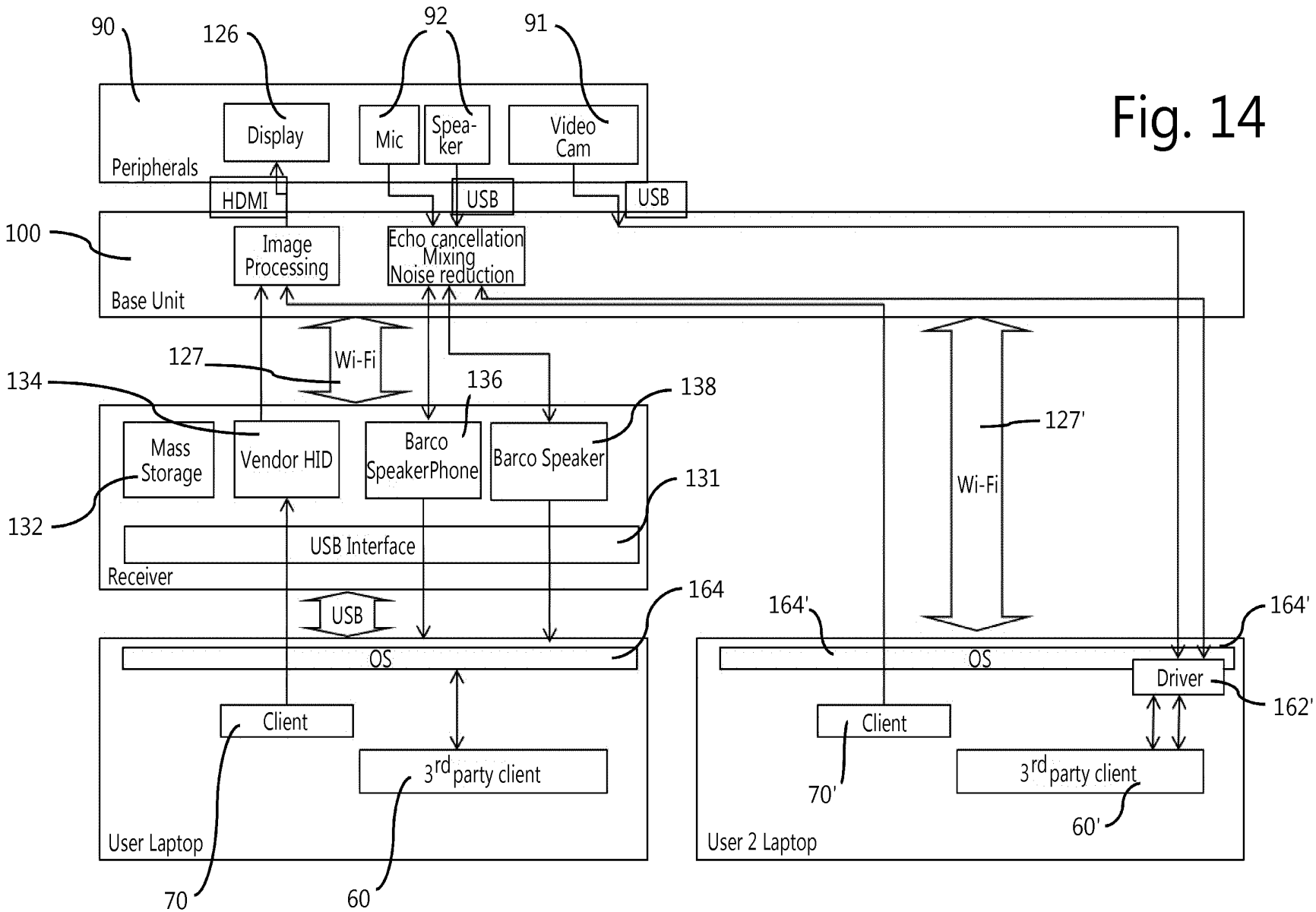


Fig. 15

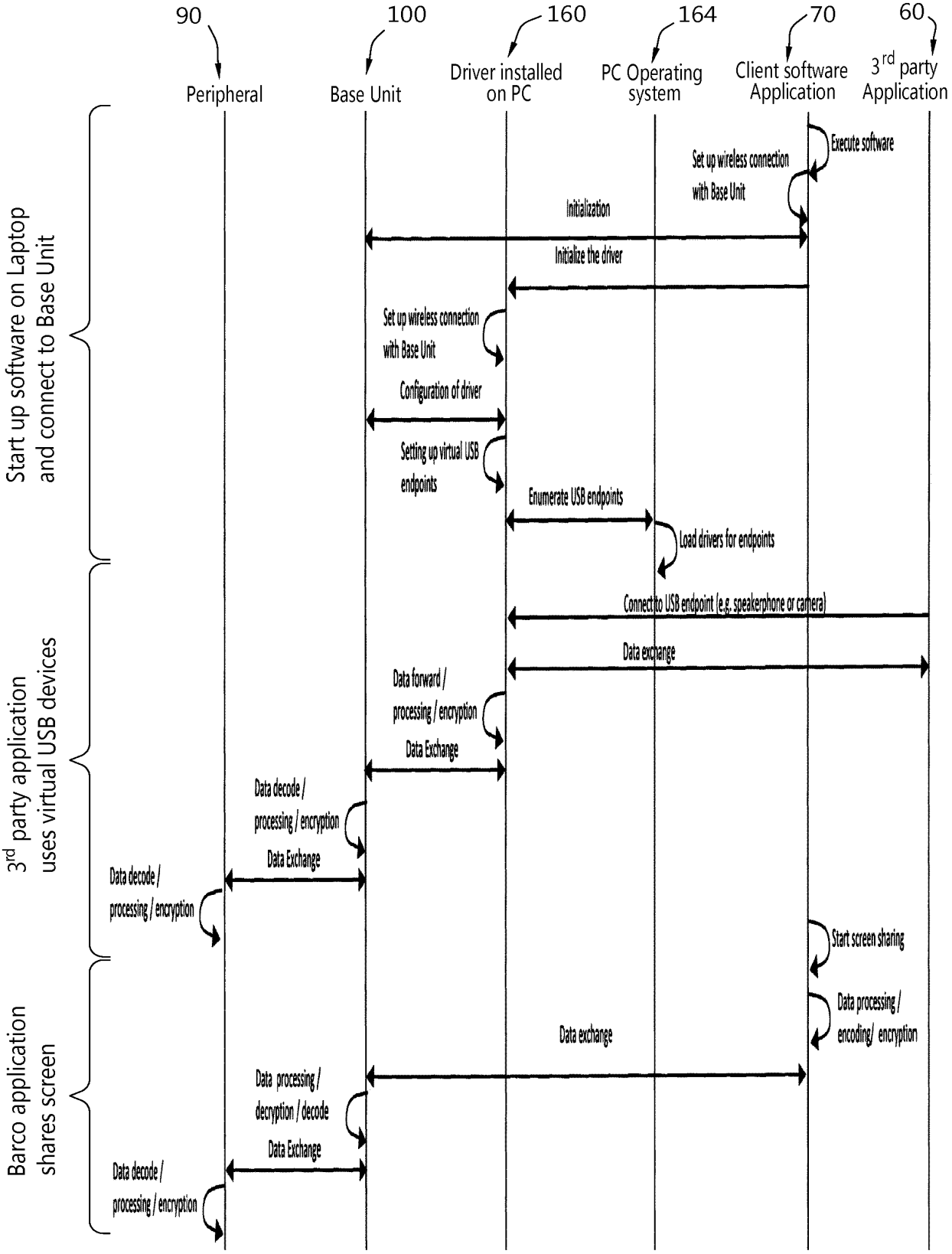

90
100
160
164
70
60
Peripheral
Base Unit
Driver installed on PC
PC Operating system
Client software Application
3rd party Application
Start up software on Laptop and connect to Base Unit
3rd party application uses virtual USB devices
Barco application shares screen
Execute software
Set up wireless connection with Base Unit
Initialization
Initialize the driver
Set up wireless connection with Base Unit
Configuration of driver
Setting up virtual USB endpoints
Enumerate USB endpoints
Load drivers for endpoints
Connect to USB endpoint (e.g. speakerphone or camera)
Data exchange
Data forward / processing / encryption
Data Exchange
Data decode / processing / encryption
Data Exchange
Data decode / processing / encryption
Start screen sharing
Data processing / encoding/ encryption
Data exchange
Data processing / decryption / decode
Data Exchange
Data decode / processing / encryption

Fig. 16

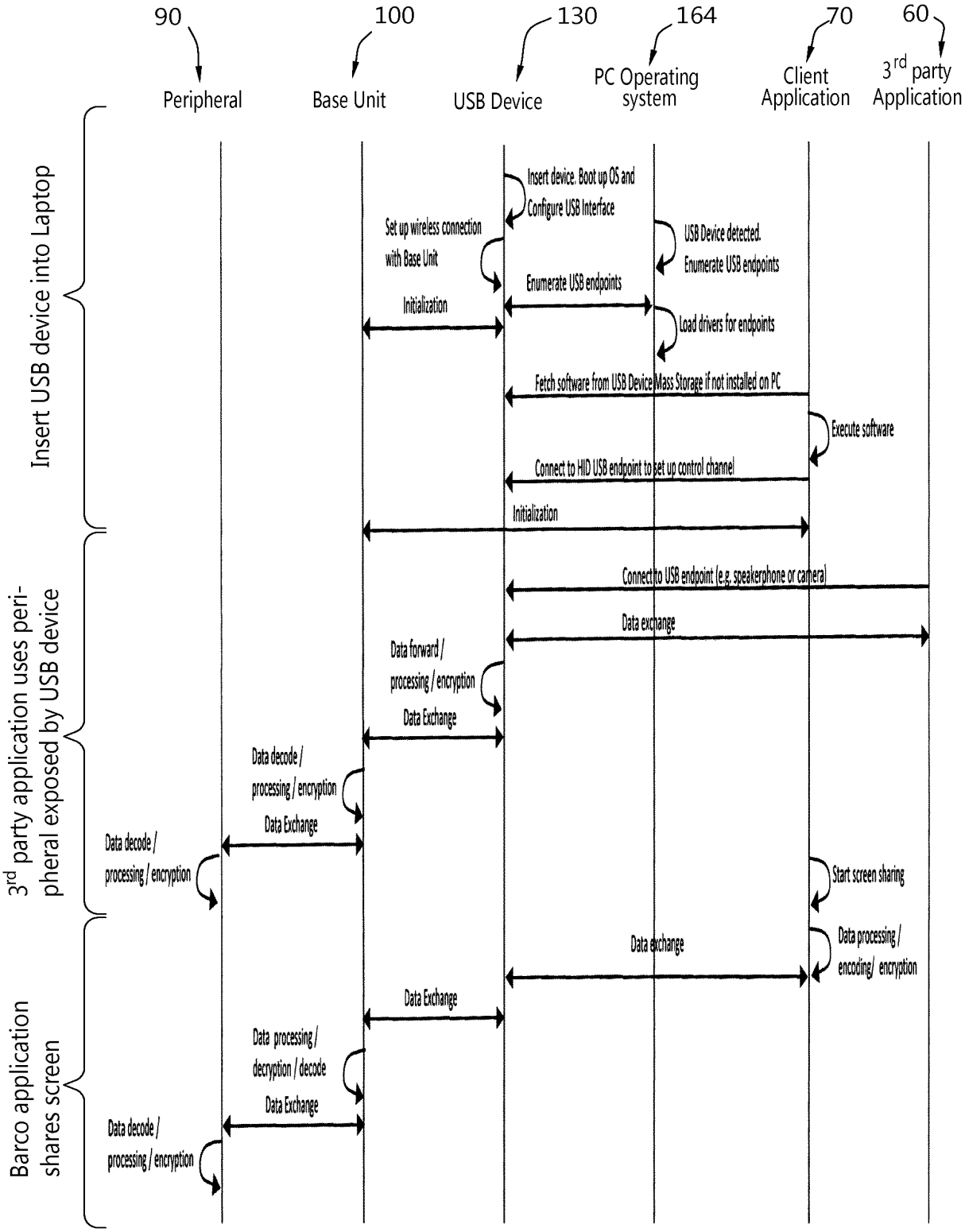
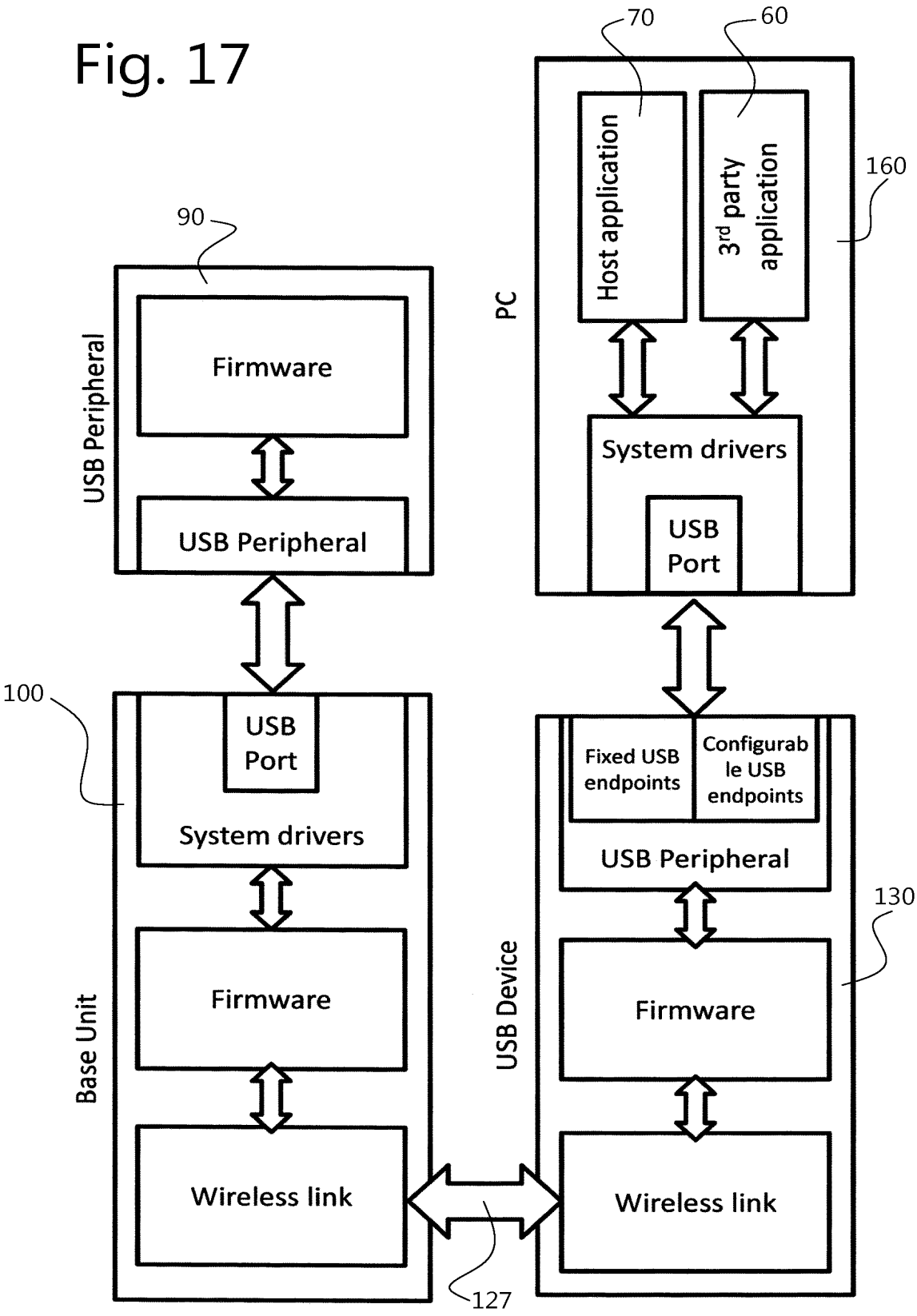

90
100
130
164
70
60
Peripheral
Base Unit
USB Device
PC Operating system
Client Application
3rd party Application
Insert USB device into Laptop
3rd party application uses peri-pheral exposed by USB device
Barco application shares screen
Insert device. Boot up OS and Configure USB Interface
Set up wireless connection with Base Unit
USB Device detected. Enumerate USB endpoints
Enumerate USB endpoints
Initialization
Load drivers for endpoints
Fetch software from USB Device Mass Storage if not installed on PC
Execute software
Connect to HID USB endpoint to set up control channel
Initialization
Connect to USB endpoint (e.g. speakerphone or camera)
Data exchange
Data forward / processing / encryption
Data Exchange
Data decode / processing / encryption
Data Exchange
Data decode / processing / encryption
Start screen sharing
Data exchange
Data processing / encoding/ encryption
Data Exchange
Data processing / decryption / decode
Data Exchange
Data decode / processing / encryption

Fig. 17


70
60
Host application
3rd party application
160
PC
90
USB Peripheral
Firmware
USB Peripheral
System drivers
USB Port
100
USB Port
System drivers
Fixed USB endpoints
Configurable USB endpoints
USB Peripheral
130
Base Unit
Firmware
USB Device
Firmware
Wireless link
Wireless link
127

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Alexandria, Virginia 22313-1450
www.uspto.gov

U.S. APPLICATION NO.	FIRST NAMED INVENTOR	ATTY. DOCKET NO.
16/771,068	Gauthier RENARD	RENA3002-2/TL

23364
BACON & THOMAS, PLLC
625 SLATERS LANE
FOURTH FLOOR
ALEXANDRIA, VA 22314-1176

INTERNATIONAL APPLICATION NO.	
PCT/EP2018/086537	
I.A. FILING DATE	PRIORITY DATE
12/21/2018	12/29/2017

CONFIRMATION NO. 1088
371 ACCEPTANCE LETTER

OC000000124191521

Date Mailed: 03/19/2021

NOTICE OF ACCEPTANCE OF APPLICATION UNDER 35 U.S.C 371 AND 37 CFR 1.495

The applicant is hereby advised that the United States Patent and Trademark Office, in its capacity as a Designated / Elected Office (37 CFR 1.495), has ACCEPTED the above identified international application for national patentability examination in the United States Patent and Trademark Office.

The United States Application Number assigned to the application is shown above. A Filing Receipt will be issued for the present application in due course. **THE DATE APPEARING ON THE FILING RECEIPT AS THE "FILING DATE or 371(c) DATE" IS THE DATE ON WHICH THE LAST OF THE 35 U.S.C. 371 (c)(1) and (c)(2) REQUIREMENTS HAS BEEN RECEIVED IN THE OFFICE. THIS DATE IS SHOWN BELOW.** The filing date of the above identified application is the international filing date of the international application (Article 11(3) and 35 U.S.C. 363)

06/09/2020
DATE OF RECEIPT OF 35 U.S.C.
371(c)(1) and (c)(2) REQUIREMENTS

The following items have been received:

- Copy of the International Application filed on 06/09/2020
- Copy of the International Search Report filed on 06/09/2020
- Copy of IPE Report filed on 06/09/2020
- Preliminary Amendments filed on 06/09/2020
- Information Disclosure Statements filed on 06/09/2020
- Inventor's Oath or Declaration filed on 06/09/2020
- Request for Immediate Examination filed on 06/09/2020
- U.S. Basic National Fees filed on 06/09/2020
- Assignee Statement for PGPUB filed on 06/09/2020
- Authorize Access to Search Results filed on 06/09/2020
- Priority Documents filed on 06/09/2020
- Power of Attorney filed on 06/09/2020
- Authorization to Permit Access filed on 06/09/2020
- Application Data Sheet (37 CFR 1.76) filed on 06/09/2020

Applicant is reminded that any communications to the United States Patent and Trademark Office must be mailed to the address given in the heading and include the U.S. application no. shown above (37 CFR 1.5)

MAMYE I WAGSTAFF

Telephone: (571) 272-1057

MULTIPLE DEPENDENT CLAIM FEE CALCULATION SHEET

Substitute for Form PTO-1360
(For use with Form PTO/SB/06)

Application Number	Filing Date
16771068	

Applicant(s) Gauthier RENARD

* May be used for additional claims or amendments

CLAIMS	AS FILED		AFTER FIRST AMENDMENT		AFTER SECOND AMENDMENT	
	Indep	Depend	Indep	Depend	Indep	Depend
1	1		---	---		
2		1	---	---		
3		2	---	---		
4		(1)	---	---		
5		(1)	---	---		
6		(1)	---	---		
7		(1)	---	---		
8		(1)	---	---		
9		(1)	---	---		
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11		(1)	---	---		
12		(1)	---	---		
13		(1)	---	---		
14		(1)	---	---		
15		(1)	---	---		
16	1		---	---		
17		1	---	---		
18		2	---	---		
19		(1)	---	---		
20		(1)	---	---		
21		(1)	---	---		
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23		(1)	---	---		
24		(1)	---	---		
25		(1)	---	---		
26		(1)	---	---		
27		(1)	---	---		
28		(1)	---	---		
29	1		---	---		
30		1	---	---		
31		2	---	---		
32		(1)	---	---		
33		(1)	---	---		
34		(1)	---	---		
35		(1)	---	---		
36			1			
37				1		
38				1		
39				1		
40				1		
41				1		
42				1		
43				1		
44			1			
45				1		
46				1		
47				1		
48				1		
49				1		
50				1		
Total Indep	3		3		0	
Total Depend	35	↵	19	↵	0	↵
Total Claims	38		22		0	

CLAIMS	*		*		*	
	Indep	Depend	Indep	Depend	Indep	Depend
51				1		
52				1		
53			1			
54				1		
55				1		
56				1		
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58						
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100						

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 16/771,068

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	320
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	540
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	800
TOTAL CLAIMS (37 CFR 1.16(i))	22 minus 20 =	* 2			OR	x 100 =	200
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =	*				x 480 =	0.00
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						0.00
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							0.00
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	1860

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
16/771,068	06/09/2020		1780	RENA3002-2/TL	22	3

CONFIRMATION NO. 1088

23364
BACON & THOMAS, PLLC
625 SLATERS LANE
FOURTH FLOOR
ALEXANDRIA, VA 22314-1176

FILING RECEIPT

OC000000124191520

Date Mailed: 03/19/2021

Receipt is acknowledged of this non-provisional utility patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF FIRST INVENTOR, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection.

Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please submit a written request for a corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections provided that the request is grantable.

Inventor(s)

Gauthier RENARD, Kuurne, BELGIUM;
Johan Peter Frans DEGRAEF, Gent, BELGIUM;

Applicant(s)

BARCO N.V., Kortrijk, BELGIUM;

Assignment For Published Patent Application

BARCO N.V., Kortrijk, BELGIUM

Power of Attorney: The patent practitioners associated with Customer Number 23364

Domestic Priority data as claimed by applicant

This application is a 371 of PCT/EP2018/086537 12/21/2018
which is a CON of 15/858,668 12/29/2017 PAT 10684972

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 03/17/2021

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 16/771,068**

Projected Publication Date: 06/24/2021

Non-Publication Request: No

Early Publication Request: No

Title

METHOD AND SYSTEM FOR MAKING FUNCTIONAL DEVICES AVAILABLE TO PARTICIPANTS OF MEETINGS

Preliminary Class

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

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Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

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technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

PTO/AIA/82A (07-13)
Approved for use through 01/31/2018. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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NOTE: This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5, unless the application number and filing date are identified in the Power of Attorney by Applicant form. If neither form PTO/AIA/82A nor form PTO/AIA82B identifies the application to which the Power of Attorney is directed, the Power of Attorney will not be recognized in the application.

Application Number	16/771,068
Filing Date	2020-06-09
First Named Inventor	Gauthier RENARD
Title	METHOD AND SYSTEM FOR MAKING FUNCTIONAL DEVICES AVAILABLE TO PARTICIPANTS OF MEETINGS
Art Unit	2185
Examiner Name	
Attorney Docket Number	21044.0022USWO

SIGNATURE of Applicant or Patent Practitioner

Signature	/Thomas Lee/	Date (Optional)	2021-06-11
Name	Thomas Lee	Registration Number	66,396
Title (if Applicant is a juristic entity)			
Applicant Name (if Applicant is a juristic entity)			

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.

☑ *Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Doc Code: PA..
Document Description: Power of Attorney

PTO/AIA/82B (07-13)
Approved for use through 11/30/2014. OMB 0651-0051
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in either the attached transmittal letter or the boxes below.

Application Number	Filing Date

(Note: The boxes above may be left blank if information is provided on form PTO/AIA/82A.)

☑ I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above: 52835

OR

☐ I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)

Please recognize or change the correspondence address for the application identified in the attached transmittal letter or the boxes above to:

☑ The address associated with the above-mentioned Customer Number

OR

☐ The address associated with Customer Number:

OR

Firm or Individual Name					
Address					
City		State		Zip	
Country					
Telephone		Email			

I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

BARCO N.V.

☐ Inventor or Joint Inventor (title not required below)

☐ Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)

☑ Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)

☐ Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature		Date (Optional)	26/05/2021
Name	Jenny Dirickx		
Title	IPC Service Manager		

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.

☐ Total of forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Electronic Acknowledgement Receipt

EFS ID:	42961565
Application Number:	16771068
International Application Number:	
Confirmation Number:	1088
Title of Invention:	METHOD AND SYSTEM FOR MAKING FUNCTIONAL DEVICES AVAILABLE TO PARTICIPANTS OF MEETINGS
First Named Inventor/Applicant Name:	Gauthier RENARD
Customer Number:	23364
Filer:	Thomas Lee/Yanling Cottle
Filer Authorized By:	Thomas Lee
Attorney Docket Number:	RENA3002-2/TL
Receipt Date:	11-JUN-2021
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Application Type:	U.S. National Stage under 35 USC 371

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Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	POA_0022USWO.pdf	505289 f1c4e2f48ee9fa153ae9bdc802e7733c193275c6	no	2

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Information:	
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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/771,068	06/09/2020	Gauthier RENARD	RENA3002-2/TL

CONFIRMATION NO. 1088

POWER OF ATTORNEY NOTICE

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Date Mailed: 06/15/2021

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 06/11/2021.

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/771,068	06/09/2020	Gauthier RENARD	21044.0022USWO

CONFIRMATION NO. 1088

52835
HAMRE, SCHUMANN, MUELLER & LARSON, P.C.
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POA ACCEPTANCE LETTER

OC000000126288959

Date Mailed: 06/15/2021

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 06/11/2021.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/771,068	06/09/2020	Gauthier RENARD	21044.0022USWO

CONFIRMATION NO. 1088

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45 South Seventh Street
Suite 2700
Minneapolis, MN 55402-1683

PUBLICATION NOTICE

OC000000126525426

Title:METHOD AND SYSTEM FOR MAKING FUNCTIONAL DEVICES AVAILABLE TO PARTICIPANTS OF MEETINGS

Publication No.US-2021-0191893-A1
Publication Date:06/24/2021

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(Not for submission under 37 CFR 1.99)

Application Number	16771068
Filing Date	2020-06-09
First Named Inventor	Gauthier RENARD
Art Unit	2185
Examiner Name	
Attorney Docket Number	21044.0022USWO

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	1	106412683	CN	A	2017-02-15		With English machine translation	×

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16771068
	Filing Date	2020-06-09
	First Named Inventor	Gauthier RENARD
	Art Unit	2185
	Examiner Name	
	Attorney Docket Number	21044.0022USWO

	1	Office Action issued in European Patent Application No. 18833045.0, dated June 28, 2021	

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Examiner Signature		Date Considered	

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[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16771068
	Filing Date	2020-06-09
	First Named Inventor	Gauthier RENARD
	Art Unit	2185
	Examiner Name	
	Attorney Docket Number	21044.0022USWO

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Thomas Lee/	Date (YYYY-MM-DD)	2021-08-12
Name/Print	Thomas Lee	Registration Number	66396

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(12)发明专利申请

(10)申请公布号 CN 106412683 A
(43)申请公布日 2017.02.15

(21)申请号 201610715728.1

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(51)Int.Cl.
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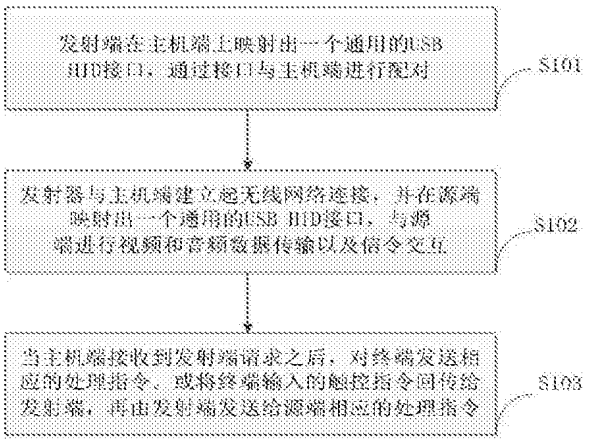
权利要求书3页 说明书7页 附图6页

(54)发明名称

通过USB接口实现音视频传输和交互信令的系统及方法

(57)摘要

本发明公开了一种通过USB接口实现音视频数据传输和交互信令的系统及方法，包括以下步骤：S101，发射端在主机端上映射出一个通用的USB HID接口，通过接口与主机端进行配对；S102，发射器与主机端建立起无线网络连接，并在源端PC端映射出一个通用的USB HID接口，与PC端进行视频和音频数据传输以及信令交互；S103，当主机端接收到发射端请求之后，对终端发送相应的处理指令。或将终端输入的触控指令回传给发射端，再由发射端发送给源端相应的处理指令。本发明通过技术的手段屏蔽了很多复杂的操作，使得一个没有任何IT背景知识的用户在几分钟内就能熟练的使用，用户的体验非常好。极大的提高了会议的效率和愉悦性。



CN 106412683 A

1.一种通过USB接口实现音视频传输和交互信令的方法,其特征在于,包括以下步骤:

S101,发射端在主机端上映射出一个通用的USB HID接口,通过接口与主机端进行配对;

S102,发射器与主机端建立起无线网络连接,并在源端映射出一个通用的USB HID接口,与源端进行视频和音频数据传输以及信令交互;

S103,当主机端接收到发射端请求之后,对终端发送相应的处理指令;或将终端输入的触控指令回传给发射端,再由发射端发送给源端相应的处理指令。

2.根据权利要求1所述的方法,其特征在于,所述S101包括:

S1011,主机端根据USB HOST接口的设备插入事件判断是否为发射端插入;

S1012,主机端检测到为发射端插入时,会给发射端发送配对请求;

S1013,发射端接收到主机的配对请求后,会给主机回复配对响应;

S1014,主机端接收到发射端的配对响应后,给发射端发送配对数据,开始配对;

S1015,发射端接收配对数据后开始校验,校验正确时,将配对数据写入Flash,给主机回复配对成功响应;

S1016,校验失败时,丢弃配对数据,给主机回复配对失败响应。

3.根据权利要求1所述的方法,其特征在于,所述步骤S101还包括:配对失败或超时,终止配对操作,需重新进行配对操作。

4.根据权利要求1所述的方法,其特征在于,所述步骤S102包括:

S1021,发射端与主机端建立无线网络连接,存储在发射端映射出来的U盘或CD盘中的应用程序在源端开始自动运行;

S1022,发射端发送按键指令,根据按下按键时间的长短,判断为短按事件或是长按事件;

S1023,当为长按事件时,发射端给源端发送全屏请求,源端给发射端回复全屏请求响应;

S1024,当为短按事件时,发射端首先判断当前的状态:当前是推屏状态时,则给源端发送退屏请求,进行推屏操作;当前是退屏状态时,则给源端发送推屏请求,进行推屏操作;

S1025,接收声音操作指令时,判断视频是否在推送;

当视频为未推送状态时,声音操作也不能进行;

当视频为推送状态时,判断声音操作指令为推送指令还是退出操作指令;

当为推送操作指令时,进行推送操作;当为退出操作指令时,进行退出操作;

一种通过USB接口实现音视频传输和交互信令的系统,其特征在于,包括:

配对模块,用于发射端在主机端上映射出一个通用的USB HID接口,通过接口与主机端进行配对;

网络连接模块,用于发射器与主机端建立起无线网络连接;

源端交互模块,用于发射端在源端PC端映射出一个通用的USB HID接口,与PC端进行视频和音频数据传输以及信令交互;

回传模块,用于主机端将终端输入的触控指令回传给发射端,再由发射端发送给源端相应的处理指令。

5.根据权利要求1所述的系统,其特征在于,所述配对模块包括:

插入事件判断单元，用于主机端根据USB HOST接口的设备插入事件判断是否为发射端插入；

配对请求单元，用于主机端检测到为发射端插入时，会给发射端发送配对请求；

配对响应单元，用于发射端接收到主机的配对请求后，会给主机回复配对响应；

数据发送单元，用于主机端接收到发射端的配对响应后，给发射端发送配对数据，开始配对；

校验模块，用于发射端接收配对数据后开始校验，校验正确时，将配对数据写入Flash，给主机回复配对成功响应；

错误处理模块，用于校验失败时，丢弃配对数据，给主机回复配对失败响应。

6.所述源端交互模块包括：

按键判断单元，用于发射端发送按键指令，根据按下按键时间的长短，分为短按事件或是长按事件；

长按处理单元，用于当为长按事件时，发射端给源端发送全屏请求，源端给发射端回复全屏请求响应；

短按处理单元，用于当为短按事件时，发射端判断当前的状态：当前是推屏状态，则给源端发送退屏请求；当前是退屏状态，则给源端发送推屏请求；源端给发射器回复请求响应；

声音推送单元，用于源端给发射端发送声音推送指令，开始对声音进行采样，然后给发射端发送音频数据；

声音退出单元，用于源端给发射端发送声音退出指令，停止对声音进行采样，停止给发射器发送音频数据；发射端接收到源端的声音退出指令，停止接收PC端传输过来的音频数据；给主机发送声音退出请求；然后断开与主机的音频传输连接，完成声音退出操作。

7.一种通过USB接口实现音视频传输和交互信令的系统，其特征在于，包括：

一发射器，通过发射器上按键的短按和长按两种状态实现推屏、推屏和全屏操作；

一主机端，通过主机端上的USB HOST接口与发射器进行数据传输与信令交互，并通过USB HOST接口外接触控屏的触控USB接口，采集触控屏终端的触摸控制信令，回传给发射器和源端，实现触控屏的反向控制；

发射器包括：

映射存储模块，用于映射出一个U盘或CD盘存储需在源端运行的应用程序；

交互传输模块，用于与源端进行信令交互和音视频数据的传输；

信号回传模块，用于将触摸显示终端反向控制信号的回传给PC端

无线模组模块，用于连接主机端网络，不占用源端网络；

按键状态监测模块，用于实时采集按键状态操作；

LED灯显示模块1，用于实时显示发射器的上电启动状态、与主机正在连接状态、与主机连接成功且没有推屏状态、与主机连接成功且正在推屏状态等工作状态；

所述主机端包括：

内置web页面模块，通过无线网络或有线网络登录内置WEB页面，对主机的无线参数和输出参数进行设置；

外接触控模块，用于采集触控屏终端的触摸控制信令，回传给发射器和源端；

配对模块，通过USB HOST接口与发射器自动配对；

升级模块，用于升级文件通过USB HOST接口实现主机端自动升级；

LED灯显示模块2，用于实时显示主机端的上电启动状态、与终端连接状态、推屏状态以及升级状态等工作状态；

分辨率自适应模块，通过读取EDID识别终端显示设备的最佳分辨，以最佳显示分辨率输出。

8.根据权利要求7所述的系统，其特征在于，所述系统还可以包括：多个发射器与一主机端。

通过USB接口实现音视频传输和交互信令的系统及方法

技术领域

[0001] 本发明涉及音视频传输和交互信令的系统及方法，尤其是一种通过USB接口实现音视频传输和交互信令的系统及方法。

背景技术

[0002] 随着近几年无线传输带宽、无线芯片、编解码算法、PC性能、解码芯片等等方面的技术进步，出现了无线传输的方式。PC、手机或平板等等多种类型源端通过无线方式可以把屏幕内容同屏传输显示到终端显示设备上。

[0003] 该方式的缺点是：

1、音视频传输的实时性没有有线好，有延时。

[0004] 2、无线传输因为带宽的因素，基本上都需要通过编解码的方式对音视频数据进行处理，才能传输，所以终端显示的内容与源端会有差异。

[0005] 3、无线传输的稳定性和保密性没有有线的好。

[0006] 总而言之，无线传输方式解决了有线的固有缺点，给用户带来了很大的便利性。如果无线传输方式还能把上述的缺点加以改进，优化到接近有线的性能，并且做到操作简单，那么无线传输方式就可以给用户带来非常好的使用体验。

[0007] 目前，主流的无线音视频传输技术是基于Wi-Fi的技术，因为Wi-Fi使用广阔、提供芯片的厂家多、技术成熟、成本低。并随着802.11n和802.11ac协议的商用，使得Wi-Fi传输带宽得到很大的提高，理论上有足够的带宽支持多路经过编码的高清视频同时传输。

[0008] 但是，市场上大部分的采用基于Wi-Fi的技术实现无线音视频传输的产品，用户体验都做的不好，这些产品或多或少都存在以下的缺点：

1、需要在PC上安装软件，软件操作非常复杂，给用户带来的操作体验很差，用户需要有一定的IT背景知识才能用的起来这类产品。

[0009] 2、占用PC的无线网卡，使得在无线同屏传输的时候，不能上网或者不能很流畅的上网，限制了用户的上网需求。

[0010] 3、对多种类型终端支持不全，多种类型终端包括windows PC、MAC OS X PC、Android移动端和iOS移动端。

[0011] 4、对多路视频传输支持不够，多路视频同时同屏传输显示时，有延时和卡顿。

[0012] 本发明采用基于Wi-Fi的技术来实现无线音视频传输的。但是，一键联系统通过采用创新的技术和先进的芯片，很好的解决了以上的缺点。

发明内容

[0013] 为了克服上述现有问题，本发明公开了一种通过USB接口实现音视频传输和交互信令的系统及方法，其目的在于通过技术的手段屏蔽了很多复杂的操作，使得一个没有任何IT背景知识的用户在10分钟内就能熟练的使用，用户的体验非常好。极大的提高了会议的效率和愉悦性。

[0014] 为了解决上述问题，本发明采用的技术方案是：

一种通过USB接口实现音视频传输和交互信令的方法，包括以下步骤：

S101，发射端在主机端上映射出一个通用的USB HID接口，通过接口与主机端进行配对；

S102，发射器与主机端建立起无线网络连接，并在源端PC端映射出一个通用的USB HID接口，与PC端进行视频和音频数据传输以及信令交互；

S103，当主机端接收到发射端请求之后，对终端发送相应的处理指令。或将终端输入的触控指令回传给发射端，再由发射端发送给源端相应的处理指令。

[0015] 优选地，所述S101包括：

S1011，主机端根据USB HOST接口的设备插入事件判断是否为发射端插入；

S1012，主机端检测到为发射端插入时，会给发射端发送配对请求；

S1013，发射端接收到主机的配对请求后，会给主机回复配对响应；

S1014，主机端接收到发射端的配对响应后，给发射端发送配对数据，开始配对；

S1015，发射端接收配对数据后开始校验，校验正确时，将配对数据写入Flash，给主机回复配对成功响应；

S1016，校验失败时，丢弃配对数据，给主机回复配对失败响应。

[0016] 优选地，所述步骤S101还包括：配对失败或超时，终止配对操作，需重新进行配对操作。

[0017] 优选地，所述步骤S102包括：

S1021，发射端与主机端建立无线网络连接，存储在发射端映射出来U盘或CD盘中的应用程序在源端开始自动运行；

S1022，发射端发送按键指令，根据按下按键时间的长短，分为短按事件或是长按事件；

S1023，当为长按事件时，发射端给源端发送全屏请求，源端给发射端回复全屏请求响应；

S1024，当为短按事件时，发射端判断当前的状态：当前是推屏状态，则给源端发送退屏请求；当前是退屏状态，则给源端发送推屏请求；源端给发射器回复请求响应。

[0018] S1025，判断视频是否在推送；当视频没有在推屏时，不能单独声音推送；当为推送状态时，源端给发射端发送声音推送指令，开始对声音进行采样，然后给发射端发送音频数据。

[0019] S1026，发射端接收到源端的声音推送指令，接收PC端传输过来的音频数据；同时，给主机端发送声音推送请求；发射端在与主机端建立起音频传输连接后，把接收到的音频数据传送给主机端，完成声音推送操作。

[0020] S1027，当为退出操作时，源端给发射端发送声音退出指令，停止对声音进行采样，停止给发射器发送音频数据；发射端接收到源端的声音退出指令，停止接收PC端传输过来的音频数据；给主机发送声音退出请求；然后断开与主机的音频传输连接，完成声音退出操作。

一种通过USB接口实现音视频传输和交互信令的系统，包括：

配对模块，用于发射端在主机端上映射出一个通用的USB HID接口，通过接口与主机端进行配对；

网络连接模块，用于发射器与主机端建立起无线网络连接；

源端交互模块，用于发射端在源端PC端映射出一个通用的USB HID接口，与PC端进行视频和音频数据传输以及信令交互；

回传模块，用于主机端将终端输入的触控指令回传给发射端，再由发射端发送给源端相应的处理指令。

[0021] 优选地，所述配对模块包括：

插入事件判断单元，用于主机端根据USB HOST接口的设备插入事件判断是否为发射端插入；

配对请求单元，用于主机端检测到为发射端插入时，会给发射端发送配对请求；

配对响应单元，用于发射端接收到主机的配对请求后，会给主机回复配对响应；

数据发送单元，用于主机端接收到发射端的配对响应后，给发射端发送配对数据，开始配对；

校验模块，用于发射端接收配对数据后开始校验，校验正确时，将配对数据写入Flash，给主机回复配对成功响应；

错误处理模块，用于校验失败时，丢弃配对数据，给主机回复配对失败响应。

[0022] 所述源端交互模块包括：

按键判断单元，用于发射端发送按键指令，根据按下按键时间的长短，分为短按事件或是长按事件；

长按处理单元，用于当为长按事件时，发射端给源端发送全屏请求，源端给发射端回复全屏请求响应；

短按处理单元，用于当为短按事件时，发射端判断当前的状态：当前是推屏状态，则给源端发送退屏请求；当前是退屏状态，则给源端发送推屏请求；源端给发射器回复请求响应；

声音推送单元，用于源端给发射端发送声音推送指令，开始对声音进行采样，然后给发射端发送音频数据；

声音退出单元，用于源端给发射端发送声音退出指令，停止对声音进行采样，停止给发射器发送音频数据；发射端接收到源端的声音退出指令，停止接收PC端传输过来的音频数据；给主机发送声音退出请求；然后断开与主机的音频传输连接，完成声音退出操作。

[0023] 一种通过USB接口实现音视频传输和交互信令的系统，包括：

一发射器，通过发射器上按键的短按和长按两种状态实现推屏、推屏和全屏操作；

一主机端，通过主机端上的USB HOST接口与发射器进行数据传输与信令交互，并通过USB HOST接口外接触控屏的触控USB接口，采集触控屏终端的触摸控制信令，回传给发射器和源端，实现触控屏的反向控制；

发射器包括：

映射存储模块，用于映射出一个U盘或CD盘存储需在源端运行的应用程序；

交互传输模块，用于与源端进行信令交互和音视频数据的传输；

信号回传模块，用于将触摸显示终端反向控制信号的回传给PC端

无线模组模块，用于连接主机端网络，不占用源端网络；

按键状态监测模块，用于实时采集按键状态操作；

LED灯显示模块1，用于实时显示发射器的上电启动状态、与主机正在连接状态、与主机连接成功且没有推屏状态、与主机连接成功且正在推屏状态等工作状态；

所述主机端包括：

内置web页面模块，通过无线网络或有线网络登录内置WEB页面，对主机的无线参数和输出参数进行设置；

外接触控模块，用于采集触控屏终端的触摸控制信令，回传给发射器和源端；

配对模块，通过USB HOST接口与发射器自动配对；

升级模块，用于升级文件通过USB HOST接口实现主机端自动升级；

LED灯显示模块2，用于实时显示主机端的上电启动状态、与终端连接状态、推屏状态以及升级状态等工作状态；

分辨率自适应模块，通过读取EDID识别终端显示设备的最佳分辨，以最佳显示分辨率输出。

[0024] 优选地，所述系统还可以包括：多个发射器与一主机端。

[0025] 本发明的有益效果如下：

1)插入发射器设备，然后存于发射器设备的源端PC端应用程序会自动运行，不论是windows系统还是MAC OS X系统；

2)发射器自动与主机建立Wi-Fi连接，连接成功有图标提示和LED灯提示；

3)然后按下按键即可实现无线推屏分享；

4)多用户可以自主加入和退出，以及全屏显示，全部通过发射器的一个按键即可实现。

[0026] 5)主机安装也非常简单，只需通过HDMI或VGA与显示终端连接，然后接上电源给主机上电启动即可完成。

附图说明

[0027] 图1为PC端应用程序功能图；

图2为发射器功能图；

图3为主机端功能图；

图4为配对流程图；

图5为推屏、退屏、全屏操作流程图；

图6为声音推送、退出操作流程图；

图7为本发明主要流程图；

图8为升级操作流程图。

具体实施方式

[0028] 应当理解，此处所描述的具体实施例仅仅用以解释本发明，并不用于限定本发明。

[0029] 如图1所示，示出了本发明一种通过USB接口实现音视频和交互信令的传输方法及传输系统的实施例。

[0030] 该实施例的通过USB接口实现音视频传输和信令交互的系统包括：

运行在源端PC端上的应用程序，用于通过USB接口与发射器进行音视频数据传输和信令交互；

主机端，通过无线网络与终端显示设备进行音视频数据传输和信令交互；

发射器，通过无线无线网络与主机端进行音视频数据传输和信令交互；

源端PC端应用程序，通过USB接口与发射器进行进行音视频数据传输和信令交互。

[0031] 源端PC端应用程序，设计为绿色软件，不需要安装，程序存储于发射器映射出来的U盘或CD盘中，插入发射器后自动运行。

[0032] 源端PC端应用程序包括两个版本，一个是windows PC版本，一个是MAC OS X PC版本。

[0033] 实现的主要功能为捕获屏幕内容、鼠标点击指令、屏幕缩放处理、屏幕编码、声音采样和音频采样率转换以及USB HID通讯等等。功能图如图1所示。

[0034] 在windows上与在MAC OS X上实现以上功能采用技术原理基本上不一样。

[0035] 对于Windows版本，采用windows提供的组件和接口驱动，实现屏幕、鼠标和声音的采样，以及USB HID的通讯。视频编码模块采用H.264算法，屏幕缩放处理和音频采样率转换采用FFmpeg提供的库实现。

[0036] 对于MAC OS X版本，采用OS X提供的组件和接口驱动，实现屏幕、鼠标和声音采样，以及USB HID的通讯。视频编码模块采用H.264算法，屏幕缩放处理和音频采样率转换采用OS X提供的库实现。

[0037] 发射器可接入到windows PC和MAC OS X上，不需要安装驱动即可运行。发射器的功能图如图2所示。

[0038] 发射器与源端PC端通过USB 2.0接口连接，在源端PC端上映射为USB Composite Device，USB枚举类型都是标准的，无论是windows PC还是MAC OS X PC，都不需要安装驱动，实现免驱即插即用。

[0039] 主机端的功能图如图3所示：

主机端包括以下几个功能模块：

1)内置WEB页面模块，可通过无线无线或有线LAN登录内置WEB页面，对主机的无线参数和输出参数进行设置。

[0040] 2)回传模块，主机的USB HOST接口外接触控屏的触控USB接口，采集触控屏的触摸控制信令，回传给发射器和源端PC端，从而可实现触控屏的反向控制功能。

[0041] 3)配对模块，把发射器插在主机的USB HOST接口上，实现发射器自动配对功能。

[0042] 4)升级模块，把主机的升级文件存入U盘，然后把U盘插入到主机的USB HOST接口，实现主机自动升级功能。

[0043] 5)显示模块，LED灯实时显示主机端的工作状态，工作状态包括上电启动状态，与终端连接状态，推屏状态以及升级状态。

[0044] 6)分辨率自适应模块，终端显示设备最佳分辨率自适应功能，可以通过读取EDID识别终端显示设备的最佳分辨，然后以最佳显示分辨率输出。

[0045] 音视频数据传输和信令交互包括以下步骤：

启动主机端，让其进入正常运行状态；

步骤S101，在主机端上映射出一个通用的USB HID接口，通过接口与主机端进行配对；

如图4，把发射器插入主机的USB HOST接口进行配对操作，这时发射端在主机上映射出一个通用的USB HID接口，通过这个接口与主机进行配对交互。

[0046] 当发射器插入主机时，主机会根据USB HOST接口的设备插入事件去判断是否为发射器插入，当检测到为发射器插入时，会给发射器发送配对请求。

[0047] 发射器接收到主机的配对请求后，会给主机回复配对响应。

[0048] 主机接收到发射器的配对响应后，开始给发射器发送配对数据。

[0049] 配对数据包括无线网络的SSID、密钥、频段、信道和IP地址等等。

[0050] 发射器接收到主机的配对数据后：校验如果正确，会把配对数据写入Flash，然后给主机回复配对成功响应。

[0051] 校验如果失败，会丢弃配对数据，然后给主机回复配对失败响应。

[0052] 配对失败或超时，终止配对操作。然后需要拔出发射器，重新插入，才能重启配对操作。

[0053] 配对成功时，实现配对操作。

[0054] 步骤S102，发射器与主机端建立起无线网络连接，并在源端PC端映射出一个通用的USB HID接口，与PC端进行视频和音频数据传输以及信令交互。

[0055] 发射器端和主机端配对成功后，拔出发射器，插入源端PC端。在源端PC端上映射出一个通用的USB HID接口，发射器与源端PC端通过这个接口并采用协议为宝疆私有协议进行信令交互，以及视频和音频数据传输。

[0056] 如图5，发射器与主机端建立起无线网络连接，存储在发射器映射出来U盘或CD盘中的应用程序在源端PC端开始自动运行。

[0057] 按下发射器按键，发射器根据按下按键时间的长短，识别为短按事件还是长按事件。

[0058] 当为长按事件时，发射器给源端PC端发送全屏请求。

[0059] 如果发射器之前是退屏状态，则开始准备接收源端PC端传输过来的视频数据；同时，发射器给主机发送全屏请求。发射器在与主机建立起视频传输连接后，把接收到的源端PC端传输过来的视频数据传送给主机，再由主机传输给终端。

[0060] 如果发射器之前是推屏状态，则只需要给主机发送全屏请求，实现全屏操作。

[0061] 当为短按事件时，发射器需要判断自己当前的状态：

如果当前是退屏状态，则给源端PC端发送推屏请求。源端PC端给发射器回复推屏请求响应，开始录屏和编码，然后给发射器发送视频数据。发射器接收到源端PC端推屏响应，开始准备接收源端PC端传输过来的视频数据；同时，发射器给主机发送推屏请求。

[0062] 发射器在与主机建立起视频传输连接后，把接收到的源端PC端传输过来的视频数据传送给主机端，实现推屏操作。

[0063] 如果当前是推屏状态，则给源端PC端发送退屏请求；

源端PC端给发射器回复推屏请求响应，并停止录屏和编码。如果之前在推送声音，也同时停止声音采样，然后停止给发射器发送音视频数据。发射器接收到源端PC端退屏响应，停止接收源端PC端传输过来的音视频数据；同时，发射器给主机发送退屏请求。然后断开与主机的音视频传输连接，实现退屏操作。

[0064] 如图6，声音推送或退出操作在源端PC端程序上进行控制。

[0065] 由于声音是不能单独推送的，所以首先需要判断是否有视频在推送，当视频没有在推屏时，声音操作菜单是灰色的，不能控制，也就是不能单独声音推送，而不推送视频。

[0066] 当前声音推送状态如果是推送状态，则可以实行退出操作；

当前声音推送状态如果是退出状态，则可以实行推送操作。

[0067] 当为推送状态时，PC端给发射器发送声音推送指令，开始对声音进行采样，然后给发射器发送音频数据。

[0068] 发射器接收到PC端的声音推送指令，开始准备接收PC端传输过来的音频数据；同时，给主机端发送声音推送请求。

[0069] 发射器在与主机建立起音频传输连接后，把接收到的PC传输过来的音频数据传送给主机端，完成实现声音推送操作。

[0070] 当为退出状态时，PC端给发射器发送声音退出指令，停止对声音进行采样，然后停止给发射器发送音频数据。

[0071] 发射器接收到PC端的声音退出指令，停止接收PC端传输过来的音频数据；同时，给主机发送声音退出请求。然后断开与主机的音频传输连接，实现声音退出操作。

[0072] 步骤S103，当主机接收到发射器请求之后，对终端发送相应的处理指令。或将终端输入的触控指令回传给发射器，再由发射器发送给源端相应的处理指令。

[0073] 主机的USB HOST接口外接触控屏的触控USB接口，采集触控屏的触摸控制信令，回传给发射器和源端PC端，从而可实现触控屏的反向控制功能。

[0074] 发射器通过标准的USB HID鼠标和键盘协议，实现触摸显示端反向控制信号的回传给源端PC端功能。

[0075] 以上仅为本发明的优选实施例，并非因此限制本发明的专利范围，凡是利用本发明说明书及附图内容所作的等效结构或等效流程变换，或直接或间接运用在其他相关的技术领域，均同理包括在本发明的专利保护范围内。

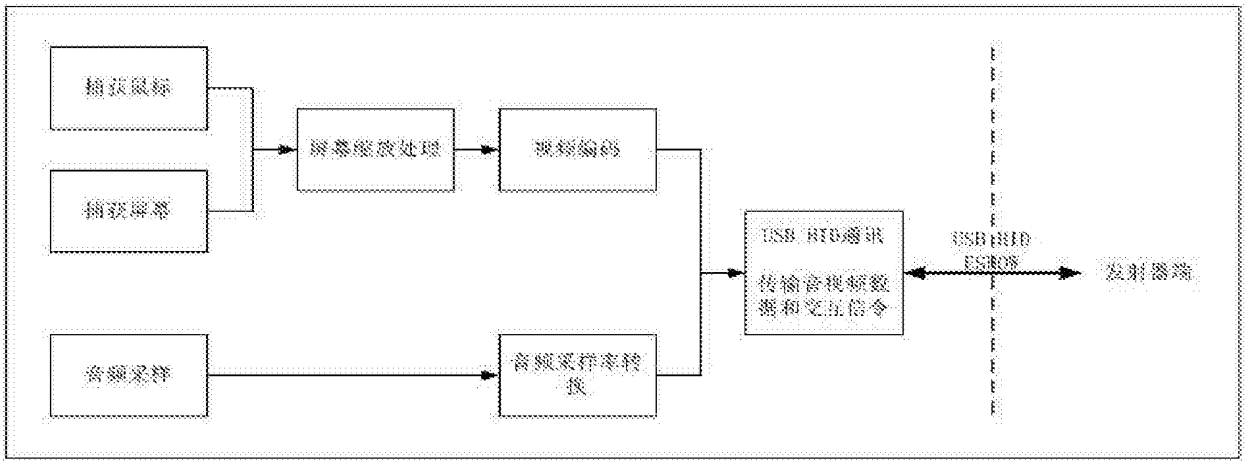

捕获鼠标
捕获屏幕
屏幕缩放处理
视频编码
USB HID通讯
传输音视频数据和控制指令
USB HID ESHOW
发射器端
音频采样
音频采样率转换

图 1

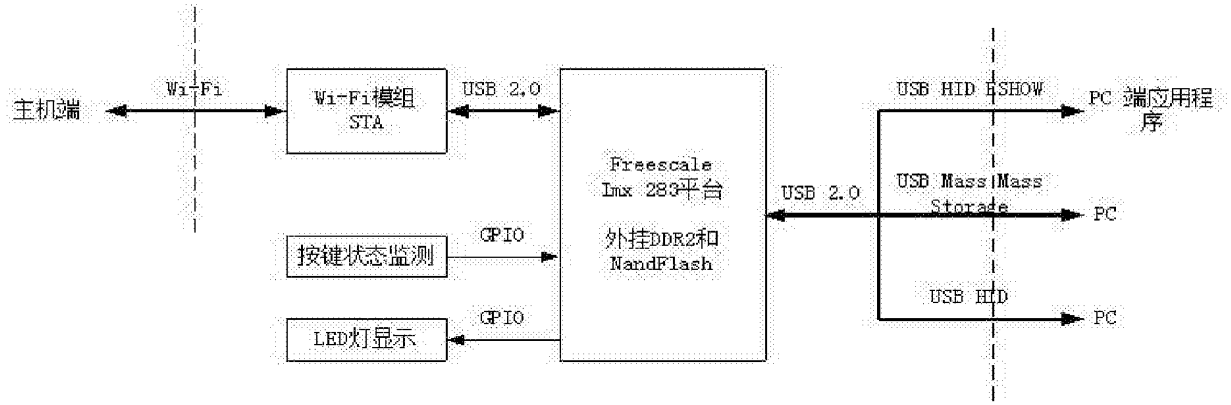

主机端
Wi-Fi
Wi-Fi模组 STA
USB 2.0
Freescale Imx 283平台
外挂DDR2和 NandFlash
按键状态监测
GPIO
LED灯显示
GPIO
USB 2.0
USB HID ESHOW
PC 端应用程序
USB Mass Storage
PC
USB HID
PC

图 2

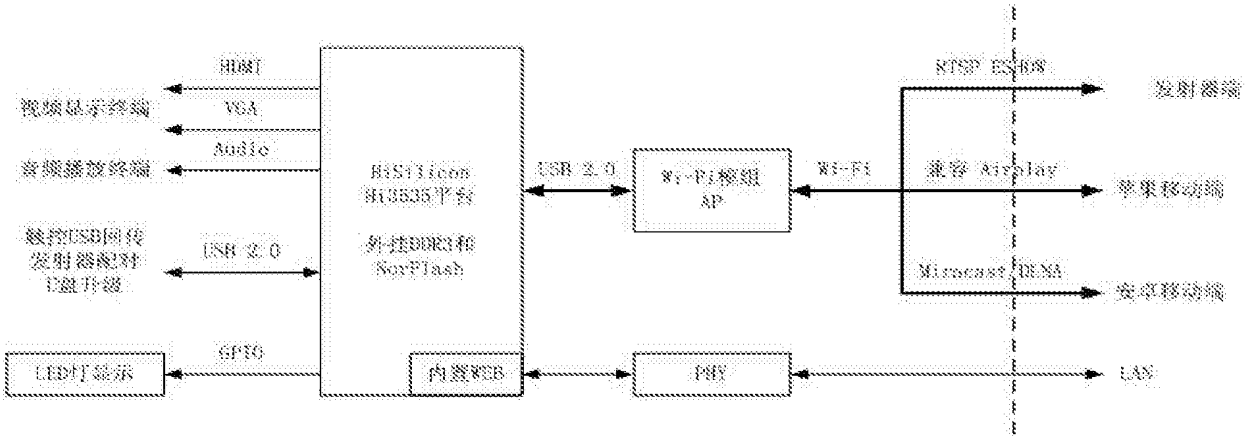

HDMI
视频显示终端
VGA
Audio
音频播放终端
HiSilicon Hi3535平台
外挂DDR2和 NorFlash
USB 2.0
USB 2.0
Wi-Fi模组 AP
Wi-Fi
RTSP ESHOW
发射器端
兼容 Airplay
苹果移动端
Miracast/DLNA
安卓移动端
LED灯显示
GPIO
内置WEB
PHY
LAN

图 3

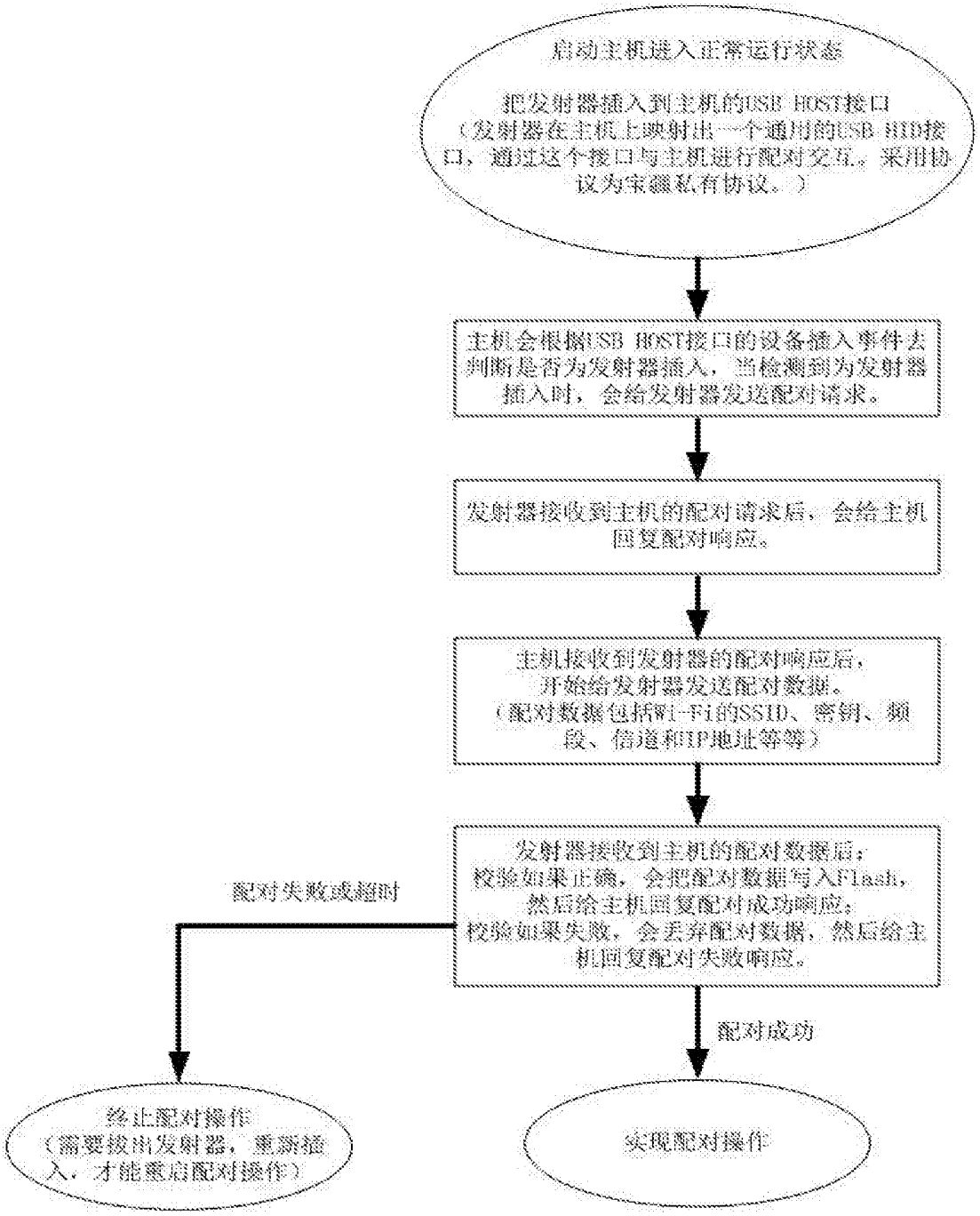

启动主机进入正常运行状态
把发射器插入到主机的USB HOST接口
（发射器在主机上映射出一个通用的USB HID接口，通过这个接口与主机进行配对交互。采用协议为宝器私有协议。）
主机会根据USB HOST接口的设备插入事件去判断是否为发射器插入，当检测到为发射器插入时，会给发射器发送配对请求。
发射器接收到主机的配对请求后，会给主机回复配对响应。
主机接收到发射器的配对响应后，开始给发射器发送配对数据。
（配对数据包括Wi-Fi的SSID、密钥、频段、信道和IP地址等等）
发射器接收到主机的配对数据后，校验如果正确，会把配对数据写入Flash，然后给主机回复配对成功响应；校验如果失败，会丢弃配对数据，然后给主机回复配对失败响应。
配对失败或超时
配对成功
终止配对操作
（需要拔出发射器，重新插入，才能重启配对操作）
实现配对操作

图 4

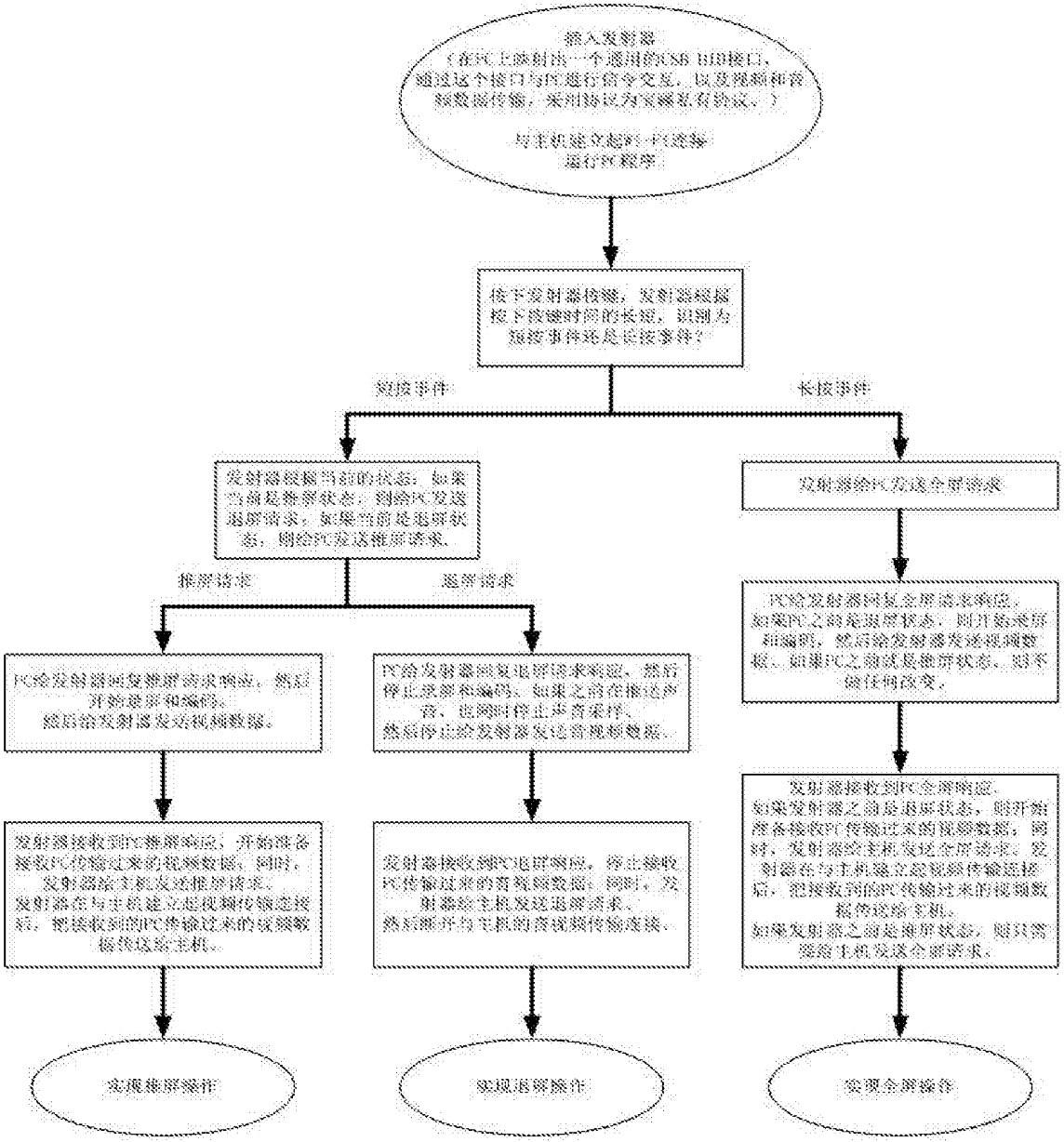

插入发射器
（在PC上映射出一个通用的USB HID接口，
通过这个接口与PC进行命令交互，以及视频和音
频数据传输，采用协议为实睿私有协议。）
与主机建立起PC-PC连接
运行PC程序
检下发射器按键，发射器根据
按下按键时间的长短，识别为
短按事件还是长按事件？
短按事件
长按事件
发射器根据当前的状态：如果
当前是推屏状态，则给PC发送
退屏请求，如果当前是退屏状
态，则给PC发送推屏请求。
发射器给PC发送全屏请求
推屏请求
退屏请求
PC给发射器回复全屏请求响应，
如果PC之前是退屏状态，则开始采屏
和编码，然后给发射器发送视频数
据。如果PC之前就是推屏状态，则不
做任何改变。
PC给发射器回复推屏请求响应，然后
开始采屏和编码，
然后给发射器发送视频数据。
PC给发射器回复退屏请求响应，然后
停止采屏和编码，如果之前在推送声
音，也同时停止声音采样，
然后停止给发射器发送音视频数据。
发射器接收到PC全屏响应，
如果发射器之前是退屏状态，则开始
准备接收PC传输过来的视频数据，同
时，发射器给主机发送全屏请求。发
射器在与主机建立起视频传输连接
后，把接收到的PC传输过来的视频数
据传送给主机。
如果发射器之前是推屏状态，则只需
给主机发送全屏请求。
发射器接收到PC推屏响应，开始准备
接收PC传输过来的视频数据，同时，
发射器给主机发送推屏请求。
发射器在与主机建立起视频传输连接
后，把接收到的PC传输过来的视频数
据传送给主机。
发射器接收到PC退屏响应，停止接收
PC传输过来的音视频数据，同时，发
射器给主机发送退屏请求。
然后断开与主机的音视频传输连接。
实现推屏操作
实现退屏操作
实现全屏操作

图 5

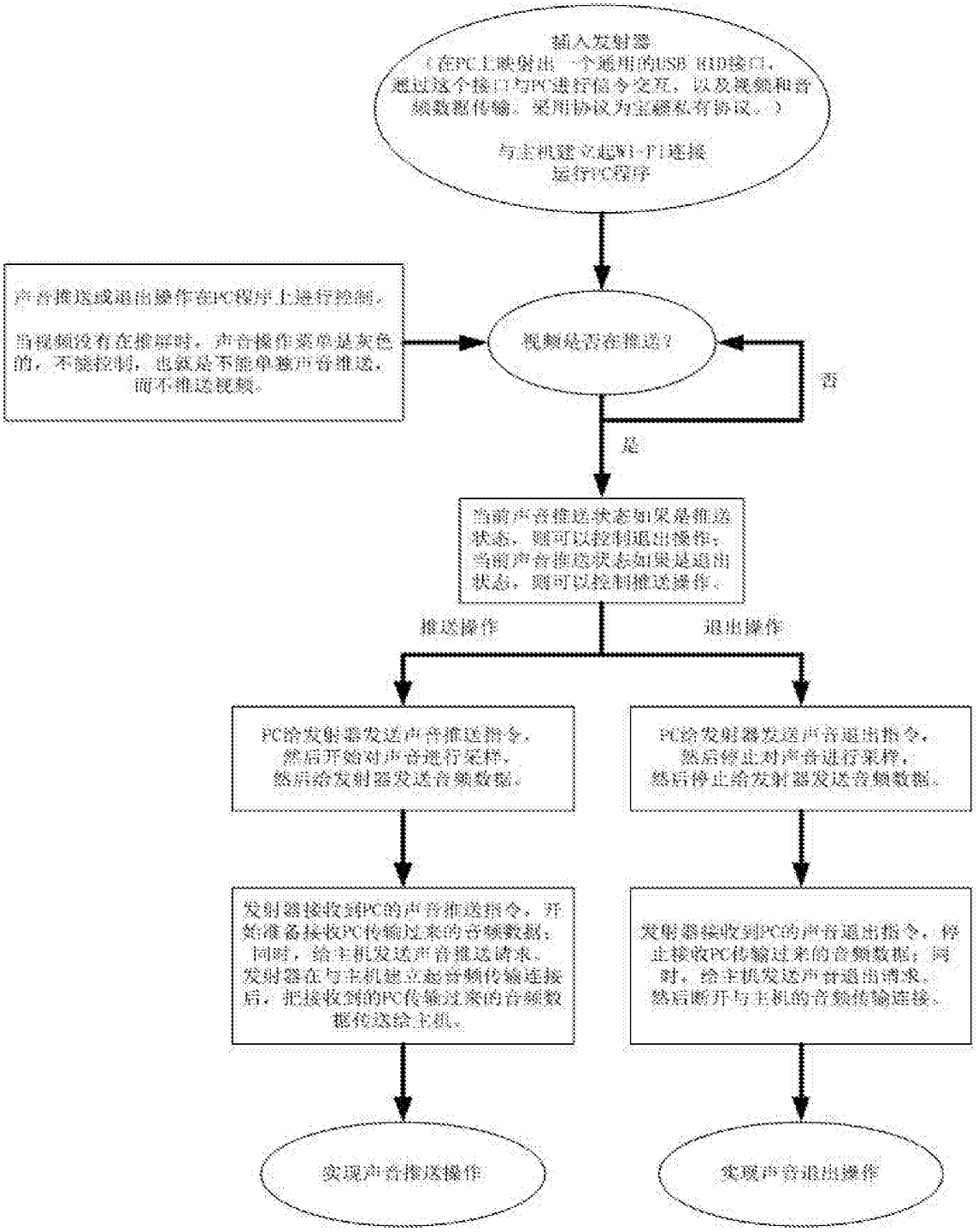

插入发射器
（在PC上映射出一个通用的USB HID接口，通过这个接口与PC进行信令交互，以及视频和音频数据传输。采用协议为完全私有协议。）
与主机建立起Wi-Fi连接
运行PC程序
声音推送或退出操作在PC程序上进行控制。
当视频没有在推送时，声音操作菜单是灰色的，不能控制，也就是不能单独声音推送，而不推送视频。
视频是否在推送？
否
是
当前声音推送状态如果是推送状态，则可以控制退出操作，当前声音推送状态如果是退出状态，则可以控制推送操作。
推送操作
退出操作
PC给发射器发送声音推送指令，然后开始对声音进行采样，然后给发射器发送音频数据。
PC给发射器发送声音退出指令，然后停止对声音进行采样，然后停止给发射器发送音频数据。
发射器接收到PC的声音推送指令，开始准备接收PC传输过来的音频数据；同时，给主机发送声音推送请求。发射器在与主机建立起音频传输连接后，把接收到的PC传输过来的音频数据传送给主机。
发射器接收到PC的声音退出指令，停止接收PC传输过来的音频数据；同时，给主机发送声音退出请求。然后断开与主机的音频传输连接。
实现声音推送操作
实现声音退出操作

图 6

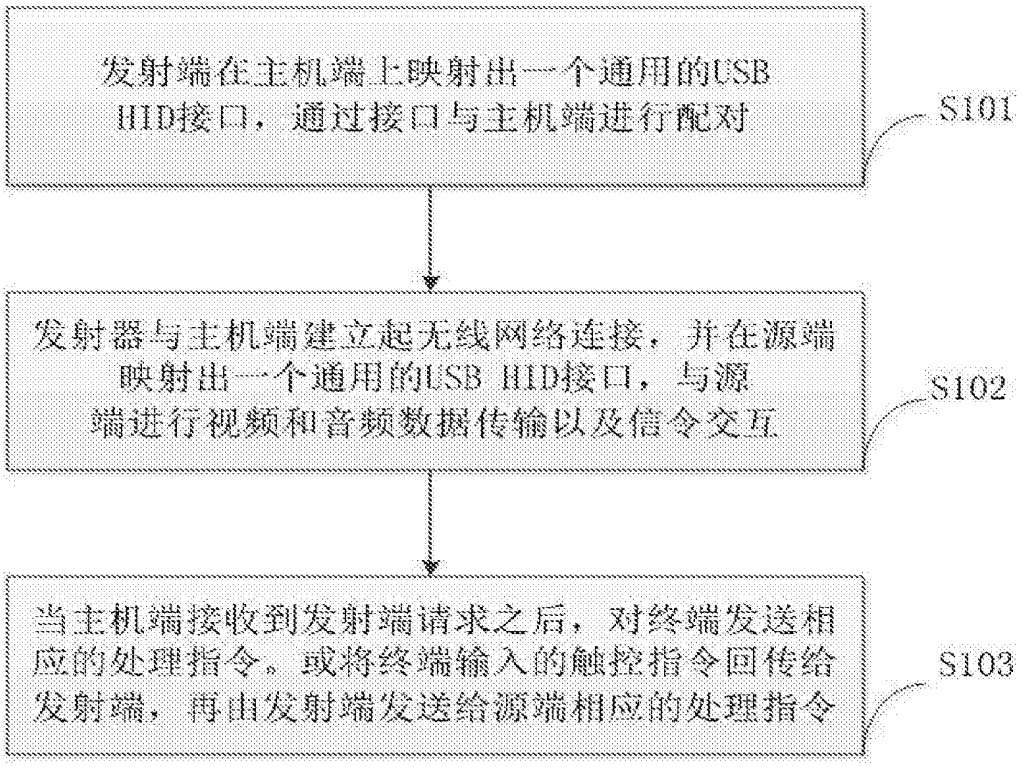

发射端在主机端上映射出一个通用的USB HID接口，通过接口与主机端进行配对
S101
发射器与主机端建立起无线网络连接，并在源端映射出一个通用的USB HID接口，与源端进行视频和音频数据传输以及信令交互
S102
当主机端接收到发射端请求之后，对终端发送相应的处理指令。或将终端输入的触控指令回传给发射端，再由发射端发送给源端相应的处理指令
S103

图7

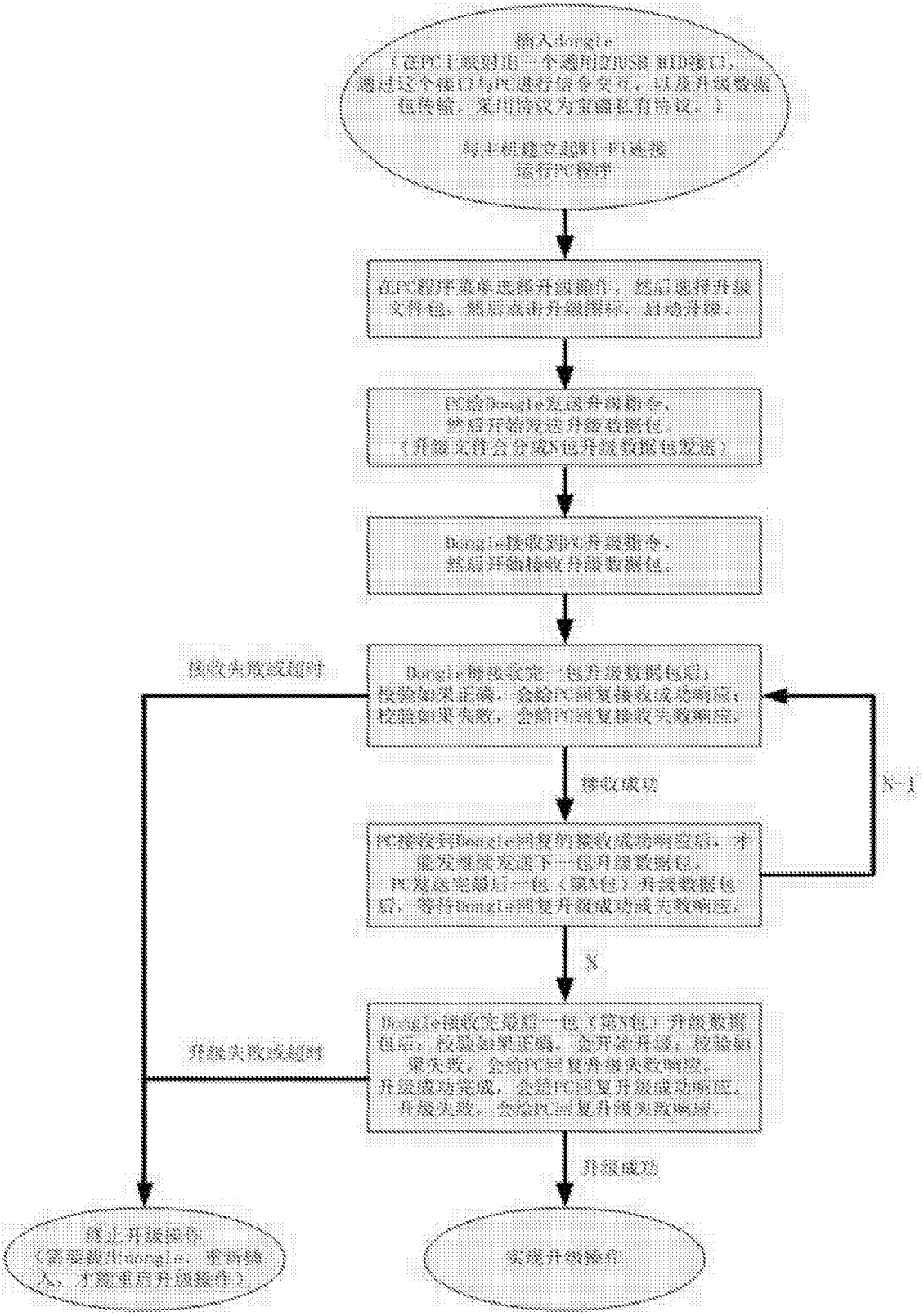

插入dongle
（在PC上映射出一个通用的USB HID接口，
通过这个接口与PC进行命令交互，以及升级数据
包传输，采用协议为宏盛私有协议。）
与主机建立起HID连接
运行PC程序
在PC程序菜单选择升级操作，然后选择升级
文件包，然后点击升级图标，启动升级。
PC给Dongle发送升级指令，
然后开始发送升级数据包。
（升级文件会分成N包升级数据包发送）
Dongle接收到PC升级指令，
然后开始接收升级数据包。
Dongle每接收完一包升级数据包后，
校验如果正确，会给PC回复接收成功响应；
校验如果失败，会给PC回复接收失败响应。
接收失败或超时
接收成功
N-1
PC接收到Dongle回复的接收成功响应后，才
能发送继续发送下一包升级数据包。
PC发送完最后一包（第N包）升级数据包
后，等待Dongle回复升级成功或失败响应。
N
Dongle接收完最后一包（第N包）升级数据
包后，校验如果正确，会开始升级，校验如
果失败，会给PC回复升级失败响应。
升级成功完成，会给PC回复升级成功响应。
升级失败，会给PC回复升级失败响应。
升级失败或超时
升级成功
终止升级操作
（需要拔出dongle，重新插
入，才能重启升级操作）
实现升级操作

图8

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DESCRIPTION CN106412683A

10 System and method for realizing audio and video transmission and interactive signaling through USB interface

[0001]

14 Technical field

[0002]

18 The invention relates to a system and method for audio and video transmission and interactive signaling, in particular to a system and method for audio and video transmission and interactive signaling through a USB interface.

[0003]

24 Background technique

[0004]

28 With technological advances in wireless transmission bandwidth, wireless chips, codec algorithms, PC performance, and decoding chips in recent years, wireless transmission methods have emerged.

30 Various types of sources, such as PCs, mobile phones, or tablets, can transmit and display the screen content on the same screen to the terminal display device through wireless means.

[0005]

35 The disadvantages of this method are:

[0006]

1、The real-time performance of audio and video transmission is not as good as wired, and there is a delay.

[0007]

2、Because of the bandwidth factor, wireless transmission basically needs to process the audio and video data through the encoding and decoding method before it can be transmitted, so the content displayed by the terminal will be different from the source.

[0008]

3、The stability and confidentiality of wireless transmission are not as good as wired ones.

[0009]

All in all, the wireless transmission method solves the inherent shortcomings of wired and brings great convenience to users.

If the wireless transmission method can improve the above-mentioned shortcomings, optimize the performance close to wired performance, and achieve simple operation, then the wireless transmission method can bring a very good user experience to the user.

[0010]

At present, the mainstream wireless audio and video transmission technology is based on Wi-Fi technology, because Wi-Fi is widely used, has many chip manufacturers, mature technology, and low cost.

With the commercialization of 802.11n and 802.11ac protocols, Wi-Fi transmission bandwidth has been greatly improved. In theory, there is enough bandwidth to support simultaneous transmission of multiple channels of encoded high-definition video.

[0011]

However, most of the products on the market that use Wi-Fi-based technology to achieve wireless audio and video transmission have poor user experience. These products more or less have the following shortcomings:

[0012]

1、The software needs to be installed on the PC. The software operation is very complicated, and the user experience is very poor. The user needs to have a certain IT background knowledge to use this type of product.

[0013]

2、Occupying the PC's wireless network card makes it impossible to surf the Internet or surf the Internet smoothly during wireless transmission on the same screen, which limits the user's Internet demand.

[0014]

3、Incomplete support for multiple types of terminals, including windows PC, MAC OS X PC, Android mobile terminal and iOS mobile terminal.

[0015]

4、Insufficient support for multi-channel video transmission. When multi-channel video is transmitted and displayed on the same screen at the same time, there are delays and freezes.

[0016]

The invention adopts Wi-Fi-based technology to realize wireless audio and video transmission.

However, the one-key connection system has solved the above shortcomings by adopting innovative technology and advanced chips.

[0017]

Summary of the invention

[0018]

In order to overcome the above-mentioned existing problems, the present invention discloses a system and method for realizing audio and video transmission and interactive signaling through a USB interface. Its purpose is to shield many complex operations through technical means, so that one does not have any IT background knowledge. Of users can use it proficiently within 10 minutes, and the user experience is very good.

Greatly improve the efficiency and pleasure of the meeting.

[0019]

In order to solve the above problems, the technical solution adopted by the present invention is:

[0020]

A method for realizing audio and video transmission and interactive signaling through a USB interface includes the following steps:

[0021]

123 S101, the transmitting end maps a universal USB HID interface on the host end, and is paired with the host end through the interface;

[0022]

128 S102, the transmitter establishes a wireless network connection with the host side, and maps a universal USB HID interface on the source side PC side, and performs video and audio data transmission and signaling interaction with the PC side;

[0023]

134 S103: After receiving the transmitter request, the host sends a corresponding processing instruction to the terminal.

136 Or, the touch command input from the terminal is sent back to the transmitter, and the transmitter sends the corresponding processing command to the source.

[0024]

141 Preferably, the S101 includes:

[0025]

145 S1011: The host side judges whether it is the transmitter plugged in according to the device plug-in event of the USB HOST interface;

[0026]

150 S1012: When the host terminal detects that it is inserted as the transmitter, it will send a pairing request to the transmitter;

[0027]

155 S1013: After receiving the pairing request from the host, the transmitter will reply to the host with a pairing response;

[0028]

160 S1014: After receiving the pairing response from the transmitter, the host sends pairing data to the transmitter to start pairing;

[0029]

S1015: After receiving the pairing data, the transmitter starts the verification. When the verification is correct, the pairing data is written into the Flash, and the host responds with a successful pairing response;

[0030]

S1016: When the verification fails, the pairing data is discarded, and a pairing failure response is returned to the host.

[0031]

Preferably, the step S101 further includes: pairing fails or times out, the pairing operation is terminated, and the pairing operation needs to be performed again.

[0032]

Preferably, the step S102 includes:

[0033]

S1021: The transmitting end establishes a wireless network connection with the host end, and the application program stored in the U disk or CD disk mapped out on the transmitting end starts to run automatically at the source end;

[0034]

S1022: The transmitter sends a key command, which is divided into a short press event or a long press event according to the length of time the key is pressed;

[0035]

S1023: When it is a long press event, the transmitter sends a full-screen request to the source, and the source replies to the transmitter with a full-screen request response;

[0036]

S1024, when it is a short press event, the transmitter judges the current state: the current state is the screen push state, then sends a screen exit request to the source; the current state is the screen exit state, then sends a push screen request to the source; the source sends the transmitter The device responds to the request.

[0037]

206 S1025: Determine whether the video is being pushed; when the video is not being pushed on the screen, it cannot be pushed by sound alone; when it is in the push state, the source sends a sound push instruction to the transmitter, starts sampling the sound, and then sends audio data to the transmitter .

[0038]

212 S1026: The transmitter receives the sound push instruction from the source and receives the audio data transmitted from the PC; at the same time, sends a sound push request to the host; the transmitter establishes an audio transmission connection with the host, and then transfers the received audio data Transmit to the host to complete the voice push operation.

[0039]

219 S1027: When it is an exit operation, the source sends a sound exit command to the transmitter, stops sampling the sound, and stops sending audio data to the transmitter; the transmitter receives the sound exit command from the source, and stops receiving the audio transmitted from the PC. Data; send a voice exit request to the host; then disconnect the audio transmission connection with the host to complete the voice exit operation.

[0040]

226 A system that realizes audio and video transmission and interactive signaling through a USB interface includes:

[0041]

230 Pairing module, used for the transmitter to map a universal USB HID interface on the host side, and pair with the host side through the interface;

[0042]

235 The network connection module is used to establish a wireless network connection between the transmitter and the host;

[0043]

240 The source interaction module is used for the transmitter to map a universal USB HID interface on the source PC to perform video and audio data transmission and signaling interaction with the PC;

[0044]

245 The return module is used for the host terminal to return the touch command input from the terminal to the transmitting terminal, and then the transmitting terminal sends the corresponding processing command to the source terminal.

[0045]

251 Preferably, the pairing module includes:

[0046]

255 Insertion event judging unit, used for the host side to judge whether the transmitter is inserted according to the device insertion event of the USB HOST interface;

[0047]

260 The pairing request unit is used to send a pairing request to the transmitter when the host detects that it is inserted by the transmitter;

[0048]

265 The pairing response unit is used for the transmitter to reply the pairing response to the host after receiving the pairing request from the host;

[0049]

270 The data sending unit is used for the host terminal to send the pairing data to the transmitting terminal after receiving the pairing response from the transmitting terminal to start pairing;

[0050]

275 The verification module is used for the transmitter to start the verification after receiving the pairing data. When the verification is correct, the pairing data is written into the Flash, and the pairing success response is returned to the host;

[0051]

281 The error processing module is used to discard the pairing data when the verification fails, and reply the pairing failure response to the host.

[0052]

286 The source interaction module includes:

[0053]

290 The key judging unit is used for the transmitter to send key commands, which can be divided into short-press events or long-press events according to the length of time the key is pressed;

[0054]

295 The long-press processing unit is used to send a full-screen request to the source from the transmitter when it is a long-press event, and the source replies to the transmitter with a full-screen request response;

[0055]

300 The short-press processing unit is used to judge the current state of the transmitter when it is a short-press event: if the current is in the push-screen state, then send a screen exit request to the source; if the current is in the exit state, send a push screen request to the source ; The source replies to the transmitter with a request response;

[0056]

307 The sound push unit is used for the source to send a sound push instruction to the transmitter, start sampling the sound, and then send audio data to the transmitter;

[0057]

312 The sound exit unit is used by the source to send a sound exit command to the transmitter, stop sampling the sound, and stop sending audio data to the transmitter; the transmitter receives the sound exit command from the source, and stops receiving the audio data transmitted from the PC; Send a voice exit request to the host; then disconnect the audio transmission connection with the host to complete the voice exit operation.

[0058]

319 A system that realizes audio and video transmission and interactive signaling through a USB interface includes:

[0059]

323 A launcher, through the short press and long press of the buttons on the launcher, push screen, push screen and full screen operation can be realized;

[0060]

328 A host side, through the USB HOST interface on the host side and the transmitter to carry out data transmission and signaling interaction, and through the USB HOST interface to connect the touch USB interface of the touch screen, collect the touch control signaling of the touch screen terminal, and return Pass it to the transmitter and the source to realize the reverse control of the touch screen;

[0061]

335 The transmitter includes:

[0062]

339 The mapping storage module is used to map out a U disk or CD disk to store applications that need to be run on the source side;

[0063]

344 Interactive transmission module, used for signaling interaction and transmission of audio and video data with the source;

[0064]

349 Signal return module, used to return the reverse control signal of the touch display terminal to the PC terminal

[0065]

353 The wireless module module is used to connect to the host-side network without occupying the source-side network;

[0066]

358 Button status monitoring module, used to collect button status operations in real time;

[0067]

362 LED light display module 1, used for real-time display of the power-on startup status of the transmitter, the status of connecting with the host, the successful connection with the host without the screen pushing status, the successful connection with the host and the pushing screen status, etc.;

[0068]

368 The host side includes:

[0069]

372 Built-in web page module, log in the built-in WEB page through wireless network or wired network, and set the wireless parameters and output parameters of the host;

[0070]

377 The external touch module is used to collect the touch control signaling of the touch screen terminal and send it back to the transmitter and source;

[0071]

382 The pairing module is automatically paired with the transmitter through the USB HOST interface;

[0072]

386 Upgrade module, used to upgrade files through the USB HOST interface to achieve automatic upgrade of the host side;

[0073]

391 LED light display module 2, used for real-time display of the power-on startup status of the host side, the connection status with the terminal, the push screen status, and the upgrade status, etc.;

[0074]

396 Resolution adaptive module, by reading the EDID to identify the best resolution of the terminal display device, and output with the best display resolution.

[0075]

401 Preferably, the system may further include: multiple transmitters and a host.

[0076]

405 The beneficial effects of the present invention are as follows:

[0077]

409 1) Insert the transmitter device, and then the source PC application stored in the transmitter device will run automatically, whether it is a windows system or a MAC OS X system;

[0078]

414 2) The transmitter automatically establishes a Wi-Fi connection with the host, and there will be an icon prompt and LED light prompt for a successful connection;

[0079]

419 3) Then press the button to realize wireless push screen sharing;

[0080]

423 4) Multiple users can join and exit independently, as well as full-screen display, all through one button of the transmitter.

[0081]

428 5) The host installation is also very simple, just connect to the display terminal through HDMI or VGA, and then connect the power supply to power on the host to start.

[0082]

433 Description of the drawings

[0083]

437 Figure 1 is a functional diagram of the PC-side application program;

[0084]

441 Figure 2 is a functional diagram of the transmitter;

[0085]

445 Figure 3 is a functional diagram of the host side;

[0086]

449 Figure 4 is a pairing flowchart;

[0087]

453 Figure 5 is a flow chart of push screen, exit screen, and full screen operation;

[0088]

457 Figure 6 is a flowchart of voice push and exit operations;

[0089]

461 Figure 7 is the main flow chart of the present invention;

[0090]

465 Figure 8 is a flowchart of the upgrade operation.

[0091]

469 Detailed ways

[0092]

473 It should be understood that the specific embodiments described here are only used to explain the present invention, but not used to limit the present invention.

[0093]

478 As shown in Fig. 1, an embodiment of a transmission method and transmission system for audio, video and interactive signaling through a USB interface according to the present invention is shown.

[0094]

483 The system for realizing audio and video transmission and signaling interaction through the USB interface of this embodiment includes:

[0095]

488 The application program running on the source PC is used for audio and video data transmission and signaling interaction with the transmitter through the USB interface;

[0096]

493 The host side performs audio and video data transmission and signaling interaction with the terminal display device through the wireless network;

[0097]

498 The transmitter performs audio and video data transmission and signaling interaction with the host through the wireless wireless network;

[0098]

503 The source PC application program performs audio and video data transmission and signaling interaction with the transmitter through the USB interface.

[0099]

508 The source-side PC-side application program is designed as a green software and does not need to be installed. The program is stored in the U disk or CD disk mapped out by the transmitter, and runs automatically after being inserted into the transmitter.

[0100]

514 The source PC application includes two versions, one is the windows PC version and the other is the MAC OS X PC version.

[0101]

519 The main functions implemented are capturing screen content, mouse click instructions, screen zoom processing, screen encoding, sound sampling and audio sampling rate conversion, USB HID communication, and so on.

522 The function diagram is shown in Figure 1.

[0102]

526 The technical principles used to achieve the above functions on windows and MAC OS X are basically different.

[0103]

531 For the Windows version, the components and interface drivers provided by windows are used to realize the sampling of the screen, mouse and sound, as well as the communication of USB HID.

533 The video encoding module uses the H.264 algorithm, and the screen scaling and audio sampling rate conversion are implemented using the library provided by FFmpeg.

[0104]

538 For the MAC OS X version, the components and interface drivers provided by OS X are used to realize screen, mouse and sound sampling, as well as USB HID communication.

540 The video encoding module uses the H.264 algorithm, and the screen scaling and audio sampling rate conversion are implemented using the library provided by OS X.

[0105]

The transmitter can be connected to windows PC and MAC OS X, and it can run without installing a driver.

The functional diagram of the transmitter is shown in Figure 2.

[0106]

The transmitter is connected to the source PC through the USB 2.0 interface, and is mapped to the USB CompositeDevice on the source PC. The USB enumeration type is standard. No matter it is a windows PC or a MAC OS X PC, there is no need to install a driver. Drive-free plug and play.

[0107]

The function diagram of the host side is shown in Figure 3:

[0108]

The host side includes the following functional modules:

[0109]

1) The built-in WEB page module can log in the built-in WEB page through wireless or wired LAN to set the wireless parameters and output parameters of the host.

[0110]

2) The return module, the USB HOST interface of the host connects to the touch USB interface of the touch screen, collects the touch control signal of the touch screen, and sends it back to the transmitter and the source PC, so as to realize the reverse control of the touch screen Features.

[0111]

3) Pairing module, plug the transmitter into the USB HOST interface of the host to realize the automatic pairing function of the transmitter.

[0112]

4) Upgrade module, save the upgrade file of the host into the U disk, and then insert the U disk into the USB HOST interface of the host to realize the automatic upgrade function of the host.

[0113]

585 5) Display module, LED lights display the working status of the host in real time. The working status includes the power-on status, the connection status with the terminal, the push screen status and the upgrade status.

[0114]

590 6) Resolution adaptive module, the best resolution adaptive function of the terminal display device, can identify the best resolution of the terminal display device by reading the EDID, and then output with the best display resolution.

[0115]

596 Audio and video data transmission and signaling interaction include the following steps:

[0116]

600 Start the host and let it enter the normal operating state;

[0117]

604 Step S101: Map a universal USB HID interface on the host side, and pair with the host side through the interface;

[0118]

609 As shown in Figure 4, insert the transmitter into the USB HOST interface of the host to perform the pairing operation. At this time, the transmitter maps a universal USB HID interface on the host, and performs pairing interaction with the host through this interface.

[0119]

615 When the transmitter is plugged into the host, the host will determine whether the transmitter is plugged in according to the device insertion event of the USB HOST interface. When it is detected that the transmitter is plugged in, it will send a pairing request to the transmitter.

[0120]

621 After the transmitter receives the pairing request from the host, it will reply to the host with a pairing response.

[0121]

625 After the host receives the pairing response from the transmitter, it starts to send pairing data to the

transmitter.

[0122]

630 The pairing data includes the SSID, key, frequency band, channel and IP address of the wireless network and so on.

[0123]

635 After the transmitter receives the pairing data from the host: If the verification is correct, it will write the pairing data into the Flash, and then reply to the host with a successful pairing response.

[0124]

640 If the verification fails, the pairing data will be discarded, and then the pairing failure response will be returned to the host.

[0125]

645 If pairing fails or timeout, the pairing operation is terminated.

646 Then you need to unplug the transmitter and plug it in again to restart the pairing operation.

[0126]

650 When the pairing is successful, the pairing operation is realized.

[0127]

654 In step S102, the transmitter establishes a wireless network connection with the host side, and maps a universal USB HID interface on the source PC side, and performs video and audio data transmission and signaling interaction with the PC side.

[0128]

660 After the transmitter end and the host end are successfully paired, pull out the transmitter and plug it into the source end PC.

662 A universal USB HID interface is mapped on the source PC. The transmitter and the source PC use this interface and adopt the protocol to be Baojiang's proprietary protocol for signaling interaction, as well as video and audio data transmission.

[0129]

668 As shown in Figure 5, the transmitter establishes a wireless network connection with the host side, and the application program stored in the U disk or CD disk mapped out by the transmitter starts to run automatically on the source PC side.

[0130]

674 Press the transmitter button, the transmitter recognizes as a short press event or a long press event according to the length of time the button is pressed.

[0131]

679 When it is a long press event, the transmitter sends a full-screen request to the source PC.

[0132]

683 If the transmitter was in the exit-screen state before, it is ready to receive the video data transmitted from the source PC; at the same time, the transmitter sends a full-screen request to the host.

685 After the transmitter establishes a video transmission connection with the host, it transmits the received video data transmitted from the source PC to the host, and then the host transmits to the terminal.

[0133]

690 If the transmitter was in the push-screen state before, you only need to send a full-screen request to the host to achieve full-screen operation.

[0134]

695 When it is a short press event, the transmitter needs to judge its current state:

[0135]

699 If it is currently in the exiting screen state, send a screen push request to the source PC.

700 The source PC responds to the launcher with a screen push request response, starts recording and encoding, and then sends video data to the launcher.

702 The transmitter receives the screen push response from the source PC and starts to prepare to receive the video data transmitted from the source PC; at the same time, the transmitter sends a screen push request to the host.

[0136]

708 After the transmitter establishes a video transmission connection with the host, it transmits the received video data transmitted from the source PC to the host to realize the screen push operation.

[0137]

713 If it is currently in the push screen state, send a screen exit request to the source PC;

[0138]

717 The source PC responds to the launcher with a screen push request response, and stops screen recording and encoding.

719 If you were pushing sound before, stop sound sampling at the same time, and then stop sending audio and video data to the transmitter.

721 The transmitter receives the exit screen response from the source PC, and stops receiving the audio and video data transmitted from the source PC; at the same time, the transmitter sends a exit screen request to the host.

723 Then disconnect the audio and video transmission connection with the host to realize the exit screen operation.

[0139]

728 As shown in Figure 6, the voice push or exit operation is controlled on the source PC program.

[0140]

732 Since the sound cannot be pushed separately, it is necessary to judge whether there is a video being pushed first. When the video is not pushing the screen, the sound operation menu is grayed out and cannot be controlled, that is, it cannot be pushed by sound alone without pushing the video.

[0141]

738 If the current voice push state is the push state, you can perform the exit operation;

[0142]

742 If the current voice push state is the exit state, the push operation can be implemented.

[0143]

746 When it is in the push state, the PC sends a sound push instruction to the transmitter, starts sampling the sound, and then sends audio data to the transmitter.

[0144]

751 The transmitter receives the voice push instruction from the PC and starts to prepare to receive the audio data

transmitted from the PC; at the same time, it sends a voice push request to the host.

[0145]

756 After the transmitter establishes an audio transmission connection with the host, it transmits the received audio data transmitted from the PC to the host to complete the sound push operation.

[0146]

761 When in the exit state, the PC sends a voice exit instruction to the transmitter, stops sampling the sound, and then stops sending audio data to the transmitter.

[0147]

766 The transmitter receives the voice exit command from the PC, and stops receiving the audio data transmitted from the PC; at the same time, it sends a voice exit request to the host.

768 Then disconnect the audio transmission connection with the host to realize the sound exit operation.

[0148]

772 Step S103: After the host receives the transmitter request, it sends a corresponding processing instruction to the terminal.

774 Or the touch command input from the terminal is sent back to the transmitter, and the transmitter sends the corresponding processing command to the source.

[0149]

779 The USB HOST interface of the host is connected to the touch USB interface of the touch screen, collects the touch control signaling of the touch screen, and sends it back to the transmitter and the source PC, so as to realize the reverse control function of the touch screen.

[0150]

785 The transmitter uses the standard USB HID mouse and keyboard protocol to realize the function of returning the reverse control signal of the touch display terminal to the source PC terminal.

[0151]

790 The above are only preferred embodiments of the present invention and do not limit the scope of the present invention. Any equivalent structure or equivalent process transformation made by using the content of the description and drawings of the present invention, or directly or indirectly applied to other related technical fields , The same reason is included in the scope of patent protection of the present invention.

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CLAIMS CN106412683A

1.

13 A method for realizing audio and video transmission and interactive signaling through a USB interface is characterized in that it includes the following steps:

15 S101, the transmitting end maps a universal USB HID interface on the host end, and is paired with the host end through the interface;

17 S102: The transmitter establishes a wireless network connection with the host, and maps a universal USB HID interface at the source to perform video and audio data transmission and signaling interaction with the source;

19 S103: After receiving the request from the transmitter, the host sends a corresponding processing instruction to the terminal; or sends the touch command input from the terminal back to the transmitter, and the transmitter sends the corresponding processing instruction to the source.

2.

25 The method according to claim 1, wherein the S101 comprises:

26 S1011: The host side judges whether it is the transmitter plugged in according to the device plug-in event of the USB HOST interface;

28 S1012: When the host terminal detects that it is inserted as the transmitter, it will send a pairing request to the transmitter;

30 S1013: After receiving the pairing request from the host, the transmitter will reply to the host with a pairing response;

32 S1014: After receiving the pairing response from the transmitter, the host sends pairing data to the transmitter to start pairing;

34 S1015: After receiving the pairing data, the transmitter starts the verification. When the verification is correct, the pairing data is written into the Flash, and the host responds with a successful pairing response;

36 S1016: When the verification fails, the pairing data is discarded, and a pairing failure response is returned to the host.

3.

41 The method according to claim 1, wherein the step S101 further comprises: pairing fails or times out, the pairing operation is terminated, and the pairing operation needs to be performed again.

4.

46 The method according to claim 1, wherein the step S102 comprises:

47 S1021: The transmitting terminal establishes a wireless network connection with the host terminal, and the application program stored in the U disk or CD disk mapped out by the transmitting terminal starts to run automatically at the source terminal;

50 S1022: The transmitter sends a button command, and judges it as a short-press event or a long-press event according to the length of time the button is pressed;

52 S1023: When it is a long press event, the transmitter sends a full-screen request to the source, and the source replies to the transmitter with a full-screen request response;

54 S1024, when it is a short press event, the transmitter first judges the current state: when it is currently in the push-screen state, it sends an exit request to the source to perform the push-screen operation; when it is the current exit state, it sends it to the source Push screen request and perform push screen operation;

57 S1025: When receiving a voice operation instruction, judge whether the video is being pushed;

58 When the video is not pushed, the sound operation cannot be performed either;

59 When the video is in the push state, judge whether the sound operation instruction is a push instruction or an exit operation instruction;

61 When it is a push operation instruction, perform a push operation; when it is an exit operation instruction, perform an exit operation;

63 A system for realizing audio and video transmission and interactive signaling through a USB interface, which is characterized in that it includes:

65 Pairing module, used for the transmitter to map a universal USB HID interface on the host side, and pair with the host side through the interface;

67 The network connection module is used to establish a wireless network connection between the transmitter and the host;

69 The source interaction module is used for the transmitter to map a universal USB HID interface on the source PC to perform video and audio data transmission and signaling interaction with the PC;

71 The return module is used for the host terminal to return the touch command input from the terminal to the transmitting terminal, and then the transmitting terminal sends the corresponding processing command to the source terminal.

5.

77 The system according to claim 1, wherein the pairing module comprises:

78 Insertion event judging unit, used for the host side to judge whether the transmitter is inserted according to the device insertion event of the USB HOST interface;

80 The pairing request unit is used to send a pairing request to the transmitter when the host detects that it is inserted by the transmitter;

82 The pairing response unit is used for the transmitter to reply the pairing response to the host after receiving the pairing request from the host;

84 The data sending unit is used for the host terminal to send the pairing data to the transmitting terminal after receiving the pairing response from the transmitting terminal to start pairing;

86 The verification module is used for the transmitter to start the verification after receiving the pairing data. When the verification is correct, the pairing data is written into the Flash, and the pairing success response is returned to the host;

89 The error processing module is used to discard the pairing data when the verification fails, and reply the pairing failure response to the host.

6.

94 The source interaction module includes:

95 The key judging unit is used for the transmitter to send key commands, which can be divided into short-press events or long-press events according to the length of time the key is pressed;

97 The long-press processing unit is used to send a full-screen request to the source from the transmitter when it is a long-press event, and the source replies to the transmitter with a full-screen request response;

99 The short-press processing unit is used to judge the current state of the transmitter when it is a short-press event: if the current is in the push-screen state, then send a screen exit request to the source; if the current is in the exit state, send a push screen request to the source ; The source replies to the transmitter with a request response;

103 The sound push unit is used for the source to send a sound push instruction to the transmitter, start sampling the sound, and then send audio data to the transmitter;

105 The sound exit unit is used by the source to send a sound exit command to the transmitter, stop sampling the sound, and stop sending audio data to the transmitter; the transmitter receives the sound exit command from the source, and stops receiving the audio data transmitted from the PC; Send a voice exit request to the host; then disconnect the audio transmission connection with the host to complete the voice exit operation.

7.

112 A system for realizing audio and video transmission and interactive signaling through a USB interface, which is characterized in that it includes:

114 A launcher, through the short press and long press of the buttons on the launcher, push screen, push screen and full screen operation can be realized;

116 A host side, through the USB HOST interface on the host side and the transmitter to carry out data transmission and signaling interaction, and through the USB HOST interface to connect the touch USB interface of the touch screen, collect the touch control signaling of the touch screen terminal, and return Pass it to the transmitter and the source to realize the reverse control of the touch screen;

120 The transmitter includes:

121 The mapping storage module is used to map out a U disk or CD disk to store applications that need to be run

on the source side;

123 Interactive transmission module, used for signaling interaction and transmission of audio and video data with the source;

125 Signal return module, used to return the reverse control signal of the touch display terminal to the PC terminal

126 The wireless module module is used to connect to the host-side network without occupying the source-side network;

128 Button status monitoring module, used to collect button status operations in real time;

129 LED light display module 1, used for real-time display of the power-on startup status of the transmitter, the status of connecting with the host, the successful connection with the host without the screen pushing status, the successful connection with the host and the pushing screen status, etc.;

132 The host side includes:

133 Built-in web page module, log in the built-in WEB page through wireless network or wired network, and set the wireless parameters and output parameters of the host;

135 The external touch module is used to collect the touch control signaling of the touch screen terminal and send it back to the transmitter and source;

137 The pairing module is automatically paired with the transmitter through the USB HOST interface;

138 Upgrade module, used to upgrade files through the USB HOST interface to achieve automatic upgrade of the host side;

140 LED light display module 2, used for real-time display of the power-on startup status of the host side, the connection status with the terminal, the push screen status, and the upgrade status, etc.;

142 Resolution adaptive module, by reading the EDID to identify the best resolution of the terminal display device, and output with the best display resolution.

8.

147 7. The system according to claim 7, wherein the system further comprises: a plurality of transmitters and a host terminal.

Electronic Acknowledgement Receipt

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International Application Number:	
Confirmation Number:	1088
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MISIURA, BRIAN THOMAS

ART UNIT	PAPER NUMBER
2186	

NOTIFICATION DATE	DELIVERY MODE
10/12/2021	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

PTOMail@hsml.com

Office Action Summary	Application No. 16/771,068	Applicant(s) RENARD et al.	
	Examiner BRIAN T MISIURA	Art Unit 2186	AIA (FITF) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on 6/9/2020.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL.** 2b) ☑ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 36-57 is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 36-57 is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☑ The drawing(s) filed on 6/9/2020 is/are: a)☑ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☑ Notice of References Cited (PTO-892)

2) ☑ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date 6/9/2020, 8/12/2021.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

Notice of Pre-AIA or AIA Status

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Detailed Action

Claim Interpretation

The following is a quotation of 35 U.S.C. 112(f):

> (f) Element in Claim for a Combination. – An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.

The following is a quotation of pre-AIA 35 U.S.C. 112, sixth paragraph:

> An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.

The claims in this application are given their broadest reasonable interpretation using the plain meaning of the claim language in light of the specification as it would be understood by one of ordinary skill in the art. The broadest reasonable interpretation of a claim element (also commonly referred to as a claim limitation) is limited by the description in the specification when 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph, is invoked.

As explained in MPEP § 2181, subsection I, claim limitations that meet the following three-prong test will be interpreted under 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph:

(A) the claim limitation uses the term “means” or “step” or a term used as a substitute for “means” that is a generic placeholder (also called a nonce term or a non-structural term having no specific structural meaning) for performing the claimed function;

(B) the term “means” or “step” or the generic placeholder is modified by functional language, typically, but not always linked by the transition word “for” (e.g.,

"means for") or another linking word or phrase, such as "configured to" or "so that"; and

(C) the term "means" or "step" or the generic placeholder is not modified by sufficient structure, material, or acts for performing the claimed function.

Use of the word "means" (or "step") in a claim with functional language creates a rebuttable presumption that the claim limitation is to be treated in accordance with 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph. The presumption that the claim limitation is interpreted under 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph, is rebutted when the claim limitation recites sufficient structure, material, or acts to entirely perform the recited function.

Absence of the word "means" (or "step") in a claim creates a rebuttable presumption that the claim limitation is not to be treated in accordance with 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph. The presumption that the claim limitation is not interpreted under 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph, is rebutted when the claim limitation recites function without reciting sufficient structure, material or acts to entirely perform the recited function.

Claim limitations in this application that use the word "means" (or "step") are being interpreted under 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph, except as otherwise indicated in an Office action. Conversely, claim limitations in this application that do not use the word "means" (or "step") are not being interpreted under 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph, except as otherwise indicated in an Office action.

Drawings

The drawings are objected to because Figure 4 comprises numeral 16 which is labeled as "video scraper". However, the Specification filed 6/9/2020, specifically Page 26 and lines 21-25, refer to numeral 16 as "a dummy audio device such as an **audio scraper**".

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate

prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the reference application or patent either is shown to be

commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement. A terminal disclaimer must be signed in compliance with 37 CFR 1.321(b).

The USPTO internet Web site contains terminal disclaimer forms which may be used. Please visit http://www.uspto.gov/forms/. The filing date of the application will determine what form should be used. **A web-based eTerminal Disclaimer may be filled out completely online using web-screens. An eTerminal Disclaimer that meets all requirements is auto-processed, approved immediately upon submission, and reduces waiting time for Terminal Disclaimer to be manually approved.** For more information about eTerminal Disclaimers, refer to http://www.uspto.gov/patents/process/file/efs/guidance/eTD-info-I.jsp.

Claims 36, 42, 43, 44, 50, 51, 52, 53, 56, and 57 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over Claims 1, 4, 1, 9, 11, 12, 9, 15, 16, and 17 of U.S. Patent No. 10,684,972. Although the conflicting claims are not identical, they are not patentably distinct from each other because the subject matter claimed in the instant application is at least fully disclosed in the reference patent.

Claim Rejections - 35 USC § 103

In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

The following is a quotation of 35 U.S.C. 103 which forms the basis for all obviousness rejections set forth in this Office action:

> A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having

> ordinary skill in the art to which the claimed invention pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103 are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 36, 38-44, 46-54, and 56-57 are rejected under 35 U.S.C. 103 as being unpatentable over **Brands** et al. U.S. PGPUB No. 2015/0121466 in view of **Christison** et al. U.S. Patent No. 7,761,627.

Per Claim 36, Brands discloses a system for connecting a processing device (**Paragraph 118, processing device 31**) to a functional device (**Paragraphs 120-121; display 44, whiteboard 45, camera 35, microphones 38**) connected to or in a base unit (**Paragraphs 119-121; base node 36**) of a communications network (**network 50**), the processing device having a memory, a display and an operating system (**Paragraph 118; Devices such as laptop computers and tablet computing devices each have those elements.**), the system comprising: a first peripheral device (**connection units 47**) being adapted to be coupled to the processing device via a generic communications protocol (**Paragraphs 118, 126, 140**), the base unit having a transmitter and the first peripheral device having a receiver (**Paragraphs 129-130**); the base unit and the first peripheral device being adapted to transmit and receive data respectively over the communications network from the functional device to the processing device using the generic communications protocol for communication between the processing device and the first peripheral device (**Paragraphs 120-131**).

Brands discloses that the functional devices may comprise a plurality of different device types, such as display 44, whiteboard 45, camera 35, microphones 38 (**Paragraphs 120-121**). Brands further discloses utilizing a screen scraping technique for copying the

contents of the computer screen to a meeting room display via a portable application resident to the dongle (**Paragraph 128**). However Brands does not specifically disclose that said functional devices are exposed on the connection units 47 as “at least one fixed or configurable endpoints of the functional device”, as claimed, or the method by which the other functional devices of the meeting room are accessed by the users 37.

However, Christison similarly discloses connecting a host computing device (**400**) via USB to a first peripheral device (**HWA 410**), wherein said first peripheral device is connected via network to a base unit (**DWA 420**) which is further connected directly to a functional device (**USB devices 421, 422, 431, 432**). Christison further discloses exposing endpoints to a host device so that they appear as though they are native USB devices (**Col. 6 line 13 – Col. 7 line 35; Wired devices appear to the host as if they are native WUSB devices. Attached USB devices are presented as a separate function on an already existing device by using wired device endpoints mapped into WUSB hub endpoints.**).

- It would have been obvious to one having ordinary skill in the art before the effective filing date of the claimed invention to implement the endpoint representation of USB devices as taught by Christison within the USB dongle of Brands electronic meeting system in order to provide a seamless integration for a meeting participant to access all of the functional devices present within the disclosure of Brands, such as various USB devices like a camera, microphone, and/or speaker.

Per Claim 38, Brands discloses the system according to claim 36, wherein the functional device is selected from the following or any combination thereof: the functional device being connected to or in a base unit of a wireless communications network, the functional device is able to be run with a vendor specific driver alone, the functional device is any one or more of a microphone, a speakerphone, a speaker, a display, a touchscreen, a projector, a camera, a video camera, and a webcamera (**Paragraphs 120-122**), the functional device is presented to a unified communication between two or more processing devices by the first peripheral device, the functional

device is a second peripheral device the functional device is a data capturing device.

Per Claim 39, Christison further teaches wherein exposure is implemented with descriptor fields (**Col. 3 lines 1-16; Col. 5 lines 28-37, Col. 6 line 66 – Col. 7 line 5**).

Per Claim 40, Brands discloses the system according to claim 36, wherein the system is adapted to transmit the data from the functional device to at least two processing devices using at least two first peripheral devices (**Figure 1; multiple processing devices 31 and multiple connection units 47**).

Per Claim 41, Brands discloses the system according to claim 36, wherein two endpoints are combined and exposed to the processing device as one endpoint, **or** wherein the at least one fixed or a configurable endpoint of the functional device exposed on the first peripheral device is one of a human interface device, a mass storage device, a composite device, a microphone, a speakerphone, a speaker, a display, a touchscreen, a projector, a camera, a video camera, or a webcamera (**Paragraphs 120-122; Additionally, Christison discloses that their endpoints correspond to any USB peripheral devices, including digital cameras and external storage devices; Col. 1 lines 44-47**), **or** wherein the same type of functional device is exposed to the processing device as is connected to the Base Unit further comprising at least one driver for the functional device installed on the processing device.

Per Claim 42, Brands discloses the system according to claim 36, further comprising means for encoding, optionally encrypting the data (**Paragraphs 60, 63, and 256-259**).

Per Claim 43, Brands discloses the system according to claim 36, wherein the processing device is adapted to host a unified communication between two or more further processing devices (**Paragraph 152; media conference**).

Per Claims 44, 46-48, and 50-52, please refer to the above rejection of claims 36 and 38-43, respectively, as the limitations are substantially similar and the mapping of the references is equally applicable.

Per Claim 49, Brands discloses the method according to claim 44, comprising exposing two endpoints which have been combined to the processing device as one endpoint, **or** exposing the same type of functional device to the processing device as is connected to the Base Unit and using at least one driver for the functional device installed on the processing device (**Paragraphs 138, 269-273**).

Per Claim 53, Brands discloses a peripheral device (**connection unit 47**) adapted to be coupled to a processing device (**processing device 31**) via a generic communications protocol (**Paragraphs 118, 126, 140**), the peripheral device comprising: a receiver (**Paragraph 129; connection unit 47 comprises a transceiver 62**), the receiver of the peripheral device being adapted to receive data over a communications network from the functional device and for sending the data to the processing device (**Paragraph 129**) and using the generic communications protocol for communication between the processing device and the peripheral device (**Paragraphs 120-131**).

Brands discloses functional devices may comprise a plurality of different device types, such as display 44, whiteboard 45, camera 35, microphones 38 (**Paragraphs 120-121**). Brands further discloses utilizing a screen scraping technique for copying the contents of the computer screen to a meeting room display via a portable application resident to the dongle (**Paragraph 128**). However Brands does not specifically disclose that said functional devices are exposed on the connection units 47 as “at least one fixed or configurable endpoints of the functional device”, as claimed, or the method by which the other functional devices of the meeting room are accessed by the users 37.

However, Christison similarly discloses connecting a host computing device (**400**) via USB to a first peripheral device (**HWA 410**), wherein said first peripheral device is connected via network to a base unit (**DWA 420**) which is further connected directly to a

functional device (**USB devices 421, 422, 431, 432**). Christison further discloses exposing endpoints to a host device so that they appear as though they are native USB devices (**Col. 6 line 13 – Col. 7 line 35; Wired devices appear to the host as if they are native WUSB devices. Attached USB devices are presented as a separate function on an already existing device by using wired device endpoints mapped into WUSB hub endpoints.**).

- It would have been obvious to one having ordinary skill in the art before the effective filing date of the claimed invention to implement the endpoint representation of USB devices as taught by Christison within the USB dongle of Brands electronic meeting system in order to provide a seamless integration for a meeting participant to access all of the functional devices present within the disclosure of Brands, such as various USB devices like a camera, microphone, and/or speaker.

Per Claim 54, Brands further discloses the peripheral device according to claim 53, wherein the communications network is a wireless communications network (**network 51**).

Per Claim 56, Brands discloses the peripheral device according to claim 53, wherein the at least one fixed or a configurable endpoint of the functional device exposed on the first peripheral device is one of a human interface device, a mass storage device, a composite device, a microphone, a speakerphone, a speaker, a display, a touchscreen, a projector, a camera, a video camera, or a webcamera (**Paragraphs 120-122; Additionally, Christison discloses that their endpoints correspond to any USB peripheral devices, including digital cameras and external storage devices; Col. 1 lines 44-47**).

Per Claim 57, Brands discloses the teachings of claim 44 as computer program product embodiment, including a non-transitory signal storage means (**Paragraphs 57-69, 243, 254**).

* * * * * * *

Claims 37, 45, and 55 are rejected under 35 U.S.C. 103 as being unpatentable over **Brands** et al. U.S. PGPUB No. 2015/0121466 in view of **Christison** et al. U.S. Patent No. 7,761,627 in further view of **Beel** et al. U.S. PGPUB No. 2015/0263905.

Per Claims 37, 45, and 55, Brands does not specifically disclose the data that is transmitted or received, optionally streaming data carrying images, audio, or similar can be in a raw or unaltered format.

However, Beel, of a common assignee and field of endeavor as Brands, discloses similar to the screen scraping technique of Brands (**paragraph 140**), a screen scraping technique where a frame grabber is used to capture video frames and display, store, and/or transmit them in **raw** or compressed digital form (**Paragraph 154**).

- It would have been obvious to one having ordinary skill in the art before the effective filing date of the claimed invention to implement the raw frame grabbing aspect of Beel's screen scraping technique within the screen scraping teaching of Brands because both raw and compressed forms of digital data can be required depending on the type of data and the use for said data.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to BRIAN T MISIURA whose telephone number is (571)272-0889 - (Direct Fax: 571-273-0889). The examiner can normally be reached on M-F: 8-4:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tim Vo can be reached on (571) 272-36423642. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Brian T Misiura/
Primary Examiner, Art Unit 2185

Notice of References Cited	Application/Control No. 16/771,068	Applicant(s)/Patent Under Reexamination RENARD et al.	
	Examiner BRIAN T MISIURA	Art Unit 2186	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-20150121466-A1	04-2015	Brands; Johannes Willem	H04L12/1818	726/4
*	B	US-20150263905-A1	09-2015	BEEL; Koen Simon Herman	H04L51/00	715/753
*	C	US-10031873-B2	07-2018	Hundal; Sukhdeep Singh	G06F13/385	1/1
	D					
	E					
	F					
	G					
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	I					
	J					
	K					
	L					
	M					

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/771,068	RENARD et al.
	Examiner	Art Unit
	BRIAN T MISIURA	2186

CPC - Searched*		
Symbol	Date	Examiner
G06F13/122, 387, 4282	10/06/2021	BTM
H04L12/12, 0428, 1813	10/06/2021	BTM

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
IDS Consideration, CPC, Inventor, and EAST prior art search	10/06/2021	BTM
Review prosecution/search history of parent application no. 15/858,668	10/06/2021	BTM

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (02-18)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	16771068
Filing Date	2020-06-09
First Named Inventor	Gauthier RENARD
Art Unit	2185
Examiner Name	
Attorney Docket Number	21044.0022USWO

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1					

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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20160125838	A1	2016-05-05	Hundal et al.	

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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2]	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	106412683	CN	A	2017-02-15		With English machine translation	X

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NON-PATENT LITERATURE DOCUMENTS Remove

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.T.M/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16771068
	Filing Date	2020-06-09
	First Named Inventor	Gauthier RENARD
	Art Unit	2185
	Examiner Name	
	Attorney Docket Number	21044.0022USWO

	1	Office Action issued in European Patent Application No. 18833045.0, dated June 28, 2021	

If you wish to add additional non-patent literature document citation information please click the Add button Add

EXAMINER SIGNATURE

Examiner Signature	/BRIAN T MISIURA/	Date Considered	10/06/2021

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.T.M/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	16771068
Filing Date	2020-06-09
First Named Inventor	Gauthier RENARD
Art Unit	2185
Examiner Name	
Attorney Docket Number	21044.0022USWO

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Thomas Lee/	Date (YYYY-MM-DD)	2021-08-12
Name/Print	Thomas Lee	Registration Number	66396

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.T.M/

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these record s.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

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Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (02-18)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	
Filing Date	2020-06-09
First Named Inventor	Gauthier RENARD
Art Unit	TBD
Examiner Name	TBD
Attorney Docket Number	RENA3002-2/TL

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	7761627		2010-07-20	Christison	
	2	7617342		2009-11-10	Rofougaran	
	3	9183164		2015-11-10	Brabenac	
	4	9201826		2015-12-01	Huang	
	5	9804977		2017-10-31	Ghosh	
	6	9934168		2018-04-03	Griffin	
	7	9722986		2017-08-01	Brands	
	8	9538138		2017-01-03	Leete	

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	First Named Inventor	Gauthier RENARD
	Art Unit	TBD
	Examiner Name	TBD
	Attorney Docket Number	RENA3002-2/TL

	9	9083769		2015-07-14	Beel	
	10	8896656		2014-11-25	Epstein	
	11	8756348		2014-06-17	Beel	
	12	8316138		2012-11-20	Chang	

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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20020196378	A1	2002-12-26	Slobodin et al.	Cited in Specification.
	2	20060075100	A1	2006-04-06	Stirbu	Cited in ISR.
	3	20140148152	A1	2014-05-29	Periyalwar et al.	Cited in ISR.
	4	20160092153		2016-03-31	Demik	
	5	20140362161		2014-12-11	Leete	

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	Filing Date	2020-06-09
	First Named Inventor	Gauthier RENARD
	Art Unit	TBD
	Examiner Name	TBD
	Attorney Docket Number	RENA3002-2/TL

	6	20100302130		2010-12-02	Kikuchi	
	7	20100115145		2010-05-06	Banerjee	
	8	20090198839		2009-08-06	Banerjee	

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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2]	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	1879143	EP	A2	2008-01-16	Bally Gaming Inc.	Cited in ISR.	
	2	3099009	EP	A1	2016-11-30	Barco N.V.	Cited in ISR, Written Opinion and IPRP.	
	3	2013037980	WO	A2	2013-03-21	Barco N.V.	Cited in Specification.	

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NON-PATENT LITERATURE DOCUMENTS Remove

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	International Search Report in corresponding PCT/EP2018/086537 dated April 10, 2019.	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	
	Filing Date	2020-06-09
	First Named Inventor	Gauthier RENARD
	Art Unit	TBD
	Examiner Name	TBD
	Attorney Docket Number	RENA3002-2/TL

	2	Written Opinion in corresponding PCT/EP2018/086537 dated April 10, 2019.
	3	International Preliminary Report on Patentability in corresponding PCT/EP2018/086537 dated November 21, 2019.
	4	Barco - Clickshare Brochure, November 2018 (20 pages).

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EXAMINER SIGNATURE

Examiner Signature	/BRIAN T MISIURA/	Date Considered	10/06/2021

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[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

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(Not for submission under 37 CFR 1.99)

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Filing Date	2020-06-09
First Named Inventor	Gauthier RENARD
Art Unit	TBD
Examiner Name	TBD
Attorney Docket Number	RENA3002-2/TL

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

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Signature	/Thomas Lee/	Date (YYYY-MM-DD)	2020-06-09
Name/Print	THOMAS LEE	Registration Number	66396

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7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

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Bibliographic Data

Application No: 16/771,068

Foreign Priority claimed: ○ Yes ◉ No

35 USC 119 (a-d) conditions met: ☐ Yes ☑ No ☐ Met After Allowance

Verified and Acknowledged: /BRIAN T MISIURA/ Examiner's Signature | Initials

Title: METHOD AND SYSTEM FOR MAKING FUNCTIONAL DEVICES AVAILABLE TO PARTICIPANTS OF MEETINGS

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
06/09/2020	710	2186	21044.0022USWO
RULE			

APPLICANTS

BARCO N.V., Kortrijk, BELGIUM

INVENTORS

Gauthier RENARD, Kuurne, BELGIUM

Johan Peter Frans DEGRAEF, Gent, BELGIUM

CONTINUING DATA

This application is a 371 of PCT/EP2018/086537 12/21/2018

PCT/EP2018/086537 is a CON of 15858668 12/29/2017 PAT 10684972

FOREIGN APPLICATIONS

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Minneapolis, MN 55402-1683
UNITED STATES

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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	1,152	barco.as.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2019/03/21 06:21
S2	1	((("RENARD") near3 ("Gauthier")) OR (("DEGRAEF") near3 ("Johan"))).INV.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	ADJ	ON	2019/03/21 06:22
S8	1,152	barco.as.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2019/03/22 06:00
S17	29	S8 and ((screen$1 with (share$1 or sharing)) or lecture or seminar or collaborative or skype)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2019/03/22 06:41
S18	105	S8 and (encod$3 or encrypt$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2019/03/22 06:52
S20	8	S19 and driver$1	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2019/03/22 09:33
S23	471	S22 and ((screen$1 with (share$1 or sharing)) or lecture or seminar or	US-PGPUB; USPAT; USOCR;	ADJ	ON	2019/03/22 09:51

		collaborative or skype or conference or meeting)	FPRS; EPO; JPO; DERWENT; IBM_TDB			
S22	5,744	barco not S8	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2019/03/22 09:51
S24	52	ClickShare	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2019/03/22 09:53
S25	47	("20030098819" | "20050078172" | "20050135611" | "20050176416" | "20060160489" | "20060258300" | "20070287498" | "20090156120" | "20090328189" | "20100046455" | "20100115145" | "20100302454" | "20100321402" | "20110090942" | "20110134852" | "20120082069" | "20120083215" | "20120133727" | "20120202426" | "20120278192" | "20120300759" | "20130016079" | "20130029685" | "20130034184" | "20130044695" | "20130050398" | "20130070739" | "20130084796" | "20130094439" | "20150035938" | "7142812" | "7593704" | "7912449" | "7912506" | "7965837" | "8218427" | "8229352" | "8259647" | "8265657" | "8279784" | "8285223" | "8306483" | "8320877" | "8326221" | "8332495" | "8345577" | "8396042").PN. OR ("9538138").URPN.	US-PGPUB; USPAT; USOCR	ADJ	ON	2019/03/22 10:07
S26	4	LiteShow	US-PGPUB; USPAT; USOCR	ADJ	ON	2019/03/22 10:17
S28	26,660	((H04M3/567 OR H04L65/4038 OR H04L12/1813 OR H04L65/403).CPC.)	US-PGPUB; USPAT; FPRS	ADJ	ON	2019/03/22 10:28
S30	8,618	S29 and (shared or share or sharing)	US-PGPUB; USPAT; FPRS	ADJ	ON	2019/03/22 10:29
S29	13,006	S28 and (collaborat$3 or group)	US-PGPUB; USPAT; FPRS	ADJ	ON	2019/03/22 10:29

S31	11	S27 and (encod$3 or encrypt$3)	US-PGPUB; USPAT; FPRS	ADJ	ON	2019/03/22 14:49
S42	307	(HID or human interface (device or device class)) (universal serial bus or USB)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2019/10/07 14:48
S41	1,289	(universal serial bus or USB) (HID or human interface (device or device class))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2019/10/07 14:48
S40	1,252	USB (HID or human interface (device or device class))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2019/10/07 14:48
S43	12	(HID or human interface (device or device class)) endpoint$1	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2019/10/07 14:49
S45	6	S44 and barco	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2019/10/07 14:53
S44	1,436	S40 or S41 or S42	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2019/10/07 14:53
S49	70	(USB or universal serial bus) near3 middleware	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO;	ADJ	ON	2019/10/08 10:06

			DERWENT; IBM_TDB			
S50	91	(wireless or bluetooth) (USB or universal serial bus) hub	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2019/10/08 10:19
S51	10	S50 and (meeting$1 or conferenc$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2019/10/08 10:24
S53	344	control (HID or human interface (device or device class))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2019/10/08 11:58
S54	46	S53 and (emulat$3 or mirror$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2019/10/08 12:00
S56	21	S55 and (stor$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2019/10/08 13:02
S64	53	clickshare	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2019/10/08 14:37
S68	53	S67 and (prox$3 or emulat$3 or endpoint$1)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO;	ADJ	ON	2019/10/08 14:47

			DERWENT; IBM_TDB			
S67	419	Connected (classroom or (meeting or conference or board) room)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2019/10/08 14:47
S72	25	S70 and endpoint	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2019/10/08 16:11
S71	5,985	barco not S70	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2019/10/08 16:11
S70	1,184	barco.as.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2019/10/08 16:11
S73	48	S71 and endpoint	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2019/10/08 16:13
S74	116	(USB or universal serial bus) (sharing or device sharing)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2019/10/08 16:24
S77	4,835	H04L65/4061.CPC.	US-PGPUB; USPAT; FPRS	ADJ	ON	2019/10/08 16:34
S78	74,532	H04L12/18-1895.cpc. OR H04M3/56-568.cpc OR H04L65/403-4061.CPC.	US-PGPUB; USPAT; FPRS	ADJ	ON	2019/10/08 16:35

S81	159	S79 and (emulat$3 with (USB or peripheral$1 or device$1))	US-PGPUB; USPAT; FPRS	ADJ	ON	2019/10/08 16:36
S80	153	S79 and (emulat$3 with device)	US-PGPUB; USPAT; FPRS	ADJ	ON	2019/10/08 16:36
S79	21,993	S78 AND (teleconference or conferenc$3 or meeting)	US-PGPUB; USPAT; FPRS	ADJ	ON	2019/10/08 16:36
S82	3,297	S79 and endpoint$1	US-PGPUB; USPAT; FPRS	ADJ	ON	2019/10/08 16:37
S93	267	appear$5 near2 (direct$2) near2 (connect$3 or insert$2) with (USB or device or peripheral)	US-PGPUB; USPAT; FPRS	ADJ	ON	2019/10/08 17:01
S91	929	appear$4 near2 (direct$2) near2 (connect$3 or insert$2)	US-PGPUB; USPAT; FPRS	ADJ	ON	2019/10/08 17:01
S94	2,554	BYOD	US-PGPUB; USPAT; FPRS	ADJ	ON	2019/10/09 06:46
S95	1,241	S94 and (meeting or conferenc$3 or teleconferenc$3 or collaborat$3)	US-PGPUB; USPAT; FPRS	ADJ	ON	2019/10/09 06:52
S96	801	S95 and ((share$1 or sharing) with (USB or peripheral$1 or device))	US-PGPUB; USPAT; FPRS	ADJ	ON	2019/10/09 06:53
S97	165	S94 and (meeting or conferenc$3 or teleconferenc$3 or collaborat$3) room	US-PGPUB; USPAT; FPRS	ADJ	ON	2019/10/09 06:55
S104	92	(wireless or bluetooth) (USB or universal serial bus) hub	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2020/01/21 15:24
S105	11	S104 and (meeting or conferenc$3 or teleconferenc$3 or collaborat$3 or unified)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2020/01/21 15:25
S106	1	S104 and (skype or facetime)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2020/01/21 15:27
S107	32,819	((H04M3/567 OR G06F13/102 OR H04L12/1822 OR H04L65/403).CPC.)	US-PGPUB; USPAT; FPRS	ADJ	ON	2020/01/21 15:29
S109	163	unified (meeting or conferenc$3 or teleconferenc$3 or collaborat$3 communication)	US-PGPUB; USPAT; USOCR;	ADJ	ON	2020/01/21 15:40

			FPRS; EPO; JPO; DERWENT; IBM_TDB			
S110	5,531	unified (meeting or conferenc$3 or teleconferenc$3 or collaborat$3 or communication)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2020/01/21 15:41
S115	12	"10684972"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2021/09/24 14:51
S117	8	((("RENARD") near3 ("Gauthier")) OR (("DEGRAEF") near3 ("Johan"))).INV.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	ADJ	ON	2021/10/05 14:39
S121	412	S120 and meeting	US-PGPUB; USPAT; FPRS	ADJ	ON	2021/10/05 15:40
S120	5,684	barco	US-PGPUB; USPAT; FPRS	ADJ	ON	2021/10/05 15:40
S123	44	("20020174254" | "20020196378" | "20040128354" | "20040263636" | "20050015719" | "20050036509" | "20050122392" | "20060031779" | "20060095376" | "20070005809" | "20070033289" | "20070109410" | "20070244970" | "20090046139" | "20090064302" | "20090198839" | "20090300520" | "20100066806" | "20100087139" | "20100302130" | "20110023096" | "20110092198" | "20110115689" | "20110150433" | "20110179182" | "20120331509" | "20130050254" | "20130060662" | "20130067121" | "20140082227" | "6966035" | "8316138" | "8346753").PN. OR ("9722986").URPN.	US-PGPUB; USPAT; USOCR	ADJ	ON	2021/10/06 10:57
S126	7	(USB or universal serial bus) same middleware same endpoint$1	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO;	ADJ	ON	2021/10/06 11:33

			DERWENT; IBM_TDB			
S127	4	"20160125838"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2021/10/06 11:34
L3	1,825	L2 AND (meeting or conferenc$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2021/10/06 21:07
L2	43,628	G06F13/122,387,4282.CPC. OR H04L12/12,0428.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2021/10/06 21:07
L6	61	l3 and (dongle)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2021/10/06 21:08
L5	23	l4 and (meeting or conferenc$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2021/10/06 21:08

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S111	35,517	H04L12/18-1895.cpc. OR H04M3/56-568.cpc OR H04L65/403-4061.CPC.	US-PGPUB; USPAT	ADJ	ON	2020/01/21 15:25
S112	55	(wireless or bluetooth) (USB or universal serial bus) hub	US-PGPUB; USPAT	ADJ	ON	2020/01/21 15:40

S113	4,126	unified (meeting or conferenc$3 or teleconferenc$3 or collaborat$3 or communication)	US-PGPUB; USPAT	ADJ	ON	2020/01/21 15:41
S114	469	S111 and S113	US-PGPUB; USPAT	ADJ	ON	2020/01/21 15:44

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Courtesy Reminder for
Application Serial No: 16/771,068

Attorney Docket No: 21063.0018USWO
Customer Number: 52835
Date of Electronic Notification: 10/12/2021

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(Not for submission under 37 CFR 1.99)

Application Number	16771068
Filing Date	2020-06-09
First Named Inventor	RENARD
Art Unit	2186
Examiner Name	MISIURA
Attorney Docket Number	21063.0018USWO

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	1	20140181325	A1	2014-06-26	Hundal et al.	

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	1	2015011679	JP	A	2015-01-19		With English translation	☒
	2	2016178422	JP	A	2016-10-06		With English translation	☒

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	Application Number	16771068
	Filing Date	2020-06-09
	First Named Inventor	RENARD
	Art Unit	2186
	Examiner Name	MISIURA
	Attorney Docket Number	21063.0018USWO

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	Notice of Reason for Refusal issued in corresponding Japanese Application No. 2020-536065, dated November 4, 2021, with English translation	X

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16771068
	Filing Date	2020-06-09
	First Named Inventor	RENARD
	Art Unit	2186
	Examiner Name	MISIURA
	Attorney Docket Number	21063.0018USWO

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Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☒ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

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See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

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Signature	/Thomas Lee/	Date (YYYY-MM-DD)	2021-12-09
Name/Print	Thomas Lee	Registration Number	66,396

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G06F	3/041	(2006.01)	G06F	3/041	380G	5E555
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(22)出願日　平成25年7月2日 (2013.7.2)

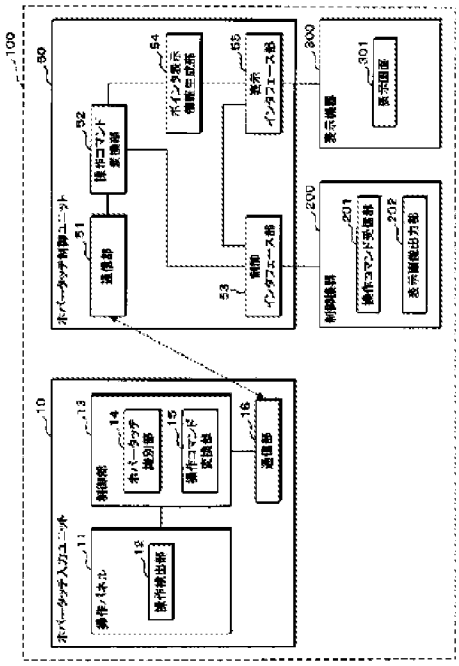
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5B068 AA05　AA22　BB25　BE06　BE11
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最終頁に続く

(54)【発明の名称】操作入力装置及び入力操作処理方法

(57)【要約】
【課題】安価な構成で操作性に優れ容易に操作位置を特定することができる操作入力装置及び入力操作処理方法を提供する。
【解決手段】操作入力装置は、フローティングタッチ操作又はタッチ操作のいずれの操作が入力されたかを判定する操作判定部、操作パネル上での操作の入力位置を算出する算出部、操作判定部でフローティングタッチ操作が入力されたと判定した場合、算出部で算出した入力位置に対応する表示画面上の位置にポインタを表示させるための表示情報を生成する表示情報生成部、表示情報生成部で生成した表示情報を、ポインタを表示する表示画面を有する表示機器へ出力する表示機器出力部などを備える。
【選択図】図１



【特許請求の範囲】
【請求項１】
フローティングタッチ操作及びタッチ操作の入力を受け付ける操作パネルを備える操作入力装置において、
フローティングタッチ操作又はタッチ操作のいずれの操作が入力されたかを判定する操作判定部と、
前記操作パネル上での前記操作の入力位置を算出する算出部と、
前記操作判定部でフローティングタッチ操作が入力されたと判定した場合、前記算出部で算出した入力位置に対応する表示画面上の位置にポインタを表示させるための表示情報を生成する表示情報生成部と、
該表示情報生成部で生成した表示情報を、前記ポインタを表示する前記表示画面を有する表示機器へ出力する表示機器出力部と
を備えることを特徴とする操作入力装置。
【請求項２】
前記操作判定部でタッチ操作が入力されたと判定した場合、該タッチ操作に基づいてタッチ操作情報を生成するタッチ操作情報生成部と、
前記タッチ操作情報生成部で生成したタッチ操作情報を前記タッチ操作又はフローティングタッチ操作により制御される制御機器へ出力する制御機器出力部と
を備えることを特徴とする請求項１に記載の操作入力装置。
【請求項３】
前記操作判定部でフローティングタッチ操作が入力されたと判定した場合、該フローティングタッチ操作に基づいてフローティングタッチ操作情報を生成するフローティングタッチ操作情報生成部を備え、
前記制御機器出力部は、
前記フローティングタッチ操作情報生成部で生成したフローティングタッチ操作情報を前記制御機器へ出力するようにしてあることを特徴とする請求項２に記載の操作入力装置。
【請求項４】
前記表示機器の表示画面の解像度及び前記操作パネルの入力位置の分解能に基づいて、前記算出部で算出した入力位置を前記表示画面上の表示位置に変換する変換部を備えることを特徴とする請求項１から請求項３までのいずれか１項に記載の操作入力装置。
【請求項５】
フローティングタッチ操作及びタッチ操作の入力を受け付ける操作パネルを備える操作入力装置による入力操作処理方法において、
フローティングタッチ操作又はタッチ操作のいずれの操作が入力されたかを判定するステップと、
前記操作パネル上での前記操作の入力位置を算出するステップと、
フローティングタッチ操作が入力されたと判定した場合、算出された入力位置に対応する表示画面上の位置にポインタを表示させるための表示情報を生成するステップと、
生成された表示情報を、前記ポインタを表示する前記表示画面を有する表示機器へ出力するステップと
を含むことを特徴とする入力操作処理方法。
【発明の詳細な説明】
【技術分野】
【０００１】
本発明は、フローティングタッチ操作及びタッチ操作の入力を受け付ける操作入力装置及び入力操作処理方法に関する。
【背景技術】
【０００２】
従来、タッチパネルを有するタッチパネルディスプレイでは、タッチパネルに対するタ

ッチ操作を受け付け、受け付けたタッチ操作に基づくタッチ情報を、タッチ操作により動作するソース機器へ出力することにより、コンテンツを操作する。

【０００３】

また、加速度センサを装着したワイヤレスマウス又はワイヤレスポインティングデバイスを操作することにより、相対的な移動情報（相対的な座標情報）をソース機器へ送信し、その移動情報に基づいて画面上にマウスカーソル又はポインタ等を表示し、所望の位置において決定用ボタン等により決定操作することによりコンテンツ操作を行う。

【０００４】

例えば、特許文献１、２には、ディスプレイに接続したポインティングデバイスを操作することでディスプレイ上に表示されたカーソルを操作する装置が開示され、また、特許文献１には、ディスプレイとポインティングデバイスとをワイヤレス接続した装置が開示されている。

【先行技術文献】

【特許文献】

【０００５】

【特許文献１】特開２００２－９１６４２号公報

【特許文献２】特開平３－２５７５２０号公報

【発明の概要】

【発明が解決しようとする課題】

【０００６】

しかし、タッチパネルディスプレイの場合、大画面のタッチパネルは高価であり、また視距離が長く、操作対象が大きくなるため直接のタッチ操作には不向きである。一方、相対的な移動情報を用いるワイヤレスデバイスの場合、相対的な移動情報又は座標情報を計算してポインタを表示するため、画面上の特定の箇所を指定するのに時間を要し、また特定の箇所を指定することが比較的難しい。さらに、ポインティング操作と決定操作とで別々のキー等を操作する必要があり操作が煩雑である。

【０００７】

本発明は斯かる事情に鑑みてなされたものであり、安価な構成で操作性に優れ容易に操作位置を特定することができる操作入力装置及び入力操作処理方法を提供することを目的とする。

【課題を解決するための手段】

【０００８】

本発明に係る操作入力装置は、フローティングタッチ操作及びタッチ操作の入力を受け付ける操作パネルを備える操作入力装置において、フローティングタッチ操作又はタッチ操作のいずれの操作が入力されたかを判定する操作判定部と、前記操作パネル上での前記操作の入力位置を算出する算出部と、前記操作判定部でフローティングタッチ操作が入力されたと判定した場合、前記算出部で算出した入力位置に対応する表示画面上の位置にポインタを表示させるための表示情報を生成する表示情報生成部と、該表示情報生成部で生成した表示情報を、前記ポインタを表示する前記表示画面を有する表示機器へ出力する表示機器出力部とを備えることを特徴とする。

【０００９】

本発明に係る入力操作処理方法は、フローティングタッチ操作及びタッチ操作の入力を受け付ける操作パネルを備える操作入力装置による入力操作処理方法において、フローティングタッチ操作又はタッチ操作のいずれの操作が入力されたかを判定するステップと、前記操作パネル上での前記操作の入力位置を算出するステップと、フローティングタッチ操作が入力されたと判定した場合、算出された入力位置に対応する表示画面上の位置にポインタを表示させるための表示情報を生成するステップと、生成された表示情報を、前記ポインタを表示する前記表示画面を有する表示機器へ出力するステップとを含むことを特徴とする。

【００１０】

本発明に係る操作入力装置は、前記操作判定部でタッチ操作が入力されたと判定した場合、該タッチ操作に基づいてタッチ操作情報を生成するタッチ操作情報生成部と、前記タッチ操作情報生成部で生成したタッチ操作情報を前記タッチ操作又はフローティングタッチ操作により制御される制御機器へ出力する制御機器出力部とを備えることを特徴とする。

【００１１】

本発明に係る操作入力装置は、前記操作判定部でフローティングタッチ操作が入力されたと判定した場合、該フローティングタッチ操作に基づいてフローティングタッチ操作情報を生成するフローティングタッチ操作情報生成部を備え、前記制御機器出力部は、前記フローティングタッチ操作情報生成部で生成したフローティングタッチ操作情報を前記制御機器へ出力するようにしてあることを特徴とする。

【００１２】

本発明に係る操作入力装置は、前記表示機器の表示画面の解像度及び前記操作パネルの入力位置の分解能に基づいて、前記算出部で算出した入力位置を前記表示画面上の表示位置に変換する変換部を備えることを特徴とする。

【発明の効果】

【００１３】

本発明によれば、安価な構成で操作性に優れ容易に操作位置を特定することができる。

【図面の簡単な説明】

【００１４】

【図１】本実施の形態の操作入力装置の構成の一例を示すブロック図である。

【図２】操作パネルに対する指による操作の一例を示す説明図である。

【図３】操作パネル内の電極の静電容量の変化の一例を示す説明図である。

【図４】本実施の形態の操作入力装置による入力操作の一例を示す説明図である。

【図５】本実施の形態の操作入力装置の使用態様の第１例を示す説明図である。

【図６】本実施の形態の操作入力装置の使用態様の第２例を示す説明図である。

【図７】本実施の形態の操作入力装置による入力操作処理の手順の一例を示すフローチャートである。

【図８】本実施の形態の操作入力装置による入力操作処理の手順の一例を示すフローチャートである。

【発明を実施するための形態】

【００１５】

以下、本発明を実施の形態を示す図面に基づいて説明する。図１は本実施の形態の操作入力装置１００の構成の一例を示すブロック図である。操作入力装置１００は、ホバータッチ入力ユニット１０、ホバータッチ制御ユニット５０などを備える。ホバータッチ入力ユニット１０とホバータッチ制御ユニット５０との間は、無線ＬＡＮ又はブルートゥース（登録商標）などのワイヤレス通信を介して接続される。また、ホバータッチ制御ユニット５０には、制御機器２００、表示機器３００などを接続してある。

【００１６】

制御機器２００は、操作コマンド受信部２０１、表示画像出力部２０２などを備える。また、表示機器３００は、表示画面３０１などを備える。表示画像出力部２０２は、表示機器３００の表示画面３０１に表示する映像又は画像（動画、静止画）を出力する。すなわち、制御機器２００は、表示機器３００の表示画面３０１に表示する映像又は画像（動画、静止画）を出力するソース機器としての機能を有する。

【００１７】

ホバータッチ入力ユニット１０は、操作パネル１１、制御部１３、通信部１６などを備える。操作パネル１１は、操作検出部１２を備える。また、制御部１３は、ホバータッチ識別部１４、操作コマンド変換部１５などを備える。

【００１８】

操作パネル１１は、例えば、静電パッド等で構成することができ、フローティングタッ

チ操作及びタッチ操作の入力を受け付ける。操作パネル１１は、例えば、フレキシブル基板上に電極パターンを形成した薄膜構造をなす。電極パターンには、複数の電極が２次元的（例えば、ＸＹ方向）に配置され、各電極の静電容量を検出することにより、指又はペン等によるフローティングタッチ操作又はタッチ操作を判定することができる。

【００１９】

図２は操作パネル１１に対する指による操作の一例を示す説明図であり、図３は操作パネル１１内の電極の静電容量の変化の一例を示す説明図である。図２Ａは、フローティングタッチ操作の一例を示す。フローティングタッチ操作は、操作パネル１１の表面１１１に指又はペン等を直接接触させずに近づけた状態での操作である。図２Ａの例では、符号ｘ１で示す位置に指を近づけている。フローティングタッチ操作は、指又はペン等をホバー状態にした操作であり、例えば、ホバー操作、ホバーフリック操作、ホバー手のひら操作などがある。各操作の詳細は後述する。本実施の形態では、フローティングタッチ操作をホバー操作とも称する。

【００２０】

図２Ｂは、タッチ操作の一例を示す。タッチ操作は、操作パネル１１の表面１１１に指又はペン等を直接接触させた状態での操作である。図２Ｂの例では、符号ｘ１で示す位置に指を接触させている。タッチ操作は、指又はペン等をタッチ状態にした操作であり、例えば、タッチ操作（シングルタッチ操作）、マルチタッチ操作、ロングタッチ操作、フリック操作などがある。各操作の詳細は後述する。

【００２１】

図３に示すように、操作パネル１１の位置ｘ１に指を接触又は近づけた場合、タッチ状態では、操作パネル１１の電極と指との間に大きな静電容量が発生するため、位置ｘ１付近での静電容量は、第１閾値Ｃｔｈ１を超える。また、ホバー状態では、操作パネル１１の電極と指との間に発生する静電容量は増加するものの、タッチ状態の場合よりは小さくなる。すなわち、ホバー状態では、位置ｘ１付近での静電容量は、第１閾値Ｃｔｈ１より小さく第２閾値Ｃｔｈ２（＜Ｃｔｈ１）を超える。なお、図３において、静電容量Ｃ０は、指を近づけていない状態での静電容量である。

【００２２】

操作検出部１２は、操作判定部としての機能を有し、操作パネル１１に入力された操作がホバー操作又はタッチ操作のいずれの操作であるかを判定する。すなわち、操作検出部１２は、操作パネル１１の各電極の静電容量の変化を検知して、ホバー操作又はタッチ操作の入力の有無を検出する。

【００２３】

また、操作検出部１２は、算出部としての機能を有し、操作パネル１１上での操作の入力位置を算出する。前述のとおり、操作パネル１１に指又はペン等を近づけると、電極と指等との間の静電容量が発生するので、指等に近い位置に存在する電極ほど静電容量が増加する。この静電容量の変化を検知することにより、操作の入力位置を、操作パネル１１上の絶対座標として算出することができる。

【００２４】

より具体的には、操作検出部１２は、静電容量の時間的変化及び空間的変化を検出する。これにより、指の数、指の動き方などの違いを検出することができる。操作検出部１２は、検出結果（ホバー操作又はタッチ操作の入力の有無、入力位置の座標、静電容量の時間的変化及び空間的変化など）を制御部１３へ出力する。

【００２５】

ホバータッチ識別部１４は、操作検出部１２が出力した検出結果に基づいて、ホバー操作又はタッチ操作が入力されたことを識別する。より具体的には、ホバータッチ識別部１４は、ホバー操作が入力された場合、例えば、ホバー操作、ホバーフリック操作、ホバー手のひら操作などを識別することができる。また、ホバータッチ識別部１４は、タッチ操作が入力された場合、例えば、タッチ操作（シングルタッチ操作）、マルチタッチ操作、ロングタッチ操作、フリック操作などを識別することができる。

【００２６】
操作コマンド変換部１５は、ホバータッチ識別部１４による識別結果を操作コマンド情報に変換する。操作コマンド情報は、ホバー操作、ホバーフリック操作、ホバー手のひら操作、タッチ操作（シングルタッチ操作）、マルチタッチ操作、ロングタッチ操作、フリック操作などのコマンド情報である。
【００２７】
通信部１６は、通信部５１との間で、無線ＬＡＮ又はブルートゥース（登録商標）などのワイヤレス通信機能を有し、操作コマンド変換部１５が変換した操作コマンド情報をホバータッチ制御ユニット５０へ送信する。
【００２８】
ホバータッチ制御ユニット５０は、通信部５１、操作コマンド変換部５２、制御インタフェース部５３、ポインタ表示情報生成部５４、表示インタフェース部５５などを備える。
【００２９】
通信部５１は、ホバータッチ入力ユニット１０が送信した操作コマンド情報を受信する。
【００３０】
操作コマンド変換部５２は、通信部５１で受信した操作コマンド情報を、制御機器２００に対応するフォーマットに変換することにより操作コマンドを生成する。操作コマンドは、制御機器２００に対して所定の動作を通知するためのものである。例えば、制御機器２００として、マウスを接続したパーソナルコンピュータを用いる場合には、マウスの移動、左クリック、右クリック、ダブルクリックなどの操作をパーソナルコンピュータに通知する必要がある。また、この場合、操作コマンド変換部５２は、表示機器３００の表示画面３０１の解像度に応じたマウスの位置（座標）を自動で変換する処理も行うことができる。
【００３１】
ポインタ表示情報生成部５４は、表示情報生成部としての機能を有し、フローティングタッチ操作が入力されたと判定された場合、算出された入力位置に対応する表示画面３０１上の位置にポインタを表示させるための表示情報を生成する。
【００３２】
表示情報は、例えば、ポインタの画像、ポインタの位置情報などを含む。ポインタの画像は、例えば、マウスカーソル画像などであり、表示画面上のクリック操作できる領域にマウスカーソルをホバーした状態を示す画像である。また、表示情報は、制御機器２００が出力した映像又は画像に重畳した態様（付加した状態）で表示することができる。また、ポインタの位置情報は、操作パネル１１上の座標と、表示画面３０１上の座標との対応関係を予め定めておくことにより、操作パネル１１上の入力位置に対応する表示画面３０１上の位置を絶対座標として特定することができる。
【００３３】
表示インタフェース部５５は、表示機器出力部としての機能を有し、ポインタ表示情報生成部５４で生成した表示情報を、ポインタを表示する表示画面３０１を有する表示機器３００へ出力する。
【００３４】
上述の構成により、操作パネル１１上でホバー操作を行った場合に、ホバー操作の入力位置に対応する表示画面３０１上の位置（絶対座標）にポインタを表示させることができる。これにより、高価な大画面タッチパネルを表示装置に装着する必要がなく、操作パネルという比較的安価な構成でホバー操作及びタッチ操作の入力を受け付けることができる。
【００３５】
また、ホバー操作及びタッチ操作の両方の操作の入力位置を算出し、算出した入力位置に対応する表示画面３０１上の位置にポインタを表示させるので、絶対座標での操作を実

現することができ、操作位置を容易に特定することができる。

【００３６】

また、特定のキーを押す等の付加的な操作を行う必要がなく、ホバー操作及びタッチ操作という一連の操作により表示画面３０１上のポインタのホバー状態及びタッチ状態を実現することができ操作性を向上させることができる。

【００３７】

また、操作コマンド変換部５２は、タッチ操作情報生成部としての機能を有し、タッチ操作が入力されたと判定された場合、当該タッチ操作に基づいてタッチ操作情報を生成する。操作コマンド変換部５２が生成するタッチ操作情報は、制御機器２００に対応するフォーマットに変換された操作コマンドであり、例えば、タッチ操作に応じた操作コマンドである。

【００３８】

制御インタフェース部５３は、制御機器出力部としての機能を有し、操作コマンド変換部５２で変換した操作コマンド（タッチ操作に応じた操作コマンド）を制御機器２００へ出力する。

【００３９】

制御機器２００の操作コマンド受信部２０１は、操作入力装置１００が操作コマンドを受信する。制御機器２００は、受信した操作コマンド（タッチ操作に応じた操作コマンド）に応じた動作を行う。上述の構成により、ユーザは、例えば、ポインタが表示されている表示画面３０１から目を離すことなく、操作パネル１１上でホバー操作を行ってポインタを所望の位置に移動させた後、タッチ操作により直接表示画面３０１をタッチするのと同じ感覚で操作することにより、制御機器２００の制御（動作）を行うことができ、操作性を向上させることができる。

【００４０】

また、制御インタフェース部５３は、表示画像出力部２０２が出力した映像又は画像を取得し、表示インタフェース部５５へ出力する。表示インタフェース部５５は、制御インタフェース部５３から取得した映像又は画像を表示機器３００へ出力する。

【００４１】

また、操作コマンド変換部５２は、フローティングタッチ操作情報生成部としての機能を有し、ホバー操作が入力されたと判定された場合、当該ホバー操作に基づいてホバー操作情報を生成する。操作コマンド変換部５２が生成するホバー操作情報は、制御機器２００に対応するフォーマットに変換された操作コマンドであり、例えば、ホバー操作に応じた操作コマンドである。

【００４２】

制御インタフェース部５３は、操作コマンド変換部５２で変換した操作コマンド（ホバー操作に応じた操作コマンド）を制御機器２００へ出力する。

【００４３】

制御機器２００の操作コマンド受信部２０１は、操作入力装置１００が操作コマンドを受信する。制御機器２００は、受信した操作コマンド（ホバー操作に応じた操作コマンド）に応じた動作を行う。上述の構成により、ユーザは、例えば、ポインタが表示されている表示画面３０１から目を離すことなく、操作パネル１１上でホバー操作を行ってポインタを所望の位置に移動させ、直接表示画面３０１に対してホバー操作するのと同じ感覚で操作することができ、制御機器２００の制御（動作）を行うことができ、操作性を向上させることができる。

【００４４】

また、操作検出部１２は、変換部としての機能を有し、表示機器３００の表示画面３０１の解像度及び操作パネル１１の入力位置の分解能（解像度）に基づいて、算出した入力位置を表示画面３０１上の表示位置に変換する。これにより、操作パネル１１及び表示機器３００の表示画面３０１との間で解像度が異なる場合でも、操作パネル１１上の指又はペン等の位置に対応した表示画面３０１上の位置にポインタを表示させることができると

ともに、操作パネル１１上の指又はペン等の移動距離に応じて表示画面３０１上のポインタを移動させることができ、表示画面３０１上のアイコン又はボタンなどの図表を直感的に操作することができ操作性を向上させることができる。

【００４５】

図４は本実施の形態の操作入力装置１００による入力操作の一例を示す説明図である。図４に示すように、入力操作の種別は、ホバー状態及びタッチ状態がある。ホバー状態においては、例えば、ホバー操作、ホバーフリック操作、ホバー手のひら操作などがある。

【００４６】

ホバー操作は、指を操作パネル１１にかざす操作である。ホバー操作に対応する操作コマンド（例えば、ホバーコマンド）により実現する機能は、マウスカーソルを表示させる機能、マウスカーソルの移動機能などである。ホバー操作の用途としては、制御機器２００が、例えば、タッチ操作に対応したＡＶ機器などである場合には、メニュー操作である。また、制御機器２００がパーソナルコンピュータ（ＰＣ）などである場合には、ＰＣ上の操作である。

【００４７】

ホバーフリック操作は、指を操作パネル１１にかざした状態で素早く指をスライドさせる操作である。ホバーフリック操作に対応する操作コマンド（例えば、ホバーフリックコマンド）により実現する機能は、右へフリック（次）させる機能、左へフリック（前）させる機能などである。ホバーフリック操作の用途としては、スライドショー又は動画再生などである。

【００４８】

ホバー手のひら操作は、手のひらを操作パネル１１にかざす操作である。ホバー手のひら操作に対応する操作コマンド（例えば、手のひらホバーコマンド）により実現する機能は、手のひらをかざした場合には一時停止させる機能、手のひらをどけた場合には再生開始する機能などである。ホバー手のひらフリック操作の用途としては、スライドショー又は動画再生などである。

【００４９】

タッチ操作は、いわゆるシングルタッチ操作であり、指を操作パネル１１に触れる操作である。タッチ操作に対応する操作コマンド（例えば、タッチコマンド）により実現する機能は、マウスの左クリック動作に対応する機能などである。タッチ操作の用途は、ホバー操作と同様である。

【００５０】

ロングタッチ操作は、指を操作パネル１１に、例えば、２秒以上触れる操作である。ロングタッチ操作に対応する操作コマンド（例えば、ロングタッチコマンド）により実現する機能は、マウスの右クリック動作に対応する機能、コンテキストメニューを表示させる機能などである。ロングタッチ操作の用途は、ホバー操作と同様である。

【００５１】

フリック操作は、指を操作パネル１１に触れた状態で素早く指をスライドさせる操作である。フリック操作に対応する操作コマンド（例えば、フリックコマンド）により実現する機能は、スクロール動作に対応する機能などである。フリック操作の用途は、ホバー操作と同様である。

【００５２】

マルチタッチ操作は、２本の指を操作パネル１１に触れる操作である。マルチタッチ操作に対応する操作コマンド（例えば、マルチタッチコマンド）により実現する機能は、拡大機能、縮小機能などである。フリック操作の用途は、ホバー操作と同様である。

【００５３】

なお、図４の例では、指を１本又は２本使用する操作を例示しているが、指の数はこれに限定されるものではなく、３本、４本使用する操作でもよい。

【００５４】

図５は本実施の形態の操作入力装置１００の使用態様の第１例を示す説明図である。図

５の例は、制御機器２００として、表示画面上でのタッチ操作により動作を制御することができるタッチ操作対応機器（例えば、タッチ操作ＡＶ機器）を使用し、表示機器３００として、タッチ操作未対応の表示装置を使用する場合を示す。この場合、図５の表示装置は、タッチ操作未対応のため、タッチ操作対応機器の動作を制御することができない。

【００５５】

そこで、本実施の形態の操作入力装置１００を用いる。すなわち、タッチ操作対応機器は、ホバータッチ制御ユニット５０を介して映像をタッチ操作未対応表示装置へ出力する。ホバータッチ入力ユニット１０で行われたホバー操作又はタッチ操作は、ホバータッチ制御ユニット５０を介して操作情報（操作コマンド）としてタッチ操作対応機器へ出力される。また、ホバータッチ入力ユニット１０で行われたホバー操作は、ホバータッチ制御ユニット５０を介してマウス（ポインタ）を表示するためのマウス表示としてタッチ操作未対応表示装置へ出力される。

【００５６】

ホバータッチ制御ユニットは、ソース機器からの映像に、ホバータッチ入力ユニット１０からのホバー操作に基づき、独自のポインタ（マウス表示）を重ねてタッチ操作未対応表示装置に表示する。また、ホバータッチ制御ユニットは、ホバータッチ入力ユニット１０で行われたホバー操作及びタッチ操作をホバーコマンド及びタッチコマンドとしてタッチ操作対応機器へ出力する。これにより、タッチ操作未対応の表示装置を使用する場合でも、タッチ操作対応機器の動作を制御することができる。

【００５７】

上述のように、図５の例では、ＡＶ機器連携として、タッチ操作に対応するソース機器と表示装置との間にホバータッチ制御ユニット５０を介し、ホバータッチ入力ユニット１０からの入力（操作）をワイヤレスで受信し、ソース機器に通知する。ホバータッチ制御ユニット５０は、ソース機器から入力された映像に対してホバータッチ入力ユニット１０からの操作入力として独自のマウスカーソル（ポインタ）を重ねて表示装置へ出力することにより、タッチ操作に対応していない表示装置であってもワイヤレスによるホバー操作及びタッチ操作が可能となる。

【００５８】

図６は本実施の形態の操作入力装置１００の使用態様の第２例を示す説明図である。図６の例は、制御機器２００として、ＰＣ（パーソナルコンピュータ）を使用し、表示機器３００として、タッチ操作対応の表示装置を使用する場合を示す。この場合、表示装置の表示画面上でタッチ操作を行うことにより、ＰＣの動作を制御することができるが、ユーザは、表示画面に触れることができる程度に表示装置の傍にいる必要があり、表示装置から離れることができない。

【００５９】

そこで、本実施の形態の操作入力装置１００を用いる。この場合、ホバータッチ制御ユニット５０に相当する機能を、ホバータッチ入力ユニット専用ドライバ６０という形で実現し、ＰＣにホバータッチ入力ユニット専用ドライバ６０をインストールしておく。ホバータッチ入力ユニット専用ドライバ６０は、ＰＣのオペレーティングシステム（ＯＳ）に対して、ホバータッチ入力ユニット１０からのイベントを仮想マウス・キーイベントとして渡すことができる。また、ホバータッチ入力ユニット１０は、ＰＣにワイヤレス受信機のＵＳＢドングルを差し込むことにより、ＰＣとの間でワイヤレス接続を行うことができる。なお、ＰＣに無線ＬＡＮ等の通信機能がある場合には、ＰＣ内蔵の通信機能を利用してもよい。これにより、表示装置から離れた場所からＰＣの動作を制御することができる。

【００６０】

上述のように、図６の例では、ＰＣ連携として、ＰＣとホバータッチ入力ユニット１０をＰＣ内蔵のワイヤレス受信機又は外付けのＵＳＢドングルを用いてワイヤレス接続し、ホバー操作及びタッチ操作の入力を、ＰＣ側の専用ドライバで変換し、仮想マウスイベント、仮想キーイベント（ジェスチャー）としてＯＳ（オペレーティングシステム）に通知

することにより、ワイヤレスによるホバー操作及びタッチ操作が可能となる。

【００６１】

図７及び図８は本実施の形態の操作入力装置１００による入力操作処理の手順の一例を示すフローチャートである。操作入力装置１００は、ホバー（ホバー操作）を検出したか否かを判定する（Ｓ１１）。ホバーを検出したか否かは、例えば、図３に示すように、操作検出部１２で検出した静電容量が、第２閾値Ｃｔｈ２より大きく、かつ第１閾値Ｃｔｈ１より小さい電極の有無で判定することができる。

【００６２】

ホバーを検出した場合（Ｓ１１でＹＥＳ）、操作入力装置１００は、シングルホバー（シングルホバー操作）を検出したか否かを判定する（Ｓ１２）。

【００６３】

シングルホバーを検出していない場合（Ｓ１２でＮＯ）、操作入力装置１００は、手のひらホバー（ホバー手のひら操作）を検出したか否かを判定する（Ｓ１３）。手のひらホバーを検出した場合（Ｓ１３でＹＥＳ）、操作入力装置１００は、手のひらホバーコマンド（手のひらホバーのジェスチャーコマンド）を発行し（Ｓ１４）、後述のステップＳ３４の処理を行う。手のひらホバーを検出していない場合（Ｓ１３でＮＯ）、操作入力装置１００は、後述のステップＳ３４の処理を行う。

【００６４】

シングルホバーを検出した場合（Ｓ１２でＹＥＳ）、操作入力装置１００は、入力位置を検出し（Ｓ１５）、ホバー移動を検出したか否かを判定する（Ｓ１６）。ホバー移動は、例えば、前回の最終入力位置と今回の入力位置とが異なる場合、ホバー移動があったと判定することができる。

【００６５】

ホバー移動を検出した場合（Ｓ１６でＹＥＳ）、操作入力装置１００は、ホバーフリック（ホバーフリック操作）を検出したか否かを判定する（Ｓ１７）。

【００６６】

ホバーフリックを検出した場合（Ｓ１７でＹＥＳ）、操作入力装置１００は、ホバーフリックコマンド（ホバーフリックのジェスチャーコマンド）を発行し（Ｓ１８）、後述のステップＳ３４の処理を行う。

【００６７】

ホバー移動を検出していない場合（Ｓ１６でＮＯ）、あるいは、ホバー検出時にホバーフリックを検出していない場合（Ｓ１７でＮＯ）、操作入力装置１００は、ホバーコマンドを発行する（Ｓ１９）。ホバーコマンドの発行は、マウスイベントの発行と同義である。この際、操作パネル１１の解像度を用いてタッチ位置座標を標準化し、表示機器３００の表示画面３０１の解像度に合わせてタッチ座標を自動的に変換した上でマウス座標を出力する。

【００６８】

操作入力装置１００は、マウスカーソル（ポインタ）の表示情報を生成する（Ｓ２０）。ホバーを検出していない場合（Ｓ１１でＮＯ）、操作入力装置１００は、後述のステップＳ２１の処理を行う。

【００６９】

操作入力装置１００は、タッチ（タッチ操作）を検出したか否かを判定する（Ｓ２１）。タッチを検出したか否かは、例えば、図３に示すように、操作検出部１２で検出した静電容量が、第１閾値Ｃｔｈ１より大きい電極の有無で判定することができる。

【００７０】

タッチを検出していない場合（Ｓ２１でＮＯ）、すなわち、タッチ操作が検出されなくなった場合には、操作入力装置１００は、タッチフラグを解除し（Ｓ２２）、後述のステップＳ３４の処理を行う。タッチを検出した場合（Ｓ２１でＹＥＳ）、操作入力装置１００は、シングルタッチ（シングルタッチ操作）を検出したか否かを判定する（Ｓ２３）。

【００７１】

シングルタッチを検出していない場合（Ｓ２３でＮＯ）、操作入力装置１００は、マルチタッチ（マルチタッチ操作）を検出したか否かを判定する（Ｓ２４）。マルチタッチを検出した場合（Ｓ２４でＹＥＳ）、操作入力装置１００は、マルチタッチコマンド（マルチタッチのコマンドジェスチャー）を発行し（Ｓ２５）、後述のステップＳ３４の処理を行う。マルチタッチを検出していない場合（Ｓ２４でＮＯ）、操作入力装置１００は、後述のステップＳ３４の処理を行う。

【００７２】

シングルタッチを検出した場合（Ｓ２３でＹＥＳ）、操作入力装置１００は、入力位置を検出し（Ｓ２６）、タッチフラグを設定する（Ｓ２７）。操作入力装置１００は、シングルタッチを検出した時点からタッチ状態のままで所定時間（例えば、２秒など）経過したか否かを判定し（Ｓ２８）、所定時間経過した場合（Ｓ２８でＹＥＳ）、ロングタッチコマンド（ロングタッチのジェスチャーコマンド）を発行し（Ｓ２９）、後述のステップＳ３４の処理を行う。

【００７３】

所定時間経過していない場合（Ｓ２８でＮＯ）、操作入力装置１００は、タッチ移動を検出したか否かを判定する（Ｓ３０）。タッチ移動は、例えば、前回の最終入力位置と今回の入力位置とが異なる場合、タッチ移動があったと判定することができる。

【００７４】

タッチ移動を検出した場合（Ｓ３０でＹＥＳ）、操作入力装置１００は、フリック（フリック操作）を検出したか否かを判定する（Ｓ３１）。フリックを検出した場合（Ｓ３１でＹＥＳ）、操作入力装置１００は、フリックコマンド（フリックのジェスチャーコマンド）を発行し（Ｓ３２）、後述のステップＳ３４の処理を行う。

【００７５】

タッチ移動を検出していない場合（Ｓ３０でＮＯ）、あるいは、タッチ移動検出時にフリックを検出していない場合（Ｓ３１でＮＯ）、操作入力装置１００は、タッチコマンド（タッチのジェスチャーコマンド）を発行し（Ｓ３３）、後述のステップＳ３４の処理を行う。操作入力装置１００は、処理が終了であるか否かを判定し（Ｓ３４）、処理が終了でない場合（Ｓ３４でＮＯ）、ステップＳ１１以降の処理を繰り返す。処理が終了である場合（Ｓ３４でＹＥＳ）、操作入力装置１００は、処理を終了する。

【００７６】

上述のとおり、本実施の形態の操作入力装置１００によれば、ホバータッチ入力ユニット１０の操作パネル１１に対してホバー操作（フローティングタッチ操作）又はタッチ操作が行われた場合、ホバー操作及びタッチ操作を含むジェスチャー操作（指や手のひらを使ったジェスチャー）を識別し、マウス移動、マウス左クリック、マウス右クリック又はジェスチャー操作として、制御機器２００において操作コマンドが実行される。制御機器２００が、例えば、パーソナルコンピュータ又はスマートフォンなどのソース機器の場合は、ソース機器のオペレーティングシステム（ＯＳ）に対してマウス、タッチの操作情報及び入力座標を通知することにより、ロングタッチやジェスチャー操作等の判断はオペレーティングシステム側、ドライバ又はアプリケーション側で実施されることになる。このように、本実施の形態によれば、ユーザは高価な大画面タッチパネルを表示装置に装着する必要がなく、表示装置から離れた場所から表示画面にタッチパネルを付加した場合と同じ絶対座標でのタッチ操作、ホバー操作が可能となる。

【００７７】

本実施の形態において、表示機器３００の表示画面３０１の画面サイズに応じて、操作パネル１１のタッチ及びホバーの検出時のサンプリング周期、あるいはタッチ数（マルチタッチの数）を自動的に変更してもよい。これにより、タッチ操作の追従性を最適にして操作性を向上させることができる。

【００７８】

本実施の形態の操作入力装置（１００）は、フローティングタッチ操作及びタッチ操作の入力を受け付ける操作パネル（１１）を備える操作入力装置において、フローティング

タッチ操作又はタッチ操作のいずれの操作が入力されたかを判定する操作判定部（１２，１４）と、前記操作パネル上での前記操作の入力位置を算出する算出部（１２）と、前記操作判定部でフローティングタッチ操作が入力されたと判定した場合、前記算出部で算出した入力位置に対応する表示画面（３０１）上の位置にポインタを表示させるための表示情報を生成する表示情報生成部（５４）と、該表示情報生成部で生成した表示情報を、前記ポインタを表示する前記表示画面を有する表示機器（３００）へ出力する表示機器出力部（５５）とを備えることを特徴とする。

【００７９】

本実施の形態の入力操作処理方法は、フローティングタッチ操作及びタッチ操作の入力を受け付ける操作パネル（１１）を備える操作入力装置（１００）による入力操作処理方法において、フローティングタッチ操作又はタッチ操作のいずれの操作が入力されたかを判定するステップと、前記操作パネル上での前記操作の入力位置を算出するステップと、フローティングタッチ操作が入力されたと判定した場合、算出された入力位置に対応する表示画面（３０１）上の位置にポインタを表示させるための表示情報を生成するステップと、生成された表示情報を、前記ポインタを表示する前記表示画面を有する表示機器（３００）へ出力するステップとを含むことを特徴とする。

【００８０】

本実施の形態にあっては、操作判定部（１２，１４）は、操作パネルに入力された操作がフローティングタッチ操作又はタッチ操作のいずれの操作であるかを判定する。タッチ操作は、操作パネルの表面に指又はペン等を直接接触させた状態での操作であり、フローティングタッチ操作は、操作パネルの表面に指又はペン等を直接接触させずに近づけた状態での操作である。操作パネルは、例えば、複数の電極が配置され、各電極の静電容量を検出することにより、指又はペン等によるフローティングタッチ操作又はタッチ操作を判定することができる。

【００８１】

算出部（１２）は、操作パネル上での操作の入力位置を算出する。操作パネルに指又はペン等を近づけると、電極と指等との間の静電容量が発生するので、指等に近い位置に存在する電極ほど静電容量が増加する。この静電容量の変化を検知することにより、操作の入力位置を、操作パネル上の絶対座標として算出することができる。

【００８２】

表示情報生成部（５４）は、操作判定部でフローティングタッチ操作が入力されたと判定した場合、算出部で算出した入力位置に対応する表示画面（３０１）上の位置にポインタを表示させるための表示情報を生成する。表示情報は、例えば、ポインタの画像、ポインタの位置情報などを含む。ポインタの画像は、例えば、マウスカーソル画像などであり、表示画面上のクリック操作できる領域にマウスカーソルをホバーした状態を示す画像である。ポインタの位置情報は、操作パネル上の座標と、表示画面上の座標との対応関係を予め定めておくことにより、操作パネル上の入力位置に対応する表示画面上の位置を絶対座標として特定することができる。

【００８３】

表示機器出力部（５５）は、表示情報生成部で生成した表示情報を、ポインタを表示する表示画面（３０１）を有する表示機器（３００）へ出力する。

【００８４】

上述の構成により、操作パネル上でフローティングタッチ操作を行った場合に、フローティングタッチ操作の入力位置に対応する表示画面上の位置（絶対座標）にポインタを表示させることができる。これにより、高価な大画面タッチパネルを表示装置に装着する必要がなく、操作パネルという比較的安価な構成でフローティングタッチ操作及びタッチ操作の入力を受け付けることができる。また、フローティングタッチ操作及びタッチ操作の両方の操作の入力位置を算出し、算出した入力位置に対応する表示画面上の位置にポインタを表示させるので、絶対座標での操作を実現することができ、操作位置を容易に特定することができる。また、特定のキーを押す等の付加的な操作を行う必要がなく、フローテ

ィングタッチ操作及びタッチ操作という一連の操作により表示画面上のポインタのホバー状態及びタッチ状態を実現することができ操作性を向上させることができる。

【００８５】

本実施の形態の操作入力装置は、前記操作判定部（１２、１４）でタッチ操作が入力されたと判定した場合、該タッチ操作に基づいてタッチ操作情報を生成するタッチ操作情報生成部（１５、５２）と、前記タッチ操作情報生成部で生成したタッチ操作情報を前記タッチ操作又はフローティングタッチ操作により制御される制御機器（２００）へ出力する制御機器出力部（５３）とを備えることを特徴とする。

【００８６】

本実施の形態にあっては、タッチ操作情報生成部（１５、５２）は、操作判定部（１２、１４）でタッチ操作が入力されたと判定した場合、当該タッチ操作に基づいてタッチ操作情報を生成する。タッチ操作には、例えば、タッチ操作（シングルタッチ操作）、マルチタッチ操作、ロングタッチ操作、フリック操作などがあり、タッチ操作情報は、例えば、タッチ操作に応じた操作コマンド情報である。制御機器出力部（５３）は、タッチ操作情報生成部で生成したタッチ操作情報をタッチ操作又はフローティングタッチ操作により制御される制御機器（２００）へ出力する。これにより、ユーザは、例えば、ポインタが表示されている表示画面から目を離すことなく、操作パネル上でフローティングタッチ操作を行ってポインタを所望の位置に移動させた後、タッチ操作により直接表示画面をタッチするのと同じ感覚で操作することにより、制御機器の制御（動作）を行うことができ、操作性を向上させることができる。

【００８７】

本実施の形態の操作入力装置は、前記操作判定部（１２、１４）でフローティングタッチ操作が入力されたと判定した場合、該フローティングタッチ操作に基づいてフローティングタッチ操作情報を生成するフローティングタッチ操作情報生成部（１５、５２）を備え、前記制御機器出力部（５３）は、前記フローティングタッチ操作情報生成部で生成したフローティングタッチ操作情報を前記制御機器（２００）へ出力するようにしてあることを特徴とする。

【００８８】

本実施の形態にあっては、フローティングタッチ操作情報生成部（１５、５２）は、操作判定部（１２、１４）でフローティングタッチ操作が入力されたと判定した場合、当該フローティングタッチ操作に基づいてフローティングタッチ操作情報を生成する。フローティングタッチ操作には、例えば、ホバー操作、ホバーフリック操作、ホバー手のひら操作などがあり、フローティングタッチ操作情報は、例えば、フローティングタッチ操作に応じた操作コマンド情報である。制御機器出力部（５３）は、フローティングタッチ操作情報生成部で生成したフローティングタッチ操作情報を制御機器（２００）へ出力する。これにより、ユーザは、例えば、ポインタが表示されている表示画面から目を離すことなく、操作パネル上でホバー操作を行ってポインタを所望の位置に移動させ、直接表示画面に対してホバー操作するのと同じ感覚で操作することができ、制御機器の制御（動作）を行うことができ、操作性を向上させることができる。

【００８９】

本実施の形態の操作入力装置は、前記表示機器（３００）の表示画面（３０１）の解像度及び前記操作パネル（１１）の入力位置の分解能に基づいて、前記算出部（１２）で算出した入力位置を前記表示画面上の表示位置に変換する変換部（１２）を備えることを特徴とする。

【００９０】

本実施の形態にあっては、変換部（１２）は、表示機器（３００）の表示画面（３０１）の解像度及び操作パネル（１１）の入力位置の分解能（解像度）に基づいて、算出部（１２）で算出した入力位置を表示画面上の表示位置に変換する。これにより、操作パネル及び表示機器の表示画面との間で解像度が異なる場合でも、操作パネル上の指又はペン等の位置に対応した表示画面上の位置にポインタを表示させることができるとともに、操作

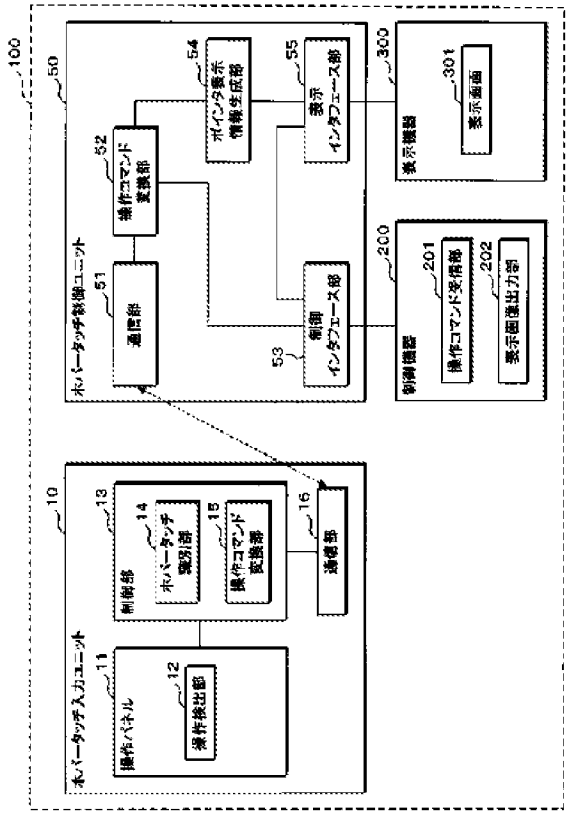
パネル上の指又はペン等の移動距離に応じて表示画面上のポインタを移動させることができ、表示画面上のアイコン又はボタンなどの図表を直感的に操作することができ操作性を向上させることができる。

【符号の説明】

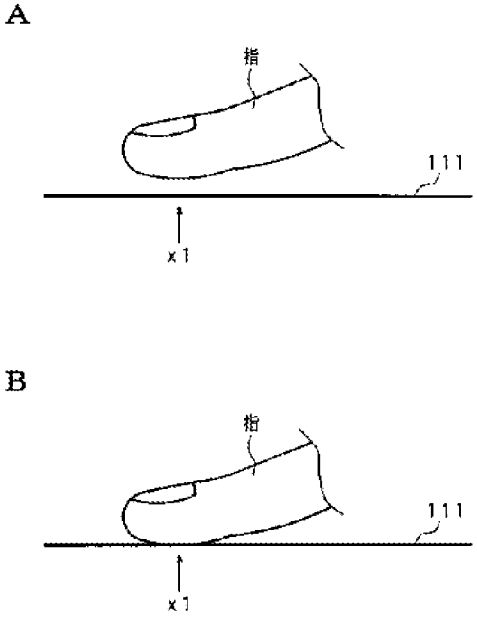
【００９１】

１００　操作入力装置
１０　ホバータッチ入力ユニット
１１　操作パネル
１２　操作検出部
１３　制御部
１４　ホバータッチ識別部
１５　操作コマンド変換部
１６　通信部
５０　ホバータッチ制御ユニット
５１　通信部
５２　操作コマンド変換部
５３　制御インタフェース部
５４　ポインタ表示情報生成部
５５　表示インタフェース部
２００　制御機器
２０１　操作コマンド受信部
２０２　表示画像出力部
３００　表示機器
３０１　表示画面

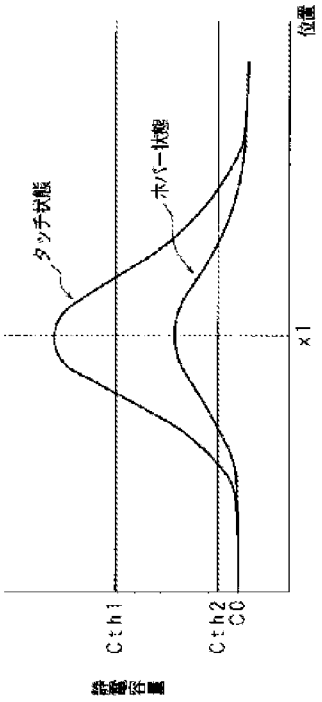
【図１】



【図２】



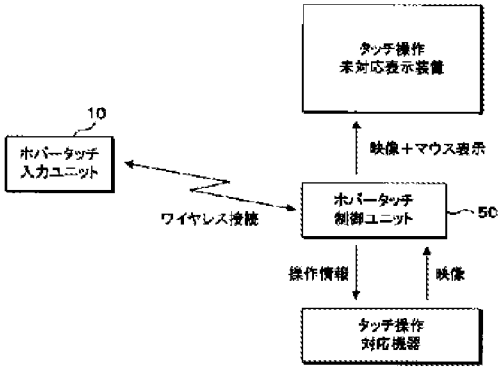
【図３】



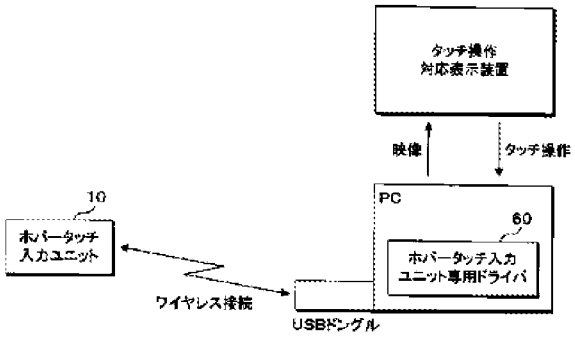
【図４】

操作種別	操作名	操作方法	機能	用途
ホバー状態	ホバー操作	指を操作パネルにかざす	マウスカーソルを表示 マウスカーソルの移動	メニュー操作 PC操作
	ホバー フリック操作	指を操作パネルにかざした状態 で素早く指をスライドさせる	右へクリック(次) 左へクリック(前)	スライドショー 又は動画再生
	ホバー 手のひら操作	手のひらを操作パネルにかざす	手のひらをかざす：一時停止 手のひらをどける：再生再開	スライドショー 又は動画再生
タッチ状態	タッチ操作	指を操作パネルに触れる	マウス左クリック動作	メニュー操作 PC操作
	ロング タッチ操作	指を操作パネルに2秒以上触れる	マウス右クリック動作 コンテキストメニューを表示	メニュー操作 PC操作
	フリック操作	指を操作パネルに触れた状態 で素早く指をスライドさせる	スクロール動作	メニュー操作 PC操作
	マルチタッチ 操作	2本の指を操作パネルに触れる	拡大、縮小	メニュー操作 PC操作

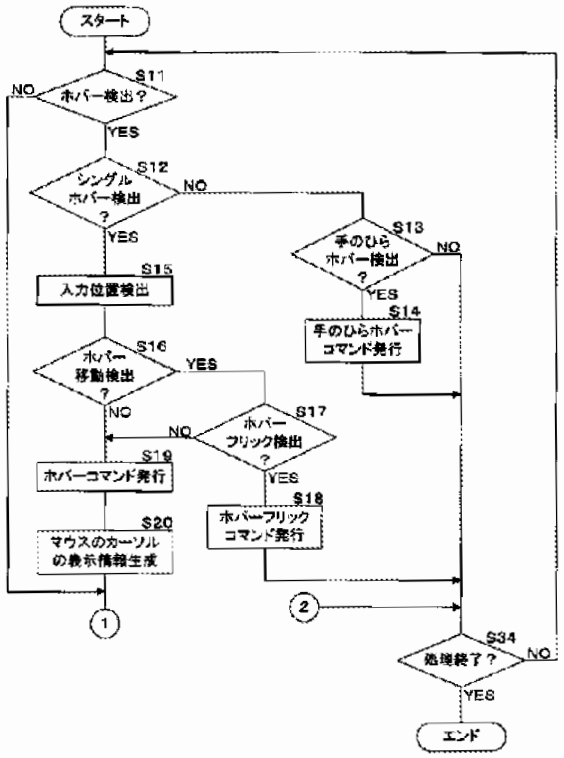
【図５】



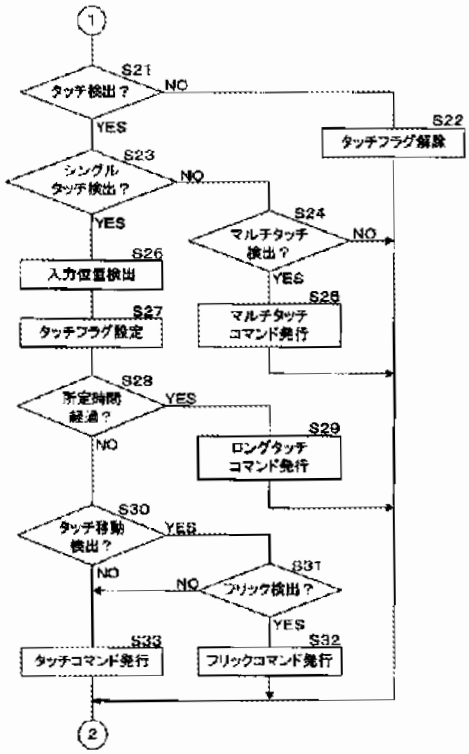
【図６】



【図７】


スタート
S11
ホバー検出？
NO
YES
S12
シングルホバー検出？
NO
YES
S13
手のひらホバー検出？
NO
YES
S14
手のひらホバーコマンド発行
S15
入力位置検出
S16
ホバー移動検出？
YES
NO
S17
ホバーフリック検出？
NO
YES
S18
ホバーフリックコマンド発行
S19
ホバーコマンド発行
S20
マウスのカーソルの表示情報生成
1
2
S34
処理終了？
NO
YES
エンド

【図８】


1
S21
タッチ検出？
NO
YES
S22
タッチフラグ解除
S23
シングルタッチ検出？
NO
YES
S24
マルチタッチ検出？
NO
YES
S25
入力位置検出
S26
マルチタッチコマンド発行
S27
タッチフラグ設定
S28
予定時間経過？
YES
NO
S29
ロングタッチコマンド発行
S30
タッチ移動検出？
YES
NO
S31
フリック検出？
NO
YES
S32
フリックコマンド発行
S33
タッチコマンド発行
2

フロントページの続き

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G06F	***3/0481***	***(2013.01)***	G06F	3/048	630	
			G06F	3/048	658B	

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CB02 CB05 CB10 CB12 CB13 CB14 CB15 CB16 CB66 CC01
CC03 EA09 EA25 FA05 FA14 FA16

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ABSTRACT JP2015011679A

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13 PROBLEM TO BE SOLVED: To provide an operation input device and an input operation processing method capable of easily specifying an operation position with an inexpensive configuration and excellent operability. An operation input device is a floating touch operation or an operation determination unit that determines whether an operation of a touch operation is input, a calculation unit that calculates an operation input position on an operation panel, and an operation determination unit that is floating. When it is determined that a touch operation has been input, the display information generation unit and the display generated by the display information generation unit generate display information for displaying the pointer at the position on the display screen corresponding to the input position calculated by the calculation unit. It is provided with a display device output unit that outputs information to a display device having a display screen that displays a pointer. [Selection diagram] Fig. 1

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DESCRIPTION JP2015011679A

10 Operation input device and input operation processing method

[0001]

14 The present invention relates to a floating touch operation and an operation input device that accepts an input of a touch operation and an input operation processing method.

[0002]

19 Conventionally, a touch panel display having a touch panel accepts a touch operation on the touch panel and outputs touch information based on the received touch operation to a source device operated by the touch operation to operate the content.

[0003]

25 In addition, by operating a wireless mouse or wireless pointing device equipped with an acceleration sensor, relative movement information (relative coordinate information) is transmitted to the source device, and the mouse cursor or mouse cursor or on the screen is based on the movement information. The content is operated by displaying a pointer or the like and performing a determination operation with a determination button or the like at a desired position.

[0004]

34 For example, Patent Documents 1 and 2 disclose a device for operating a cursor displayed on a display by operating a pointing device connected to the display, and Patent Document 1 discloses a display and a pointing device. Devices connected wirelessly are disclosed.

[0005]

40 <patcit num="1"> <text> 特開２００２－９１６４２号公報 </text> </patcit> <patcit num="2"> <text> 特開平３－２５７５２０号公報 </text> </patcit>

[0006]

45 However, in the case of a touch panel display, a large-screen touch panel is expensive, has a long viewing distance, and has a large operation target, so that it is not suitable for direct touch operation. On the other hand, in the case of a wireless device that uses relative movement information, it takes time to specify a specific part on the screen because the relative movement information or coordinate information is calculated and the pointer is displayed. It is relatively difficult to specify the location of. Further, it is necessary to operate different keys or the like for the pointing operation and the determination operation, which is complicated.

[0007]

56 The present invention has been made in view of such circumstances, and an object of the present invention is to provide an operation input device and an input operation processing method which are inexpensive in configuration, have excellent operability, and can easily specify an operation position.

[0008]

63 The operation input device according to the present invention includes an operation determination unit for determining whether a floating touch operation or a touch operation is input in an operation input device including an operation panel for receiving a floating touch operation and an input of the touch operation. A calculation unit that calculates the input position of the operation on the operation panel, and a position on the display screen corresponding to the input position calculated by the calculation unit when the operation determination unit determines that the floating touch operation has been input. A display information generation unit that generates display information for displaying a pointer on the device, and a display device output unit that outputs the display information generated by the display information generation unit to a display device having the display screen for displaying the pointer. It is characterized by having.

[0009]

77 The input operation processing method according to the present invention determines whether a floating touch operation or a touch operation is input in the input operation processing method by the operation input device including the floating touch operation and

the operation panel for receiving the input of the touch operation. Steps to be performed, a step to calculate the input position of the operation on the operation panel, and when it is determined that a floating touch operation has been input, a pointer is displayed at a position on the display screen corresponding to the calculated input position. It is characterized by including a step of generating display information for the purpose and a step of outputting the generated display information to a display device having the display screen for displaying the pointer.

[0010]

90 The operation input device according to the present invention has a touch operation information generation unit that generates touch operation information based on the touch operation when it is determined by the operation determination unit that a touch operation has been input, and the touch operation information generation unit. It is characterized by including a control device output unit that outputs the generated touch operation information to a control device controlled by the touch operation or the floating touch operation.

[0011]

99 The operation input device according to the present invention includes a floating touch operation information generation unit that generates floating touch operation information based on the floating touch operation when the operation determination unit determines that a floating touch operation has been input. The device output unit is characterized in that the floating touch operation information generated by the floating touch operation information generation unit is output to the control device.

[0012]

108 The operation input device according to the present invention converts an input position calculated by the calculation unit into a display position on the display screen based on the resolution of the display screen of the display device and the resolution of the input position of the operation panel. It is characterized by having a part.

[0013]

115 According to the present invention, the operation position can be easily specified with excellent operability with an inexpensive configuration.

[0014]

120 It is a block diagram which shows an example of the structure of the operation input device of this embodiment.

122 It is explanatory drawing which shows an example of the operation by a finger on the operation panel.

124 It is explanatory drawing which shows an example of the change of the capacitance of the electrode in the operation panel.

126 It is explanatory drawing which shows an example of the input operation by the operation input device of this embodiment.

128 It is explanatory drawing which shows the 1st example of the use mode of the operation input device of this embodiment.

130 It is explanatory drawing which shows the 2nd example of the use mode of the operation input device of this embodiment.

132 It is a flowchart which shows an example of the procedure of the input operation processing by the operation input device of this embodiment.

134 It is a flowchart which shows an example of the procedure of the input operation processing by the operation input device of this embodiment.

[0015]

139 Hereinafter, the present invention will be described with reference to the drawings showing the embodiments.

141 FIG. 1 is a block diagram showing an example of the configuration of the operation input device 100 of the present embodiment.

143 The operation input device 100 includes a hover touch input unit 10, a hover touch control unit 50, and the like.

145 The hover touch input unit 10 and the hover touch control unit 50 are connected via wireless LAN or wireless communication such as Bluetooth (registered trademark).

147 Further, a control device 200, a display device 300, and the like are connected to the hover touch control unit 50.

[0016]

152 The control device 200 includes an operation command receiving unit 201, a display image output unit 202, and the like.

154 Further, the display device 300 includes a display screen 301 and the like.

155 The display image output unit 202 outputs a video or image (moving image, still image) to be displayed on the display screen 301 of the display device 300.

157 That is, the control device 200 has a function as a source device that outputs a video or image (moving image, still image) to be displayed on the display screen 301 of the display device 300.

[0017]

163 The hover touch input unit 10 includes an operation panel 11, a control unit 13, a

communication unit 16, and the like.

165 The operation panel 11 includes an operation detection unit 12.

166 Further, the control unit 13 includes a hover touch identification unit 14, an operation command conversion unit 15, and the like.

[0018]

171 The operation panel 11 can be composed of, for example, an electrostatic pad or the like, and receives a floating touch operation and an input of the touch operation.

173 The operation panel 11 has, for example, a thin film structure in which an electrode pattern is formed on a flexible substrate.

175 In the electrode pattern, a plurality of electrodes are arranged two-dimensionally (for example, in the XY direction), and the floating touch operation or the touch operation with a finger or a pen can be determined by detecting the capacitance of each electrode. can.

[0019]

181 FIG. 2 is an explanatory diagram showing an example of finger operation on the operation panel 11, and FIG. 3 is an explanatory diagram showing an example of a change in the capacitance of the electrodes in the operation panel 11.

184 FIG. 2A shows an example of a floating touch operation.

185 The floating touch operation is an operation in a state where the surface 111 of the operation panel 11 is brought close to the surface 111 without directly contacting the finger or the pen.

188 In the example of FIG. 2A, the finger is brought close to the position indicated by the reference numeral x1.

190 The floating touch operation is an operation in which a finger or a pen is in a hover state, and includes, for example, a hover operation, a hover flick operation, and a hover palm operation.

192 Details of each operation will be described later.

193 In the present embodiment, the floating touch operation is also referred to as a hover operation.

[0020]

198 FIG. 2B shows an example of a touch operation.

199 The touch operation is an operation in which a finger, a pen, or the like is in direct contact with the surface 111 of the operation panel 11.

201 In the example of FIG. 2B, the finger is brought into contact with the position indicated by the reference numeral x1.

203 The touch operation is an operation in which a finger or a pen is in a touch state, and includes, for example, a touch operation (single touch operation), a multi-touch operation, a long touch operation, and a flick operation.

206 Details of each operation will be described later.

[0021]

210 As shown in FIG. 3, when a finger is touched or brought close to the position x1 of the operation panel 11, a large capacitance is generated between the electrode of the operation panel 11 and the finger in the touch state. Capacitance exceeds the first threshold value Cth1.

214 Further, in the hover state, the capacitance generated between the electrode of the operation panel 11 and the finger increases, but is smaller than in the touch state.

216 That is, in the hover state, the capacitance near the position x1 is smaller than the first threshold value Cth1 and exceeds the second threshold value Cth2 (<Cth1).

218 In FIG. 3, the capacitance C0 is the capacitance in a state where the finger is not brought close to it.

[0022]

223 The operation detection unit 12 has a function as an operation determination unit, and determines whether the operation input to the operation panel 11 is a hover operation or a touch operation.

226 That is, the operation detection unit 12 detects a change in the capacitance of each electrode of the operation panel 11 and detects whether or not a hover operation or a touch operation is input.

[0023]

232 Further, the operation detection unit 12 has a function as a calculation unit, and calculates an operation input position on the operation panel 11.

234 As described above, when a finger or a pen or the like is brought close to the operation panel 11, a capacitance is generated between the electrode and the finger or the like. Therefore, the capacitance is increased as the electrode exists closer to the finger or the like.

237 By detecting this change in capacitance, the input position of the operation can be calculated as the absolute coordinates on the operation panel 11.

[0024]

242 More specifically, the operation detection unit 12 detects the temporal change and the spatial change of the capacitance.

244 This makes it possible to detect differences in the number of fingers, how the fingers move, and the like.

246 The operation detection unit 12 outputs the detection result (presence / absence of input of hover operation or touch operation, coordinates of input position, temporal change and

spatial change of capacitance, etc.) to the control unit 13.

[0025]

252 The hover touch identification unit 14 identifies that a hover operation or a touch operation has been input based on the detection result output by the operation detection unit 12.

254 More specifically, the hover touch identification unit 14 can identify, for example, a hover operation, a hover flick operation, a hover palm operation, or the like when a hover operation is input.

257 Further, when a touch operation is input, the hover touch identification unit 14 can identify, for example, a touch operation (single touch operation), a multi-touch operation, a long touch operation, a flick operation, and the like.

[0026]

263 The operation command conversion unit 15 converts the identification result by the hover touch identification unit 14 into the operation command information.

265 The operation command information is command information such as hover operation, hover flick operation, hover palm operation, touch operation (single touch operation), multi-touch operation, long touch operation, and flick operation.

[0027]

271 The communication unit 16 has a wireless communication function such as a wireless LAN or Bluetooth (registered trademark) with the communication unit 51, and transmits the operation command information converted by the operation command conversion unit 15 to the hover touch control unit 50. ..

[0028]

278 The hover touch control unit 50 includes a communication unit 51, an operation command conversion unit 52, a control interface unit 53, a pointer display information generation unit 54, a display interface unit 55, and the like.

[0029]

284 The communication unit 51 receives the operation command information transmitted by the hover touch input unit 10.

[0030]

289 The operation command conversion unit 52 generates an operation command by converting

the operation command information received by the communication unit 51 into a format corresponding to the control device 200.

292 The operation command is for notifying the control device 200 of a predetermined operation.

293 For example, when a personal computer to which a mouse is connected is used as the control device 200, it is necessary to notify the personal computer of operations such as mouse movement, left click, right click, and double click.

296 Further, in this case, the operation command conversion unit 52 can also perform a process of automatically converting the position (coordinates) of the mouse according to the resolution of the display screen 301 of the display device 300.

[0031]

302 The pointer display information generation unit 54 has a function as a display information generation unit, and when it is determined that a floating touch operation has been input, the pointer is displayed at a position on the display screen 301 corresponding to the calculated input position. Generate display information for.

[0032]

309 The display information includes, for example, a pointer image, pointer position information, and the like.

311 The pointer image is, for example, a mouse cursor image or the like, and is an image showing a state in which the mouse cursor is hovered over a click-operable area on the display screen.

313 In addition, the display information can be displayed in a mode (added state) superimposed on the video or image output by the control device 200.

315 Further, the position information of the pointer is the position on the display screen 301 corresponding to the input position on the operation panel 11 by predetermining the correspondence between the coordinates on the operation panel 11 and the coordinates on the display screen 301. Can be specified as absolute coordinates.

[0033]

322 The display interface unit 55 has a function as a display device output unit, and outputs the display information generated by the pointer display information generation unit 54 to the display device 300 having the display screen 301 for displaying the pointer.

[0034]

328 With the above configuration, when the hover operation is performed on the operation panel 11, the pointer can be displayed at the position (absolute coordinates) on the display screen 301 corresponding to the input position of the hover operation.

331 As a result, it is not necessary to attach an expensive large-screen touch panel to the display

device, and it is possible to accept input of hover operation and touch operation with a relatively inexpensive configuration of an operation panel.

[0035]

337 Further, since the input position of both the hover operation and the touch operation is calculated and the pointer is displayed at the position on the display screen 301 corresponding to the calculated input position, the operation in absolute coordinates can be realized. The operating position can be easily specified.

[0036]

344 In addition, it is not necessary to perform additional operations such as pressing a specific key, and the hover state and touch state of the pointer on the display screen 301 can be realized by a series of operations of hover operation and touch operation, which improves operability. Can be improved.

[0037]

351 Further, the operation command conversion unit 52 has a function as a touch operation information generation unit, and when it is determined that a touch operation has been input, the operation command conversion unit 52 generates touch operation information based on the touch operation.

355 The touch operation information generated by the operation command conversion unit 52 is an operation command converted into a format corresponding to the control device 200, and is, for example, an operation command corresponding to the touch operation.

[0038]

361 The control interface unit 53 has a function as a control device output unit, and outputs an operation command (operation command corresponding to a touch operation) converted by the operation command conversion unit 52 to the control device 200.

[0039]

367 In the operation command receiving unit 201 of the control device 200, the operation input device 100 receives the operation command.

369 The control device 200 performs an operation according to the received operation command (operation command corresponding to the touch operation).

371 According to the above configuration, for example, the user performs a hover operation on the operation panel 11 to move the pointer to a desired position without taking his eyes off the display screen 301 on which the pointer is displayed, and then touches the operation. By

operating the control device 200 with the same feeling as directly touching the display screen 301, the control device 200 can be controlled (operation), and the operability can be improved.

[0040]

380 Further, the control interface unit 53 acquires the video or image output by the display image output unit 202 and outputs the video or image to the display interface unit 55.

382 The display interface unit 55 outputs the video or image acquired from the control interface unit 53 to the display device 300.

[0041]

387 Further, the operation command conversion unit 52 has a function as a floating touch operation information generation unit, and when it is determined that a hover operation has been input, the operation command conversion unit 52 generates hover operation information based on the hover operation.

391 The hover operation information generated by the operation command conversion unit 52 is an operation command converted into a format corresponding to the control device 200, and is, for example, an operation command corresponding to the hover operation.

[0042]

397 The control interface unit 53 outputs the operation command (operation command corresponding to the hover operation) converted by the operation command conversion unit 52 to the control device 200.

[0043]

403 In the operation command receiving unit 201 of the control device 200, the operation input device 100 receives the operation command.

405 The control device 200 performs an operation according to the received operation command (operation command corresponding to the hover operation).

407 With the above configuration, for example, the user performs a hover operation on the operation panel 11 to move the pointer to a desired position without taking his eyes off the display screen 301 on which the pointer is displayed, and directly displays the display screen 301. On the other hand, the operation can be performed with the same feeling as the hover operation, the control device 200 can be controlled (operation), and the operability can be improved.

[0044]

416 Further, the operation detection unit 12 has a function as a conversion unit, and displays the input position calculated based on the resolution of the display screen 301 of the display device 300 and the resolution (resolution) of the input position of the operation panel 11 on the display screen 301. Convert to the upper display position.

420 As a result, even if the resolution differs between the operation panel 11 and the display screen 301 of the display device 300, the pointer is displayed at the position on the display screen 301 corresponding to the position of the finger or pen on the operation panel 11. In addition, the pointer on the display screen 301 can be moved according to the movement distance of the finger or pen on the operation panel 11, and the figures and tables such as icons or buttons on the display screen 301 can be intuitively operated. And the operability can be improved.

[0045]

430 FIG. 4 is an explanatory diagram showing an example of an input operation by the operation input device 100 of the present embodiment.

432 As shown in FIG. 4, the types of input operations include a hover state and a touch state.

433 In the hover state, for example, there are hover operation, hover flick operation, hover palm operation and the like.

[0046]

438 The hover operation is an operation of holding a finger over the operation panel 11.

439 The functions realized by the operation commands corresponding to the hover operation (for example, the hover command) are the function of displaying the mouse cursor, the function of moving the mouse cursor, and the like.

442 The hover operation is a menu operation when the control device 200 is, for example, an AV device that supports touch operation.

444 When the control device 200 is a personal computer (PC) or the like, the operation is performed on the PC.

[0047]

449 The hover flick operation is an operation of quickly sliding the finger while holding the finger over the operation panel 11.

451 The functions realized by the operation command corresponding to the hover flick operation (for example, the hover flick command) include a function of flicking to the right (next) and a function of flicking to the left (previous).

454 The hover flick operation is used for slide show or video playback.

[0048]

458 The hover palm operation is an operation in which the palm is held over the operation panel 11.

460 The functions realized by the operation commands corresponding to the hover palm operation (for example, the palm hover command) are a function of pausing when the palm is held up and a function of starting playback when the palm is removed.

463 The hover palm flick operation is used for slide show or video playback.

[0049]

467 The touch operation is a so-called single touch operation, which is an operation in which a finger touches the operation panel 11.

469 The function realized by the operation command corresponding to the touch operation (for example, the touch command) is a function corresponding to the left-click operation of the mouse.

472 The use of touch operation is the same as that of hover operation.

[0050]

476 The long touch operation is an operation in which a finger touches the operation panel 11 for, for example, 2 seconds or longer.

478 The functions realized by the operation commands corresponding to the long-touch operation (for example, the long-touch command) are the function corresponding to the right-click operation of the mouse, the function of displaying the context menu, and the like.

481 The use of the long touch operation is the same as that of the hover operation.

[0051]

485 The flick operation is an operation of quickly sliding the finger while touching the operation panel 11.

487 The function realized by the operation command corresponding to the flick operation (for example, the flick command) is a function corresponding to the scroll operation.

489 The use of the flick operation is the same as that of the hover operation.

[0052]

493 The multi-touch operation is an operation in which two fingers touch the operation panel 11.

494 The functions realized by the operation commands corresponding to the multi-touch operation (for example, the multi-touch command) are the enlargement function, the reduction function, and the like.

497 The use of the flick operation is the same as that of the hover operation.

[0053]

501 In the example of FIG. 4, an operation using one or two fingers is illustrated, but the number of fingers is not limited to this, and an operation using three or four fingers may be used.

[0054]

506 FIG. 5 is an explanatory diagram showing a first example of a usage mode of the operation input device 100 of the present embodiment.

508 In the example of FIG. 5, as the control device 200, a touch operation compatible device (for example, a touch operation AV device) capable of controlling the operation by touch operation on the display screen is used, and as the display device 300, the touch operation is not performed. The case where the corresponding display device is used is shown.

512 In this case, since the display device of FIG. 5 does not support touch operation, it is not possible to control the operation of the touch operation compatible device.

[0055]

517 Therefore, the operation input device 100 of this embodiment is used.

518 That is, the touch operation compatible device outputs the image to the touch operation non-compatible display device via the hover touch control unit 50.

520 The hover operation or touch operation performed by the hover touch input unit 10 is output to the touch operation compatible device as operation information (operation command) via the hover touch control unit 50.

523 Further, the hover operation performed by the hover touch input unit 10 is output to a display device that does not support touch operation as a mouse display for displaying a mouse (pointer) via the hover touch control unit 50.

[0056]

529 The hover touch control unit superimposes a unique pointer (mouse display) on the image from the source device based on the hover operation from the hover touch input unit 10 and displays it on a display device that does not support touch operation.

532 Further, the hover touch control unit outputs the hover operation and the touch operation performed by the hover touch input unit 10 to the touch operation compatible device as a hover command and a touch command.

535 As a result, even when a display device that does not support touch operation is used, the operation of the device that supports touch operation can be controlled.

[0057]

540 As described above, in the example of FIG. 5, as an AV device linkage, an input (operation) from the hover touch input unit 10 is performed between the source device and the display

device corresponding to the touch operation via the hover touch control unit 50. Receive wirelessly and notify the source device.

544 The hover touch control unit 50 supports touch operations by superimposing a unique mouse castle (pointer) on the image input from the source device as an operation input from the hover touch input unit 10 and outputting it to the display device. Wireless hover operation and touch operation are possible even if the display device is not equipped.

[0058]

551 FIG. 6 is an explanatory diagram showing a second example of the usage mode of the operation input device 100 of the present embodiment.

553 The example of FIG. 6 shows a case where a PC (personal computer) is used as the control device 200 and a touch operation compatible display device is used as the display device 300.

556 In this case, the operation of the PC can be controlled by performing a touch operation on the display screen of the display device, but the user needs to be close to the display device to the extent that he / she can touch the display screen. I can't leave the display device.

[0059]

562 Therefore, the operation input device 100 of this embodiment is used.

563 In this case, the function corresponding to the hover touch control unit 50 is realized in the form of the hover touch input unit dedicated driver 60, and the hover touch input unit dedicated driver 60 is installed in the PC.

566 The hover touch input unit dedicated driver 60 can pass an event from the hover touch input unit 10 to the operating system (OS) of the PC as a virtual mouse key event.

568 Further, the hover touch input unit 10 can make a wireless connection with the PC by inserting the USB dongle of the wireless receiver into the PC.

570 If the PC has a communication function such as a wireless LAN, the communication function built into the PC may be used.

572 Thereby, the operation of the PC can be controlled from a place away from the display device.

[0060]

576 As described above, in the example of FIG. 6, as a PC cooperation, the PC and the hover touch input unit 10 are wirelessly connected using a wireless receiver built in the PC or an external USB dongle, and hover operation and touch operation input are input. , By converting with a dedicated driver on the PC side and notifying the OS (operating system) as a virtual mouse event and a virtual key event (gesture), wireless hover operation and touch operation become possible.

[0061]

585 7 and 8 are flowcharts showing an example of the procedure of the input operation process by the operation input device 100 of the present embodiment.

587 The operation input device 100 determines whether or not hover (hover operation) has been detected (S11).

589 Whether or not the hover is detected is determined by, for example, as shown in FIG. 3, the presence or absence of an electrode whose capacitance detected by the operation detection unit 12 is larger than the second threshold value Cth2 and smaller than the first threshold value Cth1, be able to.

[0062]

596 When the hover is detected (YES in S11), the operation input device 100 determines whether or not the single hover (single hover operation) is detected (S12).

[0063]

601 When the single hover is not detected (NO in S12), the operation input device 100 determines whether or not the palm hover (hover palm operation) is detected (S13).

603 When the palm hover is detected (YES in S13), the operation input device 100 issues a palm hover command (palm hover gesture command) (S14), and performs the process of step S34 described later.

606 When the palm hover is not detected (NO in S13), the operation input device 100 performs the process of step S34 described later.

[0064]

611 When the single hover is detected (YES in S12), the operation input device 100 detects the input position (S15) and determines whether or not the hover movement is detected (S16).

613 For example, when the previous final input position and the current input position are different from each other, it can be determined that the hover movement has occurred.

[0065]

618 When the hover movement is detected (YES in S16), the operation input device 100 determines whether or not the hover flick (hover flick operation) is detected (S17).

[0066]

623 When the hover flick is detected (YES in S17), the operation input device 100 issues a hover flick command (hover flick gesture command) (S18), and performs the process of step S34 described later.

[0067]

629 When the hover movement is not detected (NO in S16) or when the hover flick is not detected at the time of hover detection (NO in S17), the operation input device 100 issues a hover command (S19).

632 Issuing a hover command is synonymous with issuing a mouse event.

633 At this time, the touch position coordinates are standardized using the resolution of the operation panel 11, the touch coordinates are automatically converted according to the resolution of the display screen 301 of the display device 300, and then the mouse coordinates are output.

[0068]

640 The operation input device 100 generates display information of the mouse cursor (pointer) (S20).

642 When the hover is not detected (NO in S11), the operation input device 100 performs the process of step S21 described later.

[0069]

647 The operation input device 100 determines whether or not a touch (touch operation) has been detected (S21).

649 Whether or not the touch is detected can be determined by, for example, as shown in FIG. 3, the presence or absence of an electrode whose capacitance detected by the operation detection unit 12 is larger than the first threshold value Cth1.

[0070]

655 When the touch is not detected (NO in S21), that is, when the touch operation is no longer detected, the operation input device 100 releases the touch flag (S22) and performs the process of step S34 described later.

658 When the touch is detected (YES in S21), the operation input device 100 determines whether or not the single touch (single touch operation) is detected (S23).

[0071]

663 When the single touch is not detected (NO in S23), the operation input device 100 determines whether or not the multi-touch (multi-touch operation) is detected (S24).

665 When multi-touch is detected (YES in S24), the operation input device 100 issues a multi-touch command (multi-touch command gesture) (S25), and performs the process of step S34 described later.

668 When multi-touch is not detected (NO in S24), the operation input device 100 performs the process of step S34 described later.

[0072]

673 When a single touch is detected (YES in S23), the operation input device 100 detects an input position (S26) and sets a touch flag (S27).

675 The operation input device 100 determines whether or not a predetermined time (for example, 2 seconds) has elapsed in the touch state from the time when the single touch is detected (S28), and when the predetermined time has elapsed (YES in S28), A long touch command (long touch gesture command) is issued (S29), and the process of step S34 described later is performed.

[0073]

683 When the predetermined time has not elapsed (NO in S28), the operation input device 100 determines whether or not the touch movement is detected (S30).

685 For the touch movement, for example, when the previous final input position and the current input position are different, it can be determined that the touch movement has occurred.

[0074]

690 When the touch movement is detected (YES in S30), the operation input device 100 determines whether or not a flick (flick operation) is detected (S31).

692 When a flick is detected (YES in S31), the operation input device 100 issues a flick command (flick gesture command) (S32), and performs the process of step S34 described later.

[0075]

697 When the touch movement is not detected (NO in S30) or the flick is not detected when the touch movement is detected (NO in S31), the operation input device 100 issues a touch command (touch gesture command). (S33), the process of step S34 described later is performed.

701 The operation input device 100 determines whether or not the processing is completed (S34), and if the processing is not completed (NO in S34), the operation input device 100 repeats the processing after step S11.

704 When the process is completed (YES in S34), the operation input device 100 ends the process.

[0076]

709 As described above, according to the operation input device 100 of the present embodiment,

when a hover operation (floating touch operation) or a touch operation is performed on the operation panel 11 of the hover touch input unit 10, the hover operation and the touch operation are performed. Gesture operations (gestures using fingers and palms) including the above are identified, and operation commands are executed in the control device 200 as mouse movement, mouse left click, mouse right click, or gesture operation.

715 When the control device 200 is a source device such as a personal computer or a smartphone, a long touch or gesture operation is performed by notifying the operating system (OS) of the source device of mouse and touch operation information and input coordinates. Etc. will be determined by the operating system side, the driver or the application side.

720 As described above, according to the present embodiment, the user does not need to attach an expensive large screen touch panel to the display device, and has the same absolute coordinates as when the touch panel is added to the display screen from a place away from the display device. Touch operation and hover operation are possible.

[0077]

727 In the present embodiment, the sampling cycle at the time of touch and hover detection of the operation panel 11 or the number of touches (the number of multi-touches) is automatically changed according to the screen size of the display screen 301 of the display device 300. May be good.

731 As a result, the followability of the touch operation can be optimized and the operability can be improved.

[0078]

736 The operation input device (100) of the present embodiment indicates which operation of the floating touch operation or the touch operation is input in the operation input device including the floating touch operation and the operation panel (11) for receiving the input of the touch operation. When it is determined that the operation determination unit (12, 14) for determining, the calculation unit (12) for calculating the input position of the operation on the operation panel, and the operation determination unit have input the floating touch operation, the above The display information generation unit (54) that generates display information for displaying the pointer at the position on the display screen (301) corresponding to the input position calculated by the calculation unit, and the display information generated by the display information generation unit. It is characterized by including a display device output unit (55) for outputting to a display device (300) having the display screen for displaying the pointer.

[0079]

751 The input operation processing method of the present embodiment is either a floating touch

operation or a touch operation in the input operation processing method by the operation input device (100) provided with the floating touch operation and the operation panel (11) for receiving the input of the touch operation. A step of determining whether an operation has been input, a step of calculating an input position of the operation on the operation panel, and a display screen corresponding to the calculated input position when it is determined that a floating touch operation has been input (301) Includes a step of generating display information for displaying a pointer at an upper position and a step of outputting the generated display information to a display device (300) having the display screen for displaying the pointer. It is characterized by.

[0080]

764 In the present embodiment, the operation determination unit (12, 14) determines whether the operation input to the operation panel is a floating touch operation or a touch operation.

766 The touch operation is an operation in which a finger or a pen or the like is in direct contact with the surface of the operation panel, and the floating touch operation is an operation in which a finger or a pen or the like is brought close to the surface of the operation panel without direct contact. It is an operation.

770 On the operation panel, for example, a plurality of electrodes are arranged, and by detecting the capacitance of each electrode, it is possible to determine a floating touch operation or a touch operation with a finger, a pen, or the like.

[0081]

776 The calculation unit (12) calculates the input position of the operation on the operation panel.

777 When a finger or a pen or the like is brought close to the operation panel, a capacitance is generated between the electrode and the finger or the like. Therefore, the capacitance increases as the electrode exists closer to the finger or the like.

780 By detecting this change in capacitance, the input position of the operation can be calculated as the absolute coordinates on the operation panel.

[0082]

785 When the operation determination unit determines that the floating touch operation has been input, the display information generation unit (54) displays a pointer for displaying the pointer at a position on the display screen (301) corresponding to the input position calculated by the calculation unit. Generate information.

789 The display information includes, for example, a pointer image, pointer position information, and the like.

791 The pointer image is, for example, a mouse cursor image or the like, and is an image showing a state in which the mouse cursor is hovered over a click-operable area on the display screen.

793 For the pointer position information, the position on the display screen corresponding to the

input position on the operation panel is specified as an absolute coordinate by predetermining the correspondence between the coordinates on the operation panel and the coordinates on the display screen. be able to.

[0083]

800 The display device output unit (55) outputs the display information generated by the display information generation unit to the display device (300) having the display screen (301) for displaying the pointer.

[0084]

806 With the above configuration, when the floating touch operation is performed on the operation panel, the pointer can be displayed at the position (absolute coordinates) on the display screen corresponding to the input position of the floating touch operation.

809 As a result, it is not necessary to attach an expensive large-screen touch panel to the display device, and it is possible to accept the floating touch operation and the input of the touch operation with a relatively inexpensive configuration of an operation panel.

812 In addition, since the input position of both the floating touch operation and the touch operation is calculated and the pointer is displayed at the position on the display screen corresponding to the calculated input position, the operation in absolute coordinates can be realized. The operating position can be easily specified.

816 In addition, it is not necessary to perform additional operations such as pressing a specific key, and the hover state and touch state of the pointer on the display screen can be realized by a series of operations of floating touch operation and touch operation, which improves operability. Can be improved.

[0085]

823 In the operation input device of the present embodiment, when the operation determination unit (12, 14) determines that a touch operation has been input, the touch operation information generation unit (15, 14) generates touch operation information based on the touch operation. 52) and a control device output unit (53) that outputs the touch operation information generated by the touch operation information generation unit to the control device (200) controlled by the touch operation or the floating touch operation. do.

[0086]

832 In the present embodiment, when the touch operation information generation unit (15, 52) determines that the touch operation has been input by the operation determination unit (12, 14), the touch operation information is generated based on the touch operation. Generate.

835 The touch operation includes, for example, a touch operation (single touch operation), a multi-

touch operation, a long touch operation, a flick operation, and the like, and the touch operation information is, for example, operation command information corresponding to the touch operation.

839 The control device output unit (53) outputs the touch operation information generated by the touch operation information generation unit to the control device (200) controlled by the touch operation or the floating touch operation.

842 As a result, for example, the user performs a floating touch operation on the operation panel to move the pointer to a desired position without taking his eyes off the display screen on which the pointer is displayed, and then directly touches the display screen. By operating with the same feeling as touching, the control device can be controlled (operation), and the operability can be improved.

[0087]

850 When the operation determination unit (12, 14) determines that a floating touch operation has been input, the operation input device of the present embodiment generates floating touch operation information based on the floating touch operation. The control device output unit (53) includes units (15, 52) and is characterized in that the floating touch operation information generated by the floating touch operation information generation unit is output to the control device (200). And.

[0088]

859 In the present embodiment, when the floating touch operation information generation unit (15, 52) determines that the floating touch operation has been input by the operation determination unit (12, 14), the floating touch operation information generation unit (15, 52) floats based on the floating touch operation. Generate touch operation information.

863 The floating touch operation includes, for example, a hover operation, a hover flick operation, a hover palm operation, and the like, and the floating touch operation information is, for example, operation command information corresponding to the floating touch operation.

866 The control device output unit (53) outputs the floating touch operation information generated by the floating touch operation information generation unit to the control device (200).

869 As a result, for example, the user performs a hover operation on the operation panel to move the pointer to a desired position without taking his eyes off the display screen on which the pointer is displayed, and directly operates the hover on the display screen. It can be operated with the same feeling as the above, and the control device can be controlled (operated), and the operability can be improved.

[0089]

877 The operation input device of the present embodiment is an input calculated by the

calculation unit (12) based on the resolution of the display screen (301) of the display device (300) and the resolution of the input position of the operation panel (11). It is characterized by including a conversion unit (12) that converts a position into a display position on the display screen.

[0090]

885 In the present embodiment, the conversion unit (12) is based on the resolution of the display screen (301) of the display device (300) and the resolution (resolution) of the input position of the operation panel (11). The input position calculated in 12) is converted into a display position on the display screen.

889 As a result, even if the resolution differs between the operation panel and the display screen of the display device, the pointer can be displayed at the position on the display screen corresponding to the position of the finger or pen on the operation panel, and the operation can be performed. The pointer on the display screen can be moved according to the movement distance of the finger or pen on the panel, and the figures and tables such as icons or buttons on the display screen can be intuitively operated to improve operability. Can be done.

[0091]

899 100 Operation input device 10 Hover touch input unit 11 Operation panel 12 Operation detection unit 13 Control unit 14 Hover touch identification unit 15 Operation command conversion unit 16 Communication unit 50 Hover touch control unit 51 Communication unit 52 Operation command conversion unit 53 Control interface unit 54 Pointer display information generation unit 55 Display interface unit 200 Control device 201 Operation command reception unit 202 Display image output unit 300 Display device 301 Display screen

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CLAIMS JP2015011679A

1.

13 In an operation input device including an operation panel for receiving a floating touch operation and an input of a touch operation, an operation determination unit for determining whether an operation of a floating touch operation or a touch operation is input, and the operation on the operation panel. Display information for displaying a pointer at a position on the display screen corresponding to the input position calculated by the calculation unit and the operation determination unit when it is determined that the floating touch operation has been input. An operation input including a display information generation unit for generating a display information unit and a display device output unit for outputting the display information generated by the display information generation unit to a display device having the display screen for displaying the pointer. Device.

2.

26 When the operation determination unit determines that a touch operation has been input, the touch operation information generation unit that generates touch operation information based on the touch operation and the touch operation information generated by the touch operation information generation unit are used for the touch operation. The operation input device according to claim 1, further comprising a control device output unit that outputs to a control device controlled by a floating touch operation.

3.

35 When the operation determination unit determines that a floating touch operation has been input, the operation determination unit includes a floating touch operation information generation unit that generates floating touch operation information based on the floating

touch operation, and the control device output unit includes the floating touch operation. The operation input device according to claim 2, wherein the floating touch operation information generated by the information generation unit is output to the control device.

4.

44 A claim comprising a conversion unit that converts an input position calculated by the calculation unit into a display position on the display screen based on the resolution of the display screen of the display device and the resolution of the input position of the operation panel. The operation input device according to any one of items 1 to 3.

5.

51 In the input operation processing method by the operation input device provided with the floating touch operation and the operation panel for receiving the input of the touch operation, the step of determining which operation of the floating touch operation or the touch operation is input and the step on the operation panel. A step of calculating the input position of the operation, a step of generating display information for displaying a pointer at a position on the display screen corresponding to the calculated input position when it is determined that the floating touch operation has been input, and a step of generating display information. An input operation processing method including a step of outputting the generated display information to a display device having the display screen for displaying the pointer.

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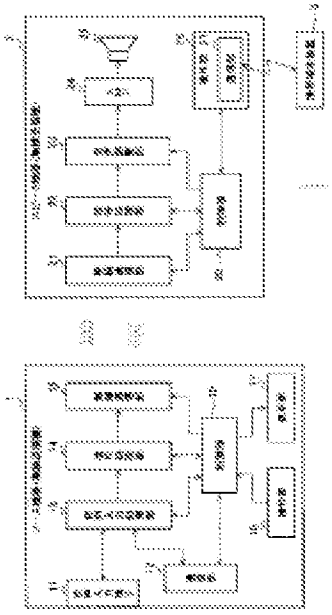
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(54)【発明の名称】音声無線伝送システム、スピーカ機器、及びソース機器

(57)【要約】
【課題】ソース機器から複数のスピーカ機器に音声信号を無線通信で送信する音声無線伝送システムにおいて、音質変更操作やコンテンツ変更操作など音声を変更する操作をスピーカ機器側からできるようにする。
【解決手段】本発明のシステムでは、スピーカ機器２がユーザ操作を受け付け、そのユーザ操作が示す操作信号に応じて変更された上記音声信号を出力する。ここで、スピーカ機器２が、上記操作信号をソース機器１に送信し、ソース機器１が、受信した上記操作信号に基づき、上記複数のスピーカ機器２に出力させるための音声信号又は音声信号処理用パラメータを変更する。若しくは、スピーカ機器２が、上記操作信号が示す音声信号処理用パラメータでソース機器２から受信した上記音声信号に対して信号処理を施し、ソース機器１に上記信号処理の実行通知を送信する。
【選択図】図１



【特許請求の範囲】
【請求項１】
複数のスピーカ機器と、該複数のスピーカ機器に対して音声信号を無線通信で送信するソース機器と、を備えた音声無線伝送システムであって、
前記スピーカ機器は、ユーザ操作を受け付け、該ユーザ操作が示す操作信号に応じて変更された前記音声信号を出力することを特徴とする音声無線伝送システム。
【請求項２】
前記スピーカ機器は、前記操作信号を前記ソース機器に送信し、
前記ソース機器は、前記スピーカ機器から受信した前記操作信号に基づき、前記複数のスピーカ機器に出力させるための音声信号又は音声信号処理用パラメータを変更することを特徴とする請求項１に記載の音声無線伝送システム。
【請求項３】
前記スピーカ機器は、前記操作信号が示す音声信号処理用パラメータで前記ソース機器から受信した前記音声信号に対して信号処理を施し、前記ソース機器に該信号処理の実行通知を送信することを特徴とする請求項１に記載の音声無線伝送システム。
【請求項４】
前記スピーカ機器は、前記ユーザ操作が示す前記操作信号を無線通信で携帯端末装置から受信する受信部を有することを特徴とする請求項１～３のいずれか１項に記載の音声無線伝送システム。
【請求項５】
複数のスピーカ機器に対して音声信号を無線通信で送信するソース機器から、該音声信号を受信する前記複数のスピーカ機器の中の１つのスピーカ機器であって、
当該スピーカ機器は、ユーザ操作を受け付け、該ユーザ操作が示す操作信号に応じて変更された前記音声信号を出力することを特徴とするスピーカ機器。
【請求項６】
当該スピーカ機器は、前記操作信号を前記ソース機器に送信し、
前記操作信号に基づいて前記ソース機器で変更された、前記複数のスピーカ機器用の音声信号又は音声信号処理用パラメータを、前記ソース機器から受信することを特徴とする請求項５に記載のスピーカ機器。
【請求項７】
当該スピーカ機器は、前記操作信号が示す音声信号処理用パラメータで前記ソース機器から受信した前記音声信号に対して信号処理を施し、前記ソース機器に該信号処理の実行通知を送信することを特徴とする請求項５に記載のスピーカ機器。
【請求項８】
前記ユーザ操作が示す前記操作信号を無線通信で携帯端末装置から受信する受信部を有することを特徴とする請求項５～７のいずれか１項に記載のスピーカ機器。
【請求項９】
複数のスピーカ機器に対して音声信号を無線通信で送信するソース機器であって、
前記スピーカ機器で受け付けられたユーザ操作が示す操作信号に応じて前記音声信号又は音声信号処理用パラメータを変更することを特徴とするソース機器。
【請求項１０】
前記スピーカ機器から送信された前記操作信号を受信し、前記操作信号に基づき、前記複数のスピーカ機器に出力させるための前記音声信号又は音声信号処理用パラメータを変更することを特徴とする請求項９に記載のソース機器。
【請求項１１】
前記スピーカ機器から送信された、前記スピーカ機器側で変更後の前記音声信号処理用パラメータを受信することを特徴とする請求項９に記載のソース機器。
【請求項１２】
前記ユーザ操作が示す前記操作信号は、前記スピーカ機器が無線通信で携帯端末装置から受信した信号であることを特徴とする請求項９～１１のいずれか１項に記載のソース機

器。

【発明の詳細な説明】
【技術分野】
【０００１】
本発明は、音声信号を無線で伝送する音声無線伝送システム、そのシステムにおけるスピーカ機器、及びソース機器に関する。
【背景技術】
【０００２】
従来から、スピーカ機器には出力される音声の音量等を調節する調節ツマミが設けられているものがある。その他、スピーカ機器に対して操作を行うための技術として、特許文献１には、リモートコントローラ（リモコン）からの操作信号を受光する受光素子を備えたスピーカ機器が開示されている。このスピーカ機器では、リモコンからの操作に基づき、音声信号を入力するソース機器の選択（切換）、内蔵された信号処理部における音質の調整、内蔵されたオーディオアンプにおける音量の調整などが可能となっている。
【０００３】
また、特許文献２には、リモコンからの操作信号を受光する受光部を備えた、複数のスピーカユニットを配列してなるスピーカ機器（つまりスピーカアレイ機器）が開示されている。このスピーカアレイ機器では、音声ビームの角度及び焦点距離を変更する操作をリモコンで受け付け、その操作に従い各スピーカユニットから出力される音声信号の遅延量や音声信号のレベルを変更するようになっている。また、この技術では、そのスピーカアレイ機器に接続されたコンテンツ再生装置に設けられた操作部において、音量調整やコンテンツ選択の操作を受け付けることが可能となっている。
【０００４】
一方で、近年、ＡＶ（Audio Visual）機器において無線通信を活用する機器が増えており、音声についてもＷｉＦｉ（登録商標。以下同様。）、ＺｉｇＢｅｅ（登録商標。以下同様。）、Ｂｌｕｅｔｏｏｔｈ（登録商標。以下同様。）、Wireless Speaker and Audio（ＷｉＳＡ；登録商標。以下同様。）等によって無線伝送することがなされている。音声信号の伝送に無線通信を用いることで、スピーカ機器とプレーヤやアンプ等のソース機器とが無線で繋がれることになるため、ケーブルを引き回す必要が無く、便利である。
【先行技術文献】
【特許文献】
【０００５】
【特許文献１】特開２０１４－２１６９８５号公報
【特許文献２】特開２００８－３５２５２号公報
【発明の概要】
【発明が解決しようとする課題】
【０００６】
ソース機器から複数のスピーカ機器に無線通信で音声信号を送信する従来のシステムにおいて、無線の特性を生かして、ソース機器が設置された部屋等の設置場所とは別の場所にもスピーカ機器を置き、複数の設置場所（設置部屋）で個別にコンテンツを聴くような聴取環境を構築することもできる。このような聴取環境は、ソース機器に無線接続された複数のスピーカ機器を複数のグループに分け、グループ毎にコンテンツを再生するようにシステムを構築する必要がある。
【０００７】
しかしながら、このような聴取環境を構築しようとした場合、コンテンツ、音声の特性などを変更する変更操作は、基本的にソース機器の設置場所（設置部屋）まで行き、ソース機器に対して行うことになる。つまり、ソース機器に無線接続された複数のスピーカ機器を複数のグループに分け、グループ毎にコンテンツを再生する場合には、上記変更操作

は基本的にソース機器に対して行うことになる。無論、１グループしか存在しないような聴取環境、つまりグループ分けを行わないような聴取環境も構築でき、その場合にも、複数のスピーカ機器の全体としての音質の変更やコンテンツの変更などの変更操作は、ソース機器に対して行うことになる。ソース機器側で操作を行う場合、特に複数のスピーカ機器を複数グループに分けた聴取環境では、ソース機器の設置場所まで移動しないと操作ができず、不便である。

【０００８】

仮に、特許文献１，２に記載の技術を適用して、ソース機器が設置されていない部屋からリモコン等の操作によりスピーカ機器に対して上記変更操作を可能に構成したとしても、そのスピーカ機器のみにそのような変更が反映され、他のスピーカ機器やソース機器に反映されないことになる。この場合には、ユーザは各スピーカ機器に対して自身の感覚を元に音質調整を行うなどの上記変更操作を行う必要があり、手間がかかる。

【０００９】

よって、上記変更操作をスピーカ機器側から受け付け、聴取環境に合ったように音声が変更できるようにすることが求められる。

なお、特許文献２に記載の技術では、スピーカアレイ装置にリモコンからの操作信号を受光する受光部を搭載することで、スピーカアレイ装置内の信号処理部から出力される音声信号レベルの調整をリモコンから制御することは可能となっているが、あくまで１箇所に設置される１つのスピーカアレイ装置の中の各スピーカユニットのそれぞれの音声信号レベルを調整できるに過ぎない。

【００１０】

本発明は、上述のような実状に鑑みてなされたものであり、その目的は、ソース機器から複数のスピーカ機器に音声信号を無線通信で送信する音声無線伝送システムにおいて、音質変更操作やコンテンツ変更操作など音声を変更する操作をスピーカ機器側からできるようにすることにある。

【課題を解決するための手段】

【００１１】

上記の課題を解決するために、本発明の第１の技術手段は、複数のスピーカ機器と、該複数のスピーカ機器に対して音声信号を無線通信で送信するソース機器と、を備えた音声無線伝送システムであって、前記スピーカ機器は、ユーザ操作を受け付け、該ユーザ操作が示す操作信号に応じて変更された前記音声信号を出力することを特徴としたものである。

【００１２】

本発明の第２の技術手段は、第１の技術手段において、前記スピーカ機器は、前記操作信号を前記ソース機器に送信し、前記ソース機器は、前記スピーカ機器から受信した前記操作信号に基づき、前記複数のスピーカ機器に出力させるための音声信号又は音声信号処理用パラメータを変更することを特徴としたものである。

【００１３】

本発明の第３の技術手段は、第１の技術手段において、前記スピーカ機器は、前記操作信号が示す音声信号処理用パラメータで前記ソース機器から受信した前記音声信号に対して信号処理を施し、前記ソース機器に該信号処理の実行通知を送信することを特徴としたものである。

【００１４】

本発明の第４の技術手段は、第１～第３のいずれか１の技術手段において、前記スピーカ機器は、前記ユーザ操作が示す前記操作信号を無線通信で携帯端末装置から受信する受信部を有することを特徴としたものである。

【００１５】

本発明の第５の技術手段は、複数のスピーカ機器に対して音声信号を無線通信で送信するソース機器から、該音声信号を受信する前記複数のスピーカ機器の中の１つのスピーカ機器であって、当該スピーカ機器は、ユーザ操作を受け付け、該ユーザ操作が示す操作信

号に応じて変更された前記音声信号を出力することを特徴としたものである。
【００１６】
本発明の第６の技術手段は、第５の技術手段において、当該スピーカ機器は、前記操作信号を前記ソース機器に送信し、前記操作信号に基づいて前記ソース機器で変更された、前記複数のスピーカ機器用の音声信号又は音声信号処理用パラメータを、前記ソース機器から受信することを特徴としたものである。
【００１７】
本発明の第７の技術手段は、第５の技術手段において、当該スピーカ機器は、前記操作信号が示す音声信号処理用パラメータで前記ソース機器から受信した前記音声信号に対して信号処理を施し、前記ソース機器に該信号処理の実行通知を送信することを特徴としたものである。
【００１８】
本発明の第８の技術手段は、第５～第７のいずれか１の技術手段において、前記ユーザ操作が示す前記操作信号を無線通信で携帯端末装置から受信する受信部を有することを特徴としたものである。
【００１９】
本発明の第９の技術手段は、複数のスピーカ機器に対して音声信号を無線通信で送信するソース機器であって、前記スピーカ機器で受け付けられたユーザ操作が示す操作信号に応じて前記音声信号又は音声信号処理用パラメータを変更することを特徴としたものである。
【００２０】
本発明の第１０の技術手段は、第９の技術手段において、前記スピーカ機器から送信された前記操作信号を受信し、前記操作信号に基づき、前記複数のスピーカ機器に出力させるための前記音声信号又は音声信号処理用パラメータを変更することを特徴としたものである。
【００２１】
本発明の第１１の技術手段は、第９の技術手段において、前記スピーカ機器から送信された、前記スピーカ機器側で変更後の前記音声信号処理用パラメータを受信することを特徴としたものである。
【００２２】
本発明の第１２の技術手段は、第９～第１１のいずれか１の技術手段において、前記ユーザ操作が示す前記操作信号は、前記スピーカ機器が無線通信で携帯端末装置から受信した信号であることを特徴としたものである。
【発明の効果】
【００２３】
本発明によれば、ソース機器から複数のスピーカ機器に音声信号を無線通信で送信する音声無線伝送システムにおいて、音質変更操作やコンテンツ変更操作など音声を変更する操作をスピーカ機器側からできるようになる。
【図面の簡単な説明】
【００２４】
【図１】本発明の第１の実施形態に係る音声無線伝送システムの一構成例を示すブロック図である。
【図２Ａ】図１の音声無線伝送システムにおける機器配置の一例を示す模式図である。
【図２Ｂ】図２Ａの機器配置における各機器を示す図である。
【図３Ａ】図１の音声無線伝送システムにおいて送信、再生される音声信号のチャンネルの一例を示す図である。
【図３Ｂ】図１の音声無線伝送システムにおいて送信、再生される音声信号のチャンネルの他の例を示す図である。
【図３Ｃ】図１の音声無線伝送システムにおいて送信、再生される音声信号のチャンネルの他の例を示す図である。

【図４】図１の音声無線伝送システムにおける音質変更処理手順の一例を説明するためのシーケンス図である。
【図５】図１の音声無線伝送システムにおける音質変更処理手順の他の例を説明するためのシーケンス図である。
【図６】本発明の第３の実施形態に係る音声無線伝送システムにおける音質変更処理手順の一例を説明するためのシーケンス図である。
【図７Ａ】本発明の第４の実施形態に係る音声無線伝送システムにおける通信処理に用いられる第１の通信方式を説明するためのシーケンス図である。
【図７Ｂ】本発明の第４の実施形態に係る音声無線伝送システムにおける通信処理に用いられる第２の通信方式を説明するためのシーケンス図である。
【図７Ｃ】本発明の第４の実施形態に係る音声無線伝送システムにおける通信処理に用いられる第３の通信方式を説明するためのシーケンス図である。
【図８Ａ】本発明の第４の実施形態に係る音声無線伝送システムにおける通信処理に用いられるパケットの一例を示す図である。
【図８Ｂ】図８Ａのパケットにおける各セクションに記述される内容の一例を示す図である。
【図９Ａ】図７Ａの第１の通信方式における指示に用いられるパケットの一例を示す図である。
【図９Ｂ】図９Ａのパケットにおいて記述されるＩＤ（コマンド種別）とＩＤ毎に規定されるパラメータの一例を示す図である。
【図９Ｃ】図７Ａの第１の通信方式における指示応答に用いられるパケットの一例を示す図である。
【図９Ｄ】図９Ｃのパケットにおいて記述されるＩＤ（指示種別）とＩＤ毎に規定されるパラメータの一例を示す図である。
【図１０Ａ】図７Ｂの第２の通信方式における要求に用いられるパケットの一例を示す図である。
【図１０Ｂ】図１０Ａのパケットにおいて記述されるＩＤ（要求種別）とＩＤ毎に規定されるパラメータの一例を示す図である。
【図１０Ｃ】図７Ｂの第２の通信方式における要求応答に用いられるパケットの一例を示す図である。
【図１０Ｄ】図１０Ｃのパケットにおいて記述されるＩＤ（要求応答種別）とＩＤ毎に規定されるパラメータの一例を示す図である。
【図１１Ａ】図７Ｃの第３の通信方式における通知に用いられるパケットの一例を示す図である。
【図１１Ｂ】図１１Ａのパケットにおいて記述されるＩＤ（通知種別）とＩＤ毎に規定されるパラメータの一例を示す図である。
【発明を実施するための形態】
【００２５】
本発明に係る音声無線伝送システムは、スピーカ機器とソース機器とを備えたシステムであり、無線オーディオシステム、無線スピーカシステムなどとも言える。このソース機器は音声信号を無線通信で送信するための無線通信部を有するが、この無線通信部を別筐体で構成することもできる。
【００２６】
また、上記ソース機器としては、ＣＤ（Compact Disc）プレーヤ、ＳＡＣＤ（Super Audio CD）プレーヤ、ＢＤ（Blu-ray Disc；登録商標）プレーヤ、ＨＤＤ（Hard disk drive）プレーヤなどの各種音声再生装置や、テレビ装置、ＰＣ（Personal Computer）などが挙げられる。ここで、音声再生装置としては、ネットワーク上のサーバに格納された楽曲ファイルをネットワーク経由で受信し、スピーカ機器に無線伝送するようなネットワークプレーヤも挙げられる。また、いずれのソース機器においても、スピーカ機器の一部を内蔵してもよい（なお、内蔵したスピーカ機器については各種データの伝送を有線で行う構

成とすることもできる）。例えば、センタスピーカをテレビ装置の表示部の筐体に具備しておき、他のチャンネル用のスピーカを上記スピーカ機器として別筐体で配置することができる。以下、図面を参照しながら、本発明に係る音声無線伝送システムについて説明する。

【００２７】

（第１の実施形態）

本発明の第１の実施形態について、図１～図５を参照しながら説明する。図１は本実施形態に係る音声無線伝送システム（以下、本システム）の一構成例を示すブロック図である。

【００２８】

本システムは、グループ分けされた複数のスピーカ機器２と、それら複数のスピーカ機器２に対して音声信号を無線通信で送信するソース機器１と、を備える。なお、図１ではこれら複数のスピーカ機器２の中の１つのみを図示しているが、ソース機器１とスピーカ機器２が１対多の関係で設けられていればよい。

【００２９】

ソース機器１は、その全体を制御する制御部１０を備えると共に、無線通信部１５を備える無線送信機である。制御部１０は、例えばＣＰＵ（Central Processing Unit）等で構成される。無線通信部１５を備えることにより、ソース機器１を、スピーカ機器２に対して非圧縮の音声信号（原音のままの音声信号）又は圧縮音声信号を無線通信で送信する無線送信機として機能させることができる。以下では音声信号を非圧縮で無線伝送する例を挙げて説明する。ソース機器１から送信される音声信号が非圧縮の信号である方が、スピーカ機器２から高品質の音声が出力できるため好ましいと言える。

【００３０】

また、本構成例のソース機器１は、出力対象の音声コンテンツ（音声信号）を入力するために音声入力部を備える。この音声入力部の例として、ここでは音声入力端子１１、通信部１２、及び音声入力処理部１３を備えた例を挙げるが、音声入力端子１１と通信部１２とは一方が設けられていればよい。

【００３１】

音声入力端子１１としては、例えばHigh-Definition Multimedia Interface（ＨＤＭＩ；登録商標。以下同様。）端子など、様々な規格の入力端子が適用できる。通信部１２は、有線、無線を問わず、ＬＡＮ（Local Area Network）、ＷｉＦｉ、Ｂｌｕｅｔｏｏｔｈなどの規格に基づき外部と通信して音声コンテンツを受信するための部位である。通信部１２により例えばインターネットラジオ放送を受信するように構成することもできる。無論、通信部１２と無線通信部１５とは双方ＷｉＦｉ規格を採用するなど同じ規格を用いることもできるが、その場合には音声信号の受信と送信とでの混信を避けるためにＭＡＣ（Media Access Control address）アドレス等の識別子を異ならせておけばよい。

【００３２】

音声入力処理部１３は、音声入力端子１１又は通信部１２から入力された音声信号に対し、後述する信号処理部１４での処理フォーマットに合うように変換する部位であり、例えばアナログ信号をデジタル信号に変換する（或いはその逆変換を行う）処理や、音声信号に含まれる複数のチャンネルの信号を多重化する処理（或いはその逆の多重分離する処理）などを行う。また、ソース機器１には、上記音声入力端子１１や通信部１２に加えて、若しくはそれらの一方又は双方の代わりとして、音声コンテンツを格納する記憶装置とその記憶装置から音声コンテンツを読み出して再生処理する音声再生部とを備えることもできる。

【００３３】

さらに、ソース機器１は、音声入力処理部１３から出力された音声信号に対して所定の信号処理を行う信号処理部１４を備える。信号処理部１４での所定の信号処理としては、例えば入力された音声信号に対し、ユーザ操作に応じて音質を変更する処理、音場を作成する処理など、各チャンネルの音声信号を送信前に補正する補正処理が挙げられる。無論

、信号処理部１４での信号処理は、後述する信号処理部２２での所定の信号処理とは異なる処理である。なお、信号処理部１４や後述の信号処理部２２はＤＳＰ（Digital Signal Processor）で構成されることが多い。

【００３４】

信号処理部１４は、信号処理後の音声信号を無線通信部１５に渡し、無線通信部１５に無線伝送させる。無論、このような制御は制御部１０が行うようにしてもよい。無線通信部１５は、信号処理部１４から入力した各チャンネルの音声信号を非圧縮のまま、各スピーカ機器２に無線通信で送信する。

【００３５】

さらに、本構成例のソース機器１は、ユーザ操作を受け付けてその操作信号を制御部１０に渡す操作部１６と、各種情報を表示する表示部１７と、を備える。操作部１６としては、ソース機器１の本体に設けられたボタン、リモコンからの赤外線信号やＢｌｕｅｔｏｏｔｈ等の短距離無線の信号を受信する受信部、タブレットやスマートフォンや携帯情報端末等の携帯端末装置３や設置型の端末装置から無線通信により制御信号を受信する受信部などが挙げられる。これらの受信部としては通信部１２を利用してもよい。表示部１７では、操作部１６での操作に係わる情報（例えば選択対象となるコンテンツや入力ソース、変更対象となる音量や音質などの情報）や操作部１６での操作結果を表示する。また、上記端末装置にソース機器１の機能を搭載することもでき、その場合、上記のような受信部は設けなくてもよく、また操作部１６及び表示部１７はタッチパネルで構成することもできる。

【００３６】

制御部１０は、操作信号に応じた制御信号を例えば無線通信部１５で無線搬送波に重畳するなどして、スピーカ機器２側に伝送することで、ソース機器１側からスピーカ機器２を制御することができる。

【００３７】

一方、スピーカ機器２は、その全体を制御する制御部２０を備えると共に、無線通信部２１を備える無線受信機である。制御部２０は、例えばＣＰＵ等で構成される。無線通信部２１を備えることにより、スピーカ機器２を、ソース機器１から無線通信で送信された音声信号を受信する無線受信機として機能させることができる。無線通信部１５と無線通信部２１との間の無線通信は、双方向通信であることが好ましく、音声信号のデータや上記制御信号のような制御信号（コマンド）以外に、各種のパラメータも送受信されることが好ましい。

【００３８】

ここで、無線通信部１５と無線通信部２１との間の無線通信について例を挙げる。この無線通信の一例としては、ＷｉＳＡ（Wireless Speaker and Audio）規格に基づく無線通信が挙げられる。この場合、無線通信部１５、スピーカ機器２側の無線通信部２１としては、それぞれＷｉＳＡ　Ａｓｓｏｃｉａｔｉｏｎで規格化が進められている送信側、受信側のモジュールが適用できる。ＷｉＳＡ規格とは、非圧縮のＰＣＭ（pulse code modulation）で音声信号を無線伝送する規格の一つである。ソース機器とスピーカ機器の両方に無線通信機を持ち、ソース機器からスピーカ機器に対してＷｉＦｉに準拠した通信プロトコルを用いて、非圧縮の音声を非圧縮のＰＣＭにて伝送するものである。また、スピーカ機器からソース機器にスピーカ機器の各仕様情報等のパラメータを送信できる。

【００３９】

ＷｉＳＡ規格を用いた一つの仕様（実装方法）を本構成例に適用して説明する。ソース機器１には信号処理部１４にイコライザを内蔵しており、ソース機器１内で周波数イコライジング処理（又はルームイコライジング処理）を施すことで、音声の特性を調整、補正する。このような補正は、各スピーカ機器２のスピーカ特性（例えばどのチャンネル用のスピーカであるか、周波数特性はどのようなものかなど）に合うように実施することが好ましい。なお、スピーカ特性に合わせる場合、そのスピーカ特性は予めソース機器１の内部に格納しておいてもよいが、各スピーカ機器２又は別途設けたサーバ装置に対してソー

ス機器１が問合せを行うなどして取得するようにしてもよい。

【００４０】

補正後、ソース機器１は、各スピーカ機器２に対して、イコライジング処理後の各チャンネルの音声信号（これが原音となる）を非圧縮の音声データとして無線送信する。スピーカ機器２は、受信した音声信号を加工することなく出力する。若しくは、全てのスピーカ機器２に対して共通データ（全チャンネル分の音声信号のデータ）として時分割などで多重化して無線送信する。つまり、無線送信は、区分けされることなく共通のデータとして一括でブロードキャスト的又はマルチキャスト的に実行されてもよい。この場合、スピーカ機器２側は受信した全チャンネル分のデータの中から自分のチャンネルのデータを抽出することになる。

【００４１】

ＷｉＳＡの規格では、もう１つの仕様（実装方法）を採用することができる。この仕様では、使用する全チャンネルの音声信号を非圧縮、無補正（原音のまま）で、上述のようにブロードキャスト的又はマルチキャスト的に無線送信される。スピーカ機器２側は受信した全チャンネル分のデータの中から自分のチャンネルのデータを抽出することになる。このような送信方法では、スピーカ機器２側でチャンネルの選択、補正（周波数イコライジング処理又はルームイコライジング処理等を含む）の量が任意に決められるので、より自由度の高い設定が可能である。そして、このような設定は、ソース機器１側からのパラメータを指定した指示でも実行できるようになっている。スピーカ機器２は、後述の信号処理部２２内に周波数イコライジング処理又はルームイコライジング処理を施すイコライザを有しており、受信した音声信号に対し、受信したパラメータに従ったイコライジング処理（音質調整）を施し、処理後の音声信号が示す音声を出力することになる。

【００４２】

なお、双方の実装方法を適用し、ソース機器１で音声の補正を行うと共に、スピーカ機器２側にそのスピーカ機器２毎にパラメータを指定した指示を行うように構成することもできる。また、ＷｉＳＡ規格のモジュールを採用しない場合でも、無線通信部１５は、各チャンネルの音声信号を多重化してから全てのスピーカ機器２に対して無線送信してもよいし、各スピーカ機器２の無線通信部２１と一対一で対象チャンネルの音声信号のみを無線通信するようにしてもよい。

【００４３】

本構成例のスピーカ機器２は、スピーカ部２５を備えると共に、信号処理部２２、音量調整部２３、及びアンプ部（ＡＭＰ）２４を備える。信号処理部２２は、無線通信部２１で受信した音声信号に対し、例えば各種フィルタ処理等の所定の信号処理を施し、音量調整部２３に出力する。また、信号処理部２２では、上記所定の信号処理の前又は後に、音声信号をデジタル信号からアナログ信号に変換するためのＤ／Ａコンバータ（ＤＡＣ）を有する。なお、このＤＡＣは音量調整部２３側に設けられていてもよい。

【００４４】

ここで、上記所定の信号処理に必要なパラメータは、信号処理部２２（又は制御部２０）の内部のメモリなどに格納されており、必要に応じて読み出される。また、制御部２０又は信号処理部２２は、ソース機器１からの上記操作信号に応じた制御信号に基づき、及び／又は後述の操作部２６で受け付けたユーザ操作に基づき、上記のパラメータを書き換えることが可能なように構成してもよい。

【００４５】

音量調整部２３は、入力した音声信号をＡＭＰ２４に渡すと共に、ＡＭＰ２４を調整することでスピーカ部２５から出力する音声の音量を調整する。ＡＭＰ２４は、音量調整部２３を介して信号処理部２２から出力された音声信号を増幅し、スピーカ部２５に出力する。

【００４６】

そして、スピーカ機器２は、ユーザ操作を受け付けてその操作信号を制御部２０に渡す操作部２６を備える。操作部２６としては、例えば、スピーカ機器２の本体に設けられた

ボタンや通信部２７が挙げられる。通信部２７は、リモコンからの赤外線信号やＢｌｕｅｔｏｏｔｈ等の短距離無線の信号を受信する受信部。タブレットやスマートフォンや携帯情報端末などの携帯端末装置３や設置型の端末装置から無線通信により制御信号を受信する受信部などを指す。なお、通信部２７で受信する信号を送信する側の機器は、ソース機器１側の操作部１６の例として挙げた受信部で受信する信号を送信する側の機器と共通化を図ることが好ましい。

【００４７】

また、スピーカ機器２には表示部１７と同様に各種情報を表示する表示部も併設することが好ましい。これにより、操作部２６での操作に係わる情報（例えば選択対象となるコンテンツや入力ソース、変更対象となる音量や音質などの情報）や操作部２６での操作結果を表示することが可能になる。

【００４８】

そして、本発明の主たる特徴として、スピーカ機器２は、操作部２６でユーザ操作を受け付け、そのユーザ操作が示す操作信号に応じて変更された音声信号を出力する。スピーカ機器２は、通信部２７で例示した受信部を備え、その受信部で、上記ユーザ操作が示す上記操作信号を無線通信で携帯端末装置３から受信することが好ましい。これにより、ユーザは手元で操作できるため、操作性を向上させることができる。無論、スピーカ機器２に設けた操作ボタン等の他の操作部２６で上記ユーザ操作を受け付けるようにしてもよい。

【００４９】

変更対象の音声信号は、本システム内に含まれる複数のスピーカ機器に対して送信される音声信号であるため、上記の変更は、ユーザ操作を受け付けたスピーカ機器２と共に同じ音場を形成するスピーカ機器群に対して反映されることになる。特に、本システム内の全てのスピーカ機器２を複数のスピーカグループにグループ分けする場合にも同様に、上記の変更は同じ音場を形成する（同グループの）スピーカ機器群に対して反映されることになる。

【００５０】

本発明では、スピーカ機器２が変更された音声信号の出力を行えばよい。よって、この変更は、ソース機器１側で実行してもよいし、スピーカ機器２側で実行してもよいし、両者が協働して実行してもよい。また、ソース機器１側では、上記操作信号に応じて、最終的に音声信号又は音声信号処理用パラメータのいずれかを変更するものとする。

【００５１】

このような変更方法のうち、本実施形態では、この変更をソース機器１が主体となって行うものとする。そのため、スピーカ機器２が上記操作信号をソース機器１に送信する。そして、ソース機器１が、スピーカ機器２から上記操作信号を受信し、その操作信号に基づき、上記複数のスピーカ機器２に出力させるための音声信号又は音声信号処理用パラメータを変更し、各スピーカ機器２に送信する。この送信は無線通信部１５により行うが、音声信号処理用パラメータは別経路で送信してもよい。

【００５２】

上記操作信号の送信について具体的に説明する。本実施形態では、上記ユーザ操作はソース機器１を操作するためのユーザ操作であり、以下、区別のために「ソース機器操作」と呼ぶ。操作部２６がこのソース機器操作を受け付け、制御部２０がそのソース機器操作を示す操作信号を解釈し、その操作信号をそのまま、或いは必要に応じてソース機器１に渡すための操作信号に変換して、ソース機器１に送信する。この送信は、無線通信部２１を用いて無線搬送波に重畳させることで実施することが好ましいが、スピーカ機器２及びソース機器１に別途、有線又は無線通信を行う通信部を設けて、その通信部で送信してもよい。この通信部としては通信部２７や通信部１２を利用することもできる。但し、スピーカ機器２の配置のし易さなどの理由から、スピーカ機器２は無線通信で上記操作信号をソース機器１に送信することが好ましいと言える。

【００５３】

ソース機器１は、スピーカ機器２から送信されたソース機器操作を示す操作信号を受信する。そして、ソース機器１の信号処理部１４は、受信した上記操作信号に基づき、本システム内の複数のスピーカ機器２のうちの上記操作信号の送信元であるスピーカ機器２が属するスピーカグループに出力させるための、音声信号又は音声信号処理用パラメータを変更する。無論、スピーカグループが１つしか存在しない場合には、送信元を判定せずに全てのスピーカ機器２に出力させるための音声信号又は音声信号処理用パラメータを出力することもできる。以下、基本的にスピーカグループにグループ分けした例を挙げるが、グループ分けしない場合にはこのように送信元の判定等を省略することができる。

【００５４】

音声信号処理用パラメータとは、信号処理部２２で所定の信号処理に用いるパラメータを指し、複数のパラメータのうち少なくとも１つが変更されればよい。ソース機器１の無線通信部１５は、このように変更した音声信号又は音声信号処理用パラメータを、上記スピーカグループに無線通信で送信する。他のスピーカグループに属するスピーカ機器２については、上記操作信号によっては音声信号や音声信号処理用パラメータを変更しない。

【００５５】

上記スピーカグループに属するスピーカ機器２の無線通信部２１は、このようにして変更された当該スピーカグループ用の音声信号又は音声信号処理用パラメータを、ソース機器１から無線通信で受信する。そして、このスピーカ機器２では、受信した音声信号が示す音声をスピーカ部２５から出力する。

【００５６】

ソース機器１で変更されたものが音声信号である構成を採用する場合、スピーカ機器２ではそのままその音声信号を出力すれば済む。一方で、変更されたものが音声信号処理用パラメータである構成を採用する場合、スピーカ機器２では、その音声信号処理用パラメータで信号処理部２２又は制御部２０内の上記メモリに格納されたパラメータを書き換え、書き換え後のパラメータを用いて、その後（又は同時に）に受信する音声信号に対して所定の信号処理を施せばよい。これにより音声信号が変更された場合と同様の音声出力が可能である。

【００５７】

本システムのより具体的な例について、図２Ａ～図５を参照しながら説明する。図２Ａは本システムにおける機器配置の一例を示す模式図、図２Ｂは図２Ａの機器配置における各機器を示す図、図３Ａ～図３Ｃは本システムにおいて送信、再生される音声信号のチャンネルの例を示す図である。

【００５８】

図２Ａ，図２Ｂで例示するシステムは、ソース機器１が設置された部屋（オーディオ部屋）に６つのスピーカ機器ＳＰ１～ＳＰ６が設置され，離れた部屋（居間）に２つのスピーカ機器ＳＰ７，ＳＰ８が設置されている。ＳＰ１～ＳＰ８はいずれもスピーカ機器２であるが、そのスピーカ特性などが異なる。無論、同じスピーカ特性のスピーカ機器も含まれていてもよい。この例では、スピーカ機器ＳＰ１，ＳＰ２，ＳＰ３，ＳＰ４，ＳＰ５，ＳＰ６，ＳＰ７，ＳＰ８のそれぞれがセンタ（Ｃ）、フロントの左（Ｌ）、フロントの右（Ｒ）、サラウンドの左（ＬＳ）、サブウーファ（ＬＦＥ）、サラウンドの右（ＲＳ）、左（Ｌ）、右（Ｒ）のチャンネル用のスピーカ機器であるものとする。

【００５９】

そして、スピーカ機器ＳＰ１～ＳＰ６はスピーカグループ（以下，単に「グループ」とも呼ぶ）Ｎｏ．０（２ａ）、スピーカ機器ＳＰ７，ＳＰ８はグループＮｏ．１（２ｂ）に分類されている。その分類された情報をソース機器１の制御部１０（又は信号処理部１４など）内のメモリなどに格納しておくことで、ソース機器１はあるスピーカ機器がグループ２ａ，２ｂのいずれに属するかを認識することができる。よって、ソース機器１がソース機器操作を示す操作信号を受信した場合でも、その操作信号を送信したスピーカ機器２に固有の情報を含めておくだけで、そのスピーカ機器２がどのグループに属するかを特定することができる。上記分類された情報は、例えばチャンネルマップ（チャンネルマップ

ケーブル）をどのように接続されていればよい。２つのダルーブに分けた例のみ挙げるが、３つ以上でも同様の考え方が適用できる。

【０００６０】

このシステムにおいて、図３Ａで例示するようにソース機器１が８つのスピーカ機器Ｓｐ１～Ｓｐ８のうち全てに共通データ（全チャンネル分の音声信号のデータ）を送信する場合について説明する。このとき、ダルーブ２ａに属するスピーカ機器Ｓｐ１，Ｓｐ２，Ｓｐ３，Ｓｐ４，Ｓｐ５，Ｓｐ６がそれぞれチャンネルＣ，Ｌ，Ｒ，ＬＳ，ＬＦＥ，ＲＳの音声信号を抽出してその音声を出力し、ダルーブ２ｂに属するスピーカ機器Ｓｐ７，Ｓｐ８がそれぞれチャンネルＬＳ，Ｌ，Ｃ，Ｒ，ＲＳの音声信号を抽出してそれぞれ左用（Ｌａ），右用（Ｒａ）の音声信号を生成（ダウンミックス）し出力する。

【０００６１】

次に、図３Ｂで例示するように、ソース機器１が６つのスピーカ機器Ｓｐ１～Ｓｐ６用のＬＴＣＰの音声信号と、２つのスピーカ機器Ｓｐ７，Ｓｐ８用の第２ＬＴＣＰのデータ（２つのＬＴＣＰのうちの全チャンネル分の音声信号のデータ）を送信する場合について説明する。このとき２つのＬＴＣＰの同時配信については、ソース機器１のチャンネルのストリームＣ，Ｌ，Ｒ，ＬＳ，ＬＦＥ，ＲＳ，Ｌａ，Ｒａ（５．１ｃｈ以上のｃｈ用が２つあってもよい）、つまり解像度１０、音声入力処理部１３、及び信号処理部１４の処理能力や無線通信部１５の処理能力（通信帯域など）が２つのＬＴＣＰの配信に対応していれば可能である。

【０００６２】

この場合、ダルーブ２ａに属するスピーカ機器Ｓｐ１，Ｓｐ２，Ｓｐ３，Ｓｐ４，Ｓｐ５，Ｓｐ６がそれぞれ第１ＬＴＣＰのチャンネルＣ，Ｌ，Ｒ，ＬＳ，ＬＦＥ，ＲＳの音声信号を抽出してその音声を出力し、ダルーブ２ｂに属するスピーカ機器Ｓｐ７，Ｓｐ８がそれぞれ第２ＬＴＣＰのチャンネルＬＳ，Ｌ，Ｃ，第２ＬＴＣＰのチャンネルＲ，ＲＳの音声信号を抽出してそれらの音声信号から第２ＬＴＣＰの左用（Ｌａ），右用（Ｒａ）の音声信号を生成（ダウンミックス）して出力する。

【０００６３】

図３Ｃで例示するように、ソース機器１が６つのスピーカ機器Ｓｐ１～Ｓｐ６用の第１ＬＴＣＰのデータの音声信号と、２つのスピーカ機器Ｓｐ７，Ｓｐ８用の第２ＬＴＣＰのデータの左用（Ｌａ），右用（Ｒａ）のチャンネルの音声の共通データを送信する場合について説明する。この場合、まず、第２ＬＴＣＰについては、ソース機器１側で上述のような左右ＬＲチャンネルを生成し、第２ＬＴＣＰのデータチャンネルＬａ，Ｒａの音声信号を生成しておく。ダルーブ２ａでの音声出力については図３Ｂの場合と同様である。ダルーブ２ｂに属するスピーカ機器Ｓｐ７，Ｓｐ８は、それぞれ第２ＬＴＣＰのデータチャンネルＬａ，Ｒａの音声信号を抽出してその音声を出力する。

【０００６４】

図３Ｂ，図３Ｃの例では２つのＬＴＣＰを多重化して配信する例を挙げたが、これらのＬＴＣＰデータはソース機器１から１つのソース機器１以外からも受信したものに限らない。上述したように、ソース機器１は、通信部１２と音声入力端子１１の双方からＬＴＣＰを取得できるように構成してもよいし、通信部１２で２種類のソース機器１がそれぞれのＬＴＣＰを配信するようにしてもよい。いずれの場合であっても２つ以上のＬＴＣＰを配信することを可能とするために、端末識別部１５における各ＬＴＣＰを識別する能力（つまり識別のコンテンツを処理する能力）が必要となる。

なお、図３Ａ～図３Ｃと異なり、ソース機器１と各スピーカ機器２とが一対一で通信することも可能である。

【０００６５】

そして、上記ソース機器構成は、ソース機器１から出力させる音声信号が示す音声の特性（特徴）を変更する操作、すなわち音質を変更する操作を含むことが好ましく、このよ

うな場合の処理例について、図４，図５を参照しながら説明する。図４，図５は本システムにおける音質変更処理手順の例を説明するためのシーケンス図である。ここで音質の変更は、周波数特性を変更する操作や他の音声特性を変更する操作が挙げられる。周波数特性の変更は予め複数用意した音楽モード（音質モード或いはサウンドモードとも呼べる）を変更することでも実現させることができる。

【００６６】

図４に基づき、図３Ａのようにスピーカ機器２側で音声信号の補正（ダウンミックス以外の補正も含む）を行い、且つスピーカ機器ＳＰ８で音質変更操作を受け付ける例について説明する。まず、ユーザが携帯端末装置３にインストールした音質変更アプリケーション（以下、アプリと言う）を起動する（ステップＳ１）。このアプリは起動して、事前に設定した或いはそのときにユーザ設定された通信先と通信部２７を介して無線通信する。この無線通信では、まず、アプリが音質設定データをスピーカ機器ＳＰ８に対して要求する（ステップＳ２）。

【００６７】

なお、Ｂｌｕｅｔｏｏｔｈなどは一対一の無線通信であるため問題ないが、赤外線通信などを採用する場合、同じ部屋に設置されたスピーカ機器ＳＰ７，ＳＰ８の双方でこの要求を受信し、後述のステップＳ３の処理を双方でしてしまうことも考えられる。この場合には、例えば後述のステップＳ３，Ｓ４の処理の際に、そのように同じグループ内のスピーカ機器から同じ指示を受信した場合には、ＩＤの最も若いものを採用し他のＩＤの指示を無視するなど、調停を行えばよい。また、例えば同じグループに属するスピーカ機器群のうちマスタとして１台だけに通信部２７を設ける（又はソース機器操作を無視しないようにする）ことで、このような調停や上述した事前設定を行わないで済むようになる。

【００６８】

スピーカ機器ＳＰ８は、通信部２７においてこの要求を受信すると、無線通信部２１を介してソース機器１に対して音質設定データ（音声信号処理用パラメータ）を送付するよう指示する（ステップＳ３）。ここでは、ソース機器１に自身の固有情報を付加した状態で指示を行う。ソース機器１はその固有情報からスピーカ機器ＳＰ８が送信元であると判定し、送信元が属するグループ２ｂについての音質設定データを、無線通信部１５で返信する（ステップＳ４）。このように音質設定データをソース機器１から取得する理由は、本処理例ではソース機器１で各グループの音質設定データを管理しているためである。

【００６９】

その返信を受けたスピーカ機器ＳＰ８は携帯端末装置３に音質設定データを送信し（ステップＳ５）、アプリがそれを認識し、変更可能な音質設定データをＧＵＩ（Graphical User Interface）画像（図示せず）で表示させ、ユーザから音質変更操作を受け付ける（ステップＳ６）。変更可能な音質設定データとしては、例えば周波数特性やそのグループにおける各チャンネルの音声のバランスなどが挙げられる。その後、アプリはスピーカ機器ＳＰ８に対して音質変更を要求し（ステップＳ７）、スピーカ機器ＳＰ８がソース機器１に自身の固有情報を付加した状態で音質変更指示を送信する（ステップＳ８）。

【００７０】

ソース機器１は、その固有情報からスピーカ機器ＳＰ８が送信元であると判定し（或いはステップＳ３，Ｓ４の時点で判定し）、送信元が属するグループ２ｂについての音質設定データを更新する（ステップＳ９）。本処理例ではスピーカ機器２側で音声信号の補正を行うようになっているため、ソース機器１はステップＳ９に伴い、スピーカ機器ＳＰ７，ＳＰ８に対して音質変更要求を送信する（ステップＳ１０，Ｓ１１）。この音質変更要求には、ユーザが操作した音質に係る変更後のパラメータとそのパラメータの更新要求を含んでおけばよい。これにより、スピーカ機器ＳＰ７，ＳＰ８では信号処理部２２用の所定の信号処理のパラメータを更新することで、音質を変更することになる。

【００７１】

最後に、ソース機器１は音質変更完了通知をスピーカ機器ＳＰ８に対して送信し（ステップＳ１２）、スピーカ機器ＳＰ８がそれを受けて携帯端末装置３に音質変更完了通知を

送信し（ステップＳ１３）、アプリがその通知を表示させる（ステップＳ１４）。なお、グループ２ｂに属さないスピーカ機器ＳＰ１～ＳＰ６については音質変更要求を送らない。結果として、グループ２ｂのスピーカ機器群のみ音質が変更され、グループ２ａのスピーカ機器群は音質変化がなく、操作した部屋以外の部屋の聴取者は操作していないのに音質が変わるなどの違和感無く聴取を続けられる。

【００７２】

図５に基づき、図４の処理例において、音声信号処理用パラメータとしてグループ用とスピーカ機器個別用とが存在し、グループ（全体）の音声信号処理用パラメータがソース機器１で管理され、且つ個別の音声信号処理用パラメータが各スピーカ機器ＳＰ７，ＳＰ８のそれぞれで独自に管理されているような例について説明する。

【００７３】

まず、ステップＳ１～Ｓ３と同様の処理がなされる（ステップＳ２１～Ｓ２３）。次いで、ソース機器１は、送信元が属するグループ２ｂに属するスピーカ機器ＳＰ８，ＳＰ７に対して、個別の音質設定データ（音声信号処理用パラメータ）を要求する（ステップＳ２４，Ｓ２５）。その要求に対してスピーカ機器ＳＰ８，ＳＰ７が個別の音質設定データを返信する（ステップＳ２６，Ｓ２７）。そして、ソース機器１は、ステップＳ２３への応答として、グループ２ｂ全体の音質設定データとスピーカ機器ＳＰ７，ＳＰ８についての個別の音質設定データを、スピーカ機器ＳＰ８に返信する（ステップＳ２８）。

【００７４】

その返信を受けたスピーカ機器ＳＰ８は携帯端末装置３にそれらの音質設定データを送信し（ステップＳ２９），アプリがそれを認識し、変更可能な音質設定データをＧＵＩ画像（図示せず）で表示させ、ユーザから音質変更操作を受け付ける（ステップＳ３０）。変更可能な音質設定データとしては、例えばそのグループにおける周波数特性やそのグループにおける各チャンネルの音声のバランスや、スピーカ機器個別の周波数特性などが挙げられる。その後、アプリはスピーカ機器ＳＰ８に対して音質変更を要求し（ステップＳ３１），スピーカ機器ＳＰ８がソース機器１に自身の固有情報を付加した状態で音質変更指示を送信する（ステップＳ３２）。

【００７５】

ソース機器１は、その固有情報からスピーカ機器ＳＰ８が送信元であると判定し（或いはステップＳ２３，Ｓ２４の時点で判定した結果を利用し），送信元が属するグループ２ｂについての音質設定データを更新する（ステップＳ３３）。本処理例でも図４の処理例と同様にスピーカ機器２側で音声信号の補正を行うようになっているため、ソース機器１はステップＳ３３に伴い、スピーカ機器ＳＰ７，ＳＰ８に対して音質変更要求を送信する（ステップＳ３４，Ｓ３５）。この音質変更要求には、ユーザが操作した音質に係る変更後のパラメータとそのパラメータの更新要求を含んでおけばよい。これにより、スピーカ機器ＳＰ７，ＳＰ８では信号処理部２２用の所定の信号処理のパラメータを更新することで、音質を変更することになる。

【００７６】

最後に、図４のステップＳ１２～Ｓ１４と同様の処理が実行される（ステップＳ３６～Ｓ３８）。図５の処理例でも、グループ２ｂに属さないスピーカ機器ＳＰ１～ＳＰ６については音質変更要求を送らないため、図４の処理例と同様に聴取者に違和感を与えることがない。また、図５の処理例の代替処理として、グループ全体用の音質変更（例えばサウンドモード変更）については、携帯端末装置３がソース機器１に直接指示し、個別用の音質変更は図４の処理例を適用するように構成してもよい。

【００７７】

以上のように図２Ａのシステムでは、部屋毎にスピーカグループを構築しておき、複数の部屋で同じコンテンツを聴取しているが、自分のいる部屋にあるスピーカグループのみについて音質変更などのソース機器操作ができ、他の部屋のスピーカグループから出力される音声にその操作が影響することがない。つまり、このシステムでは、部屋毎に音質を容易に変更させることができる。家庭での部屋を例に挙げたが、これに限らずスピーカグ

ループ（スピーカシステム）の設置場所毎の処理が可能である。例えば、レストランの個室毎に異なるスピーカグループとして、個室毎に異なる特性の音声を出力することもできる。なお、携帯端末装置３等の端末装置にソース機器１の機能を搭載する場合にも、ソース機器１を持ち歩いて、スピーカグループの設置場所に行き、その設置場所の音質だけを変更することもできる。

【００７８】

この例のように、本システムでは、音質変更操作など音声を変更する操作をスピーカ機器側からでき、ユーザ利便性を向上させることができる。特に、本システムに含まれる複数のスピーカ機器２を複数のグループに分けてグループ毎に音声信号を再生する場合に、スピーカ機器２側での操作によりグループ個別に音質を変更することができ、有益となる。換言すれば、このような音質の変更は、複数のチャンネルについてソース機器１から送信される音声信号、例えばチャンネルが多重化されてブロードキャスト又はマルチキャスト的に送信された音声信号に対して行うことが特に有益となる。

【００７９】

以上、本実施形態について図１の構成例を挙げて説明したが、本システムはこれに限ったものではなく、例えば以下のような応用例も適用できる。例えば、携帯端末装置３の上述のようなアプリのＧＵＩ画像に（又は各スピーカ機器の操作ボタンとして）、システム内の全スピーカ機器に対する操作ボタンと、そのグループに属する全スピーカ機器に対する操作ボタンの双方を設けておくことで、ユーザは変更対象を選択して操作することができる。

【００８０】

また、１台のスピーカ機器につきスピーカ部２５として１つのスピーカユニットを備えることを前提に説明したが、１台のスピーカ機器（内部に１つの無線通信部２１を備える）はスピーカユニットを複数配列したようなスピーカアレイ機器であってもよいし、例えば高音域用、中音域用、低音域用の３つのスピーカユニット（トゥイータ、ミッドレンジ、ウーファ）などの複数のスピーカユニットを備えたスピーカ機器であってもよい。さらに、１台のスピーカ機器は、スピーカ部２５（又はＡＭＰ２４及びスピーカ部２５）が他の部位と別筐体で構成されていてもよいし、その場合、操作部２６はスピーカ部２５側に付属するように構成することもできる。これらの構成を採用する場合、基本的に筐体間は有線で接続を行っておけばよい。

これらの応用例は、無論、後述する他の実施形態でも同様に適用できる。

【００８１】

（第２の実施形態）

本発明の第２の実施形態について、第１の実施形態との相違点を中心に説明するが、第１の実施形態の様々な例が適用できる。

【００８２】

本実施形態における上記ソース機器操作は、ソース機器１から音声信号として出力させるコンテンツを選択する操作、そのコンテンツの再生状態を変更する操作のうち、いずれかを含むものとする。つまり、本実施形態では、上記ソース機器操作としてコンテンツに関する操作をスピーカ機器２で受け付け可能としておく。無論、スピーカ機器２では、第１の実施形態で説明した音質を変更する操作も受け付け可能に構成しておいてもよい。また、以下の例はコンテンツの再生状態（再生、停止、一時停止、早送り、早戻しなど）を変更する操作にも同様に適用できる。

【００８３】

図３Ｂ，図３Ｃのようにソース機器１から２つのコンテンツを配信し、且つスピーカ機器ＳＰ８でコンテンツ切換操作を受け付ける例について説明する。このような処理例は、基本的に図４の処理例（但し、ステップＳ１０、Ｓ１１は不要）において、「音質変更」が「コンテンツ変更（選択）」に置き換わり、「音質設定データ」が「コンテンツ」に置き換わった処理となる。

【００８４】

簡単に説明すると、ステップＳ１でコンテンツ変更アプリを起動し、そのアプリがステップＳ２～Ｓ５のようにして現在のコンテンツ及び再生可能なコンテンツに関する情報を取得し、ステップＳ９でユーザが再生させるコンテンツを変更する操作を行う。この情報としては、コンテンツ名が挙げられるが、コンテンツのソースの切り換えも考慮した場合にはコンテンツサーバ名（ソース名）なども含めておけばよい。そして、そのアプリがステップＳ７，Ｓ８のようにコンテンツ変更をスピーカ機器ＳＰ８に要求し、ステップＳ９でソース機器１がコンテンツを変更する。なお、変更通知は、その通知内容以外はステップＳ１２～Ｓ１４と同様となる。

【００８５】

再生対象コンテンツの変更時の処理について補足する。ソース機器１の制御部１０は、そのグループ２ｂに属するスピーカ機器ＳＰ７，ＳＰ８の再生用にコンテンツを新たなものに切り換える指示を音声入力処理部１３に送り、音声入力処理部１３が現在出力しているコンテンツのソースに対し、音声入力端子１１又は通信部１２を介してコンテンツの切り換えを指示する。この指示を受けて切り換え後のコンテンツが再生され、音声入力処理部１３及び信号処理部１４を経て無線通信部１５から配信される。なお、図３Ｂの場合にはダウンミックスされずに配信され、図３Ｃの場合にはダウンミックス後に配信される。

【００８６】

スピーカ機器ＳＰ７，ＳＰ８は配信された共通データを受信して、図３Ｂの場合には自身のための音声データを抽出後にダウンミックスして出力し、図３Ｃの場合には自身のためのダウンミックス済みの音声データを抽出して出力する。一方、スピーカ機器ＳＰ１～ＳＰ６では従来再生されていたコンテンツをそのまま抽出して再生することになる。結果として、グループ２ｂのスピーカ機器群のみコンテンツ切換が起こり、グループ２ａのスピーカ機器群は従来のコンテンツを出力続けることになるため、操作した部屋以外の部屋の聴取者は操作していないのにコンテンツが変わるなどの違和感無く聴取を続けられる。

【００８７】

ここで、スピーカ機器ＳＰ７，ＳＰ８での音声出力に関して補足する。ソース機器操作によって生じるコンテンツ切換であるか否かに拘わらず、複数のコンテンツを連続して再生させる場合には、コンテンツ間でチャンネル数が切り換わる場面がある。この場面では、チャンネル数の変化に対応して音質も変わるため、一対一で通信する場合にもダウンミックス等の補正処理により、スピーカ機器２に応じて送信する音声信号を変えれば済む。この補正処理は、ソース機器１でそのチャンネル数の情報を得てそれに応じて実行すればよい。

【００８８】

一方で、ブロードバンド的又はマルチキャスト的に配信する場合には、スピーカ機器２側でそのまま特定のチャンネルの音声を抽出して出力させるように、スピーカ機器２が自身で抽出するチャンネルを固定しておくこともできる。しかし、音質の変化に対応させるために、この場合にも同様に、ソース機器１側で必要に応じてダウンミックス等の補正処理により、それに合った音声信号を生成しておくことが望ましい。

【００８９】

ブロードバンド的又はマルチキャスト的に配信する場合において、チャンネル数の変化に伴う音質の変化に対処するための他の方法として、スピーカ機器２で抽出するチャンネルを固定しないようにすることもできる。図３Ｂの例を適用したスピーカ機器ＳＰ７，ＳＰ８のように、スピーカ機器２側でダウンミックス等の補正処理を行う場合には特にこのような可変処理は有益となる。

【００９０】

上記可変処理は、ソース機器１でそのチャンネル数の情報を得るだけでなく、スピーカ機器に対してチャンネル数の情報を送信するなどして切り換え後のチャンネル数（又は抽出すべきチャンネルを示す情報）を、再生開始前にスピーカ機器ＳＰ７，ＳＰ８に対して通知すればよい。これにより適切な音声を出力できる。

【００９１】

また、コンテンツの切り換わり時に音声出力を一旦ミュートするなどして、コンテンツの切り換わりにおけるギャップ（ノイズ）音を消去することもできる。例えば、まず、コンテンツの切り換え通知を、新たなコンテンツの無線送信開始前（好ましくはコンテンツ変更指示を受けた直後）にスピーカ機器ＳＰ７，ＳＰ８に対して無線送信して、スピーカ機器ＳＰ７，ＳＰ８がミュートを実行する。次いで、ソース機器１が新たなコンテンツの無線送信を開始し、その後、コンテンツの切り換え完了通知を行い、スピーカ機器ＳＰ７，ＳＰ８がミュートを解除すればよい。これにより、適切な音声を出力できるだけでなく、ギャップ音の出力を防止することもできる。

【００９２】

また、図３Ａのように１つのコンテンツしか出力していない状態でコンテンツ切換操作があった場合には、ソース機器１が新たなコンテンツを取得し、新たなチャンネルスロットを用いて図３Ｂ，図３Ｃのように共通データに加えて配信するなどすればよい。

【００９３】

なお、ソース機器１が２種類以上のソースからコンテンツを取得できるように構成されている場合、コンテンツのスキップは１つのソースの最初、最後のコンテンツに対し、それぞれ前、後へのスキップ操作により、同じソースの最後、最初に戻るようにしてもよいが、前、後のソースの最初のコンテンツに切り換えるようにしてもよい。また、前者を採用し、後者の操作はコンテンツ選択操作に属するソース切換操作として別途定義しておいてもよい。

【００９４】

以上のように、図２Ａのシステムでは、部屋毎にスピーカグループを構築しておき、複数の部屋で同じコンテンツを聴取しているが、自分のいる部屋にあるスピーカグループのみコンテンツの変更などといったソース機器操作ができ、他の部屋のスピーカグループから出力される音声にその操作が影響することがない。つまり、このシステムでは、部屋毎など、スピーカシステムの設置場所毎にコンテンツを容易に変更させることができる。

【００９５】

（第３の実施形態）

本発明の第３の実施形態について、図６を併せて参照しながら説明する。図６は本実施形態に係る音声無線伝送システムにおける音質変更処理手順の一例を説明するためのシーケンス図である。本実施形態について第１の実施形態との相違点を中心に説明するが、第１の実施形態の様々な例が適用できる。

【００９６】

本実施形態ではスピーカ機器２が主体となって、自身の音声信号処理用パラメータを変更することで音声信号の変更を行うと共に、ソース機器１側ではその変更に合わせるようにソース機器１に格納された音声信号処理用パラメータの変更を行う。これにより、本システム全体としてソース機器１が少なくともシステム全体（及びグループ全体）の音声信号処理用パラメータを管理することができる。

【００９７】

具体的に説明すると、スピーカ機器２は、操作信号が示す音声信号処理用パラメータを用い、ソース機器１から受信した音声信号に対して信号処理部２２が信号処理を施し、ソース機器１にその信号処理の実行通知を送信する。この操作信号は、スピーカ機器２の操作部２６で受け付けたユーザ操作が示す操作信号であり、本実施形態ではこのユーザ操作はソース機器操作とは呼べない。また、この実行通知には変更された上記音声信号処理用パラメータを含めておけばよい。ソース機器１は、スピーカ機器２から送信された、スピーカ機器２側で変更後の上記音声信号処理用パラメータを受信し、それを更新する。

【００９８】

図６に基づき、スピーカ機器ＳＰ８，ＳＰ７のグループ２ｂで音質変更操作を受け付ける例について説明する。本実施形態では、図３Ａのようにスピーカ機器２側で音声信号の補正（ダウンミックス以外の補正も含む）を行うことになるだけでなく、その補正のためのパラメータの変更も行うことになる。

【００９９】
まず、図４のステップＳ１，Ｓ２と同様の処理が実行される（ステップＳ４１，Ｓ４２）。スピーカ機器ＳＰ８は、通信部２７において音質設定データ（音声信号処理用パラメータ）要求を受信すると、自身に格納されている音質設定データ（個別の、又は個別及びグループ全体に係わる個別の音質設定データ）を携帯端末装置３に送信する（ステップＳ４３）。同様に、アプリはスピーカ機器ＳＰ７に対しても音質設定データを要求して取得する（ステップＳ４４，Ｓ４５）。なお、Ｂｌｕｅｔｏｏｔｈなどの一対一の無線通信である場合にはアプリが通信先を切り換える必要がある。

【０１００】
アプリがステップＳ４３，Ｓ４５で送付された変更可能な音質設定データをＧＵＩ画像（図示せず）で表示させ、ユーザから音質変更操作を受け付ける（ステップＳ４６）。変更可能な音質設定データとしては、例えばスピーカ機器ＳＰ７，ＳＰ８の周波数特性やそのグループ２ｂにおける各チャンネルの音声のバランスなどが挙げられる。その後、アプリはスピーカ機器ＳＰ８，ＳＰ７のそれぞれに対して音質変更を要求する（ステップＳ４７，Ｓ４８）。

【０１０１】
その後、スピーカ機器ＳＰ８，ＳＰ７がソース機器１に自身の固有情報を付加した状態で音質を強制的に変えた旨の通知（換言すれば音質設定データの更新指示）を、無線通信部２１を介してソース機器１に送信する（ステップＳ４９，Ｓ５０）。ソース機器１はその固有情報からスピーカ機器ＳＰ８，ＳＰ７が送信元であると判定し、その送信元についての音質設定データを更新する（ステップＳ５１）。このように音質設定データをソース機器１で更新する理由は、本処理例ではソース機器１で各グループの音質設定データを管理しているためである。なお、操作されなかったスピーカ機器ＳＰ１～ＳＰ６については音質の変更がなされない。結果として、操作対象となったスピーカ機器群のみ音質が変更され、操作対象とならなかったスピーカ機器群は音質変化がなく、聴取者は操作していないのに音量が変わるなどの違和感無く聴取を続けられる。なお、ステップＳ４７～Ｓ５０の代わりに、携帯端末装置３のアプリが直接、ソース機器１の通信部１２と通信して音質設定データの更新を依頼するように構成することもできる。

【０１０２】
（第４の実施形態）
本発明の第４の実施形態として、第１～第３の実施形態に適用可能なスピーカ機器とソース機器との間の通信制御例について、図７Ａ～図１１Ｂを併せて参照しながら説明する。図７Ａ，図７Ｂ，図７Ｃはそれぞれ、本実施形態に係る音声無線伝送システムにおける通信処理に用いられる第１，第２，第３の通信方式を説明するためのシーケンス図である。図８Ａは本実施形態に係る音声無線伝送システムにおける通信処理に用いられるパケットの一例を示す図で、図８Ｂは図８Ａのパケットにおける各セクションに記述される内容の一例を示す図である。

【０１０３】
ソース機器１（無線送信機）とスピーカ機器２（無線受信機）との間における制御に関する信号の最小通信単位としては、以下の３つの形式（タイプ）の通信方式があり、一連の通信手続き（シーケンス）はこれらのタイプの組み合わせとなる。なお、上述したように音声信号は無線通信で伝送されるが、この信号は有線で伝送されてもよい。

【０１０４】
第１の通信方式としては、無線受信機が操作されることで、無線受信機が指示（Cossand）を発行し、これにより無線送信機に制御を要求する（ステップＳ７１）。無線送信機はこの指示に対し、指示応答（Cossand Response）を返す（ステップＳ７２）。第２の通信方式としては、無線送信機から無線受信機に要求（Request）を発行することで情報などを要求する（ステップＳ７３）。無線受信機はこの要求に対し、要求応答（Request Response）を返す（ステップＳ７４）。第３の通信方式としては、無線送信機が無線受信機に通知（Report）を発行することで状態変化を通知する（ステップＳ７５）。

【０１０５】
図８Ａで例示するように、これらの通信方式で用いられる通信データ形式（パケット）４１は、パケットの種別（ステップＳ７１～Ｓ７５のどの種類のパケットであるかを示す種別）、パケットのＩＤ、自アドレス、並アドレス、パラメータ長、パラメータ、巡回冗長検査値（ＣＲＣ値：Cyclic Redundancy Check Value）が含まれる。各セクションの長さや記述は、特に説明しないが、図８Ｂの表４２で例示する通りである。無論、このパケットの長さや記述に限らず、図９Ａ～図１１Ｂを参照しながら後述するパケット種別毎のパラメータ長やパラメータの記述方法は、例示するものに限ったものではない。
【０１０６】
第１の通信方式について説明する。図９Ａは図７Ａの第１の通信方式における指示に用いられるパケットの一例を示す図、図９Ｂは図９Ａのパケットにおいて記述されるＩＤ（コマンド種別）とＩＤ毎に規定されるパラメータの一例を示す図、図９Ｃは図７Ａの第１の通信方式における指示応答に用いられるパケットの一例を示す図、図９Ｄは図９Ｃのパケットにおいて記述されるＩＤ（指示種別）とＩＤ毎に規定されるパラメータの一例を示す図である。
【０１０７】
図９Ａに示すように、ステップＳ７１で使用する指示のパケット４３には、パケット種別で指示に該当する“００ｈ”が記述されている。そして、パケット４３には図９Ｂの表４４において「説明」として記載したことを意味するＩＤが付され、必要に応じてパラメータ（追加パラメータ）も付加されている。例えば図４，図５の処理例の音質設定データ送付指示（ステップＳ３，Ｓ２３）については、図示しないＩＤを設定しておけばよい。また、自アドレスによりスピーカ機器ＳＰ８からの指示であることをソース機器１が認識することができる。また、図４，図５の処理例の音質変更指示（ステップＳ８，Ｓ３２）については、サウンドモードの変更であればＩＤが“０００７”で追加パラメータが変更したいサウンドモードの値（例えばスタンダードモードであれば“１”）が付加されることになる。周波数の変更であれば、ＩＤ“０００８”で、追加パラメータとして例示するように周数と４種類のパラメータとが付加されることになる。また、図６の処理例の通知（ステップＳ４９，Ｓ５０）については、音質設定データの更新指示に該当し、同様に処理すればよい。
【０１０８】
また、第２の実施形態の処理例のコンテンツ切換指示については、ＩＤが“０００４”で、追加パラメータとして前スキップ（又は後スキップ）を示す値（図示せず）が付加されることになる。また、その応用として説明したソース機器１に入力されるソースの切り換えについては、ＩＤ“０００３”の音源選択の指示が利用できる。
【０１０９】
図９Ｃに示すように、ステップＳ７２で使用する指示応答のパケット４５には、パケット種別で指示応答に該当する“０１ｈ”が記述されている。そして、パケット４５には図９Ｄの表４６において「説明」として記載したことを意味するＩＤが付され、必要に応じてパラメータ（追加パラメータ）も付加されている。このＩＤは指示時のＩＤと同じものが用いられる。例えば図４，図５の処理例の音質設定データ送付指示（ステップＳ３，Ｓ２３）に対する応答である音質設定データ送付（ステップＳ４，Ｓ２８）については、図示しないが、音質設定データ送付指示時と同じＩＤを設定し、音質設定データを追加パラメータとして含めておけばよい。この記述方法は、例えば表４４のＩＤが“０００７”，“０００８”と同様の記述方法が採用できる。また、図４，図５の処理例の音質変更指示（ステップＳ８，Ｓ３２）に対する応答（ステップＳ１２，Ｓ３６）や図６の処理例の通知（ステップＳ４９，Ｓ５０）に対する応答（図６では図示せず）については、“０００７”又は“０００８”で、追加パラメータとして指示実行結果（音質変更の予約がなされた場合には予約済みであることを示す情報も含む）が付加される。
【０１１０】
また、第２の実施形態の処理例のコンテンツ切換指示に対する指示応答としては、ＩＤ

が“０００４”で、追加パラメータとして指示実行結果と指定操作を示す値（図示せず）が付加されることになる。指定操作を示す値とは、例えばコンテンツの前スキップであればその旨を示す値であればよい。

【０１１１】

第２の通信方式について説明する。図１０Ａは図７Ｂの第２の通信方式における要求に用いられるパケットの一例を示す図、図１０Ｂは図１０Ａのパケットにおいて記述されるＩＤ（要求種別）とＩＤ毎に規定されるパラメータの一例を示す図、図１０Ｃは図７Ｂの第２の通信方式における要求応答に用いられるパケットの一例を示す図、図１０Ｄは図１０Ｃのパケットにおいて記述されるＩＤ（要求応答種別）とＩＤ毎に規定されるパラメータの一例を示す図である。

【０１１２】

図１０Ａに示すように、ステップＳ７３で使用する要求のパケット５１には、パケット種別で要求に該当する“０２ｈ”が記述されている。そして、パケット５１には図１０Ｂの表５２において「説明」として記載したことを意味するＩＤが付され、必要に応じてパラメータ（追加パラメータ）も付加されている。例えば図４，図５の処理例の音質変更要求（ステップＳ１０，Ｓ１１，Ｓ３４，Ｓ３５）については、局数の変更であれば、ＩＤ“０００４”で、追加パラメータとして例示するように局数と４種類のパラメータとが付加されることになる。図１０Ｂでは図示しないが、音質変更がサウンドモードの変更であれば、表４４と同様にＩＤやサウンドモードの値を定めておき、そのような要求を送信すればよい。また、図５の処理例の個別音質データ要求（ステップＳ２４，Ｓ２５）については、図示しないＩＤを設定しておけばよい。

【０１１３】

図１０Ｃに示すように、ステップＳ７４で使用する要求応答のパケット５３には、パケット種別で要求応答に該当する“０３ｈ”が記述されている。そして、パケット５３には図１０Ｄの表５４において「説明」として記載したことを意味するＩＤが付され、必要に応じてパラメータ（追加パラメータ）も付加されている。このＩＤは指示時のＩＤと同じものが用いられる。例えば図４，図５の音質変更要求（ステップＳ１０，Ｓ１１，Ｓ３４，Ｓ３５）に対する応答や、図５の個別音質設定データ送付（ステップＳ２７，Ｓ２８）については、図示しないが、上述した指示実行結果と同様にＩＤ及び追加パラメータとしての要求実行結果を定義しておけばよい。

【０１１４】

第３の通信方式について説明する。図１１Ａは図７Ｃの第３の通信方式における通知に用いられるパケットの一例を示す図、図１１Ｂは図１１Ａのパケットにおいて記述されるＩＤ（通知種別）とＩＤ毎に規定されるパラメータの一例を示す図である。

【０１１５】

図１１Ａに示すように、ステップＳ７５で使用する要求のパケット６１には、パケット種別で通知に該当する“０４ｈ”が記述されている。そして、パケット６１には図１１Ｂの表６２において「説明」として記載したことを意味するＩＤが付され、必要に応じてパラメータ（追加パラメータ）も付加されている。例えば第２の実施形態の処理例において可変処理時の通知として例示したような音源情報変化の通知については、ＩＤが“００００”で、追加パラメータとしてチャンネル数などの音源の情報の変化を示す値（図示せず）が付加されることになる。

【０１１６】

（その他）

以上、本発明の各実施形態に係るシステムについて説明したが、このシステムはＷｉＳＡで前提としている技術を採用しないこともできる。例えば、ＷｉＳＡでは、スピーカ機器の１つ１つに無線で音声信号を受信できるＩＣ（Integrated Circuit）チップを搭載しているが、１つのスピーカ機器に複数の信号処理部を設けてもよい。

【０１１７】

また、図１で例示したソース機器やスピーカ機器におけるスピーカ部以外の部位は、例

メばマイクロプロセッサ（又はＤＳＰ）、メモリ、バス、インターフェイス、リモコン等の周辺装置などのハードウェアと、これらのハードウェア上にて実行可能なソフトウェアとにより実現できる。上記ハードウェアのユーザはＩＣチップとして提供することができ、その場合、上記ソフトウェアは上記メモリに記憶しておけばよい。また、本発明の各構成要素の全てをハードウェアで構成してもよく、その場合についても同様に、そのハードウェアの一部をＩＣ／ＩＣチップとして提供することも可能である。

【０１１８】

また、上述した様々な構成例における機能を実現するためのソフトウェアのプログラムコードを記録した記録媒体を、ソース機器やスピーカ機器に供給し、各装置内のマイクロプロセッサ又はＤＳＰによりプログラムコードが実行されることによっても、本発明の目的が達成される。この場合、ソフトウェアのプログラムコード自体が上述した様々な構成例の機能を実現することになり、このプログラムコード自体や、プログラムコードを記録した記録媒体（外部記録媒体や内部記憶装置）であるコードを制御側が読み出して実行することで、本発明を構成することができる。外部記録媒体としては、例えばＣＤ－ＲＯＭ又はＤＶＤ－ＲＯＭなどの光ディスクやメモリカードやハードディスクの半導体メモリなど、様々なものが挙げられる。また、プログラムコードはインターネットからダウンロード実行することや、放送波から受信して実行することもできる。

【０１１９】

以上、本発明に係る音声無線伝送システムについて説明したが、その処理の手順を説明したように、本発明は、複数のスピーカ機器と、それら複数のスピーカ機器に対して音声信号を無線通信で送信するソース機器と、を備えた音声無線伝送システムにおける音声無線伝送方法としての形態も保り得る。

【０１２０】

この音声無線伝送方法は、上記スピーカ機器が、コーヤ機作を受け付け、上記コーヤ機作が示す機作信号に応じて変更された上記音声信号を出力するステップを有する。その他の処理例については、音声無線伝送システムについて説明した通りであり、その説明を省略する。

【０１２１】

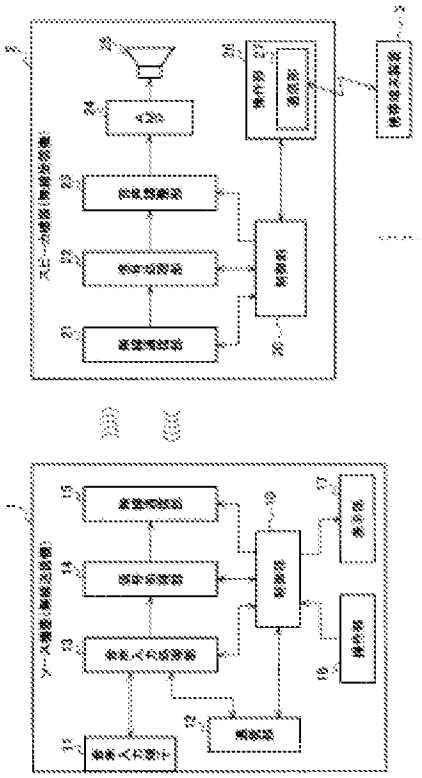
なお、上記プログラムコードは、実行すると、この音声無線伝送方法を、ソース機器の１ンピュータとスピーカ機器のコンピュータとに実行させるためのプログラムである。すなわち、このプログラムは、スピーカ機器のコンピュータに、コーヤ機作を受け付け、上記コーヤ機作が示す機作信号に応じて変更された上記音声信号を出力するステップを実行させるための受信プログラムを含む。また、上記のプログラムは、ソース機器のコンピュータに、上記音声信号又は音声信号処理用パラメータを変更するステップを実行させるための送信プログラムを含む。その他の応用例については、音声無線伝送システムについて説明した通りであり、その説明を省略する。

【符号の説明】

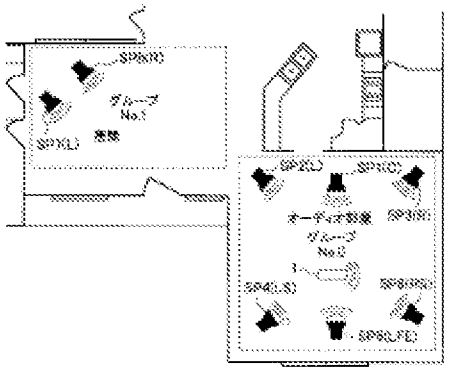
【０１２２】

１…ソース機器、２，ＳＰ１，ＳＰ２，ＳＰ３、ＳＰ４，ＳＰ５，ＳＰ６，ＳＰ７，ＳＰ８…スピーカ機器、２ａ，２ｂ…スピーカプログラム、３…携帯端末装置、１０…ソース機器の制御部、１１…音声入力端子、１２…ソース機器の通信部、１３…音声入力処理部、１４…ソース機器の信号処理部、１５…ソース機器の無線通信部、１６…ソース機器の操作部、１７…表示部、２０…スピーカ機器の制御部、２１…スピーカ機器の無線通信部、２２…スピーカ機器の信号処理部、２３…音量調整部、２４…アンプ部（ＡＭＰ）、２５…スピーカ部、２６…スピーカ機器の操作部、２７…スピーカ機器の通信部。

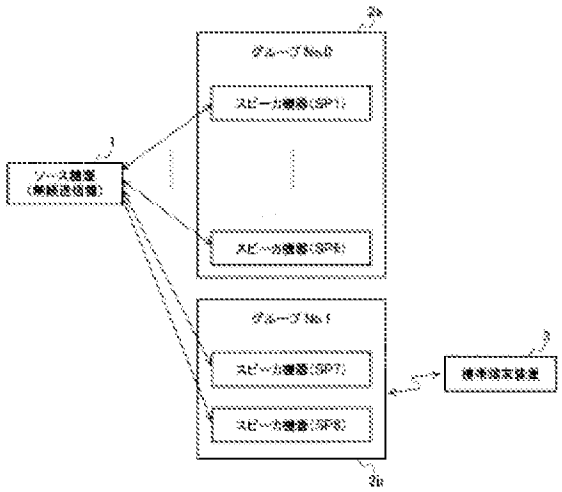
【図１】



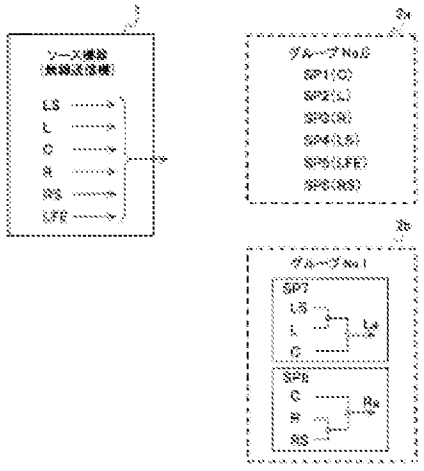
【図２Ａ】



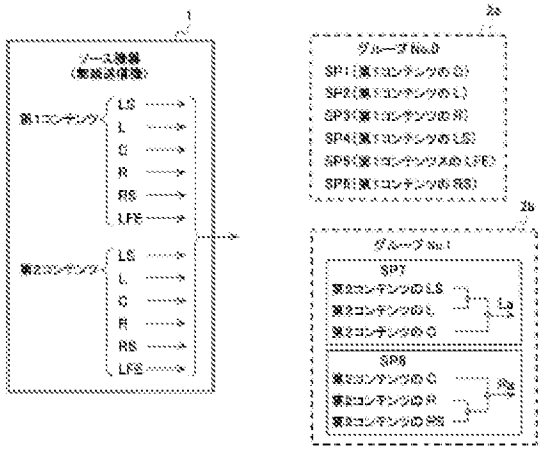
【図２Ｂ】



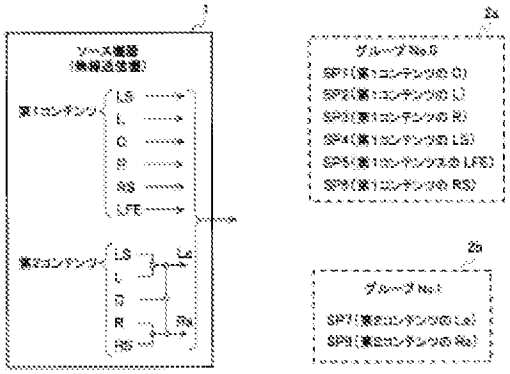
【図３Ａ】



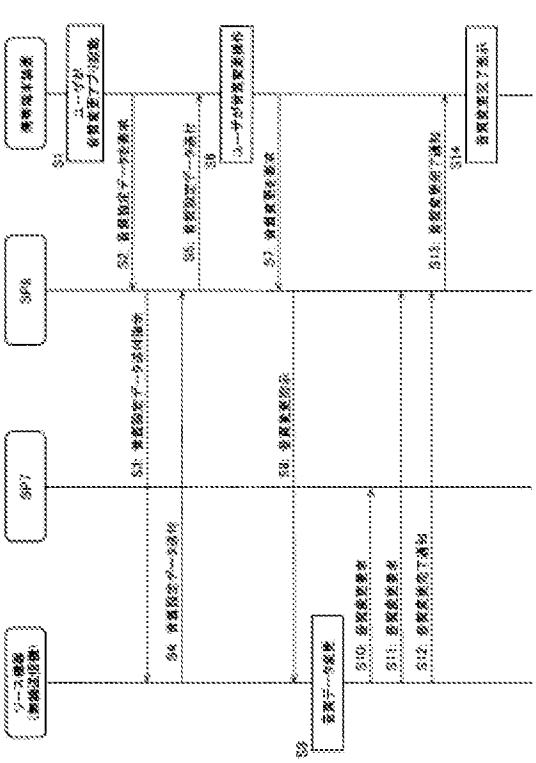
【図３Ｂ】



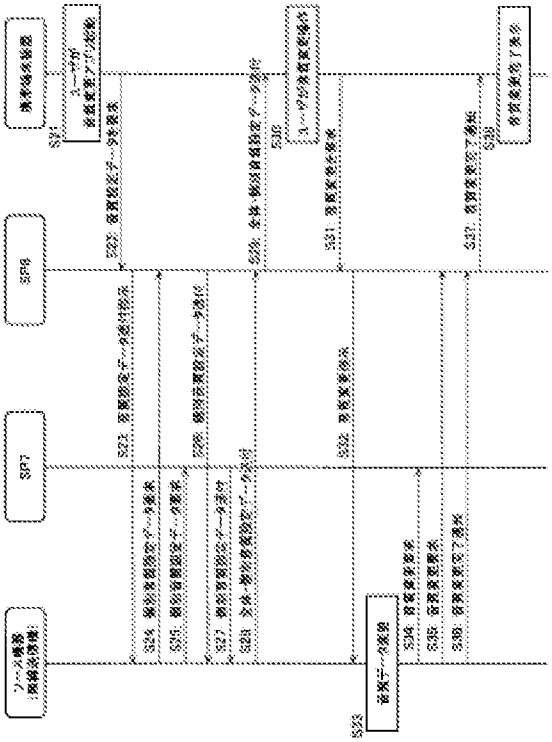
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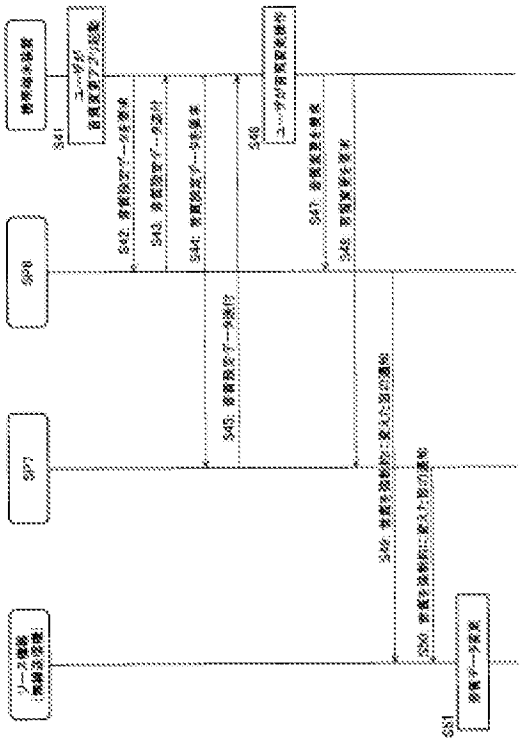
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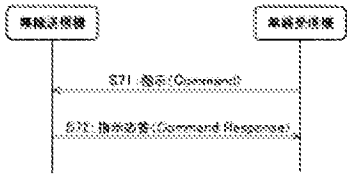
【図５】



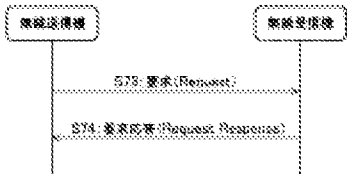
【図６】



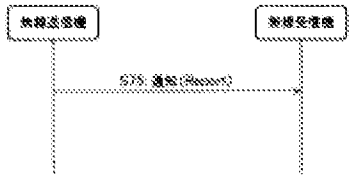
【図７Ａ】



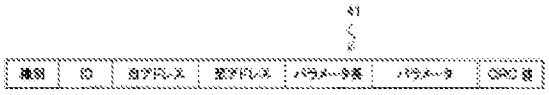
【図７Ｂ】



【図７Ｃ】



【図８Ａ】



【図８Ｂ】

42

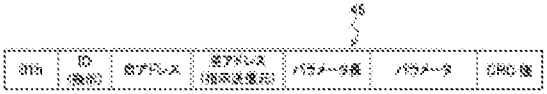
Section	Length	Description
種別 (Packet Type)	1Byte	パケット識別子 ・指示(Command): 03h ・指示応答(Command Response): 01h ・要求(Request): 05h ・要求応答(Request Response): 06h ・通知(Report): 04h ・Reserve: 02h,07h
ID (Packet ID)	2Byte	パケットID、範囲値：0000h から定義する。 初期値は0x09、第2ID：0x08、第3ID：0x07、第4ID：
送アドレス (Source Address)	6Byte	パケット送信元の装置識別子、すべて、全てのノード送信機、受信機器に異なるアドレスを重複なく割り振ってあるものとする。
宛アドレス (Destination Address)	6Byte	パケット送信先の装置識別子を設定する。 全ての装置にブロードキャストする場合は、 FF:FF:FF:FF:FF:FFを設定する。 ブロードキャストは送信機能のみ設定可能
パラメータ長 (Parameter Length)	2Byte	この セクションに続くパラメータ byte 長を設定する。
パラメータ (Parameters)	可変長 Byte	種別、ID 毎に定義されたデータを設定する。
CRC 値 (CRC Value)	2Byte	先頭からパラメータ末までの巡回冗長検査値 (Cyclic Redundancy Check Value)、16 bit、 送信文字数として付加する。

【図９Ｂ】



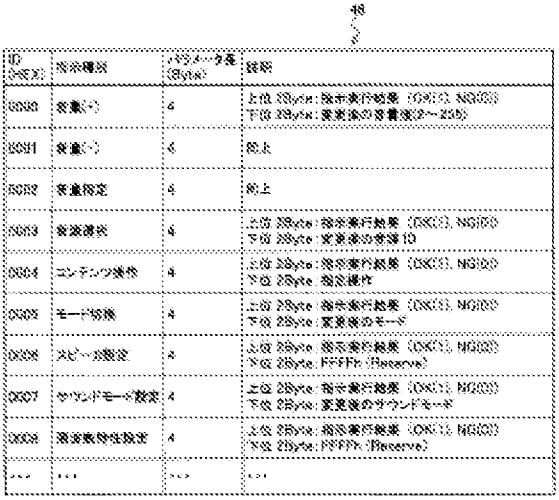
ID (HEX)	指示種別	パラメータ長 (Byte)	説明
0000	音量(+)	0	音量値を一段階上げるのを１回とする音量設定 要求に対して、正常終了エラーを返す。
0001	音量(-)	0	音量値を一段階下げるのを１回とする音量設定 要求に対して、正常終了エラーを返す。
0002	音量指定	3	パラメータに指定した音量値を設定する 範囲 0～255、範囲外の指定に対して、正常終了エラーを返す。
0003	音源選択	2	各個人向け応用例の入力音源を変更する。パラメータには音源毎の ID を指定する。 ※システムによって異なり、設計時に ID 割り振りを行っておく。 システム構成例: 0000h：チューナー(インターネットラジオ、ストーミングサービスなど) 0001h：メモリ(USB メモリなど) 0002h：外部音声入力(光・同軸デジタル、HDMI、MHL、アナログ)
0004	コンテンツ操作	2	コンテンツの再生・停止・一時停止・早送り・巻戻し・次スキップ・前スキップの各操作を行う。 但し、対応する音源以外を選択している場合は、正常終了エラーを返す。
0005	モード切換	1	各グループ、各グループ内モード切換を行う。 このコマンドを送信後、受け付けた場合、GUI 側は再びモード切換が行われるまで待受になる。
0006	スピーカ特定	6	各スピーカのチャンネル、グループ割り当て等の音声出力設定に変える。
0007	サウンドモード設定	2	サウンドモードの設定。 例）　1：スタンダード　2：シネマ　3：スポーツ 4：ミュージック　5：ジャズ　6：クラシック 7：ロック　8：ゲーム　9：ナイト　10：ダイレクト
0008	音声調整特性設定	4（固定） 16 x（可変）	音声調二対して、音声調整特性を設定する。 例）　第１パラメータ 設定(4Byte) 第２パラメータ 設定パラメータ x 種類 （可変 x 設定パラメータ x4Byte） 1．中心周波数(63Hz／125Hz／250Hz／500Hz／1KHz／2KHz／4KHz／8KHz) 2．バンド幅(100Hz／500Hz／1KHz) 3．利得(dB 設定：-20dB～20dB) 4．フィルタタイプ(ハイパス、ローパス、バンドパス、…etc)
…	…	…	…

【図９Ｃ】



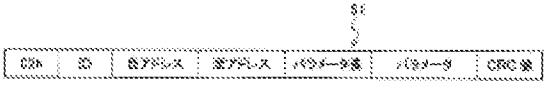
0Fh	ID (固定)	送アドレス	宛アドレス (指示応答元)	パラメータ長	パラメータ	CRC 値

【図９Ｄ】



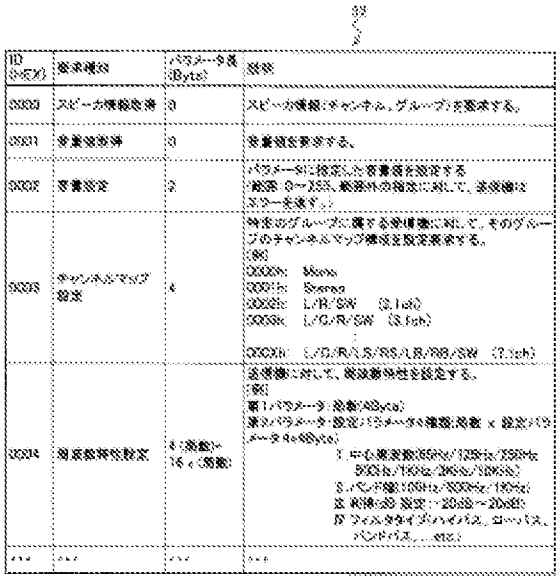
ID (HEX)	指示種別	パラメータ長 (Byte)	説明
0000	音量(+)	4	上位 2Byte：指示実行結果（OK:0, NG:FF） 下位 2Byte：変更後の音量値（0～255）
0001	音量(-)	4	同上
0002	音量指定	4	同上
0003	音源選択	4	上位 2Byte：指示実行結果（OK:0, NG:FF） 下位 2Byte：変更後の音源 ID
0004	コンテンツ操作	4	上位 2Byte：指示実行結果（OK:0, NG:FF） 下位 2Byte：指定操作
0005	モード切換	4	上位 2Byte：指示実行結果（OK:0, NG:FF） 下位 2Byte：変更後のモード
0006	スピーカ指定	4	上位 2Byte：指示実行結果（OK:0, NG:FF） 下位 2Byte：FFFFh（Reserve）
0007	サウンドモード設定	4	上位 2Byte：指示実行結果（OK:0, NG:FF） 下位 2Byte：変更後のサウンドモード
0008	音声調整特性設定	4	上位 2Byte：指示実行結果（OK:0, NG:FF） 下位 2Byte：FFFFh（Reserve）
…	…	…	…

【図１０Ａ】



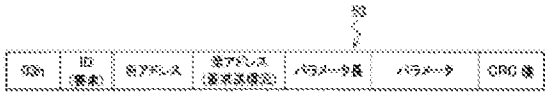
03h	ID	送アドレス	宛アドレス	パラメータ長	パラメータ	CRC 値

【図１０Ｂ】

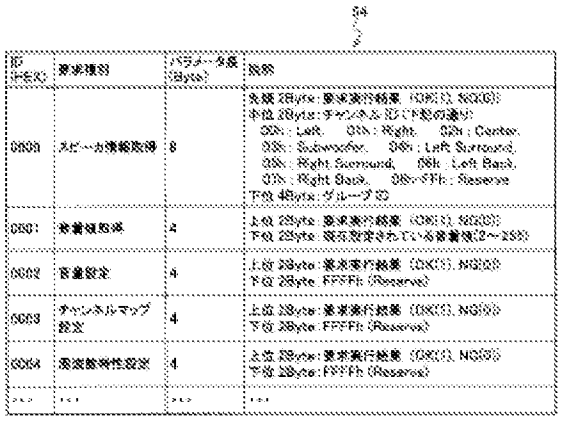


ID (HEX)	指示種別	パラメータ長 (Byte)	説明
0000	スピーカ情報取得	0	スピーカ情報（チャンネル、グループ）を取得する。
0001	音量値取得	0	音量値を取得する。
0002	音量設定	0	パラメータに指定した音量値を設定する 範囲 0～255、範囲外の指定に対して、正常終了エラーを返す。
0003	チャンネル/マップ設定	4	特定のグループに属する全機器に対して、そのグループのチャンネルマップ構成を設定変更する。 例） 0000h：Mono 0001h：Stereo 0002h：L/R/SW　(2.1ch) 0003h：L/C/R/SW　(3.1ch) … 0023h：L/C/R/LS/RS/LB/RB/SW　(7.1ch)
0004	音声調整特性設定	4（固定） 16 x（可変）	音声調二対して、音声調整特性を設定する。 例） 第１パラメータ 設定(4Byte) 第２パラメータ 設定パラメータ x 種類（可変 x 設定パラメータ x4Byte） 1．中心周波数(63Hz／125Hz／250Hz／500Hz／1KHz／2KHz／4KHz／8KHz) 2．バンド幅(100Hz／500Hz／1KHz) 3．利得(dB 設定：-20dB～20dB) 4．フィルタタイプ(ハイパス、ローパス、バンドパス、…etc)
…	…	…	…

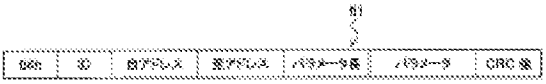
【図１０Ｃ】



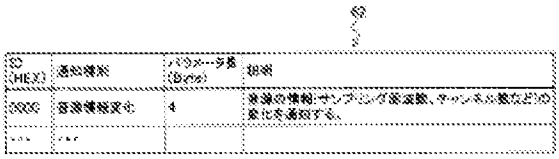
【図１０Ｄ】



【図１１Ａ】



【図１１Ｂ】



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5D220 AA11 AA14 AA16 AA31 AB01 AB08 DA03

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ABSTRACT JP2016178422A

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13 PROBLEM TO BE SOLVED: To enable an operation of changing voice such as a sound quality changing operation and a content changing operation from the speaker device side in a voice wireless transmission system for transmitting a voice signal from a source device to a plurality of speaker devices by wireless communication. In the system of the present invention, a speaker device 2 accepts a user operation and outputs the above-mentioned audio signal changed according to the operation signal indicated by the user operation. Here, for audio signal or audio signal processing for the speaker device 2 to transmit the operation signal to the source device 1 and to output the operation signal to the plurality of speaker devices 2 based on the received operation signal by the source device 1. Change the parameters. Alternatively, the speaker device 2 performs signal processing on the audio signal received from the source device 2 with the audio signal processing parameters indicated by the operation signal, and transmits the execution notification of the signal processing to the source device 1. [Selection diagram] Fig. 1

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DESCRIPTION JP2016178422A

Audio-wireless transmission systems, speaker equipment, and source equipment

[0001]

The present invention relates to a voice wireless transmission system that wirelessly transmits a voice signal, a speaker device in the system, and a source device.

[0002]

Conventionally, some speaker devices are provided with an adjustment knob for adjusting the volume of output sound. In addition, as a technique for operating the speaker device, Patent Document 1 discloses a speaker device provided with a light receiving element that receives an operation signal from a remote controller (remote control). With this speaker device, it is possible to select (switch) the source device that inputs the audio signal, adjust the sound quality in the built-in signal processing unit, adjust the volume in the built-in audio amplifier, etc. based on the operation from the remote control. ing.

[0003]

Further, Patent Document 2 discloses a speaker device (that is, a speaker array device) in which a plurality of speaker units are arranged and provided with a light receiving unit that receives an operation signal from a remote controller.

In this speaker array device, an operation of changing the angle and focal length of the audio beam is accepted by the remote controller, and the delay amount of the audio signal and the level of the audio signal output from each speaker unit are changed according to the operation. .. Further, in this technology, the operation unit provided in the content playback device connected to the speaker array device can accept operations for volume adjustment and content selection.

[0004]

41 On the other hand, in recent years, the number of AV (Audio Visual) devices that utilize wireless communication has increased, and WiFi is also a registered trademark.

43 The same applies below.), ZigBee® (registered trademark. The same applies below.), Bluetooth (registered trademark). The same applies below.), Wireless Speaker and Audio (WiSA; registered trademark. The same applies below.) Etc. are used for wireless transmission. By using wireless communication for the transmission of audio signals, the speaker device and the source device such as a player or an amplifier are wirelessly connected, which is convenient because there is no need to route a cable.

[0005]

52 <patcit num="1"> <text> 特開２０１４－２１６９８５号公報 </text> </patcit> <patcit num="2"> <text> 特開２００８－３５２５２号公報 </text> </patcit>

[0006]

57 In a conventional system that transmits audio signals from a source device to multiple speaker devices by wireless communication, the speaker device is placed in a place other than the installation location such as the room where the source device is installed, taking advantage of the wireless characteristics. , It is also possible to build a listening environment in which the content is individually listened to at multiple installation locations (installation rooms).

62 In such a listening environment, it is necessary to divide a plurality of speaker devices wirelessly connected to the source device into a plurality of groups and construct a system so that the content is reproduced for each group.

[0007]

68 However, when trying to build such a listening environment, the change operation to change the contents, audio characteristics, etc. basically goes to the installation location (installation room) of the source device and is performed on the source device. Become.

71 That is, when a plurality of speaker devices wirelessly connected to the source device are divided into a plurality of groups and the content is reproduced for each group, the above change operation is basically performed on the source device.

74 Of course, it is possible to build a listening environment in which only one group exists, that is, a listening environment in which grouping is not performed, and even in that case, change operations such as changing the sound quality of multiple speaker devices as a whole and changing the contents Will be done for the source device.

78 When operating on the source device side, especially in a listening environment in which a plurality of speaker devices are divided into a plurality of groups, the operation cannot be

performed unless the source device is moved to the installation location, which is inconvenient.

[0008]

Even if the techniques described in Patent Documents 1 and 2 are applied to enable the above-mentioned change operation for the speaker device from a room in which the source device is not installed by operating a remote controller or the like, only the speaker device is used. Such changes will be reflected in, and will not be reflected in other speaker devices and source devices.

In this case, the user needs to perform the above-mentioned change operation such as adjusting the sound quality for each speaker device based on his / her own sense, which is troublesome.

[0009]

Therefore, it is required to accept the above change operation from the speaker device side so that the voice can be changed so as to suit the listening environment.

In the technique described in Patent Document 2, the speaker array device is equipped with a light receiving unit that receives an operation signal from the remote control, so that the remote control can adjust the audio signal level output from the signal processing unit in the speaker array device. Although it is possible to control from, it is only possible to adjust the audio signal level of each speaker unit in one speaker array device installed at one place.

[0010]

The present invention has been made in view of the above-mentioned actual conditions, and an object of the present invention is to perform a sound quality change operation or content change in a voice wireless transmission system for transmitting a voice signal from a source device to a plurality of speaker devices by wireless communication. The purpose is to enable operations such as operation to change the sound from the speaker device side.

[0011]

In order to solve the above problems, the first technical means of the present invention includes a plurality of speaker devices and a source device for transmitting a voice signal to the plurality of speaker devices by wireless communication. The speaker device is a transmission system, characterized in that it accepts a user operation and outputs the audio signal changed according to the operation signal indicated by the user operation.

[0012]

122 In the second technical means of the present invention, in the first technical means, the speaker device transmits the operation signal to the source device, and the source device is based on the operation signal received from the speaker device. It is characterized in that the audio signal or the audio signal processing parameter for being output to the plurality of speaker devices is changed.

[0013]

130 According to the third technical means of the present invention, in the first technical means, the speaker device performs signal processing on the voice signal received from the source device with the voice signal processing parameters indicated by the operation signal. It is characterized in that the execution notification of the signal processing is transmitted to the source device.

[0014]

138 In the fourth technical means of the present invention, in any one of the first to third technical means, the speaker device receives the operation signal indicated by the user operation from the mobile terminal device by wireless communication. It is characterized by having.

[0015]

145 The fifth technical means of the present invention is one speaker device among the plurality of speaker devices that receives the audio signal from the source device that transmits the audio signal to the plurality of speaker devices by wireless communication. The speaker device is characterized in that it accepts a user operation and outputs the audio signal changed according to the operation signal indicated by the user operation.

[0016]

153 In the fifth technical means, the sixth technical means of the present invention is that the speaker device transmits the operation signal to the source device and is modified by the source device based on the operation signal. It is characterized in that an audio signal for a speaker device or a parameter for processing an audio signal is received from the source device.

[0017]

161 In the fifth technical means, the seventh technical means of the present invention is that the speaker device performs signal processing on the voice signal received from the source device with the voice signal processing parameters indicated by the operation signal. It is

characterized in that the execution notification of the signal processing is transmitted to the source device.

[0018]

169 The eighth technical means of the present invention is characterized in that, in any one of the fifth to seventh technical means, it has a receiving unit that receives the operation signal indicated by the user operation from the mobile terminal device by wireless communication. It was done.

[0019]

176 The ninth technical means of the present invention is a source device that transmits a voice signal to a plurality of speaker devices by wireless communication, and the voice signal corresponds to an operation signal indicated by a user operation received by the speaker device. Alternatively, it is characterized in that the parameters for audio signal processing are changed.

[0020]

184 In the ninth technical means, the tenth technical means of the present invention receives the operation signal transmitted from the speaker device, and based on the operation signal, outputs the audio signal to the plurality of speaker devices. Alternatively, it is characterized in that the parameters for audio signal processing are changed.

[0021]

191 The eleventh technical means of the present invention is characterized in that, in the ninth technical means, the speaker device side receives the changed audio signal processing parameter transmitted from the speaker device. ..

[0022]

197 In the twelfth technical means of the present invention, in any one of the ninth to eleventh technical means, the operation signal indicated by the user operation is a signal received by the speaker device from the mobile terminal device by wireless communication. It is characterized by that.

[0023]

204 According to the present invention, in a voice wireless transmission system in which a voice signal is transmitted from a source device to a plurality of speaker devices by wireless

communication, operations for changing sound such as sound quality change operation and content change operation can be performed from the speaker device side. ..

[0024]

211 It is a block diagram which shows one configuration example of the voice wireless transmission system which concerns on 1st Embodiment of this invention.

213 It is a schematic diagram which shows an example of the device arrangement in the voice wireless transmission system of FIG.

215 It is a figure which shows each device in the device arrangement of FIG. 2A.

216 It is a figure which shows an example of the channel of the audio signal transmitted and reproduced in the audio wireless transmission system of FIG.

218 It is a figure which shows another example of the channel of the audio signal transmitted and reproduced in the audio wireless transmission system of FIG.

220 It is a figure which shows another example of the channel of the audio signal transmitted and reproduced in the audio wireless transmission system of FIG.

222 It is a sequence diagram for demonstrating an example of the sound quality change processing procedure in the voice wireless transmission system of FIG.

224 It is a sequence diagram for demonstrating another example of the sound quality change processing procedure in the voice wireless transmission system of FIG.

226 It is a sequence diagram for demonstrating an example of the sound quality change processing procedure in the voice wireless transmission system which concerns on 3rd Embodiment of this invention.

229 It is a sequence diagram for demonstrating the 1st communication system used for the communication processing in the voice wireless transmission system which concerns on 4th Embodiment of this invention.

232 It is a sequence diagram for demonstrating the 2nd communication system used for the communication processing in the voice wireless transmission system which concerns on 4th Embodiment of this invention.

235 It is a sequence diagram for demonstrating the 3rd communication system used for the communication processing in the voice wireless transmission system which concerns on 4th Embodiment of this invention.

238 It is a figure which shows an example of the packet used for the communication processing in the voice wireless transmission system which concerns on 4th Embodiment of this invention.

240 It is a figure which shows an example of the content described in each section in the packet of FIG. 8A.

242 It is a figure which shows an example of the packet used for the instruction in the 1st communication system of FIG. 7A.

244 It is a figure which shows an example of the ID (command type) described in the packet of FIG. 9A and the parameter specified for each ID.

246 It is a figure which shows an example of the packet used for the instruction response in the 1st communication system of FIG. 7A.

248 It is a figure which shows an example of the ID (instruction type) described in the packet of FIG. 9C and the parameter defined for each ID.

250 It is a figure which shows an example of the packet used for the request in the 2nd communication system of FIG. 7B.

252 It is a figure which shows an example of the ID (request type) described in the packet of FIG. 10A and the parameter specified for each ID.

254 It is a figure which shows an example of the packet used for the request response in the 2nd communication system of FIG. 7B.

256 It is a figure which shows an example of the ID (request response type) described in the packet of FIG. 10C and the parameter specified for each ID.

258 It is a figure which shows an example of the packet used for the notification in the 3rd communication system of FIG. 7C.

260 It is a figure which shows an example of the ID (notification type) described in the packet of FIG. 11A and the parameter defined for each ID.

[0025]

265 The audio-wireless transmission system according to the present invention is a system including a speaker device and a source device, and can be said to be a wireless audio system, a wireless speaker system, or the like.

268 This source device has a wireless communication unit for transmitting an audio signal by wireless communication, but this wireless communication unit can also be configured in a separate housing.

[0026]

274 The source devices include various audio playback devices such as CD (Compact Disc) players, SACD (Super Audio CD) players, BD (Blu-ray Disc; registered trademark) players, and HDD (Hard disk drive) players. Examples include TV devices and PCs (Personal Computers).

277 Here, as the audio reproduction device, a network player that receives a music file stored in a server on the network via the network and wirelessly transmits the music file to a speaker device can also be mentioned.

280 In addition, a part of the speaker device may be built in any of the source devices (note that the built-in speaker device may be configured to transmit various data by wire).

282 For example, a center speaker can be provided in the housing of the display unit of the television device, and speakers for other channels can be arranged in a separate housing as the speaker device.

285 Hereinafter, the voice wireless transmission system according to the present invention will be described with reference to the drawings.

[0027]

290 (First Embodiment) The first embodiment of the present invention will be described with reference to FIGS. 1 to 5.

292 FIG. 1 is a block diagram showing a configuration example of a voice wireless transmission system (hereinafter, this system) according to the present embodiment.

[0028]

297 The system includes a plurality of grouped speaker devices 2 and a source device 1 that transmits an audio signal to the plurality of speaker devices 2 by wireless communication.

299 Although only one of the plurality of speaker devices 2 is shown in FIG. 1, the source device 1 and the speaker device 2 may be provided in a one-to-many relationship.

[0029]

304 The source device 1 is a wireless transmitter including a control unit 10 that controls the entire source device 1 and a wireless communication unit 15.

306 The control unit 10 is composed of, for example, a CPU (Central Processing Unit) or the like.

307 By providing the wireless communication unit 15, the source device 1 functions as a wireless transmitter that transmits an uncompressed audio signal (audio signal as it is) or a compressed audio signal to the speaker device 2 by wireless communication. Can be done.

310 In the following, an example of wirelessly transmitting an audio signal without compression will be described.

312 It can be said that it is preferable that the audio signal transmitted from the source device 1 is an uncompressed signal because high quality audio can be output from the speaker device 2.

[0030]

317 Further, the source device 1 of this configuration example includes an audio input unit for inputting an audio content (audio signal) to be output.

319 As an example of this voice input unit, an example including a voice input terminal 11, a communication unit 12, and a voice input processing unit 13 will be given here, but if one of the voice input terminal 11 and the communication unit 12 is provided, the voice input terminal 11 and the communication unit 12 are provided. good.

[0031]

326 The audio input terminal 11 is, for example, a High-Definition Multimedia Interface (HDMI; registered trademark.

328 The same applies below.

329) Terminals and other input terminals of various standards can be applied.

330 The communication unit 12 is a part for receiving voice content by communicating with the outside based on standards such as LAN (Local Area Network), WiFi, and Bluetooth,

regardless of whether it is wired or wireless.

333 The communication unit 12 may be configured to receive, for example, an Internet radio broadcast.

335 Of course, both the communication unit 12 and the wireless communication unit 15 can use the same standard, such as adopting the WiFi standard, but in that case, MAC (Media Access) is used to avoid interference between reception and transmission of audio signals. Control address) Identifiers such as addresses may be different.

[0032]

342 The audio input processing unit 13 is a portion that converts an audio signal input from the audio input terminal 11 or the communication unit 12 so as to match the processing format of the signal processing unit 14 described later. For example, an analog signal is converted into a digital signal. (Or vice versa), and multiplexing the signals of a plurality of channels included in the audio signal (or vice versa).

347 Further, in the source device 1, in addition to the audio input terminal 11 and the communication unit 12, or as a substitute for one or both of them, a storage device for storing the audio content and the audio content are read from the storage device and reproduced. It can also be provided with an audio reproduction unit.

[0033]

354 Further, the source device 1 includes a signal processing unit 14 that performs predetermined signal processing on the audio signal output from the audio input processing unit 13.

357 The predetermined signal processing in the signal processing unit 14 includes, for example, a process of changing the sound quality of the input audio signal according to the user's operation, a process of creating a sound field, and the like before transmitting the audio signal of each channel. A correction process for correction can be mentioned.

361 Of course, the signal processing in the signal processing unit 14 is different from the predetermined signal processing in the signal processing unit 22 described later.

363 The signal processing unit 14 and the signal processing unit 22 described later are often composed of a DSP (Digital Signal Processor).

[0034]

368 The signal processing unit 14 passes the signal-processed voice signal to the wireless communication unit 15 and causes the wireless communication unit 15 to wirelessly transmit the signal.

371 Of course, such control may be performed by the control unit 10.

372 The wireless communication unit 15 transmits the audio signal of each channel input from the signal processing unit 14 to each speaker device 2 by wireless communication without

being compressed.

[0035]

378 Further, the source device 1 of the present configuration example includes an operation unit 16 that receives a user operation and passes the operation signal to the control unit 10, and a display unit 17 that displays various information.

381 The operation unit 16 includes a button provided on the main body of the source device 1, a receiving unit that receives an infrared signal from a remote controller and a short-range wireless signal such as Bluetooth, and a mobile terminal device 3 such as a tablet, a smartphone, or a mobile information terminal. And a receiving unit that receives a control signal by wireless communication from a stationary terminal device.

386 Communication unit 12 may be used as these receiving units.

387 The display unit 17 displays information related to the operation on the operation unit 16 (for example, information such as content and input source to be selected, volume and sound quality to be changed), and an operation result on the operation unit 16.

390 Further, the function of the source device 1 can be mounted on the terminal device, and in that case, the receiving unit as described above may not be provided, and the operation unit 16 and the display unit 17 can be configured by a touch panel. ..

[0036]

396 The control unit 10 controls the speaker device 2 from the source device 1 side by transmitting a control signal corresponding to the operation signal to the speaker device 2 side, for example, by superimposing the control signal on the wireless carrier wave on the wireless communication unit 15. Can be done.

[0037]

403 On the other hand, the speaker device 2 is a wireless receiver including a control unit 20 that controls the entire speaker device 2 and a wireless communication unit 21.

405 The control unit 20 is composed of, for example, a CPU or the like.

406 By providing the wireless communication unit 21, the speaker device 2 can function as a wireless receiver that receives an audio signal transmitted by wireless communication from the source device 1.

409 The wireless communication between the wireless communication unit 15 and the wireless communication unit 21 is preferably bidirectional communication, and various parameters are transmitted and received in addition to voice signal data and control signals (commands) such as the above control signal. It is preferable to be done.

[0038]

416 Here, an example will be given of wireless communication between the wireless communication unit 15 and the wireless communication unit 21.

418 An example of this wireless communication is wireless communication based on the WiSA (Wireless Speaker and Audio) standard.

420 In this case, as the wireless communication unit 15 and the wireless communication unit 21 on the speaker device 2 side, modules on the transmitting side and the receiving side, which are being standardized by WiSA Association, can be applied, respectively.

423 The WiSA standard is one of the standards for wirelessly transmitting audio signals by uncompressed PCM (pulse code modulation).

425 A wireless communication device is provided in both the source device and the speaker device, and uncompressed audio is transmitted from the source device to the speaker device by an uncompressed PCM using a WiFi-compliant communication protocol.

428 In addition, parameters such as each specification information of the speaker device can be transmitted from the speaker device to the source device.

[0039]

433 One specification (mounting method) using the WiSA standard will be described by applying it to this configuration example.

435 The source device 1 has an equalizer built in the signal processing unit 14, and the characteristics of the sound are adjusted and corrected by performing frequency equalizing processing (or room equalizing processing) in the source device 1.

438 It is preferable that such correction is performed so as to match the speaker characteristics of each speaker device 2 (for example, which channel the speaker is for, what the frequency characteristics are, etc.).

441 When matching the speaker characteristics, the speaker characteristics may be stored in the source device 1 in advance, but the source device 1 makes an inquiry to each speaker device 2 or a separately provided server device. You may try to get it.

[0040]

447 After the correction, the source device 1 wirelessly transmits the audio signal of each channel after the equalizing process (which becomes the original sound) to each speaker device 2 as uncompressed audio data.

450 The speaker device 2 outputs the received audio signal without processing.

451 Alternatively, it is multiplexed by time division or the like as common data (audio signal data for all channels) to all the speaker devices 2 and wirelessly transmitted.

453 That is, the wireless transmission may be collectively broadcast or multicast as common data without being divided.

455 In this case, the speaker device 2 side extracts the data of its own channel from the data of all the received channels.

[0041]

460 In the WiSA standard, another specification (mounting method) can be adopted.

461 In this specification, the audio signals of all the channels used are wirelessly transmitted uncompressed and uncorrected (as is the original sound) in a broadcast or multicast manner as described above.

464 The speaker device 2 side extracts the data of its own channel from the data of all the received channels.

466 In such a transmission method, since the amount of channel selection and correction (including frequency equalizing processing or room equalizing processing) is arbitrarily determined on the speaker device 2 side, a higher degree of freedom can be set.

469 Then, such a setting can be executed even by an instruction specifying a parameter from the source device 1 side.

471 The speaker device 2 has an equalizer that performs frequency equalizing processing or room equalizing processing in the signal processing unit 22 described later, and performs equalizing processing (sound quality adjustment) according to the received parameters on the received audio signal. , The sound indicated by the processed audio signal will be output.

[0042]

478 It should be noted that both mounting methods can be applied so that the source device 1 corrects the sound and the speaker device 2 is instructed to specify parameters for each speaker device 2.

481 Further, even when the WiSA standard module is not adopted, the wireless communication unit 15 may multiplex the audio signal of each channel and then wirelessly transmit it to all the speaker devices 2, or the wireless of each speaker device 2. Only the audio signal of the target channel may be wirelessly communicated with the communication unit 21 on a one-to-one basis.

[0043]

489 The speaker device 2 of this configuration example includes a speaker unit 25, a signal processing unit 22, a volume adjusting unit 23, and an amplifier unit (AMP) 24.

491 The signal processing unit 22 performs predetermined signal processing such as various filter processing on the audio signal received by the wireless communication unit 21 and outputs it to the volume adjusting unit 23.

494 Further, the signal processing unit 22 has a D / A converter (DAC) for converting an audio signal from a digital signal to an analog signal before or after the predetermined signal processing.

497 The DAC may be provided on the volume adjusting unit 23 side.

[0044]

501 Here, the parameters required for the predetermined signal processing are stored in a memory or the like inside the signal processing unit 22 (or the control unit 20), and are read out as needed.

504 Further, the control unit 20 or the signal processing unit 22 rewrites the above parameters based on the control signal corresponding to the operation signal from the source device 1 and / or the user operation received by the operation unit 26 described later. May be configured to allow.

[0045]

511 The volume adjusting unit 23 passes the input audio signal to the AMP 24, and adjusts the AMP 24 to adjust the volume of the audio output from the speaker unit 25.

513 The AMP 24 amplifies the audio signal output from the signal processing unit 22 via the volume adjusting unit 23, and outputs the audio signal to the speaker unit 25.

[0046]

518 The speaker device 2 includes an operation unit 26 that receives a user operation and passes the operation signal to the control unit 20.

520 Examples of the operation unit 26 include a button provided on the main body of the speaker device 2 and a communication unit 27.

522 The communication unit 27 is a reception unit that receives an infrared signal from a remote controller or a short-range wireless signal such as Bluetooth, and a control signal by wireless communication from a mobile terminal device 3 such as a tablet, a smartphone, or a mobile information terminal, or a stationary terminal device. Refers to a receiver that receives.

526 It is preferable that the device on the side of transmitting the signal received by the communication unit 27 is shared with the device on the side of transmitting the signal received by the receiving unit as an example of the operation unit 16 on the source device 1. ..

[0047]

533 Further, it is preferable that the speaker device 2 is provided with a display unit for displaying various information as well as the display unit 17.

535 This makes it possible to display information related to the operation on the operation unit 26 (for example, information such as content and input source to be selected, volume and sound quality to be changed) and the operation result on the operation unit 26. ..

[0048]

541 Then, as a main feature of the present invention, the speaker device 2 receives a user

operation by the operation unit 26 and outputs an audio signal changed according to the operation signal indicated by the user operation.

544 It is preferable that the speaker device 2 includes a receiving unit exemplified by the communication unit 27, and the receiving unit receives the operation signal indicated by the user operation from the mobile terminal device 3 by wireless communication.

547 As a result, the user can operate it at hand, so that the operability can be improved.

548 Of course, the user operation may be accepted by another operation unit 26 such as an operation button provided on the speaker device 2.

[0049]

553 Since the audio signal to be changed is an audio signal transmitted to a plurality of speaker devices included in the system, the above change is a speaker forming the same sound field together with the speaker device 2 that has received the user operation. It will be reflected for the device group.

557 In particular, when all the speaker devices 2 in this system are grouped into a plurality of speaker groups, the above changes are similarly reflected to the speaker device groups (of the same group) that form the same sound field. It will be.

[0050]

563 In the present invention, the speaker device 2 may output the modified audio signal.

564 Therefore, this change may be executed on the source device 1 side, the speaker device 2 side, or both in cooperation with each other.

566 Further, on the source device 1 side, either the audio signal or the audio signal processing parameter is finally changed according to the operation signal.

[0051]

571 Among such change methods, in the present embodiment, it is assumed that the source device 1 mainly makes this change.

573 Therefore, the speaker device 2 transmits the operation signal to the source device 1.

574 Then, the source device 1 receives the operation signal from the speaker device 2, and based on the operation signal, changes the audio signal or the audio signal processing parameter for output to the plurality of speaker devices 2, and each speaker device. Send to 2.

577 This transmission is performed by the wireless communication unit 15, but the audio signal processing parameters may be transmitted by another route.

[0052]

582 The transmission of the operation signal will be specifically described.

583 In the present embodiment, the user operation is a user operation for operating the source

device 1, and is hereinafter referred to as a "source device operation" for the sake of distinction.

586 The operation unit 26 receives the operation of the source device, the control unit 20 interprets the operation signal indicating the operation of the source device, and converts the operation signal as it is or into an operation signal to be passed to the source device 1 as needed. And send it to the source device 1.

590 This transmission is preferably carried out by superimposing it on the wireless carrier wave using the wireless communication unit 21, but the speaker device 2 and the source device 1 are separately provided with a communication unit for wired or wireless communication, and the communication unit is provided. You may send it with.

594 As this communication unit, a communication unit 27 or a communication unit 12 can also be used.

596 However, for reasons such as the ease of arranging the speaker device 2, it can be said that the speaker device 2 preferably transmits the operation signal to the source device 1 by wireless communication.

[0053]

602 The source device 1 receives an operation signal indicating the operation of the source device transmitted from the speaker device 2.

604 Then, based on the received operation signal, the signal processing unit 14 of the source device 1 outputs the output to the speaker group to which the speaker device 2 which is the source of the operation signal belongs among the plurality of speaker devices 2 in the system. To change the voice signal or the parameter for voice signal processing.

608 Of course, when there is only one speaker group, it is possible to output an audio signal or an audio signal processing parameter to be output to all the speaker devices 2 without determining the transmission source.

611 Hereinafter, an example of grouping into speaker groups will be given, but if the speakers are not grouped, the determination of the transmission source and the like can be omitted in this way.

[0054]

617 The audio signal processing parameter refers to a parameter used for predetermined signal processing by the signal processing unit 22, and at least one of a plurality of parameters may be changed.

620 The wireless communication unit 15 of the source device 1 transmits the audio signal or the audio signal processing parameter changed in this way to the speaker group by wireless communication.

623 For the speaker device 2 belonging to another speaker group, the audio signal and the audio signal processing parameter are not changed depending on the operation signal.

[0055]

628 The wireless communication unit 21 of the speaker device 2 belonging to the speaker group receives the audio signal or the audio signal processing parameter for the speaker group changed in this way from the source device 1 by wireless communication.

631 Then, in the speaker device 2, the voice indicated by the received voice signal is output from the speaker unit 25.

[0056]

636 When adopting a configuration in which what is changed in the source device 1 is an audio signal, the speaker device 2 only needs to output the audio signal as it is.

638 On the other hand, when adopting a configuration in which the changed one is an audio signal processing parameter, in the speaker device 2, the audio signal processing parameter is a parameter stored in the memory in the signal processing unit 22 or the control unit 20. Is rewritten, and the rewritten parameters are used to perform predetermined signal processing on the audio signal received thereafter (or at the same time).

643 As a result, the same audio output as when the audio signal is changed is possible.

[0057]

647 A more specific example of this system will be described with reference to FIGS. 2A to 5.

648 2A is a schematic diagram showing an example of equipment arrangement in this system, FIG. 2B is a diagram showing each equipment in the equipment arrangement of FIG. 2A, and FIGS. 3A to 3C are examples of audio signal channels transmitted and reproduced in this system. It is a figure which shows.

[0058]

655 In the system illustrated in FIGS. 2A and 2B, six speaker devices SP1 to SP6 are installed in a room (audio room) in which the source device 1 is installed, and two speaker devices SP7 and SP8 are installed in a remote room (living room), is set up.

658 All of SP1 to SP8 are speaker devices 2, but their speaker characteristics and the like are different.

660 Of course, speaker devices having the same speaker characteristics may also be included.

661 In this example, the speaker devices SP1, SP2, SP3, SP4, SP5, SP6, SP7, and SP8 are center (C), front left (L), front right (R), surround left (LS), respectively. It is assumed that the speaker device is for the subwoofer (LFE), surround right (RS), left (L), and right (R) channels.

[0059]

667 Then, the speaker devices SP1 to SP6 have speaker group (hereinafter, also simply referred to

as "group") No. 0 (2a), speaker devices SP7, SP8 are group No. It is classified into 1 (2b).

669 By storing the classified information in a memory or the like in the control unit 10 (or signal processing unit 14, etc.) of the source device 1, the source device 1 determines whether a speaker device belongs to groups 2a or 2b. Can be recognized.

672 Therefore, even when the source device 1 receives an operation signal indicating the operation of the source device, it is only necessary to include information unique to the speaker device 2 that has transmitted the operation signal, and it is possible to determine which group the speaker device 2 belongs to. Can be identified.

676 The above-classified information may be stored as, for example, a channel map (channel map table).

678 Only examples divided into two groups are given, but the same idea can be applied to three or more groups.

[0060]

683 In this system, as illustrated in FIG. 3A, a case where the source device 1 transmits common data (audio signal data for all channels) to all of the eight speaker devices SP1 to SP8 will be described.

686 In this case, the speaker devices SP1, SP2, SP3, SP4, SP5, and SP6 belonging to the group 2a extract the audio signals of the channels C, L, R, LS, LFE, and RS, respectively, output the audio, and send the audio to the group 2b. The speaker devices SP7 and SP8 to which they belong extract the audio signals of channels LS, L, C, channels C, R, and RS, respectively, and generate left (La) and right (Ra) audio signals from those audio signals (Ra). Downmix) and output.

[0061]

695 Next, as illustrated in FIG. 3B, the source device 1 has common data of the audio signal of the first content for the six speaker devices SP1 to SP6 and the audio signal of the second content for the two speaker devices SP7 and SP8. A case of transmitting (audio signal data for all channels of two contents) will be described.

699 For simultaneous distribution of such two contents, if the source device 1 has two channel slots, one for 5.1ch and one for 2ch (there may be two for 5.1ch or more channels), that is, This is possible if the processing capacity of the control unit 10, the voice input processing unit 13, and the signal processing unit 14 and the processing capacity (communication band, etc.) of the wireless communication unit 15 correspond to the distribution of the two contents.

[0062]

708 In this case, the speaker devices SP1, SP2, SP3, SP4, SP5, and SP6 belonging to the group 2a extract the audio signals of the channels C, L, R, LS, LFE, and RS of the first content,

respectively, and output the audio. , The speaker devices SP7 and SP8 belonging to the group 2b extract the audio signals of the second content channels LS, L, C and the second content channels C, R, RS, respectively, and use the audio signals for the left of the second content. (La) and right (Ra) audio signals are generated (downmixed) and output.

[0063]

717 As illustrated in FIG. 3C, the source device 1 is the audio signal of the first content for the six speaker devices SP1 to SP6, and the second content for the two speaker devices SP7 and SP8 for the left (La) and right (La). A case of transmitting common data of the audio signal of the channel of Ra) will be described.

721 In this case, first, for the second content, the source device 1 side performs the downmix as described above to generate the audio signals of the channels La and Ra of the second content.

724 The audio output in group 2a is the same as in FIG. 3B.

725 The speaker devices SP7 and SP8 belonging to the group 2b extract the audio signals of the channels La and Ra of the second content, respectively, and output the audio.

[0064]

730 In the examples of FIGS. 3B and 3C, an example in which two contents are multiplexed and distributed is given, but these contents are not limited to those received by the source device 1 from one source.

733 As described above, the source device 1 may be configured so that the content can be acquired from both the communication unit 12 and the audio input terminal 11, or the communication unit 12 can acquire the content from two types of sources. You may.

736 In any case, in order for the source device 1 to distribute two or more contents, not only the ability of the wireless communication unit 15 to multiplex the channels but also the contents of the voice input processing unit 13 are multiplexed. Ability (that is, the ability to process multiple contents) is required.

740 Unlike FIGS. 3A to 3C, the source device 1 and each speaker device 2 can communicate one-to-one.

[0065]

745 The source device operation preferably includes an operation of changing the characteristics (characteristics) of the sound indicated by the voice signal output from the source device 1, that is, an operation of changing the sound quality. This will be described with reference to FIGS. 4 and 5.

749 4 and 5 are sequence diagrams for explaining an example of the sound quality change processing procedure in this system.

751 Here, the change of sound quality includes an operation of changing the frequency

characteristic and an operation of changing other voice characteristics.

753 The frequency characteristics can also be changed by changing a plurality of music modes (also called sound quality mode or sound mode) prepared in advance.

[0066]

758 Based on FIG. 4, an example will be described in which the speaker device 2 side corrects the audio signal (including corrections other than the town mix) as shown in FIG. 3A, and the speaker device SP8 accepts the sound quality change operation.

761 First, the user starts a sound quality changing application (hereinafter referred to as an application) installed on the mobile terminal device 3 (step S1).

763 This application is activated and wirelessly communicates with a communication destination set in advance or set by the user at that time via the communication unit 27.

765 In this wireless communication, the application first requests the sound quality setting data from the speaker device SP8 (step S2).

[0067]

770 Since Bluetooth or the like is one-to-one wireless communication, there is no problem, but when infrared communication or the like is adopted, both the speaker devices SP7 and SP8 installed in the same room receive this request, and in step S3 described later, the request is received. It is conceivable that the processing will be done on both sides.

774 In this case, for example, when the same instruction is received from the speaker devices in the same group during the processes of steps S3 and S4 described later, the one with the youngest ID is adopted and the instruction of another ID is instructed. You can mediate by ignoring.

778 Further, for example, by providing the communication unit 27 as a master in only one speaker device group belonging to the same group (or not ignoring the source device operation), such arbitration and the above-mentioned advance setting are not performed. Will be enough.

[0068]

785 When the communication unit 27 receives this request, the speaker device SP8 instructs the source device 1 to send sound quality setting data (audio signal processing parameters) via the wireless communication unit 21 (step S3).

788 Here, the instruction is given with its own unique information added to the source device 1.

789 The source device 1 determines that the speaker device SP8 is the source from the unique information, and returns the sound quality setting data for the group 2b to which the source belongs to the wireless communication unit 15 (step S4).

792 The reason for acquiring the sound quality setting data from the source device 1 in this way is that in this processing example, the source device 1 manages the sound quality setting data

of each group.

[0069]

788 Upon receiving the reply, the speaker device SP8 transmits the sound quality setting data to the mobile terminal device 3 (step S5), the application recognizes the sound quality setting data, and the changeable sound quality setting data is displayed as a GUI (Graphical User Interface) image (not shown).), And accepts the sound quality change operation from the user (step S6).

803 Examples of the sound quality setting data that can be changed include frequency characteristics and the sound balance of each channel in the group.

805 After that, the application requests the speaker device SP8 to change the sound quality (step S7), and the speaker device SP8 transmits the sound quality change instruction with its own unique information added to the source device 1 (step S8).

[0070]

811 The source device 1 determines that the speaker device SP8 is the source from the unique information (or determines at the time of steps S3 and S4), and updates the sound quality setting data for the group 2b to which the source belongs (step S9).).

814 In this processing example, since the audio signal is corrected on the speaker device 2 side, the source device 1 transmits a sound quality change request to the speaker devices SP7 and SP8 in accordance with step S9 (steps S10 and S11).).

817 The sound quality change request may include a changed parameter related to the sound quality operated by the user and an update request for the parameter.

819 As a result, in the speaker devices SP7 and SP8, the sound quality is changed by updating the predetermined signal processing parameters for the signal processing unit 22.

[0071]

824 Finally, the source device 1 transmits the sound quality change completion notification to the speaker device SP8 (step S12), and the speaker device SP8 receives the sound quality change completion notification and transmits the sound quality change completion notification to the mobile terminal device 3 (step S13). The application displays the notification (step S14).

828 The sound quality change request is not sent to the speaker devices SP1 to SP6 that do not belong to the group 2b.

830 As a result, the sound quality is changed only in the speaker device group of group 2b, the sound quality of the speaker device group of group 2a does not change, and there is no discomfort such as the volume changing even though the listeners in the rooms other than the operated room do not operate. You can continue listening.

[0072]

837 Based on FIG. 5, in the processing example of FIG. 4, there are audio signal processing parameters for the group and individual speaker devices, and the audio signal processing parameters for the group (whole) are managed by the source device 1 and individually. An example in which the audio signal processing parameters of the above are independently managed by each of the speaker devices SP7 and SP8 will be described.

[0073]

845 First, the same processing as in steps S1 to S3 is performed (steps S21 to S23).

846 Next, the source device 1 requests individual sound quality setting data (audio signal processing parameters) from the speaker devices SP8 and SP7 belonging to the group 2b to which the source belongs (steps S24 and S25).

849 In response to the request, the speaker devices SP8 and SP7 return individual sound quality setting data (steps S26 and S27).

851 Then, as a response to step S23, the source device 1 returns the sound quality setting data of the entire group 2b and the individual sound quality setting data of the speaker devices SP7 and SP8 to the speaker device SP8 (step S28).

[0074]

857 Upon receiving the reply, the speaker device SP8 transmits the sound quality setting data to the mobile terminal device 3 (step S29), the application recognizes the sound quality setting data, and the changeable sound quality setting data is displayed as a GUI image (not shown). And accept the sound quality change operation from the user (step S30).

861 Examples of the sound quality setting data that can be changed include frequency characteristics in the group, sound balance of each channel in the group, and frequency characteristics of individual speaker devices.

864 After that, the application requests the speaker device SP8 to change the sound quality (step S31), and the speaker device SP8 transmits the sound quality change instruction with its own unique information added to the source device 1 (step S32).

[0075]

870 The source device 1 determines that the speaker device SP8 is the source from the unique information (or uses the result determined at the time of steps S23 and S24), and updates the sound quality setting data for the group 2b to which the source belongs. (Step S33).

873 In this processing example as well, the audio signal is corrected on the speaker device 2 side as in the processing example of FIG. 4, so that the source device 1 requests the speaker devices SP7 and SP8 to change the sound quality in accordance with step S33. Is transmitted (steps S34 and S35).

877 The sound quality change request may include a changed parameter related to the sound

quality operated by the user and an update request for the parameter.

870 As a result, in the speaker devices SP7 and SP8, the sound quality is changed by updating the predetermined signal processing parameters for the signal processing unit 22.

[0076]

884 Finally, the same processing as in steps S12 to S14 of FIG. 4 is executed (steps S36 to S38).

885 Even in the processing example of FIG. 5, since the sound quality change request is not sent to the speaker devices SP1 to SP6 that do not belong to the group 2b, the listener does not feel uncomfortable as in the processing example of FIG.

888 Further, as an alternative process of the processing example of FIG. 5, the mobile terminal device 3 directly instructs the source device 1 for the sound quality change for the entire group (for example, the sound mode change), and the individual sound quality change is the process of FIG. It may be configured to apply an example.

[0077]

895 As described above, in the system of FIG. 2A, a speaker group is constructed for each room, and the same content is listened to in a plurality of rooms. It can be operated, and the operation does not affect the sound output from the speaker group in another room.

898 That is, in this system, the sound quality can be easily changed for each room.

899 The example is a room at home, but the processing is not limited to this, and processing can be performed for each installation location of the speaker group (speaker system).

901 For example, it is possible to output sound having different characteristics for each private room as a speaker group different for each private room of the restaurant.

903 Even when the function of the source device 1 is mounted on a terminal device such as the mobile terminal device 3, it is possible to carry the source device 1 and go to the installation location of the speaker group and change only the sound quality of the installation location. ..

[0078]

909 As in this example, in this system, operations for changing voice such as sound quality change operations can be performed from the speaker device side, and user convenience can be improved.

912 In particular, when a plurality of speaker devices 2 included in this system are divided into a plurality of groups and audio signals are reproduced for each group, the sound quality can be changed for each group by the operation on the speaker device 2 side, which is beneficial. It becomes.

916 In other words, such a change in sound quality is particularly performed for an audio signal transmitted from the source device 1 for a plurality of channels, for example, an audio signal in which the channels are multiplexed and transmitted in a broadcast or multicast manner. It will be beneficial.

[0079]

923 Although the present embodiment has been described with reference to the configuration example of FIG. 1, the system is not limited to this, and for example, the following application examples can also be applied.

926 For example, in the GUI image of the above-mentioned application of the mobile terminal device 3, both the operation buttons for all the speaker devices in the system and the operation buttons for all the speaker devices belonging to the group are displayed on the GUI image (or as the operation buttons of each speaker device). By providing, the user can select and operate the change target.

[0080]

934 Further, although the description has been made on the premise that one speaker device is provided with one speaker unit as the speaker unit 25, one speaker device (having one wireless communication unit 21 inside) has a plurality of speaker units arranged. Such a speaker array device may be used, or is a speaker device provided with a plurality of speaker units such as three speaker units (tweeter, midrange, and woofer) for treble, midrange, and bass. You may.

940 Further, in one speaker device, the speaker unit 25 (or the AMP 24 and the speaker unit 25) may be configured in a housing separate from other parts, and in that case, the operation unit 26 is attached to the speaker unit 25 side. It can also be configured to do so.

943 When adopting these configurations, basically, it is sufficient to connect the housings by wire.

944 Of course, these application examples can be similarly applied to other embodiments described later.

[0081]

949 (Second Embodiment) The second embodiment of the present invention will be described focusing on the differences from the first embodiment, but various examples of the first embodiment can be applied.

[0082]

955 The source device operation in the present embodiment includes either an operation of selecting content to be output as an audio signal from the source device 1 or an operation of changing the playback state of the content.

958 That is, in the present embodiment, the speaker device 2 can accept the operation related to the content as the source device operation.

960 Of course, the speaker device 2 may be configured to accept the operation of changing the sound quality described in the first embodiment.

962 Further, the following example can be similarly applied to an operation of changing the playback state (playback, stop, pause, fast forward, fast rewind, etc.) of the content.

[0083]

967 An example will be described in which two contents are distributed from the source device 1 and the speaker device SP8 accepts the content switching operation as shown in FIGS. 3B and 3C.

970 In such a processing example, basically, in the processing example of FIG. 4 (however, steps S10 and S11 are unnecessary), "sound quality change" is replaced with "content change (selection)", and "sound quality setting data" is replaced with "content". It is a process that replaces.

[0084]

977 Briefly, the content change application is started in step S1, the application acquires information about the current content and the playable content as in steps S2 to S5, and the content to be played by the user is changed in step S9. Do the operation to do.

980 This information includes the content name, but if the switching of the content source is also taken into consideration, the content server name (source name) and the like may be included.

983 Then, the application requests the speaker device SP8 to change the content as in steps S7 and S8, and the source device 1 changes the content in step S9.

985 The change notification is the same as in steps S12 to S14 except for the content of the notification.

[0085]

990 Supplement the processing when changing the content to be played.

991 The control unit 10 of the source device 1 sends an instruction to switch the content to a new one for playback of the speaker devices SP7 and SP8 belonging to the group 2b to the voice input processing unit 13, and the voice input processing unit 13 currently outputs the instruction. The source of the content is instructed to switch the content via the voice input terminal 11 or the communication unit 12.

996 In response to this instruction, the content after switching is reproduced and distributed from the wireless communication unit 15 via the voice input processing unit 13 and the signal processing unit 14.

999 In the case of FIG. 3B, the distribution is performed without downmixing, and in the case of FIG. 3C, the distribution is performed after the downmixing.

[0086]

1004 The speaker devices SP7 and SP8 receive the distributed common data, and in the case of FIG. 3B, the audio data for itself is extracted and then downmixed and output, and in the case of FIG. 3C, the downmix for itself is performed. Extracts and outputs the completed voice data.

1008 On the other hand, in the speaker devices SP1 to SP6, the content that has been conventionally reproduced is extracted and reproduced as it is.

1010 As a result, the content switching occurs only in the speaker device group of the group 2b, and the speaker device group of the group 2a continues to output the conventional content. Therefore, the listener in the room other than the operated room does not operate the content. You can continue listening without any discomfort such as changing.

[0087]

1017 Here, the audio output of the speaker devices SP7 and SP8 will be supplemented.

1018 When playing back a plurality of contents continuously regardless of whether or not the contents are switched by operating the source device, there is a scene where the number of channels is switched between the contents.

1021 In this scene, the sound quality changes in response to the change in the number of channels, so even in the case of one-to-one communication, it is sufficient to change the audio signal to be transmitted according to the speaker device 2 by correction processing such as downmixing.

1025 This correction process may be performed by obtaining information on the number of channels in the source device 1 and executing the correction process accordingly.

[0088]

1030 On the other hand, in the case of broadband or multicast distribution, the channel extracted by the speaker device 2 itself should be fixed so that the audio of the specific channel is extracted and output as it is on the speaker device 2 side. You can also.

1033 However, in order to cope with the change in sound quality, it is desirable that the source device 1 similarly generates an audio signal suitable for the change by downmixing or other correction processing as necessary.

[0089]

1039 In the case of broadband or multicast distribution, as another method for coping with the change in sound quality due to the change in the number of channels, the channel extracted by the speaker device 2 may not be fixed.

1042 Such variable processing is particularly useful when correction processing such as downmixing is performed on the speaker device 2 side as in the speaker devices SP7 and SP8 to which the example of FIG. 3B is applied.

[0090]

1048 In the above variable processing, not only the information on the number of channels is obtained by the source device 1, but also the number of channels after switching (or information indicating the channel to be extracted) by transmitting the information on the number of channels to the speaker device or the like. May be notified to the speaker devices SP7 and SP8 before the start of playback.

1053 As a result, an appropriate voice can be output.

[0091]

1057 It is also possible to eliminate the gap (noise) sound in the content switching by temporarily muting the audio output when the content is switched.

1059 For example, first, the content switching notification is wirelessly transmitted to the speaker devices SP7 and SP8 before the start of wireless transmission of new content (preferably immediately after receiving the content change instruction), and the speaker devices SP7 and SP8 are muted. To execute.

1063 Next, the source device 1 may start wireless transmission of new content, and then the content switching completion notification may be given, and the speaker devices SP7 and SP8 may cancel the mute.

1066 As a result, not only can an appropriate sound be output, but also the output of a gap sound can be prevented.

[0092]

1071 Further, when a content switching operation is performed in a state where only one content is output as shown in FIG. 3A, the source device 1 acquires new content and uses the new channel slot to use the new channel slots in FIGS. 3B and 3C. It may be distributed in addition to the common data as in.

[0093]

1078 When the source device 1 is configured to be able to acquire content from two or more types of sources, skipping the content is performed by skipping the first and last contents of one source, respectively, before and after. You may want to go back to the end of the same source, or switch back to the first content of the previous or later source.

1082 Further, the former may be adopted and the latter operation may be separately defined as a source switching operation belonging to the content selection operation.

[0094]

1087 As described above, in the system of FIG. 2A, a speaker group is constructed for each room,

and the same content is listened to in a plurality of rooms, but only the speaker group in the room in which the user is located changes the content. The device can be operated, and the operation does not affect the sound output from the speaker group in another room.

1091 That is, in this system, the content can be easily changed for each place where the speaker system is installed, such as for each room.

[0095]

1096 (Third Embodiment) A third embodiment of the present invention will be described with reference to FIG.

1098 FIG. 6 is a sequence diagram for explaining an example of the sound quality change processing procedure in the voice wireless transmission system according to the present embodiment.

1101 Although the present embodiment will be described focusing on the differences from the first embodiment, various examples of the first embodiment can be applied.

[0096]

1105 In the present embodiment, the speaker device 2 plays a central role in changing the audio signal by changing its own audio signal processing parameters, and the source device 1 is stored in the source device 1 so as to match the change. Change the parameters for audio signal processing.

1110 As a result, the source device 1 can manage at least the audio signal processing parameters of the entire system (and the entire group) of the entire system.

[0097]

1115 Specifically, the speaker device 2 uses the audio signal processing parameters indicated by the operation signals, the signal processing unit 22 performs signal processing on the audio signal received from the source device 1, and the source device 1 receives the signal. Send a process execution notification.

1119 This operation signal is an operation signal indicated by a user operation received by the operation unit 26 of the speaker device 2, and in the present embodiment, this user operation cannot be called a source device operation.

1122 Further, the execution notification may include the modified parameters for audio signal processing.

1124 The source device 1 receives the changed audio signal processing parameter on the speaker device 2 side, which is transmitted from the speaker device 2, and updates it.

[0098]

1129 An example of accepting a sound quality change operation in the group 2b of the speaker

devices SP8 and SP7 will be described with reference to FIG.

1131 In the present embodiment, not only the audio signal is corrected (including the correction other than the town mix) on the speaker device 2 side as shown in FIG. 3A, but also the parameters for the correction are changed. ..

[0099]

1137 First, the same processing as in steps S1 and S2 of FIG. 4 is executed (steps S41 and S42).

1138 When the speaker device SP8 receives the sound quality setting data (audio signal processing parameter) request in the communication unit 27, the sound quality setting data stored in itself (individual or individual sound quality setting data related to the individual and the entire group). Is returned to the mobile terminal device 3 (step S43).

1142 Similarly, the application requests and acquires the sound quality setting data from the speaker device SP7 (steps S44 and S45).

1144 In the case of one-to-one wireless communication such as Bluetooth, the application needs to switch the communication destination.

[0100]

1149 The application displays the changeable sound quality setting data sent in steps S43 and S45 as a GUI image (not shown), and accepts the sound quality change operation from the user (step S46).

1152 Examples of the sound quality setting data that can be changed include the frequency characteristics of the speaker devices SP7 and SP8 and the balance of the sound of each channel in the group 2b.

1155 After that, the application requests each of the speaker devices SP8 and SP7 to change the sound quality (steps S47 and S48).

[0101]

1160 After that, a notification (in other words, an instruction to update the sound quality setting data) that the speaker devices SP8 and SP7 forcibly changed the sound quality while adding their own unique information to the source device 1 is sent via the wireless communication unit 21. Is transmitted to the source device 1 (steps S49 and S50).

1164 The source device 1 determines that the speaker devices SP8 and SP7 are the transmission sources from the unique information, and updates the sound quality setting data for the transmission source (step S51).

1167 The reason for updating the sound quality setting data in the source device 1 in this way is that in this processing example, the source device 1 manages the sound quality setting data of each group.

1170 The sound quality of the speaker devices SP1 to SP6 that have not been operated is not changed.

1172 As a result, the sound quality of only the speaker device group that was the operation target was changed, and the sound quality of the speaker device group that was not the operation target did not change. Can be continued.

1175 Instead of steps S47 to S50, the application of the mobile terminal device 3 may be configured to directly communicate with the communication unit 12 of the source device 1 to request the update of the sound quality setting data.

[0102]

1181 (Fourth Embodiment) As a fourth embodiment of the present invention, FIGS. 7A to 11B are combined with respect to an example of communication control between a speaker device and a source device applicable to the first to third embodiments. It will be explained with reference to.

1185 7A, 7B, and 7C are sequence diagrams for explaining the first, second, and third communication methods used for communication processing in the voice wireless transmission system according to the present embodiment, respectively.

1188 FIG. 8A is a diagram showing an example of a packet used for communication processing in the voice wireless transmission system according to the present embodiment, and FIG. 8B is a diagram showing an example of the contents described in each section of the packet of FIG. 8A.

[0103]

1195 There are the following three types of communication methods as the minimum communication unit of signals related to control between the source device 1 (wireless transmitter) and the speaker device 2 (wireless receiver), and a series of communication procedures (Sequence) is a combination of these types.

1199 As described above, the audio signal is transmitted by wireless communication, but this signal may be transmitted by wire.

[0104]

1204 As the first communication method, when the wireless receiver is operated, the wireless receiver issues a command, thereby requesting control from the wireless transmitter (step S71).

1207 The wireless transmitter returns a command response to this instruction (step S72).

1208 As the second communication method, information or the like is requested by issuing a request from the wireless transmitter to the wireless receiver (step S73).

1210 The wireless receiver returns a request response to this request (step S74).

1211 As a third communication method, the wireless transmitter issues a notification (Report) to the wireless receiver to notify the state change (step S75).

[0105]

1216 As illustrated in FIG. 8A, the communication data format (packet) 41 used in these communication methods includes a packet type (type indicating which type of packet is in steps S71 to S75), a packet ID, and a self. The address, the destination address, the parameter length, the parameter, and the cyclic redundancy check value (CRC value: Cyclic Redundancy Check Value) are included.

1221 The length and description of each section are not particularly described, but are as illustrated in Table 42 of FIG. 8B.

1223 Of course, the length and description of this packet are not limited, and the parameter length and parameter description method for each packet type described later with reference to FIGS. 9A to 11B are not limited to the examples.

[0106]

1229 The first communication method will be described.

1230 FIG. 9A is a diagram showing an example of a packet used for an instruction in the first communication method of FIG. 7A, and FIG. 9B is an example of an ID (command type) described in the packet of FIG. 9A and an example of parameters specified for each ID. 9C is a diagram showing an example of a packet used for an instruction response in the first communication method of FIG. 7A, and FIG. 9D is an ID (instruction type) described in the packet of FIG. 9C and is defined for each ID. It is a figure which shows an example of a parameter.

[0107]

1240 As shown in FIG. 9A, in the instruction packet 43 used in step S71, "00h" corresponding to the instruction is described in the packet type.

1242 Then, the packet 43 is given an ID meaning that it is described as "explanation" in Table 44 of FIG. 9B, and a parameter (additional parameter) is also added as necessary.

1244 For example, for the sound quality setting data sending instruction (steps S3 and S23) of the processing example of FIGS. 4 and 5, an ID (not shown) may be set.

1246 Further, the source device 1 can recognize that the instruction is from the speaker device SP8 based on its own address.

1248 Regarding the sound quality change instructions (steps S8 and S32) of the processing examples of FIGS. 4 and 5, if the sound mode is changed, the ID is "0007" and the additional parameter is the value of the sound mode to be changed (for example, in the standard mode). If so, "1") will be added.

1252 If the frequency is changed, the number of stations and four types of parameters are added with the ID "0008" as illustrated as additional parameters.

1254 Further, the notification (steps S49 and S50) of the processing example of FIG. 6 corresponds to the update instruction of the sound quality setting data, and may be processed in the

same manner.

[0108]

1260 Further, with respect to the content switching instruction of the processing example of the second embodiment, the ID is "0004", and a value (not shown) indicating a pre-skip (or post-skip) is added as an additional parameter.

1263 Further, for switching the source input to the source device 1 described as its application, the instruction for selecting the sound source with the ID "0003" can be used.

[0109]

1268 As shown in FIG. 9C, in the instruction response packet 45 used in step S72, "01h" corresponding to the instruction response is described in the packet type.

1270 Then, the packet 45 is given an ID meaning that it is described as "explanation" in Table 46 of FIG. 9D, and a parameter (additional parameter) is also added as necessary.

1272 This ID is the same as the ID at the time of instruction.

1273 For example, the sound quality setting data transmission (steps S4 and S28), which is a response to the sound quality setting data transmission instruction (steps S3 and S23) of the processing example of FIGS. 4 and 5, is not shown, but is the same as when the sound quality setting data transmission instruction is given. The ID may be set and the sound quality setting data may be included as an additional parameter.

1278 As this description method, for example, the same description method as those in which the IDs in Table 44 are "0007" and "0008" can be adopted.

1280 Further, the response to the sound quality change instruction (steps S8, S32) of the processing example of FIGS. 4 and 5 (steps S12, S36) and the response to the notification (steps S49, S50) of the processing example of FIG. 6 (shown in FIG. 6). For (1), the instruction execution result (including information indicating that the reservation has been made when the sound quality change is reserved) is added as an additional parameter with "0007" or "0008".

[0110]

1289 Further, as the instruction response to the content switching instruction of the processing example of the second embodiment, the ID is "0004", and a value (not shown) indicating the instruction execution result and the designated operation is added as additional parameters. Become.

1293 The value indicating the designated operation may be, for example, a value indicating that in the case of skipping before the content.

[0111]

1298 The second communication method will be described.

1299 FIG. 10A is a diagram showing an example of a packet used for a request in the second communication method of FIG. 7B, and FIG. 10B is an example of an ID (request type) described in the packet of FIG. 10A and an example of parameters specified for each ID. 10C is a diagram showing an example of a packet used for a request response in the second communication method of FIG. 7B, and FIG. 10D is a diagram showing an ID (request response type) and an ID described in the packet of FIG. 10C. It is a figure which shows an example of the parameter.

[0112]

1309 As shown in FIG. 10A, in the request packet 51 used in step S73, "02h" corresponding to the request is described in the packet type.

1311 Then, the packet 51 is given an ID meaning that it is described as "explanation" in Table 52 of FIG. 10B, and a parameter (additional parameter) is also added as necessary.

1313 For example, regarding the sound quality change request (steps S10, S11, S34, S35) of the processing example of FIGS. Kind of parameters will be added.

1315 Although not shown in FIG. 10B, if the change in sound quality is a change in sound mode, the ID and sound mode values may be determined and such a request may be transmitted as in Table 44.

1318 Further, for the individual sound quality data request (steps S24 and S25) of the processing example of FIG. 5, an ID (not shown) may be set.

[0113]

1323 As shown in FIG. 10C, in the request response packet 53 used in step S74, "03h" corresponding to the request response is described in the packet type.

1325 Then, the packet 53 is given an ID meaning that it is described as "explanation" in Table 54 of FIG. 10D, and a parameter (additional parameter) is also added as necessary.

1327 This ID is the same as the ID at the time of instruction.

1328 For example, the response to the sound quality change request (steps S10, S11, S34, S35) of FIGS. 4 and 5 and the individual sound quality setting data transmission (steps S27, S28) of FIG. 5 are not shown, but the above-mentioned instruction execution result. Similarly, the ID and the request execution result as additional parameters may be defined.

[0114]

1335 The third communication method will be described.

1338 FIG. 11A is a diagram showing an example of a packet used for notification in the third communication method of FIG. 7C, and FIG. 11B is an example of an ID (notification type) described in the packet of FIG. 11A and an example of parameters defined for each ID. It is a figure which shows.

[0115]

1343 As shown in FIG. 11A, in the request packet 61 used in step S75, "04h" corresponding to the notification is described in the packet type.

1345 Then, the packet 61 is given an ID meaning that it is described as "explanation" in Table 62 of FIG. 11B, and a parameter (additional parameter) is also added as necessary.

1347 For example, for the notification of the change in sound source information as illustrated as the notification at the time of variable processing in the processing example of the second embodiment, the ID is "0000" and a value indicating a change in sound source information such as the number of channels as an additional parameter. (Not shown) will be added.

[0116]

1354 (Others) Although the system according to each embodiment of the present invention has been described above, this system may not adopt the technology premised on WiSA.

1356 For example, in WiSA, an IC (Integrated Circuit) chip capable of wirelessly receiving an audio signal is mounted on each speaker device, but one speaker device may be provided with a plurality of signal processing units.

[0117]

1362 Further, the parts other than the speaker portion in the source device and the speaker device illustrated in FIG. 1 include hardware such as a microprocessor (or DSP), memory, a bus, an interface, peripheral devices such as a remote controller, and hardware thereof. It can be realized by software that can be executed in.

1366 A part of the hardware can be mounted as an IC / IC chipset, in which case the software may be stored in the memory.

1368 Further, all of the constituent elements of the present invention may be configured by hardware, and in that case as well, a part of the hardware can be mounted as an IC / IC chipset.

[0118]

1374 Further, a recording medium on which the program code of the software for realizing the functions in the various configuration examples described above is recorded is supplied to the source device and the speaker device, and the program code is executed by the microprocessor or DSP in each device. This also achieves the object of the present invention.

1379 In this case, the software program code itself realizes the functions of the various configuration examples described above, and even if the program code itself or the recording medium (external recording medium or internal storage device) on which the

program code is recorded is used. , The present invention can be constructed by the control side reading and executing the code.

1384 Examples of the external recording medium include various types such as an optical disk such as a CD-ROM or a DVD-ROM, and a non-volatile semiconductor memory such as a memory card.

1387 Examples of the internal storage device include various devices such as a hard disk and a semiconductor memory.

1388 The program code can also be downloaded from the Internet and executed, or received from a broadcast wave and executed.

[0119]

1394 The voice wireless transmission system according to the present invention has been described above, but as described in the processing procedure, the present invention transmits voice signals to a plurality of speaker devices and the plurality of speaker devices by wireless communication. It is also possible to take a form as a voice radio transmission method in a voice radio transmission system provided with a source device.

[0120]

1402 This voice wireless transmission method includes a step in which the speaker device accepts a user operation and outputs the voice signal changed according to the operation signal indicated by the user operation.

1405 Other application examples are as described for the voice wireless transmission system, and the description thereof will be omitted.

[0121]

1410 In other words, the program code itself is a program for causing the computer on the source device side and the computer on the speaker device side to execute this voice wireless transmission method.

1413 That is, this program includes a receiving-side program for causing the computer on the speaker device side to perform a step of accepting a user operation and outputting the audio signal changed according to the operation signal indicated by the user operation.

1416 Further, the above program causes the computer on the source device side to execute a step of changing the voice signal or the parameters for voice signal processing according to the operation signal indicated by the user operation received by the speaker device. Includes program.

1420 Other application examples are as described for the voice wireless transmission system, and the description thereof will be omitted.

[0122]

1425 1 ... Source device, 2, SP1, SP2, SP3, SP4, SP5, SP6, SP7, SP8 ... Speaker device, 2a, 2b ... Speaker group, 3 ... Portable terminal device, 10 ... Source device control unit, 11 ... Voice Input terminal, 12 ... Communication unit of source device, 13 ... Voice input processing unit, 14 ... Signal processing unit of source device, 15 ... Wireless communication unit of source device, 16 ... Operation unit of source device, 17 ... Display unit, 20 ... Speaker device control unit, 21 ... Speaker device wireless communication unit, 22 ... Speaker device signal processing unit, 23 ... Volume adjustment unit, 24 ... Amplifier unit (AMP), 25 ... Speaker unit, 26 ... Speaker device operation Unit, 27 ... Communication unit of speaker equipment.

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CLAIMS JP2016178422A

1.

13 A voice wireless transmission system including a plurality of speaker devices and a source device that transmits a voice signal to the plurality of speaker devices by wireless communication. The speaker device accepts a user operation and performs the user operation. A voice wireless transmission system characterized by outputting the voice signal changed according to the operation signal indicated by.

2.

21 The speaker device transmits the operation signal to the source device, and the source device is for audio signal or audio signal processing for outputting to the plurality of speaker devices based on the operation signal received from the speaker device. The audio wireless transmission system according to claim 1, wherein the parameters are changed.

3.

28 The speaker device is characterized in that it performs signal processing on the audio signal received from the source device with the audio signal processing parameters indicated by the operation signal, and transmits an execution notification of the signal processing to the source device. The audio wireless transmission system according to claim 1.

4.

35 The voice wireless transmission system according to any one of claims 1 to 3, wherein the speaker device has a receiving unit that receives the operation signal indicated by the user operation from a mobile terminal device by wireless communication.

5.

41 It is one of the plurality of speaker devices that receives the audio signal from the source device that transmits the audio signal to the plurality of speaker devices by wireless communication, and the speaker device accepts the user operation. , A speaker device characterized by outputting the audio signal changed according to the operation signal indicated by the user operation.

6.

49 The speaker device transmits the operation signal to the source device, and the audio signal or the audio signal processing parameter for the plurality of speaker devices changed by the source device based on the operation signal is transmitted to the source device. The speaker device according to claim 5, wherein the speaker device receives from.

7.

56 The speaker device is characterized in that it performs signal processing on the audio signal received from the source device with the audio signal processing parameters indicated by the operation signal, and transmits an execution notification of the signal processing to the source device. The speaker device according to claim 5.

8.

63 The speaker device according to any one of claims 5 to 7, further comprising a receiving unit that receives the operation signal indicated by the user operation from a mobile terminal device by wireless communication.

9.

69 A source device that transmits audio signals to a plurality of speaker devices by wireless communication, and changes the audio signal or audio signal processing parameters according to an operation signal indicated by a user operation received by the speaker device. Source equipment featuring.

10.

76 9. The aspect 9 is characterized in that the operation signal transmitted from the speaker device is received, and the audio signal or the audio signal processing parameter for being output to the plurality of speaker devices is changed based on the operation signal. Source equipment described in.

11.

The source device according to claim 9, wherein the speaker device side receives the changed parameters for audio signal processing transmitted from the speaker device.

12.

The source device according to any one of claims 9 to 11, wherein the operation signal indicated by the user operation is a signal received from the mobile terminal device by the speaker device by wireless communication.

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventorship:	RENARD	Examiner:	MISIURA, BRIAN THOMAS
Serial No.:	16/771068	Group Art Unit:	2186
Filed:	June 9, 2020	Docket No.:	21063.0018USWO
Title:	METHOD AND SYSTEM FOR MAKING FUNCTIONAL DEVICES AVAILABLE TO PARTICIPANTS OF MEETINGS		

CERTIFICATE OF TRANSMISSION.
I hereby certify that this paper is being transmitted by EFS Web to the United States Patent & Trademark Office on January 10, 2022.

By: /Jessica A. Sun/
Name: Jessica A. Sun

AMENDMENT AND RESPONSE

Mail Stop: AMENDMENT
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Dear Commissioner:

In response to the Non-Final Office Action issued October 12, 2021, please amend the above-identified application as follows:

Amendment to the Specification begins on page 2 of this paper.

Amendments to the Drawings begin on page 5 of this paper.

Amendments to the Claims are reflected in the listing of claims that begins on page 6 of this paper.

Remarks begin on page 10 of this paper.

A fee for one additional claim accompanies this reply.

AMENDMENTS TO THE SPECIFICATION

Please revise the specification as noted below. It is respectfully submitted that no new matter is added, since the amendments clarify the previous disclosure.

Please amend the paragraph starting on page 27, line 23, as seen in the following marked-up paragraph:

> The configurable USB endpoints are configured either when pairing a first peripheral device 130 device with a base unit 100 or over the wireless connection 127 between the processing device [[130]] 160 and the base unit 100. Once configured, the USB endpoints will expose second peripherals devices 91-93 which can be interpreted as custom drivers, vendor specific drivers or default OS drivers. These can be used by either a host application or third party applications. These endpoints can be an exact copy of the ones of the second peripheral device 91-93 connected to the Base Unit 100 or can be dedicated specified endpoints.

Please amend the paragraph starting on page 28, line 13, as seen in the following marked-up paragraph:

> Data from a second peripheral device connected to the Base Unit 100 can flow into the Base Unit 100 or can be captured in the base unit 100 such as data for display 126. Any such data can be interpreted and possibly processed, enhanced, encoded and/or encrypted using firmware of the base unit 100 to generate processed data. In some embodiments this processed data will then be sent to the first peripheral device 130 ~~deviee~~ through a wireless link 127. This first peripheral device 130 will, if necessary, decode, decrypt, process and/or interpret the data and make it available through one or more of the USB endpoints of this first peripheral device 130 (e.g. either the fixed or the configured ones). This data will then be captured by the operating system of the processing device 160 and will be made available through a custom or standard driver to either the host application or a 3rd party application running on the processing device 160 or to other processing devices 160 of other participants of the meeting

Please amend the paragraph starting on page 32, line 8, as seen in the following marked-up paragraph:

> Data from the speakerphone 92 can be processed on the base unit 100 and/or on the first peripheral device 130 and can be mimicked to the processing device 160. The microphone of the speakerphone 92 generates a signal that is transmitted to the processing device 160 via a USB speakerphone endpoint 136 on the first peripheral device whereby any noise reduction or echo cancellation can be carried out in the base unit 100 as described with respect to Figure 1 (block 115). The microphone data is made available to the UC call as the speakerphone endpoint 136 is recognized by the processing device 160 as a speakerphone as if the speakerphone were plugged into the processing device 160. Also, the microphone data is made available to all other users who have a processing device [[10]] 160 with a connected first peripheral device. In this embodiment the speaker of the speakerphone has its USB endpoint 136 on the first peripheral device 130.

Please amend the paragraph starting on page 32, line 20, as seen in the following marked-up paragraph:

> Figure 7 shows a similar configuration to that of Figure 6 except there are two USB endpoints 136 and 138 for a speakerphone and a speaker respectively. As previously, the HID endpoint 134 makes the HDMI display 126 available to any processing device 160 with a first peripheral device 130 attached thereto when in a meeting room for providing audiovisual signals to the display [[16]] 126. However, the display 126 is not exposed on the processing device 160, i.e. it is not presented as a display but as a HID endpoint.

Please amend the paragraph starting on page 32, line 27, as seen in the following marked-up paragraph:

> The two endpoints 136, 138 receive audio signals from two different sources. The sound from the UC call can be dealt with as described for Figure 6 via the speakerphone endpoint 136 and ~~processing~~ processed on the base unit. But if there is additional audio data which is not part of the UC call, this data is sent via the speaker endpoint 138. As there is no second peripheral device in the group 90 which is a standalone speaker, the

base unit 100 mixes the audio signals for the speakerphone and the speaker before sending all audio data to the speaker of the speakerphone 92. If there were a separate speaker 97 in group 90, then the base unit 100 could send this audio data to the speaker. The result is that a virtual speaker has been exposed on the processing device 160.

Please amend the paragraph starting on page 36, line 6, as seen in the following marked-up paragraph:

Figure 17 shows a further embodiment of the present invention comprising a processing device 160 with a processor and memory and executing and optionally storing a client software 70 comprising also a host application as well as a third party application 60 which can be adapted to execute a unified communications call such as a Skype™ call or a Skype™ for business call. The processing device [[130]] 160 has a serial port such as a USB port and generic or custom drivers for communicating across the port with a first peripheral device 130. The peripheral device 130 has a processor and memory and executes and optionally stores firmware which provides a wireless link 127 to a base unit 100 as well as providing at least one configurable or fixed endpoint of a functional device 90 which is connected to or is connected in the base unit 100. The base unit has a processor and a memory for executing and optionally storing firmware for providing a connection to the wireless link 127 and also to provide a port to the functional device 90. The functional device 90 has a processor and memory and executes and optionally stores firmware for providing the link and interface to the base unit 100 and for providing data to be sent to the at least one configurable or fixed endpoints on the peripheral device 130.

AMENDMENTS TO THE DRAWINGS

The attached sheet of drawings includes changes to Fig. 4. The figures have been amended to address the objection to the drawings as set forth in the Office Action. This sheet 6/19, which includes Fig. 4 is to replace the original sheet 6/19 including Fig. 4.

Attachment: Replacement Sheet

AMENDMENT TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

1-35. (Cancelled)

36-57. (Cancelled)

58. (New) A system for connecting a processing device to a functional device connected to or in a base unit of a wireless connection, the system comprising:

the base unit having a transmitter,

a first display device connected to or in the base unit,

at least one functional device connected to or in the base unit, and

the processing device having a memory, a second display device, an operating system, a third party software for a Unified Communication call, a driver and a client software configured to interact directly with the base unit over a wireless connection,

wherein the base unit, via the transmitter, is configured to transmit data over the wireless connection to the processing device,

wherein the client software, when executed by a processor of the processing device, is configured to present the first display device to the processing device and to allow interaction therewith, in a way such that the client software and the driver are configured to present the at least one functional device to the operating system as a virtual functional device, and the third party software for the Unified Communication call is presented with the virtual functional device for the Unified Communication call, the processing device being configured to host the Unified Communication between two or more other processing devices.

59. (New) The system of claim 58, wherein the client software and the driver are configured to present a simulated speakerphone to the operating system to create a virtual microphone and a virtual speaker.

60. (New) The system of claim 58, wherein the client software and the driver are configured to present a simulated videocam to the operating system to create a virtual videocam device.

61. (New) The system of claim 58, wherein the client software is configured to provide video data, optionally obtained by screen scraping, directly to the base unit, wherein the base unit processes the video data.

62. (New) The system of claim 58, wherein the processing device processes video data received from the base unit via the transmitter over the wireless connection.

63. (New) The system of claim 62, wherein processing of the video data comprises decoding and compositing or decrypting the video data.

64. (New) The system of claim 58, wherein the at least one functional device which is presented to the operating system as a virtual functional device, is one or more of a data capturing device, a microphone, a speakerphone, a speaker, another display, a touchscreen, a projector, a camera, a video camera, and a webcamera.

65. (New) The system of claim 58, further comprising means for encoding, optionally encrypting the data in the base unit or the processing device.

66. (New) The system of claim 58, wherein the virtual functional device is presented to the unified communication between the two or more other processing devices.

67. (New) The system of claim 58, wherein the system is configured to expose the virtual functional device to the processing device.

68. (New) The system of claim 58, further comprising at least one fixed or a configurable endpoint of the virtual functional device, wherein the at least one fixed or a configurable

endpoint is a data source or a data sink which is configured to store or emit data of the virtual functional device.

69. (New) A method for connecting a processing device to a functional device connected to or in a base unit of a communications network, the base unit having a transmitter and a first display device, the processing device having a memory, a second display device and an operating system, a third party software for a Unified Communication call, and a driver and a client software wherein, the client software, when executed by a processor on the processing device:

interacts directly with the base unit over a wireless connection and presents the first display device to the processing device and to allow interaction therewith, wherein the base unit transmits data over the wireless connection to the processing device,

the client software and a driver present the functional device to the operating system as a virtual functional device,

third party software for a Unified Communication call is presented with the virtual functional device which it then uses for the call,

wherein the processing device hosts the Unified Communication call between two or more processing devices.

70. (New) The method of claim 69, wherein the client software and the driver present a simulated speakerphone to the operating system thus creating a virtual microphone and a virtual speaker.

71. (New) The method of claim 69, wherein the client software and a driver present a simulated videocam to the operating system thus creating a virtual videocam device.

72. (New) The method of claim 69, wherein the client software of processing device provides video data, optionally obtained by screen scraping, directly to the base unit where it is processed.

73. (New) The method of claim 72, wherein the process comprises decoding and compositing or decrypting the video data and providing the video data to the first display device.

74. (New) The method of claim 69, wherein the functional device which is presented to the operating system as the virtual functional device is any one or more of a data capturing device, a microphone, a speakerphone, a speaker, another display, a touchscreen, a projector, a camera, a video camera, a webcamera.

75. (New) The method of claim 69, further comprising encoding, optionally encrypting the data.

76. (New) The method of claim 69, wherein the virtual functional device is presented to the unified communication between the two or more other processing devices.

77. (New) The method of claim 69, further exposing a same type of functional device to the processing device as is connected to the base unit which is presented to the operating system as a virtual functional device.

78. (New) The method of claim 69, further comprising at least one fixed or a configurable endpoint of the virtual functional device, wherein the at least one fixed or a configurable endpoint is a data source or a data sink which stores or emits data of the virtual functional device.

REMARKS

Applicant respectfully requests favorable reconsideration of this application in view of the above amendments and the following remarks. Claims 38-57 are cancelled without prejudice or disclaimer. Claims 58-78 are added. Support for the claims may be found, for example, at least in FIGS. 12-15 and page 34, line 21 to page 36, line 1 of the specification as filed.

No new matter has been added.

Claims 58-78 are pending.

Objections to Drawings

The drawings are objected to for informalities. Without acquiescing to the merits of the objection, FIG. 4 has been amended, as indicated in the Office Action. Applicant respectfully requests that the objection to the drawings be withdrawn.

Double Patenting

Claims 36, 42-44, 50-53, 56, and 57 are provisionally rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1,4, 9, 11, 12, 15, 16, and 17 of U.S. Patent No. 10,684,972. Without acquiescing to the merits of the rejection, but in order to advance prosecution, claims 36, 42-44, 50-53, 56, and 57 have been cancelled. New claims 58-78 are not obvious over the claims of U.S. patent 10,684,972 for at least reciting "a virtual functional device." Accordingly, Applicant respectfully requests withdrawal of the rejection.

Claim Rejections - 35 U.S.C. § 103

Claims 36, 38-44, 46-54, 56, and 57 are rejected under 35 U.S.C. 103 as being unpatentable over Brands et al. (U.S. Patent Application Publication No. 2015/0121466) ("Brands") in view of Christison et al. (U.S. Patent No. 7,761,627) ("Christison"). Applicant respectfully traverses the rejection. Without acquiescing to the merits of the rejection, but in order to advance prosecution, the previous claims have been cancelled and new claims 58-78 added.

Claim 58 recites, at least in part, wherein the client software, when executed by a processor of the processing device, is configured to present the first display device to the processing device and to allow interaction therewith, in a way such that the client software and

the driver are configured to present the at least one functional device to the operating system as a virtual functional device, and the third party software for the Unified Communication call is presented with the virtual functional device for the Unified Communication call, the processing device being configured to host the Unified Communication between two or more other processing devices. For example, as discussed in the specification, the features recited in claim 58 are at least directed to, in an embodiment, in which the processing device 60' has no first peripheral device 130, e.g., none is available (page 34, lines 25-26). The specification further teaches that in such a case, client software 70' can be adapted to interact directly with base unit 100 over a wireless connection 172' and the client software 70' is adapted to provide any simulations, or translations are required to present the display device 126 to the processing unit 160' and to allow interaction therewith (page 34, lines 26-29). Further, the specification teaches starting on page 35, line 14 the flowing:

> For the processing device 160' the client software 70' and a driver 162' can present a simulated speakerphone 92 to the OS 164' thus creating a virtual microphone and a virtual speaker. The third party software 60' for the Unified Communication such as the Skype™ call will be presented with these virtual devices which it then uses for the call.

Thus, one having ordinary skill in the art would have understood that the features recited in the claims are at least directed virtual functional devices, e.g., driver installed on PC 160, virtual microphone and speaker and in which the generation and exposure of the endpoints are on the virtual functional device, e.g., virtual USB endpoints, enumerate USB endpoints, load drivers to endpoints, etc.

Neither Brands nor Christison, taken alone or in combination, discloses or suggests the features recited in new claim 58.

As admitted on page 7 of the Office Action, "Brands does not specifically disclose that said functional devices are exposed on the connection units 47 as 'at least one fixed or configurable endpoints of the functional device.'" Rather, Brands at least discloses, e.g. in Figure 1a, peripheral devices 47, 52, in Figure 5, a dongle, in Figure 4, a button, and in Figure 10, USB devices inserted in laptops L11, L21, L22. While Brands teaches in the third and fourth embodiments, a portable application or a software only client installed on the client processing device that do not include a peripheral device, it is appreciated that Brand does not teach that the portable application or software create a virtual functional device, as would have been understood in view of the present application, and hence do not present the virtual functional

device to the third party software for the Unified Communication call. Thus, one having ordinary skill in the art would have appreciated that the processing device of Brands is not configured to host the unified communication between two or more other processing devices. Furthermore, Brands does not teach a client software, which, when executed by a processor of the processing device, is configured to present the first display device to the processing device and to allow interaction therewith, e.g., for operation as a virtual functional device. In other words, Brands teaches a different system and fails to disclose or suggest the features recited in new claim 58.

Christison fails to cure the deficiencies of Brands with respect to new claim 58. Instead, Christison teaches a Wireless USB (WUSB) hub that allows wireless communication between wired USB devices and a host system (see Christison, col. 2, lines 58-60). Christison teaches that the data is communicated from the host 400 to the HWA 410 through a wired connection and the HWA 410 then uses a wireless protocol to transmit the data to one of the DWAs 420, 430 which in turn sends the data to the specified USB device 421, 422, 431, or 432 over a wired connection (see, col. 4, lines 12-16). Further, Christison teaches that when a USB device attaches, the WUSB hub maps WUSB hub wireless endpoints one-for-one for USB device endpoints and treats the collection of endpoints associated with a particular USB device as a function on the WUSB hub and the WUSB hub informs the host that a new function needs to be enumerated in order to activate support for a newly attached device (see, col. 7, lines 29-35). Thus, Christison teaches physical USB devices and ports, but does not teach or suggest the combination of features recited in new claim 58.

That is, as suggested on page 7 of the Office Action, Christison teaches wired devices that appear to the host, but one having ordinary skill in the art would not have observed any evidence in Christison that the USB device is presented as a virtual functional device and that a third party software for the Unified Communication call is presented with the virtual fictional device for the Unified Communication call and the processing device is configured to host the Unified Communication between two or more other processing devices.

Therefore, since neither Brands nor Christison teaches or suggests the same combination of features recited in new claim 58, obviousness of claim 58 cannot be established. Thus, claim 58 is patentable over the cited references. Claim 69 is patentable over Brands and Christison for at least reciting similar features as recited in new claim 58. The remaining claims depend on new claims 58 or 69 and are patentable over Brands and Christison for at least the same reasons as

claims 58 and 69. Applicant is not conceding the correctness of the rejection of features not discussed. Applicant respectfully requests withdrawal of the rejection.

Moreover, Applicant submits that the proposed combination of Brands and Christison fails to in result in each and every feature recited in new claims 68 and 78. For example, claim 68 recites at least one fixed or a configurable endpoint of the virtual functional device, wherein the at least one fixed or a configurable endpoint is a data source or a data sink which is configured to store or emit data of the virtual functional device.

As admitted on page 7 of the Office Action, "Brands does not specifically disclose that said functional devices are exposed on the connection units 47 as 'at least one fixed or configurable endpoints of the functional device.'" Thus, since Brands fails to disclose or suggest a virtual functional device, Brands also fails to disclose or suggests at least one fixed or a configurable endpoint of the virtual functional device, as recited in claims 68 and 78. Christison fails to cure the deficiencies of Brands at least because Christison also fails to disclose a virtual functional device and thus, fails to disclose that the endpoints of the virtual functional device. Therefore, the proposed combination of the invention of Brands in accordance with the teachings of Christison fails to result in the same combination of features as recited in new claims 68 and 78.

Claims 37, 45, and 55 are rejected under 35 U.S.C. 103 as being unpatentable over Brands in view of Christison, and further in view of Beel et al. (U.S. Patent Application Publication No. 2015/0263905) ("Beel"). This rejection is rendered moot in view of the cancellation of the claims. Thus, Applicant respectfully requests that the rejection be withdrawn.

In view of the above, Applicant respectfully requests favorable reconsideration in the form of a Notice of Allowance. If any questions arise regarding this communication, the Examiner is invited to contact Applicant's representative listed below. Please charge any additional fees or credit any overpayment to Deposit Account No. 50-3478.

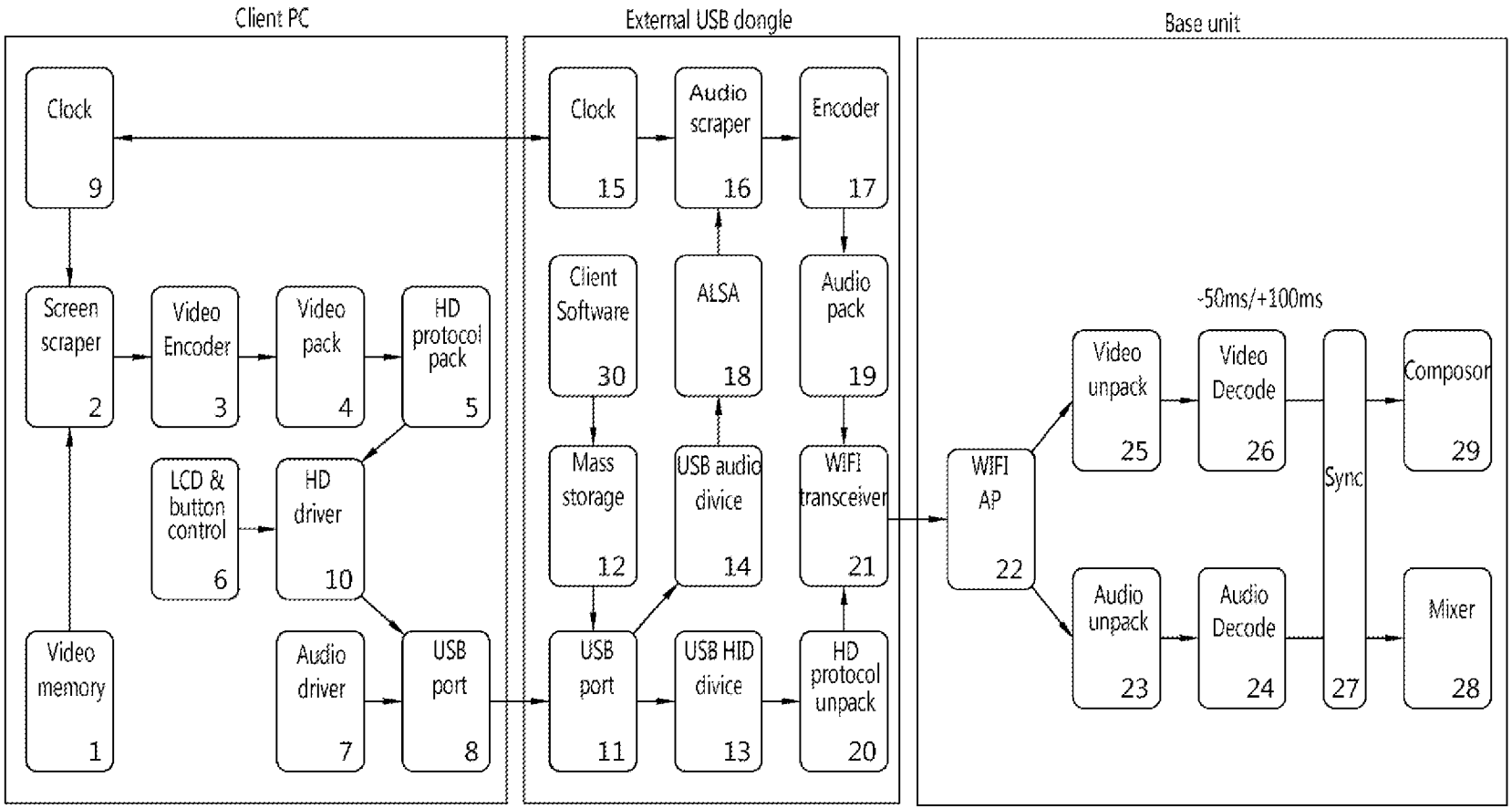
Respectfully submitted,

HAMRE, SCHUMANN, MUELLER & LARSON, P.C.
45 S. 7th St., Suite 2700
Minneapolis, MN 55402
(612) 455-3800

Dated: January 10, 2022

By: /Thomas Lee/
Thomas Lee
Reg. No.: 66,396
TL/ajs

Fig. 4



REPLACEMENT SHEET

6/19

Electronic Patent Application Fee Transmittal

Application Number:	16771068
Filing Date:	09-Jun-2020
Title of Invention:	METHOD AND SYSTEM FOR MAKING FUNCTIONAL DEVICES AVAILABLE TO PARTICIPANTS OF MEETINGS
First Named Inventor/Applicant Name:	Gauthier RENARD
Filer:	Thomas Lee/Jessica Sun
Attorney Docket Number:	21063.0018USWO

Filed as Large Entity

Filing Fees for U.S. National Stage under 35 USC 371

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
CLAIMS IN EXCESS OF 20	1615	1	100	100
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**100**

Electronic Acknowledgement Receipt

EFS ID:	44705506
Application Number:	16771068
International Application Number:	
Confirmation Number:	1088
Title of Invention:	METHOD AND SYSTEM FOR MAKING FUNCTIONAL DEVICES AVAILABLE TO PARTICIPANTS OF MEETINGS
First Named Inventor/Applicant Name:	Gauthier RENARD
Customer Number:	52835
Filer:	Thomas Lee/Jessica Sun
Filer Authorized By:	Thomas Lee
Attorney Docket Number:	21063.0018USWO
Receipt Date:	10-JAN-2022
Filing Date:	09-JUN-2020
Time Stamp:	13:37:18
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$100
RAM confirmation Number	E202210D37474272
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		Response_0018USWO.pdf	6072238 4cc1501244e1ce766737d4dfb751692160a655ce	yes	15

Multipart Description/PDF files in .zip description

Document Description	Start	End
Amendment/Req. Reconsideration-After Non-Final Reject	1	1
Specification	2	4
Drawings-only black and white line drawings	5	5
Claims	6	9
Applicant Arguments/Remarks Made in an Amendment	10	14
Drawings-only black and white line drawings	15	15

Warnings:

Information:

2	Fee Worksheet (SB06)	fee-info.pdf	38291 778840b6f274950f4ee89287d059e3dcf82bb2ec	no	2

Warnings:

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Total Files Size (in bytes):	6110529

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/771,068	Filing Date 06/09/2020	☐ To be Mailed

ENTITY: ☑ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $100 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $460 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	01/10/2022	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 21	Minus	** 22	= 0		x $100 =	0
	Independent (37 CFR 1.16(h))	* 2	Minus	*** 3	= 0		x $480 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/BRENDA V HARRISON/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/771,068	06/09/2020	Gauthier RENARD	21063.0018USWO	1088

52835 7590 03/21/2022

HAMRE, SCHUMANN, MUELLER & LARSON, P.C.
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EXAMINER
MISIURA, BRIAN THOMAS

ART UNIT	PAPER NUMBER
2186	

NOTIFICATION DATE	DELIVERY MODE
03/21/2022	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

PTOMail@hsml.com

Office Action Summary	Application No. 16/771,068	Applicant(s) RENARD et al.	
	Examiner BRIAN T MISIURA	Art Unit 2186	AIA (FITF) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on 1/10/2022.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☑ This action is **FINAL.** 2b) ☐ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 58-78 is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 58-78 is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☑ The drawing(s) filed on 6/9/2020 is/are: a)☑ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☑ Notice of References Cited (PTO-892)

2) ☑ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date 12/9/2021.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

Notice of Pre-AIA or AIA Status

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Detailed Action

Response to Arguments

Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection.

Claim Interpretation

The following is a quotation of 35 U.S.C. 112(f):

> (f) Element in Claim for a Combination. – An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.

The following is a quotation of pre-AIA 35 U.S.C. 112, sixth paragraph:

> An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.

The claims in this application are given their broadest reasonable interpretation using the plain meaning of the claim language in light of the specification as it would be understood by one of ordinary skill in the art. The broadest reasonable interpretation of a claim element (also commonly referred to as a claim limitation) is limited by the description in the specification when 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph, is invoked.

As explained in MPEP § 2181, subsection I, claim limitations that meet the following three-prong test will be interpreted under 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph:

(A) the claim limitation uses the term "means" or "step" or a term used as a substitute for "means" that is a generic placeholder (also called a nonce term or a non-structural term having no specific structural meaning) for performing the claimed function;

(B) the term "means" or "step" or the generic placeholder is modified by functional language, typically, but not always linked by the transition word "for" (e.g., "means for") or another linking word or phrase, such as "configured to" or "so that"; and

(C) the term "means" or "step" or the generic placeholder is not modified by sufficient structure, material, or acts for performing the claimed function.

Use of the word "means" (or "step") in a claim with functional language creates a rebuttable presumption that the claim limitation is to be treated in accordance with 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph. The presumption that the claim limitation is interpreted under 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph, is rebutted when the claim limitation recites sufficient structure, material, or acts to entirely perform the recited function.

Absence of the word "means" (or "step") in a claim creates a rebuttable presumption that the claim limitation is not to be treated in accordance with 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph. The presumption that the claim limitation is not interpreted under 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph, is rebutted when the claim limitation recites function without reciting sufficient structure, material or acts to entirely perform the recited function.

Claim limitations in this application (**Claim 65**) that use the word "means" (or "step") are being interpreted under 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph, except as otherwise indicated in an Office action. Conversely, claim limitations in this application that do not use the word "means" (or "step") are not being interpreted under 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph, except as otherwise indicated in an Office action.

Claim Rejections - 35 USC § 103

In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

The following is a quotation of 35 U.S.C. 103 which forms the basis for all obviousness rejections set forth in this Office action:

> A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103 are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 58-78 are rejected under 35 U.S.C. 103 as being unpatentable over **Brands** et al. U.S. PGPUB No. 2015/0121466 in view of **Beel** et al. U.S. PGPUB No. 2015/0169477.

Per Claim 58, Brands discloses:

- a system for connecting a processing device (**Paragraph 118, Processing device 31 such as a laptop computer.**) to a functional device (**Paragraphs 120-121; display 44, whiteboard 45, camera 35, microphones 38**) connected to or in a base unit (**Paragraphs 119-122; base node 36**) of a wireless network (**Paragraphs 88, 118, and 119; wireless network 50**),

- the system comprising: the base unit having a transmitter (**Paragraph 130; Base node 36 comprises a wireless transmitter/receiver.**),
- a first display device connected to or in the base unit (**Paragraphs 120 and 124, Figures 1a and 1b; "base node 36 being coupled to a central display 44"**),
- at least one functional device connected to or in the base unit (**Paragraphs 120-121; Any of the whiteboard 45, display 44, cameras 39-41, or microphones 38 can be considered a "functional device".**),
- the processing device having a memory, a second display device, and an operating system (**Paragraph 118; Devices such as laptop computers and tablet computing devices each comprise memory, displays, and OS's.**),
- a third party software for a Unified Communication call (**Paragraph 152, "multiple participants…engage in a media conference"; Paragraph 153, "a dedicated software client"**), a driver and a client software configured to interact directly with the base unit over a wireless connection (**Paragraph 128, "portable application 60"; Paragraph 138, "portable application" and "pre-installed generic drivers"**),
- wherein the base unit, via the transmitter, is configured to transmit data over the wireless connection to the processing device (**Paragraphs 128-130**),
- wherein the client software (**portable application 60**), when executed by a processor of the processing device, is configured to present the first display device to the processing device and to allow interaction therewith (**Paragraphs 128 and 138-140**),
- and the third party software for the unified communication call is presented with the virtual functional device for the unified communication call (**Paragraphs 123, 127, and 152 disclose that a media conference is conducted using the invention presented in the disclosure. Paragraph 153 discloses a "dedicated software client". The peripheral devices present within meeting room 30 will be available to participants 37 of processing devices 31 to utilize during the media conference.**),

- the processing device being configured to host the unified communication between two or more other processing devices (**Paragraphs 148-242 provide an in-depth configuration of a media conference between "multiple participants".**).

Brands discloses that base node 36 interconnects processing devices 31 with display 44, whiteboard 45, and/or other peripheral devices such as cameras, loudspeakers, and microphones. The interconnected processing and peripheral devices allow for an electronic meeting to take place by way of sharing media content from the plurality of different devices through the use of the display(s) in a meeting room 30 **(Paragraphs 119-124 and 127)**. Brands further teaches the portable application's role in coordinating the interactions between the processing devices 31 and the peripheral devices present within meeting room 30 (**Paragraphs 128 and 138-140**). Brands does not specifically disclose presenting a functional device as a virtual functional device to the processing device.

However, Beel, of common Assignee and field of endeavor, similarly teaches a media conference within a meeting room 30 comprising a client processing device 31, base unit 36, and a plurality of peripheral/functional devices (**Figure 1a, similarly labeled and referenced as Brands**). Beel further teaches that a peripheral device can be presented to the processing device as an audio out device by way of a "virtual audio device". Upon connection to the system, the virtual audio device will be present to a user of the processing device to utilize (**Paragraphs 313 and 314**).

- It would have been obvious to one having ordinary skill in the art before the effective filing date of the claimed invention to implement the virtual device representation of Beel within the electronic meeting system of Brands because it makes it clear to the user that the audio device can now be utilized as a supplemental audio output device during the meeting.

Per Claim 59, Brands discloses the system of claim 58, wherein the client software and the driver are configured to present a simulated speakerphone to the operating system

to create a virtual microphone and a virtual speakerphone (**Paragraph 121; A microphone 38 and loud speaker is provided for use by the processing devices 31.**). Similar to Claim 58, Brands does not specifically teach the virtualized devices. However, please refer to the above rejection of Claim 58 with respect to Beel teaching the virtualized presentation of the peripheral devices to the client processing system. It further would have been obvious to one having ordinary skill in the art to include the microphone and loud speakers of Brands as the virtualized devices as taught by Beel.

Per Claim 60, Brands discloses the system of claim 58, wherein the client software and the driver are configured to present a simulated videocam to the operating system to create a virtual videocam device (**Paragraph 120; camera 35**). Similar to Claim 58, Brands does not specifically teach the virtualized devices. However, please refer to the above rejection of Claim 58 with respect to Beel teaching the virtualized presentation of the peripheral devices to the client processing system. It further would have been obvious to one having ordinary skill in the art to include the video camera of Brands as the virtualized devices as taught by Beel.

Per Claim 61, Brands discloses the system of claim 58, wherein the client software is configured to provide video data, optionally obtained by screen scraping, directly to the base unit, wherein the base unit processes the video data (**Paragraph 140; Base unit 36 receives screen scraped video data and auto composes it for the central display.**).

Per Claim 62, Brands discloses the system of claim 58, wherein the processing device processes video data received from the base unit via the transmitter over the wireless connection (**Paragraphs 64 and 65; "The executable software code can comprise eleventh code for providing a means for receiving, decrypting and decoding incoming arbitrary media content." The executable software code is stored for execution on the processing device.**).

Per Claim 63, Brands discloses the system of claim 62, wherein the processing of the video data comprises decoding and compositing or decrypting the video data (**Paragraphs 64 and 65; "The executable software code can comprise eleventh code for providing a means for receiving, decrypting and decoding incoming arbitrary media content."**)

Per Claim 64, Brands discloses the system of claim 58, wherein the at least one functional device which is presented to the operating system as a virtual functional device, is one or more of a data capturing device, a microphone, a speakerphone, a speaker, another display, a touchscreen, a projector, a camera, a video camera, and a webcamera (**Paragraphs 120-122**). Please see the above rejection of Clam 58 for explanation of how Beel teaches the "virtual functional device" limitation.

Per Claim 65, Brands discloses the system according to claim 58, further comprising means for encoding, optionally encrypting the data (**Paragraphs 60, 63, and 256-259**).

Per Claim 66, Brands discloses the system according to claim 58, wherein the processing device is adapted to host a unified communication between two or more further processing devices (**Paragraph 152; Media conference featuring multiple participants**).

Per Claim 67, Beel further teaches wherein the system is configured to expose the virtual functional device to the processing device (**Paragraphs 313 and 314**).

Per Claim 68, Beel further teaches at least one fixed or a configurable endpoint of the virtual functional device, wherein the at least one fixed or a configurable endpoint is a data source or a data sink which is configured to store or emit data of the virtual functional device (**Paragraphs 313 and 314; An audio signal can be emited.**).

Per Claims 69-74 and 76-78, please refer to the above rejections of Claims 58-61, 63, 64, and 66-68, respectively, as the limitations are substantially similar and the mapping of the references is equally applicable.

Per Claim 75, Brands discloses the method of claim 69, further comprising encoding, optionally encrypting the data (**Paragraphs 60, 63, and 256-259**).

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to BRIAN T MISIURA whose telephone number is (571)272-0889. The examiner can normally be reached on M-F: 8-4:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kim Huynh can be reached at (571) 272-4174. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For

more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Brian T Misiura/

Primary Examiner, Art Unit 2186

Notice of References Cited	Application/Control No. 16/771,068	Applicant(s)/Patent Under Reexamination RENARD et al.	
	Examiner BRIAN T MISIURA	Art Unit 2186	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-20150169477-A1	06-2015	Beel; Koen Simon Herman	H04N21/4126	710/10
	B					
	C					
	D					
	E					
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	G					
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	I					
	J					
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	L					
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FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
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	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/771,068	RENARD et al.
	Examiner	Art Unit
	BRIAN T MISIURA	2186

CPC - Searched*		
Symbol	Date	Examiner
G06F13/122, 387, 4282	10/06/2021	BTM
H04L12/12, 0428, 1813	10/06/2021	BTM

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
IDS Consideration, CPC, Inventor, and EAST prior art search	10/06/2021	BTM
Review prosecution/search history of parent application no. 15/858,668	10/06/2021	BTM
IDS Consideration, Update prior art search	03/15/2022	BTM

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S145	5	"20140181325"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2022/03/14 13:52
S149	21	S148 and ((software or program or application) same (meeting or call or conferenc$3))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2022/03/15 12:11
S148	34	(US-20150169477-$ or US-20150089395-$ or US-20100302130-$ or US-20090198839-$ or US-20150121466-$ or US-20150263905-$ or US-20130067121-$ or US-20100115145-$ or US-20140362161-$ or US-20190205275-$ or US-20160092153-$ or US-20070233922-$ or US-20210191893-$ or US-20210176285-$ or US-20140181325-$).did. or (US-7180475-$ or US-8756348-$ or US-8896656-$ or US-8316138-$ or US-9722986-$ or US-9083769-$ or US-9538138-$ or US-9183164-$ or US-7761627-$ or US-9201826-$ or US-7617342-$ or US-9804977-$ or US-9934168-$ or US-10684972-$ or US-10031873-$ or US-9817772-$).did. or (WO-2013037980-$ or EP-3099009-$).did.	US-PGPUB; USPAT; FPRS	ADJ	ON	2022/03/15 12:11
S150	34	(US-20150169477-$ or US-20150089395-$ or US-20100302130-$ or US-20090198839-$ or US-20150121466-$ or US-20150263905-$ or US-20130067121-$ or US-20100115145-$ or US-20140362161-$ or US-20190205275-$ or US-20160092153-$ or US-20070233922-$ or US-20210191893-$ or US-20210176285-$ or US-20140181325-$).did. or (US-7180475-$ or US-8756348-$ or US-8896656-$ or US-8316138-$ or US-9722986-$ or US-	US-PGPUB; USPAT; FPRS	ADJ	ON	2022/03/15 15:28

		9083769-$ or US-9538138-$ or US-9183164-$ or US-7761627-$ or US-9201826-$ or US-7617342-$ or US-9804977-$ or US-9934168-$ or US-10684972-$ or US-10031873-$ or US-9817772-$).did. or (WO-2013037980-$ or EP-3099009-$).did.				
S152	17	S150 and (virtual)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2022/03/15 15:30
S153	9	S150 and (virtual with (device or USB or peripheral) same (program or software or application))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2022/03/15 17:28

EAST Search History (Interference)

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Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (02-18)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	16771068
Filing Date	2020-06-09
First Named Inventor	RENARD
Art Unit	2186
Examiner Name	MISIURA
Attorney Docket Number	21063.0018USWO

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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20140181325	A1	2014-06-26	Hundal et al.	

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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	2015011679	JP	A	2015-01-19		With English translation	☓
	2	2016178422	JP	A	2016-10-06		With English translation	☒

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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.T.M/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Attorney Docket Number	21063.0018USWO

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	Notice of Reason for Refusal issued in corresponding Japanese Application No. 2020-536065, dated November 4, 2021, with English translation	X

If you wish to add additional non-patent literature document citation information please click the Add button [Add]

EXAMINER SIGNATURE

Examiner Signature	/BRIAN T MISIURA/	Date Considered	03/14/2022

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.T.M/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Filing Date	2020-06-09
First Named Inventor	RENARD
Art Unit	2186
Examiner Name	MISIURA
Attorney Docket Number	21063.0018USWO

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☒ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Thomas Lee/	Date (YYYY-MM-DD)	2021-12-09
Name/Print	Thomas Lee	Registration Number	66,396

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2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

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5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

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Courtesy Reminder for
Application Serial No: 16/771,068

Attorney Docket No: 21063.0018USWO
Customer Number: 52835
Date of Electronic Notification: 03/21/2022

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	16771068
Filing Date	2020-06-09
First Named Inventor	RENARD
Art Unit	2186
Examiner Name	MISIURA
Attorney Docket Number	21063.0018USWO

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Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	9722986	B2	2017-08-01	Brands et al.	Corresponds to CN104412542

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	1	104412542	CN	A	2015-03-11		Corresponds to US9722986	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
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	Filing Date	2020-06-09
	First Named Inventor	RENARD
	Art Unit	2186
	Examiner Name	MISIURA
	Attorney Docket Number	21063.0018USWO

	1	Office Action issued in Chinese Application No. 201880084464.1, dated January 26, 2022, with machine tranlation	X

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[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

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	Application Number	16771068
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	First Named Inventor	RENARD
	Art Unit	2186
	Examiner Name	MISIURA
	Attorney Docket Number	21063.0018USWO

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☒ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

☒ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

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Signature	/Thomas Lee/	Date (YYYY-MM-DD)	2022-03-29
Name/Print	Thomas Lee	Registration Number	66396

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(19)中华人民共和国国家知识产权局

(12)发明专利申请

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(43)申请公布日 2015.03.11

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(71)申请人 巴科股份有限公司
地址 比利时科特赖克
(72)发明人 J·W·布兰兹 R·R·德瓦尔勒
(74)专利代理机构 上海专利商标事务所有限公司 31100
代理人 陈小刚
(51)Int.Cl.
H04L 12/18(2006.01)

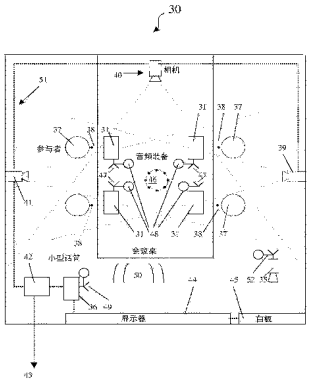
权利要求书9页 说明书34页 附图11页

(54)发明名称

用于会议的电子工具和方法

(57)摘要

描述了一种电子会议工具和用于传递来自参会用户的任意媒体内容的方法。这些可包括适配成操作通信网络的显示节点的节点配置装置，该显示节点耦合到第一显示器。节点配置装置适配成接收用户所选的任意媒体内容并控制用户所选的任意媒体内容在第一显示器上的显示。提供了适配成经由所述通信网络传递用户所选的任意媒体内容的至少一个外围设备，其中所述外围设备是连接单元，包括：(a)适配成耦合到具有第二显示器、存储器、以及操作系统的处理设备的端口的连接器；以及(b)用于与所述通信网络通信的发射机。提供了适配成被加载到所述处理设备上并且在所述处理设备的操作系统上运行的程序，所述程序适配成获得用户所选的任意媒体内容，所述程序在终止时留下零足迹。提供了一种输入设备，所述输入设备允许所述用户执行触发所述用户所选的任意媒体内容通过所述端口向所述发射机的传送的用户动作。



CN 104412542 A

1. 一种用于在具有多个参与者的会议中在显示设备上显示从处理设备获得的任意媒体内容的方法，所述媒体内容是通过通信网络传送的，所述处理设备具有存储器和显示器，所述方法包括：

使用外围设备来提供令牌，所述令牌在被传送到所述通信网络时，内在地或分立地提供认证或许可来在所述显示设备上显示所述任意媒体内容，所述令牌还提供到所述显示设备的链接；

将来自所述处理设备的所述任意媒体内容路由通过所述通信网络；

获得对所述显示设备的单方电子访问权；以及

显示所述任意媒体内容。

2. 如权利要求 1 所述的方法，其特征在于，通过对来自所述处理设备的数据进行屏幕抓取来获得所述任意媒体内容。

3. 一种用于在具有多个参与者的会议中在显示设备上显示从处理设备获得的任意媒体内容的方法，所述媒体内容是通过通信网络传送的，所述处理设备具有存储器和显示器，所述方法包括：

使用外围设备来提供令牌，所述令牌在被传送到所述通信网络时，内在地或分立地提供认证或许可来在所述显示设备上显示所述任意媒体内容，所述令牌还提供到所述显示设备的链接；

通过对来自所述处理设备的数据进行屏幕抓取来获得所述任意媒体内容；

将来自所述处理设备的经屏幕抓取的任意媒体内容路由通过所述通信网络；

获得对所述显示设备的电子访问权；以及

显示所述任意媒体内容。

4. 如任何前述权利要求所述的方法，其特征在于，还包括将所述处理设备连接到所述通信网络，所述处理设备具有带有至少一个预安装通用驱动程序的操作系统，所述至少一个预安装通用驱动程序提供用于处理设备与标准类型外围设备之间的通信的通用通信协议，所述方法包括以下步骤：

a) 将外围设备耦合到所述处理设备，所述外围设备具有收发机；

b) 通过所述操作系统的所述预安装的通用驱动程序，设置用于所述外围设备与所述处理设备之间的通信的手段；

c) 经由所述外围设备将所述处理设备耦合到通信网络；

d) 经由所述用于通信的手段在所述处理设备与所述通信网络之间路由经屏幕抓取的数据，其中所述通用通信协议被用于在所述处理设备与所述外围设备之间传送经屏幕抓取的数据。

5. 如权利要求 4 所述的方法，其特征在于，步骤 b) 包括将所述外围设备呈现给所述处理设备作为人类接口设备，并且其中所述预安装的通用驱动程序是人类接口设备驱动程序。

6. 如权利要求 4 所述的方法，其特征在于，步骤 b) 包括将所述外围设备呈现给所述处理设备作为大容量存储设备，并且其中所述预安装的通用驱动程序是大容量存储设备驱动程序。

7. 如权利要求 4 所述的方法，其特征在于，步骤 b) 包括将所述外围设备呈现给所述

处理设备作为复合设备，并且其中所述预安装的通用驱动程序独立地驱动各不同的设备接口。

8. 如权利要求 4 到 7 中的任一项所述的方法，其特征在于，客户机应用被存储在所述外围设备上，当所述客户机应用在所述处理设备上运行时获得经屏幕抓取的数据。

9. 如权利要求 8 所述的方法，其特征在于，所述客户机应用是便携式应用。

10. 如任何前述权利要求所述的方法，其特征在于，还包括操作所述通信网络的显示节点，所述显示节点耦合到第一显示器、接收用户所选的任意媒体内容并控制用户所选的任意媒体内容在所述第一显示器上的显示；以及

将外围设备连接到处理设备的端口并经由所述通信网络传递用户所选的任意媒体内容，

将程序加载到所述处理设备上并且在所述处理设备的操作系统上运行所述程序以获得用户所选的任意媒体内容，所述程序在终止时留下零足迹，以及

在输入设备上的用户动作之后，触发所述用户所选的任意媒体内容通过所述端口传送到所述发射机。

11. 如权利要求 1 到 10 中的任一项所述的方法，其特征在于，还包括设置通信网络，所述通信网络处于所述通信网络的基节点与耦合到所述处理设备的外围设备之间；

在所述处理设备和所述外围设备之间传送媒体内容，

将所述媒体内容从所述外围设备传送到所述通信网络，

在所述基节点处接收来自所述通信网络的媒体内容，并且根据一组规则在显示器上显示所述媒体内容。

12. 如权利要求 1 到 11 中的任一项所述的方法，其特征在于，所述外围设备与所述处理设备配对。

13. 一种用于在具有多个参与者的会议中在显示设备上显示从处理设备获得的任意媒体内容的系统，所述媒体内容是通过通信网络传送的，所述处理设备具有存储器和显示器，所述系统包括：

用于提供令牌的外围设备，所述令牌在被传送到所述通信网络时，内在地或分立地提供认证或许可来在所述显示设备上显示所述任意媒体内容，所述令牌还提供到所述显示设备的链接；

用于将来自所述处理设备的所述任意媒体内容路由通过所述通信网络的装置；

用于获得对所述显示设备的单方电子访问权的装置；以及

用于显示所述任意媒体内容的装置。

14. 如权利要求 13 所述的系统，其特征在于，所述用于获得所述任意媒体的装置包括用于对来自所述处理设备的数据进行屏幕抓取的装置。

15. 一种用于在具有多个参与者的会议中在显示设备上显示从处理设备获得的任意媒体内容的系统，所述媒体内容是通过通信网络传送的，所述处理设备具有存储器和显示器，所述系统包括：

用于提供令牌的外围设备，所述令牌在被传送到所述通信网络时，内在地或分立地提供认证或许可来在所述显示设备上显示所述任意媒体内容，所述令牌还提供到所述显示设备的链接；

用于通过对来自所述处理设备的数据进行屏幕抓取来获得所述任意媒体内容的装置；

用于将来自所述处理设备的经屏幕抓取的任意媒体内容路由通过所述通信网络的装置；

用于获得对所述显示设备的电子访问权的装置；以及

用于显示所述任意媒体内容的装置。

16. 如权利要求 13 到 15 中的任一项所述的系统，其特征在于，还包括用于将所述处理设备连接到所述通信网络的装置，所述处理设备具有带有至少一个预安装通用驱动程序的操作系统，所述至少一个预安装通用驱动程序提供用于处理设备与标准类型外围设备之间的通信的通用通信协议，所述系统包括：

a) 用于将外围设备耦合到所述处理设备的装置，所述外围设备具有收发机；

b) 用于通过所述操作系统的所述预安装的通用驱动程序，设置用于所述外围设备与所述处理设备之间的通信的手段的装置；

c) 用于经由所述外围设备将所述处理设备耦合到通信网络的装置；

d) 用于经由所述用于通信的手段在所述处理设备与所述通信网络之间路由经屏幕抓取的数据的装置，其中所述通用通信协议被用于在所述处理设备与所述外围设备之间传送经屏幕抓取的数据。

17. 如权利要求 16 所述的系统，其特征在于，还包括用于将所述外围设备呈现给所述处理设备作为人类接口设备的装置，并且其中所述预安装的通用驱动程序是人类接口设备驱动程序。

18. 如权利要求 16 所述的系统，其特征在于，还包括用于将所述外围设备呈现给所述处理设备作为大容量存储设备的装置，并且其中所述预安装的通用驱动程序是大容量存储设备驱动程序。

19. 如权利要求 16 所述的系统，其特征在于，还包括用于将所述外围设备呈现给所述处理设备作为复合设备的装置，并且其中所述预安装的通用驱动程序独立地驱动各不同的设备接口。

20. 如权利要求 14 到 19 中的任一项所述的系统，其特征在于，客户机应用被存储在所述外围设备上，当所述客户机应用在所述处理设备上运行时获得经屏幕抓取的数据。

21. 如权利要求 20 所述的系统，其特征在于，所述客户机应用是便携式应用。

22. 如权利要求 13 到 21 中的任一项所述的系统，其特征在于，还包括用于操作所述通信网络的显示节点的装置，所述显示节点耦合到第一显示器、接收用户所选的任意媒体内容并控制用户所选的任意媒体内容在所述第一显示器上的显示；以及

用于将外围设备连接到处理设备的端口并经由所述通信网络传递用户所选的任意媒体内容的装置，

将程序加载到所述处理设备上并且在所述处理设备的操作系统上运行所述程序以获得用户所选的任意媒体内容，所述程序在终止时留下零足迹，以及

用于在输入设备上的用户动作之后，触发所述用户所选的任意媒体内容通过所述端口传送到所述发射机的装置。

23. 如权利要求 13 到 22 中的任一项所述的系统，其特征在于，还包括用于设置通信网

络的装置，所述通信网络处于所述通信网络的基节点与耦合到所述处理设备的外围设备之间；

用于在所述处理设备和所述外围设备之间传送媒体内容的装置，

用于将所述媒体内容从所述外围设备传送到所述通信网络的装置，

用于在所述基节点处接收来自所述通信网络的媒体内容，并且根据一组规则在显示器上显示所述媒体内容的装置。

24. 如权利要求 13 到 24 中的任一项所述的系统，其特征在于，所述外围设备与所述处理设备配对。

25. 一种用于与权利要求 13 到 24 中的任一项所述的系统一起使用且用于传递来自与会用户的任意媒体内容的电子会议工具，包括：

适配成操作通信网络的显示节点的节点配置装置，所述显示节点耦合到第一显示器，所述节点配置装置适配成接收用户所选的任意媒体内容且控制用户所选的任意媒体内容在所述第一显示器上的显示；以及

适配成经由所述通信网络传递用户所选的任意媒体内容的至少一个外围设备，其中所述外围设备是连接单元，包括：

c) 适配成耦合到具有第二显示器、存储器、以及操作系统的处理设备的端口的连接器；以及

d) 用于与所述通信网络通信的发射机，

适配成被加载到所述处理设备上并且在所述处理设备的操作系统上运行的程序，所述程序适配成获得用户所选的任意媒体内容，所述程序在终止时留下零足迹，以及

输入设备，所述输入设备允许所述用户执行触发所述用户所选的任意媒体内容通过所述端口向所述发射机的传送的用户动作。

26. 如权利要求 25 所述的电子会议工具，其特征在于，所述程序被存储在所述外围设备上。

27. 如权利要求 25 或 26 所述的电子会议工具，其特征在于，所述发射机是无线发射机或收发机。

28. 如权利要求 25 到 27 中的任一项所述的电子会议工具，其特征在于，所述外围设备是即插即用设备。

29. 如权利要求 25 到 28 中的任一项所述的电子会议工具，其特征在于，所述程序适配成对所述第二显示器的内容进行屏幕抓取。

30. 如权利要求 25 到 29 中的任一项所述的电子会议工具，其特征在于，所述输入设备是耦合到所述外围设备的物理致动器。

31. 如权利要求 30 所述的电子会议工具，其特征在于，所述物理致动器具有 100 和 14400 平方毫米之间的表面积。

32. 如权利要求 25 到 31 中的任一项所述的电子会议工具，其特征在于，所述输入设备是显示在所述第二显示器上的键。

33. 如权利要求 33 所述的电子会议工具，其特征在于，显示在所述第二显示器上的所述键不被所述程序进行屏幕抓取。

34. 一种与如权利要求 13 到 24 中的任一项所述的系统一起使用并且用于将处理设备

连接到通信网络的方法，所述处理设备具有存储器、显示器、带有至少一个预安装通用驱动程序的操作系统，所述至少一个预安装通用驱动程序提供用于处理设备与标准类型外围设备之间的通信的通用通信协议，所述方法包括以下步骤：

a) 将外围设备耦合到所述处理设备，所述外围设备具有收发机；

b) 通过所述操作系统的所述预安装的通用驱动程序，设置用于所述外围设备与所述处理设备之间的通信的手段；

c) 经由所述外围设备将所述处理设备耦合到通信网络；

d) 经由所述用于通信的手段在所述处理设备与所述通信网络之间路由经屏幕抓取的数据，其中所述通用通信协议被用于在所述处理设备与所述外围设备之间传送经屏幕抓取的数据。

35. 如权利要求 34 所述的方法，其特征在于，步骤 b) 包括将所述外围设备呈现给所述处理设备作为人类接口设备，并且其中所述预安装的通用驱动程序是人类接口设备驱动程序。

36. 如权利要求 34 所述的方法，其特征在于，步骤 b) 包括将所述外围设备呈现给所述处理设备作为大容量存储设备，并且其中所述预安装的通用驱动程序是大容量存储设备驱动程序。

37. 如权利要求 34 所述的方法，其特征在于，步骤 b) 包括将所述外围设备呈现给所述处理设备作为复合设备，并且其中所述预安装的通用驱动程序独立地驱动各不同的设备接口。

38. 如权利要求 34 到 37 中的任一项所述的方法，其特征在于，客户机应用被存储在所述外围设备上，当所述客户机应用在所述处理设备上运行时获得经屏幕抓取的数据。

39. 如权利要求 38 所述的方法，其特征在于，所述客户机应用是便携式应用。

40. 一种与如权利要求 13 到 24 中的任一项所述的系统一起使用并且用于提供到处理设备的通信连接性的外围设备，所述处理设备提供有存储器、显示器、带有至少一个预安装通用驱动程序的操作系统，所述至少一个预安装通用驱动程序提供用于所述处理设备与标准类型外围设备之间的通信的通用通信协议，所述外围设备包括其中储存有可执行软件代码以供在所述处理设备上执行的存储器，所述可执行软件代码包括：

用于通过所述操作系统的所述预安装的通用驱动程序，设置用于所述外围设备与所述处理设备之间的通信的手段的第一软件代码部分；

用于经由所述外围设备将所述处理设备连接到通信网络的第二软件代码部分，所述外围设备具有收发机；

用于对来自所述处理设备的数据进行屏幕抓取的第三软件代码部分；以及

用于通过所述用于通信的手段在所述处理设备与所述通信网络之间路由经屏幕抓取的数据的第四软件代码，其中所述第一软件代码部分适配成使用所述通用通信协议在所述处理设备与所述外围设备之间传送经屏幕抓取的数据。

41. 如权利要求 40 所述的外围设备，其特征在于，所述第一软件代码部分适配成将所述外围设备呈现给所述处理设备作为人类接口设备，并且其中所述预安装通用驱动程序是人类接口设备驱动程序。

42. 如权利要求 40 所述的外围设备，其特征在于，所述第一软件代码部分适配成将所

述外围设备呈现给所述处理设备作为大容量存储设备，并且其中所述预安装通用驱动程序是大容量存储设备驱动程序。

38. 如权利要求 15 所述的外围设备，其特征在于，所述第一软件代码部分适配成将所述外围设备呈现给所述处理设备作为复合设备，并且其中所述预安装通用驱动程序独立地驱动各不同的设备接口。

43. 如权利要求 40 到 42 中的任一项所述的外围设备，其特征在于，所述可执行软件代码包括用于提供用于连接到包括基节点的所述通信网络的手段的第五代码。

44. 如权利要求 40 到 43 中的任一项所述的外围设备，其特征在于，所述可执行软件代码包括用于提供用于捕捉所述处理设备的视频帧缓冲区的手段的第六代码。

45. 如权利要求 40 到 44 中的任一项所述的外围设备，其特征在于，所述可执行软件代码包括用于提供用于编码、压缩、以及可任选地加密经屏幕抓取的数据并通过所述通信网络发送经屏幕抓取的数据的手段的第七代码。

46. 如权利要求 40 到 44 中的任一项所述的外围设备，其特征在于，所述可执行软件代码包括用于提供用于处理所述外围设备的手段的第八代码。

47. 如权利要求 43 到 46 中的任一项所述的外围设备，其特征在于，所述可执行软件代码包括用于提供用于发起连接到所述基节点的手段的第九代码。

48. 如权利要求 40 到 47 中的任一项所述的外围设备，其特征在于，所述可执行软件代码包括用于在所述外围设备上接收来自输入设备的输入的第十代码。

49. 如权利要求 40 到 48 中的任一项所述的外围设备，其特征在于，所述可执行软件代码包括用于提供用于向所述外围设备上的视觉指示器发送状态变化的手段的第十一代码。

50. 如权利要求 40 到 49 中的任一项所述的外围设备，其特征在于，所述可执行软件代码包括用于提供用于向所述用户呈现 GUI 的手段的第十二代码。

51. 如权利要求 40 到 50 中的任一项所述的外围设备，其特征在于，所述可执行软件代码包括用于呈现 GUI 以供在所述可执行软件代码作为便携式应用执行时管理所述可执行软件代码的第十三代码。

48. 如权利要求 35 到 47 中的任一项所述的外围设备，其特征在于，所述可执行软件代码包括用于提供用于在所述客户机处理设备的显示器上显示并激活键以允许用户输入将来自所述处理设备的数据开始传送到所述基节点的手段的第十四代码。

52. 一种与如权利要求 13 到 24 中的任一项所述的系统一起使用并且用于提供到处理设备的通信连接性的外围设备，所述处理设备提供有存储器、显示器、带有至少一个预安装通用驱动程序的操作系统，所述至少一个预安装通用驱动程序提供用于所述处理设备与标准类型外围设备之间的通信的通用通信协议，所述外围设备包括其中储存有可执行软件代码以供在所述处理设备上执行的存储器，所述可执行软件代码包括 ：

用于通过所述操作系统的所述预安装的通用驱动程序，设置用于所述外围设备与所述处理设备之间的通信的手段的第一软件代码部分 ；

用于经由所述外围设备将所述处理设备连接到通信网络的第二软件代码部分，所述外围设备具有收发机 ；以及

用于通过所述用于通信的手段在所述处理设备与所述通信网络之间路由数据的第三处理软件代码，其中所述第一软件代码部分适配成使用所述通用通信协议在所述处理设备

与所述外围设备之间传送所述数据，以及

耦合到所述外围设备的输入设备，所述输入设备适配成对用户动作作出反应以触发所述数据从所述处理设备到所述外围设备的传送。

53. 如权利要求 52 所述的外围设备，其特征在于，所述第一软件代码部分适配成将所述外围设备呈现给所述处理设备作为人类接口设备，并且其中所述预安装通用驱动程序是人类接口设备驱动程序。

54. 如权利要求 52 所述的外围设备，其特征在于，所述第一软件代码部分适配成将所述外围设备呈现给所述处理设备作为大容量存储设备，并且其中所述预安装通用驱动程序是大容量存储设备驱动程序。

55. 如权利要求 52 所述的外围设备，其特征在于，所述第一软件代码部分适配成将所述外围设备呈现给所述处理设备作为复合设备，并且其中所述预安装通用驱动程序独立地驱动各不同的设备接口。

56. 如权利要求 52 到 55 中的任一项所述的外围设备，其特征在于，所述输入设备是耦合到所述外围设备的物理致动器。

57. 如权利要求 56 所述的外围设备，其特征在于，所述物理致动器具有 100 和 14400 平方毫米之间的表面积。

58. 如权利要求 52 到 57 中的任一项所述的外围设备，其特征在于，所述输入设备是用于显示在所述显示器上的键。

59. 如权利要求 52 到 58 中的任一项所述的外围设备，其特征在于，所述可执行软件代码包括用于提供用于连接到包括基节点的所述通信网络的手段的第四代码。

60. 如权利要求 52 到 59 中的任一项所述的外围设备，其特征在于，所述可执行软件代码包括用于提供用于捕捉所述处理设备的视频帧缓冲区的手段的第五代码。

61. 如权利要求 60 所述的外围设备，其特征在于，所述可执行软件代码包括用于提供用于编码、压缩、以及可任选地加密所述视频帧并通过安全链路将它们发送到所述基节点的手段的第六代码。

62. 如权利要求 52 到 61 中的任一项所述的外围设备，其特征在于，所述可执行软件代码包括用于提供用于处理所述外围设备的手段的第七代码。

63. 如权利要求 61 或 62 所述的外围设备，其特征在于，所述可执行软件代码包括用于提供用于发起到所述基节点的连接的手段的第八代码。

64. 如权利要求 52 到 63 中的任一项所述的外围设备，其特征在于，所述可执行软件代码包括用于在所述外围设备上接收来自输入设备的输入的第九代码。

65. 如权利要求 52 到 64 中的任一项所述的外围设备，其特征在于，所述可执行软件代码包括用于提供用于向所述外围设备上的视觉指示器发送状态变化的手段的第十代码。

66. 如权利要求 52 到 65 中的任一项所述的外围设备，其特征在于，所述可执行软件代码包括用于提供用于向所述用户呈现 GUI 的手段的第十一代码。

67. 如权利要求 52 到 66 中的任一项所述的外围设备，其特征在于，所述可执行软件代码包括用于呈现 GUI 以供在所述可执行软件代码作为便携式应用执行时管理所述可执行软件代码的第十二代码。

68. 如权利要求 59 到 67 中的任一项所述的外围设备，其特征在于，所述可执行软件代

码包括用于提供用于在所述客户机处理设备的显示器上显示并激活键以允许用户输入将来自所述处理设备的数据开始传送到所述基节点的手段的第十四代码。

69. 一种与如权利要求 13 到 24 中的任一项所述的系统一起使用并且用于提供到处理设备的通信连接性的外围设备，所述处理设备提供有存储器、显示器、带有至少一个预安装通用驱动程序的操作系统，所述至少一个预安装通用驱动程序提供用于所述处理设备与标准类型外围设备之间的通信的通用通信协议，所述外围设备包括其中储存有可执行软件代码以供在所述处理设备上执行的存储器，所述可执行软件代码包括：

用于通过所述操作系统的所述预安装的通用驱动程序，设置用于所述外围设备与所述处理设备之间的通信的手段的第一软件代码部分；

用于经由所述外围设备将所述处理设备连接到通信网络的第二软件代码部分，所述外围设备具有收发机；

用于接收来自所述网络的媒体内容以及用于根据一组规则在所述显示器上显示所述媒体内容的第三软件代码部分；其中所述第一软件代码部分适配成使用所述通用通信协议在所述外围设备与所述处理设备之间传送所述媒体内容。

70. 如权利要求 69 所述的外围设备，其特征在于，所述可执行软件代码包括用于提供用于正确地配置接收机作为接入点的手段的第四代码。

71. 如权利要求 69 或 70 所述的外围设备，其特征在于，所述可执行软件代码包括用于提供用于监听尝试连接在特定端口上的连接单元的输出的手段的第五代码。

72. 如权利要求 69 到 71 中的任一项所述的外围设备，其特征在于，所述可执行软件代码包括用于提供用于用作管理目的的 GUI 的手段的第六代码。

73. 如权利要求 69 到 72 中的任一项所述的外围设备，其特征在于，所述可执行软件代码包括用于提供用于使用 zeroconf 协议通过所述网络发布其存在的手段的第七代码。

74. 如权利要求 69 到 73 中的任一项所述的外围设备，其特征在于，所述可执行软件代码包括用于提供用于接受并安装软件更新的手段的第八代码。

75. 如权利要求 69 到 74 中的任一项所述的外围设备，其特征在于，所述可执行软件代码包括用于提供用于提供用作将连接单元配对到所述处理设备的设施的手段的第九代码。

76. 如权利要求 69 到 75 中的任一项所述的外围设备，其特征在于，所述可执行软件代码包括用于提供用于自动合成不同的传入任意媒体流并在显示器上渲染合成图像的手段的第十代码。

77. 如权利要求 69 或 76 中的任一项所述的外围设备，其特征在于，所述可执行软件代码包括用于提供用于接收、解密、以及解码传入的任意媒体内容的手段的第十一代码。

78. 如权利要求 69 或 77 中的任一项所述的外围设备，其特征在于，所述可执行软件代码包括用于缩放传入的任意媒体流的第十二代码。

79. 如权利要求 69 到 78 中的任一项所述的外围设备，其特征在于，所述可执行软件代码包括用于提供用于根据一组规则显示传入的任意媒体内容的手段的第十三代码。

80. 一种用于与权利要求 13 到 24 中的任一项所述的系统一起使用且用于传递与会用户的任意媒体内容的方法，包括：

操作通信网络的显示节点，所述显示节点耦合到第一显示器、接收用户所选的任意媒体内容并控制用户所选的任意媒体内容在所述第一显示器上的显示；以及

将外围设备连接到处理设备的端口并经由所述通信网络传递用户所选的任意媒体内容，

将程序加载到所述处理设备上并且在所述处理设备的操作系统上运行所述程序以获得用户所选的任意媒体内容，所述程序在终止时留下零足迹，以及

在输入设备上的用户动作之后，触发所述用户所选的任意媒体内容通过所述端口传送到所述发射机。

81. 一种与如权利要求 13 到 24 中的任一项所述的系统一起使用的外围设备，包括：

基节点

用于连接到主机处理设备的即插即用端口的连接器，

所述基节点与所述连接器之间的用于传送数据信号和功率的灵活连接，

所述基节点上的用于致动信号且用于将所述信号传送到所述连接器以供传送到所述端口的致动器，其中所述基节点具有包括用于存储便携式应用的持久存储、处理引擎、收发机以及视觉指示器的电子装置。

82. 一种用于与如权利要求 13 到 24 中的任一项所述的系统一起使用并且用于提供自处理设备的通信连接性的方法，

设置通信网络，所述通信网络处于所述通信网络的基节点与耦合到所述处理设备的外围设备之间；

在所述处理设备和所述外围设备之间传送媒体内容，

将所述媒体内容从所述外围设备传送到所述通信网络，

在所述基节点处接收来自所述通信网络的媒体内容，并且根据一组规则在显示器上显示所述媒体内容。

83. 上述权利要求中的任一项作为存储在非瞬态存储介质上的软件代码。

用于会议的电子工具和方法

[0001] 本发明涉及用于会议的电子工具，包括用于提供到通信网络的连接的方法或设备、网络或操作网络的方法、用于显示媒体内容的方法或设备、以及用于执行这些方法中的任一种方法的软件。

技术背景

[0002] 用于协作的工具

[0003] 允许人员的自组织群体彼此通信是协作、问题解决、协商、教育等的各基本方面之一。为了帮助通信，电子通信工具出现了爆发，如电子会议工具，例如，同步和异步会议、在线聊天、即时消息收发、音频会议、视频会议、数据会议、应用共享、远程桌面共享、电子会议系统、协作式管理（协调）工具、项目管理系统、知识管理系统、以及社交软件系统。

[0004] 一种经典方法是通常涉及使用演示软件的演示的讲座或研讨会。在很大程度上，传统单人演示或演讲是在听众处于相当被动的模式下被维护的，所关心的只是确定、构造、扩充或修改要被呈现的信息。

[0005] 与其他业务过程一样，会议正在变成数字式的。在实际会议之前及期间，人们日益增加地单独并结合宽带网络使用计算机技术来支持它们的会议目标。例如，电子邮件被用来分发文件以供人们在会议之前阅读。

[0006] 协作网络中以及因特网上的协作式工作空间向地理上分散的各协作者提供用于与项目或会议相关的文档的虚拟储存库。诸如交互式网络连接白板及视频会议设备等电子会议支持系统可供用于共享同一房间以及在远程位置处的人的利益。

[0007] AMIDA 最终公开报告描述了会议支持技术的开发背后的总体方法体系。它报告说多个研究确认会议主导了人们工作的方式。即，根据 MCI Worldcom 在 2003 年进行的研究，商务人士每月参与 60 个会议。人们出于多种原因而成群会面。他们以多种可预测和不可预测的方式交互并且他们的交互结果随着参与的人以及他们协作或交流的项目而变化。业务过程的研究还揭示与项目或过程相关联的约 80％的“工作负荷”发生在会议的准备中。换言之，许多人将“实况”会议看做他们可调整步调并测量他们的生产力以及其同事的生产力的里程碑或最终期限。不幸的是，对于许多信息管理者而言，参与不断的会议降低了他们为下一会议充分地进行准备的能力，从而陷入恶性且负面的循环。

[0008] 然而，Marc Al-Hames 等人在“Audio-Visual Processing in Meetings:Seven Questions and Current AMI Answers（会议中的音频－视频处理：七个问题及当前 AMI 答案）”中报告说，虽然大部分工作日被会议和会晤消耗，但不幸的是，它们中的许多既不高效也不特别成功。他们报告了其中要求人们选择他们认为在会议中频繁体验到的情绪词汇的研究。最高答案——三分之二以上的参与者提到——是“厌烦”，此外，近三分之一提到“烦恼”作为频繁感受到的情绪。

[0009] 结论是尽管对会议的电子辅助过多，但处理会议的基本问题尚未被解决。事实上，在业务上下文中组织并进行会议涉及大量因素。

[0010] 参与

[0011] 会议效率的缺失在 IBM 的 IP.com 号为 IPCOM000011711D 的发布日期为 2003 年 3 月 12 日的文章“Mood indicators on electronic meeting tools(电子会议工具上的心情指示符)”中得到解决。这一文章解决了缺少直接反馈使得会议拙劣、不高效且通常效果不佳的问题。它提出了“心情指示符”以及“我想要提问”指示符,这允许演示者选择适当的时间来暂停、改变音轨或回答问题。它提到打断充满激情的演示者是不方便的;然而,有时在许多不同的人尝试发言时难以得到提问或发表意见的机会。以类似的脉络,US6966035 提出了显示“私语框架”以供参与者表达观点。为了提高用户参与度,US 2010/0087139 公开了一种用于向另一计算机发送选择的系统,且 US 2006/0095376 公开了一种用于安全投票的系统。评论、投票、或选择需要中央权威机构提供要被选择或评论或投票的信息。因此,这些建议仍然留下了中心人物,如处于主导位置的演示者,并且会议的其他成员很大程度上是具有有限的选择或投票或参与权的听众。

[0012] 会议的进一步问题是有人常常迟到或不得不早退。对于迟到的人,必须决定该会议是否被中断并且直到此时的会议录的概要是否被给出。对于早退的人(通常是高级人员),后续讨论可能缺失。如果存在记录人员,这提供了会议的个人概要——但并不是客观的概要。

[0013] 现有系统没有提供最优解决方案。

[0014] 法律和安全问题

[0015] 会议的法律要求是演示、评论、以及提交需要是完全可再现的——在一些情况下,例如,在股份持有者会议中,会议中的事件应当可以完全召回。计算机支持的协作式工作技术,尤其是捕捉除在会议期间生成的文本和图像以外的人类语言和非语言交流(音频和视频交互)的那些技术,对人们将如何准备和在会议期间以及会议后将如何作为肯定具有长期影响。另外,连接到网络带来了在任一方向上的病毒、恶意软件或间谍软件传输的危险,并且存在复制机密信息的危险。

[0016] 实际困难

[0017] 可扩展性和易于使用性

[0018] 对于将电子工具用于会议中而言,甚至存在更多基本问题。如果两个人想要作两个演示,则通常这两个演示必须都被置于一个机器上,或者需要在这两个演示者的机器之间切换。为了将计算机的显示内容带到投影仪,最常见的方式是使用将图形卡的显示适配器连接到投影仪的视频输入的电缆[方法 1]或使用捕捉显示内容并通过有线或无线网络将其发送给连接到投影仪的远程基本单元的软件[方法 2]。这通常称为“远程桌面”且大部分被用于远程管理或远程 IT 辅助目的。

[0019] 较不常见但也被实施的方法是使用连接到图形卡的显示适配器的特殊设备,所述特殊设备通过有线或无线网络捕捉、编码、以及流传输显示内容[方法 3]。

[0020] 方法 1 具有若干实际问题和缺点。在其中人们想要从他们自己的计算机贡献内容(例如将图像投影到显示器上)的会议中,通常诸如 VGA 电缆等视频电缆被用于将各 PC 一次一个地连接到投影仪。这不仅不可扩展,而且还可能且通常是相当麻烦的过程,该过程通常浪费宝贵的会议时间且使会议失去活力。连接可能更加困难且耗时,例如在计算机必须被重新引导以检测投影仪或者在 PC 的格式与投影仪的格式不同的情况下。另外,改变格式可为计算机留下与其自己的屏幕不兼容的新格式,从而在 PC 自己的重新引导时,没有什么

被显示在计算机屏幕上。在没有可见屏幕图像的情况下，必要的重新配置可能是困难的。这些问题因多个因素而恶化：

[0021] - 许多不同视频适配器的使用，如 VGA、DVI、DP、HDMI……

[0022] - 所及范围取决于电缆长度：过长会在会议室中留下乱成一团的电缆“色拉”，过短会降低灵活性，通常使人们在想要演示一些东西时必须在会议室中四处移动。

[0023] - 电缆连接是点对点的或需要进行冗长且昂贵的电缆敷设以及使用复杂且昂贵的视频交换机。

[0024] - 找出计算机和显示器或投影仪两者所支持的正确显示分辨率和刷新率通常是困难且耗时的。

[0025] 方法 2 也具有许多缺点。如果作出到企业 LAN 的连接，则存在在任一方向上的病毒、恶意软件或间谍软件传输的危险，存在机密信息的复制的危险，以及存在作出所述连接的困难，例如用户代码和口令的录入以及这些口令和用户代码的管理。

[0026] 方法 3 的优点是计算机无需使用它自己的处理能力以按易于通过网络传输的形式带来显示内容。随着计算机处理能力的增长，这一优点变得较没有意义。方法 3 的缺点是方法 1 通常遇到的连接到显示适配器的相同问题依然存在。另一缺点是所引用的特殊设备需要大量处理能力，这意味着这一设备将消耗许多功率、相对很大、且当然相对昂贵。

[0027] 当今在发展中的另选方法是使用计算机的公知 USB 接口来提取计算机的显示内容。US 2009/0198839 公开了这种可插拔电缆安排。US 2011/0115689 公开了用于无线连接到投影仪的类似 USB 解决方案。相应地，使用标准 USB 端口将投影仪连接到计算机可能随时间进展而变得常见。然而，这通常需要特殊驱动程序以及甚至特殊硬件。使用标准 USB 端口将投影仪连接到计算机因此可能变得常见——但甚至在这一点发生时，在若干年内也将仍然存在新机器与传统机器的混合。

[0028] 防火墙

[0029] 防火墙可发生附加问题。通常，会议的访客将携带计算机，如针对不同企业联网环境设置并且因此具有不同或不兼容的联网设置的膝上型计算机。防火墙的设置可能是复杂的，并且如果这没有被正确地完成，必须穿过防火墙的电信软件可能被阻塞。为了解决与防火墙相关联的问题，打开端口或者标识或甚至添加例外列表中的程序可能是必要的。在网络（硬件）防火墙以及操作系统防火墙之外，如果存在任何基于软件的第三方防火墙，如 Zonealarm、CA 因特网安全套件或 McAfee 防火墙，则遵循该软件开发者的文件编制以将程序置于安全列表上或将例外添加到防火墙规则是必要的。这样的活动超出了普通用户的能力。过分讲究计算机设置或必须要求 IT 支持浪费了宝贵的会议时间并且使会议失去活力。

[0030] 结语

[0031] 当前，使用高级电子工具主持面对面会议仍然存在以下问题：

[0032] - 联网基础结构的复杂性。

[0033] - 对被假定为设计成支持非专家用户的每天使用的当前系统中对用户的技术专家能力的高要求。

[0034] - 在会议中使用复杂技术的障碍。

[0035] - 大量各种可能的协作式软件解决方案——它们中没有一个看起来解决了主持成功会议的基本问题。

[0036] - 对会议的成员而言，会议令人厌烦或烦恼。

[0037] - 在企业网络中采用的防火墙以及其他安全措施的复杂性。

[0038] - 会议成员的参与度的缺失或受限。

[0039] - 准备用于会议的演示所花的时间。

[0040] - 在不会超出所需地加重会议负担的情况下，按正确的时序记录会议中事件的需求。

[0041] 虽然某些工具有效地解决这些问题中的一些问题，但没有电子会议工具解决了全部问题。

发明概要

[0042] 本发明的目标是提供包括用于会议的电子工具以及用于提供到通信网络的连接的设备的网络解决方案，操作所述网络的方法，显示媒体内容的方法，以及用于执行这些方法中的任一种方法或用于实现这些系统的软件。

[0043] 在本发明的一方面，提供了一种用于在显示设备上显示从处理设备（例如，数字处理设备）获得的任意媒体内容的方法，该媒体内容是通过通信网络传送的，该处理设备具有存储器和显示器，该方法包括：

[0044] 使用外围设备来提供令牌，该令牌内在地或分立地提供认证以在显示设备上显示内容并提供到该显示设备的链接。

[0045] 具体而言，本发明提供了一种用于在具有多个参与者的会议中在显示设备上显示从处理设备（例如，数字处理设备）获得的任意媒体内容的方法，该媒体内容是通过共享资源通信网络传送的，该处理设备具有存储器和显示器，该方法包括：

[0046] 使用外围设备来提供令牌，该令牌在被传送到通信网络时内在地或分立地提供认证或许可来在显示设备上显示任意媒体内容，该令牌还提供到显示设备的链接；

[0047] 将来自处理设备的任意媒体内容路由通过通信网络；

[0048] 获得对显示设备的单方电子访问权；以及

[0049] 显示该任意媒体内容。

[0050] 该任意媒体内容是优选地通过对来自该处理设备的数据进行屏幕抓取来获得的。

[0051] 在另一方面，本发明提供了一种用于在具有多个参与者的会议中在显示设备上显示从处理设备获得的任意媒体内容的方法，该媒体内容是通过共享资源通信网络传送的，该处理设备具有存储器和显示器，该方法包括：

[0052] 使用外围设备来提供令牌，该令牌在被传送到通信网络时内在地或分立地提供认证或许可来在显示设备上显示任意媒体内容，该令牌还提供到显示设备的链接；

[0053] 通过对来自处理设备的数据进行屏幕抓取来获得该任意媒体内容；

[0054] 将来自处理设备的经屏幕抓取的任意媒体内容路由通过通信网络；

[0055] 获得对显示设备的电子访问权；以及

[0056] 显示该任意媒体内容。

[0057] 获得用户所选的任意媒体内容优选地不是通过应用共享而是通过屏幕抓取的过程来获得的。虽然提供屏幕抓取的软件包需要安装在目标设备上，或至少需要安装专用和/或自定义驱动程序，但本发明的各实施例使用加载到外围设备上的软件，当该软件在处理

设备上运行时允许屏幕抓取但在终止时留下零足迹。本发明的各实施例能以20fps对全HD视频进行屏幕抓取，而不需要在处理设备上安装任何程序也不需要配置它们在其上运行以用于到网络的连接性的诸如PC等处理设备，从而满足“零足迹”要求。

[0058] 在外围设备上提供大容量存储设备，该大容量存储设备存储要在处理设备上运行的软件。一旦软件已被读取并加载且从处理设备中的RAM运行，该大容量存储设备就可在逻辑上关闭。在外围设备上还提供了另一设备，如捕捉用户输入并提供用户反馈的HID（人类接口设备）。在本发明的各实施例中，外围设备包含组合在一起的多个内部逻辑设备：

[0059] 用于捕捉用户输入（例如，在诸如按下或激活按钮等用户动作之后）并提供用户反馈（例如通过诸如围绕按钮的光环（例如LED环）等光指示器）、并且用于将经屏幕抓取的视频内容流传输到网络并从而传送到基单元和显示器的HID（人类接口设备），

[0060] 用于存储应用的大容量存储设备，以及可任选地

[0061] 使用通用驱动程序（如UAC1或UAC2设备驱动程序）通过USB担当客户机PC的虚拟声卡的音频设备。

[0062] 屏幕抓取能够以中性的方式捕捉所有材料，而不受专用应用的限制。此外，屏幕抓取器应用在终止时是零足迹，而非被完全安装在处理设备上。

[0063] 本发明的各实施例可以向会议室提供任意“全内容”且各参与者可以实时显示，

[0064] 实时内容被示出在中央显示器上，而非被广播给各单独的参与者或被存档。

[0065] 本发明的各实施例在中央显示器或屏幕上“自动合成”任意用户数据，从而向有意共享这一内容的多个会议参与者提供全实时内容，以使该会议更加有效和高效，

[0066] 本发明的各实施例实现“民主屏幕共享”的原理，其中各会议参与者在对等的基础上自己决定在何时以及在何处共享什么内容。对等数据共享与其中要显示的内容由演示者或会议主持者来确定的系统不同。用户确定他的内容要被路由到何处且可以在无需用户处理设备上的任何软件配置的情况下这样做。

[0067] 在又一方面，本发明提供了一种用于在会议处传递来自用户的任意媒体内容的电子会议工具，包括：

[0068] 适于操作通信网络的显示节点的节点配置装置，该显示节点耦合到第一显示器，该节点配置装置适配成接收用户所选的任意媒体内容且控制用户所选的任意媒体内容在该第一显示器上的显示；以及

[0069] 适配成经由通信网络传递用户所选的任意媒体内容的至少一个外围设备，其中该外围设备是连接单元，包括：

[0070] (a)适配成耦合到具有第二显示器、存储器、以及操作系统的处理设备的端口的连接器；以及

[0071] (b)用于与通信网络通信的发射机，

[0072] 适配成被加载到处理设备上并且在处理设备的操作系统上运行的程序，所述程序适配成获得用户所选的任意媒体内容，所述程序在终止时留下零足迹，以及

[0073] 输入设备，该输入设备允许用户执行触发所述用户所选的任意媒体内容通过所述端口向所述发射机的传送的用户动作。

[0074] 该程序可被存储在外围设备上。发射机可以是无线发射机或收发机。外围设备可以是即插即用设备。该程序可适配成对该第二显示器的内容进行屏幕抓取。

[0075] 输入设备可以是耦合到外围设备的物理致动器。该物理致动器优选地具有 100 和 14400 平方毫米之间的表面积。或者，输入设备可以是显示在第二显示器上的键。显示在第二显示器上的键可以是不被程序进行屏幕抓取的键。

[0076] 在另一方面，本发明提供了一种将处理设备连接到通信网络的方法，该处理设备具有存储器、显示器、带有至少一个预安装通用驱动程序的操作系统，该至少一个预安装通用驱动程序提供用于处理设备与标准类型外围设备之间的通信的通用通信协议，该方法包括以下步骤：

[0077] a) 将外围设备耦合到处理设备，该外围设备具有收发机；

[0078] b) 通过操作系统的预安装的通用驱动程序，设置用于外围设备与处理设备之间的通信的手段；

[0079] c) 经由外围设备将处理设备耦合到通信网络；

[0080] d) 经由用于通信的手段在处理设备与通信网络之间路由经屏幕抓取的数据，其中通用通信协议被用于在处理设备与外围设备之间传送经屏幕抓取的数据。

[0081] 经屏幕抓取的数据的路由可以去往所定义的网络节点，如显示节点，而无需用户输入配置细节。因而，路由可以专用于特定网络节点，如显示节点、基站等。在通过在通信开始之前将外围设备配对到相关节点来实现。

[0082] 根据本发明的各实施例，用户启动来自外围设备（如 USB 加密狗 (dongle)）的应用，从而按 3 步过程进行连接：(1) 连接，例如将外围设备插入处理设备，(2) 启动屏幕抓取应用，(3) 执行用户动作，如点击外围设备上的按钮以允许内容被显示在中央屏幕或显示器上。为了实现步骤 2，Autorun（自动运行）或 AutoPlay（自动播放）可以与某些 Windows 操作系统一起使用，但基于操作系统版本以及安装了哪些补丁，存在着许多不同的变型。此外，这一机制一般被认为有安全危险，这是大多数 IT 部门将禁用 Autorun/Autoplay 的原因。其他操作系统提供者已禁用这一功能，例如自 Snow Leopard（雪豹操作系统）以来，Apple 从其 OS/X 中完全移除了类似功能。

[0083] 在本发明的一实施例中，提供了需要安装在处理设备（如膝上型计算机）上的非常小的服务——在某些操作系统中也被称为 daemon（守护进程）。这一服务被预安装在处理设备上。这一安装只需在每一处理设备（如膝上型计算机）上安装一次。这一安装的角色是提供持续监视根据本发明的外围设备是否提出连接到处理设备的持久运行服务。在这样的外围设备被连接时，该服务将检测这一点并启动驻留在外围设备的大容量存储区域中的客户机应用软件。一旦该服务被安装，与外围设备的连接性变成 2 步过程：连接，例如将外围设备插入处理设备，(2) 执行用户动作，如点击外围设备上的按钮以允许内容被显示在中央屏幕或显示器上。从处理设备加载的应用在终止时仍然留下零足迹。

[0084] 步骤 b) 可包括将外围设备呈现给处理设备作为人类接口设备，并且其中预安装的通用驱动程序是人类接口设备驱动程序。

[0085] 作为替换或补充，步骤 b) 可包括将外围设备呈现给处理设备作为大容量存储设备，并且其中预安装的通用驱动程序是大容量存储设备驱动程序。

[0086] 作为替换或补充，步骤 b) 包括将外围设备呈现给处理设备作为复合设备，并且其中预安装的通用驱动程序独立地驱动各不同的设备接口。

[0087] 客户机应用可被存储在外围设备上，当该客户机应用在处理设备上运行时获得经

屏幕抓取的数据。这样的客户机应用可以是便携式应用并且在终止时不留下足迹。

[0088] 在又一方面，本发明提供了一种用于提供到处理设备的通信连接性的外围设备，该处理设备提供有存储器、显示器、带有至少一个预安装通用驱动程序的操作系统，该至少一个预安装通用驱动程序提供用于处理设备与标准外围设备类之间的通信的通用通信协议，该外围设备包括其中储存有可执行软件代码以供在处理设备上执行的存储器，所述可执行软件代码包括：

[0089] 用于通过操作系统的预安装的通用驱动程序，设置用于外围设备与处理设备之间的通信的手段的第一软件代码部分；

[0090] 用于经由外围设备将处理设备连接到通信网络的第二软件代码部分，该外围设备具有收发机；

[0091] 用于对来自处理设备的数据进行屏幕抓取的第三软件代码部分；以及

[0092] 用于通过用于通信的手段在处理设备与通信网络之间路由经屏幕抓取的数据的第四软件代码，其中第一软件代码部分适配成使用通用通信协议在处理设备与外围设备之间传送经屏幕抓取的数据。

[0093] 第一软件代码部分可适配成将外围设备呈现给处理设备作为人类接口设备，并且其中预安装的通用驱动程序是人类接口设备驱动程序。第一软件代码部分可适配成将外围设备呈现给处理设备作为大容量存储设备，并且其中预安装的通用驱动程序是大容量存储设备驱动程序。第一软件代码部分可适配成将外围设备呈现给处理设备作为复合设备，并且其中预安装的通用驱动程序独立地启动各不同的设备接口。可执行软件代码可包括用于提供用于连接到包括基节点的通信网络的手段的第五代码。可执行软件第三代码可包括用于提供用于捕捉处理设备的视频帧缓冲区的手段的第六代码。

[0094] 可执行软件代码可包括用于提供用于编码、压缩、以及可任选地加密经屏幕抓取的数据并通过通信网络发送经屏幕抓取的数据的手段的第七代码。该可执行软件代码可包括用于提供用于处理外围设备的手段的第八代码。该可执行软件代码可包括用于提供用于发起到基节点的连接的手段的第九代码。该可执行软件代码可包括用于在外围设备上接收来自输入设备的输入的第十代码。该可执行软件代码可包括用于提供用于向外围设备上的视觉指示器发送状态变化的手段的第十一代码。该可执行软件代码可包括用于提供用于向用户呈现 GUI 的手段的第十二代码。该可执行软件代码可包括用于呈现 GUI 以供在可执行软件代码作为便携式应用执行时管理所述可执行软件代码的第十三代码。该可执行软件代码可包括用于提供用于在客户机处理设备的显示器上显示并激活键以允许用户输入将来自处理设备的数据开始传送到基节点的手段的第十四代码。

[0095] 在又一方面，本发明提供一种用于提供到处理设备的通信连接性的外围设备，该处理设备提供有存储器、显示器、带有至少一个预安装通用驱动程序的操作系统，该至少一个预安装通用驱动程序提供用于处理设备与标准类型外围设备之间的通信的通用通信协议，该外围设备包括其中储存有可执行软件代码以供在处理设备上执行的存储器，所述可执行软件代码包括：

[0096] 用于通过操作系统的预安装的通用驱动程序，设置用于外围设备与处理设备之间的通信的手段的第一软件代码部分；

[0097] 用于经由外围设备将处理设备连接到通信网络的第二软件代码部分，该外围设备

具有收发机；以及

[0098] 用于通过用于通信的手段在处理设备与通信网络之间路由数据的第三处理软件代码，其中第一软件代码部分适配成使用通用通信协议在处理设备与外围设备之间传送数据，以及

[0099] 耦合到外围设备的输入设备，该输入设备适配成对用户动作作出反应以触发数据从处理设备到外围设备的传送。

[0100] 该第一软件代码部分可适配成将外围设备呈现给处理设备作为人类接口设备，并且其中该预安装的通用驱动程序是人类接口设备驱动程序。该第一软件代码部分可适配成将外围设备呈现给处理设备作为大容量存储设备，并且其中该预安装的通用驱动程序是大容量存储设备驱动程序。该第一软件代码部分可适配成将外围设备呈现给处理设备作为复合设备，并且其中预安装的通用驱动程序独立地启动各不同的设备接口。

[0101] 该输入设备优选地是耦合到外围设备的物理致动器。该物理致动器优选地具有100 和 14400 平方毫米之间的表面积。该输入设备可以例如是用于显示在显示器上的键。可执行软件代码可包括用于提供用于连接到包括基节点的通信网络的手段的第四代码。该可执行软件代码可包括用于提供用于捕捉处理设备的视频帧缓冲区的手段的第五代码。该可执行软件代码可包括用于提供用于编码、压缩、以及可任选地加密视频帧并通过安全链路将它们发送到基节点的手段的第六代码。该可执行软件代码可包括用于提供用于处理外围设备的手段的第七代码。该可执行软件代码可包括用于提供用于发起到基节点的连接的手段的第八代码。该可执行软件代码可包括用于在外围设备上接收来自输入设备的输入的第九代码。该可执行软件代码可包括用于提供用于向外围设备上的视觉指示器发送状态变化的手段的第十代码。该可执行软件代码可包括用于提供用于向用户呈现 GUI 的手段的第十一代码。该可执行软件代码可包括用于呈现 GUI 以供在可执行软件代码作为便携式应用执行时管理该可执行软件代码的第十二代码。该可执行软件代码可包括用于提供用于在处理设备的显示器上显示并激活键以允许用户输入将来自处理设备的数据开始传送到基节点的手段的第十三代码。

[0102] 在本发明的又一方面，提供了一种用于提供到处理设备的通信连接性的外围设备，该处理设备提供有存储器、显示器、带有至少一个预安装通用驱动程序的操作系统，该至少一个预安装通用驱动程序提供用于处理设备与标准类型外围设备之间的通信的通用通信协议，该外围设备包括其中储存有可执行软件代码以供在处理设备上执行的存储器，该可执行软件代码包括：

[0103] 用于通过操作系统的预安装的通用驱动程序，设置用于外围设备与处理设备之间的通信的手段的第一软件代码部分；

[0104] 用于经由外围设备将处理设备连接到通信网络的第二软件代码部分，该外围设备具有收发机；

[0105] 用于接收来自网络的媒体内容以及用于根据一组规则在显示器上显示媒体内容的第三软件代码部分；其中第一软件代码部分适配成使用通用通信协议在外围设备与处理设备之间传送媒体内容。

[0106] 该可执行软件代码可包括用于提供用于将接收机正确地配置成接入点的手段的第四代码。该可执行软件代码可包括用于提供用于监听尝试连接在特定端口上的连接单元

的输出的手段的第五代码。该可执行软件代码可包括用于提供用作管理目的的GUI的手段的第六代码。该可执行软件代码可包括用于提供用于使用zeroconf协议通过网络发布其存在的手段的第七代码。该可执行软件代码可包括用于提供用于接受并安装软件更新的手段的第八代码。该可执行软件代码可包括用于提供用于提供连接单元到处理设备的配对的设施的手段的第九代码。该可执行软件代码可包括用于提供用于自动合成不同的传入任意媒体流并在显示器上渲染合成图像的手段的第十代码。该可执行软件代码可包括用于提供用于接收、解密、以及解码传入的任意媒体内容的手段的第十一代码。该可执行软件代码可包括用于缩放传入的任意媒体流的第十二代码。该可执行软件代码可包括用于提供用于根据一组规则显示传入的任意媒体内容的手段的第十三代码。

[0107] 本发明还提供一种用于在会议上传递来自用户的任意媒体内容的方法，包括：

[0108] 操作通信网络的显示节点，该显示节点耦合到第一显示器、接收用户所选的任意媒体内容并控制用户所选的任意媒体内容在第一显示器上的显示；以及

[0109] 将外围设备连接到处理设备的端口并经由通信网络传递用户所选的任意媒体内容，

[0110] 将程序加载到处理设备上并且在处理设备的操作系统上运行该程序以获得用户所选的任意媒体内容，所述程序在终止时留下零足迹，以及

[0111] 在输入设备上的用户动作之后，触发所述用户所选的任意媒体内容通过所述端口传送到所述发射机。

[0112] 本发明还提供一种外围设备，包括：

[0113] 基节点

[0114] 用于连接到主机处理设备的即插即用端口的连接器，

[0115] 基节点与连接器之间的用于传送数据信号和功率的灵活连接，

[0116] 基节点上的用于致动信号且用于将该信号传送到连接器以供传送到端口的致动器，其中该基节点具有包括用于存储便携式应用的持久存储、处理引擎、收发机以及视觉指示器的电子装置。

[0117] 本发明还提供一种用于提供自处理设备的通信连接性的方法，

[0118] 设置通信网络，该通信网络处于通信网络的基节点与耦合到处理设备的外围设备之间；

[0119] 在处理设备和外围设备之间传送媒体内容，

[0120] 将媒体内容从外围设备传送到通信网络，

[0121] 在基节点处接收来自通信网络的媒体内容，并且根据一组规则在显示器上显示媒体内容。

[0122] 上述任一软件代码存储在非瞬态存储介质上。

[0123] 定义

[0124] “单方”意味着显示过程是只通过会议中涉及的一个参与者的动作来获得的，而无需另一个或多个参与者的同意。术语“单方”暗示供显示的数据被允许盖写或替换由会议的同一或另一参与者显示在屏幕上的任何数据。

[0125] “即插即用”是用于描述计算机总线或设备规范的特性的术语，它促进系统中硬件组件的发现，而无需物理设备配置或用户干预来解决资源冲突。即插即用设备可被添加到

计算系统的总线（在运行时或在关闭时），并且新添加的设备以及可能计算系统的其余设备被自动配置成使新添加的设备从硬件以及从软件观点两者来看都工作。

[0126] 即插即用接口包括例如（非穷尽性列表）：火线（IEEE-1394）、PCI、Mini PCI、PCI Express、Mini PCI Express、PCMCIA、PC 卡、通用串行总线（USB）、SDIO 卡。

[0127] “自动配置”是设备的自动配置，无需手动干预、无需设置任何开关或跳转、并且无需任何软件配置。自动配置设备的一个示例：USB 设备。

[0128] 自动配置协议的示例：DHCP、Zeroconf、Bonjour。

[0129] 即插即用设备默认具有自动配置软件，以使其即插即用。示例：USB 设备通过包括正确自动配置软件（例如，主机驱动程序、主机栈、应用软件）而被使得成为即插即用。自动配置也可以仅指软件并且不限于物理设备。

[0130] “热交换和热插拔”是用于描述替换计算机系统组件而无需关闭该系统的功能的术语。更具体而言，热交换描述在无需显著中断系统的情况下替换组件，而热插拔描述在无需显著中断系统的操作的情况下添加将扩展该系统的组件。这一功能的公知示例是允许用户添加或移除外围组件（如鼠标、键盘或打印机）的通用串行总线（USB）。其他示例是例如 eSATA、PCIe、火线。

[0131] “便携式应用”（便携式 app），有时也称为独立应用，是被设计成在无需安装在目标机器上的情况下运行的计算机软件程序。这一类型的应用被存储在可移动存储设备上，如 CD、USB 闪存驱动器、闪存卡、或软盘——只在该存储介质上存储其程序文件、配置信息以及数据。它是可被存储在诸如 USB 闪存驱动器、iPOD、存储卡、便携式硬盘驱动器或其他便携式电子设备等电子设备上并且在耦合到该电子设备的计算机或其他处理设备上运行而无需对主机计算机作出持久配置改变的程序。所有这样的程序具有零足迹，意味着所有临时文件、注册表项、以及对机器的任何其他改变只在该程序运行时存在。

[0132] 出于本发明的目的，为了被认为是便携式应用，软件程序必须：

[0133] 不需要在计算机的持久存储设备上执行任何类型的正式安装，并且可被存储在可移动存储设备上，如 USB 闪存驱动器、iPOD、存储卡、便携式硬盘驱动器或其他便携式电子存储设备，从而使得它能够在多个计算机上使用。

[0134] 各设置与该软件一起存储，并且可优选地与它一起携带（即，它们被写入电子设备，如 USB 驱动器）。各设置不被存储在计算机的注册表或任何其他中央系统数据库中。

[0135] 在被使用之后在所运行的任何 PC 上留下零（或接近零）“足迹”，即，一旦该程序已经存在，所有临时文件 / 注册表设置应当被避免或至少被移除，且用户创建的文件可被直接保存到与其上存储有该应用的可移动介质相同的可移动介质。

[0136] 便携式应用没有在所运行的主机计算机上留下其文件或设置。例如，该应用不写入 Windows 注册表或将其配置文件（如 INI 文件）存储在用户的简档中；相反，它将其配置文件存储在该程序的目录中。因为文件路径通常将由于 Windows 驱动器字母指派的变化而因不同的计算机而不同，所以另一要求是需要应用将它们存储成相关格式。优选地，这样的程序在该应用启动时不需要启动器程序将必要的设置和文件复制到主机计算机，并且在它关闭时不需要将它们移回该应用的目录，因为这在电源故障的情况下可能会在硬盘驱动器上留下残余。

[0137] “电子会议系统”（EMS）需要一方面与传统群件区分开，另一方面与 web 会议系统

区分开。实际上，所命名类别的产品的少量特征之间存在某种重叠。与群件的主要差异是协作的强度。EMS 应当与可能在同时具有多个用户的远程显示器上示出单独计算机屏幕的内容的系统区分开。

[0138] “群件”支持在群内的协作，其中各单独贡献保持是可标识的。相反，EMS 使得该群能够协作式地产生该群作为整体对其负责的结果。在业务过程中，群件和电子会议系统彼此互补：当在 EMS 会话之前研究和创建文档时或当实现这种会话的结果时，群件支持团队。

[0139] “web 会议系统”和“电子会议系统”在在线会议或研讨会中彼此互补：EMS 通过提供用于产生并存档群结果的交互式工具来扩展 web 会议系统。另一方面，“web 会议系统”用同步在线会议中所需的且不存在于 EMS 中的屏幕共享和语音会议功能对 EMS 进行补充。

[0140] “数据会议”指的是实时共享计算机数据的两个或更多个参与者之间的通信会话。诸如屏幕、键盘、鼠标、相机等交互和演示设备可被共享。它是用来区分视频会议和音频会议的术语。数据可包括可被会议的参与者看到的屏幕、文档、图形、绘图、以及应用。

[0141] “应用共享”是使得两个或更多个用户能从他们相应的计算机同时实时访问共享应用或文档的远程访问的元素，囊括在协作式软件下。一般而言，共享应用或文档将在主机计算机上运行，并且对共享内容的远程访问将由主机用户提供给其他用户。应用共享应当与以下系统区分开：其中不同用户之间对该应用的协作是不可能的，但各单独的计算机屏幕的内容可被同时投影到具有多个用户的远程显示器上。

[0142] 术语“任意媒体内容”指的是用户可生成、创建或选择适于显示的任何媒体内容的事实。这与客户机对由会议或演示中的另一人所显示的媒体内容进行投票或选择不同。这一术语指的是用于显示内容的面向客户机的分布式权限和特权，而非提供呈现给会议成员的内容的中心演示者。

[0143] 在本文的意义上，“屏幕抓取”指的是读取视频帧缓冲区并处理它们，而非指示将它们渲染在显示器上。屏幕抓取以用于演示在 Slobodin 等人的 US2002/0196378 中描述，它通过援引纳入于此。

[0144] “自动合成”或“自动布局”指的是其中多个图形 / 视频源被渲染在中央显示器上的自动性质，无需用户干预且以用户将直观地认为它将发生的方式。

[0145] “无线”和“无线通信网络”可以是节点之间不使用电缆链路的任何网络，例如使用 RF、光或红外来用于通信目的，如 IrDA、散射红外、WLAN、WiMax、WiFi、WiFi 直连、蓝牙或本领域技术人员已知的任何其他无线通信网络。

[0146] “计算机”一般指的是处理设备，即具有能进行各种类型的数字处理的处理引擎，如渲染图形图像以供显示。计算机可以是工作站、个人计算机、膝上型计算机、掌上计算机、PDA、智能电话、平板等等的形式。一般而言，计算机具有诸如易失性 RAM 等存储器。诸如硬盘、光盘、或固态存储器等非易失性存储器可被包括在计算机中或可以是外围设备。当前，大多数计算机是电子装置，但术语“计算机”也包括基于光学器件的计算设备。

[0147] 术语“预安装的通用驱动程序”旨在意指安装在诸如计算机等处理设备上作为标准驱动程序的驱动程序，例如随操作系统的安装而安装的标准驱动程序。这样的驱动程序对操作系统而言是标准的且可驱动耦合到或连接到处理设备的标准类型外围设备。针对这样的外围设备的特定驱动程序的安装是不需要的。这样的通用驱动程序可以是人类接口驱动程序 (HID) 或大容量存储设备驱动程序，它已将预定软件组件配置成用于驱动大容量存

储、CD-ROM、键盘等、或它们的组合。这样的设备可以是可读且可写的计算机外围存储器设备，如 USB 存储棒、闪存、外部硬盘驱动器、或其他。

[0148] 附图简述

[0149] 图 1a 示出可以与本发明的各实施例一起使用的会议室。图 1b 示出根据本发明的一实施例的客户机处理设备、连接单元、基节点以及显示器的组合。

[0150] 图 2 示出根据本发明的一实施例的屏幕显示。

[0151] 图 3 到 5 示出根据本发明的各实施例的基节点和外围设备以及客户机处理设备。

[0152] 图 6 示出根据本发明的一实施例的显示器。

[0153] 图 7 示出根据本发明的一实施例的外围设备。

[0154] 图 8 示出根据本发明的一实施例的客户机处理设备。

[0155] 图 9 示出根据本发明的一实施例的又一客户机处理设备。

[0156] 图 10 示出根据本发明的一实施例的外围设备的实施例。

[0157] 图 11 示出使用平板的实施例。

[0158] 图 12 示出了本发明的又一实施例。

[0159] 图 13 到 15 示出根据本发明的一实施例使用 QR 码进行远程访问。

[0160] 图 16 示出根据本发明的一实施例的配对。

具体实施方式

[0161] 将针对具体实施例且参考特定附图来描述本发明，但是本发明不限于此而仅由权利要求书定义。所描述的附图只是示意性的和非限制性的。

[0162] 此外，本说明书和权利要求书中的术语第一、第二、第三等等用于在类似的元件之间进行区分，而不一定用于描述顺序次序或时间次序。这些术语可在适当环境中互换，并且本发明的实施例可以不同于本文中描述或示出的其他顺序操作。

[0163] 此外，本说明书和权利要求书中的术语顶部、底部、上方、下方等用于描述性目的，而不一定用于描述相对位置。这样使用的术语可在适当的环境中互换，并且本文中所述的本发明的实施例可以不同于本文中描述或示出的其他取向操作。

[0164] 权利要求中所使用的术语“包括”不应被解释为限于此后列出的装置；它不排除其他元件或步骤。它需要被解释为指定存在如所引用的所述特征、整体、步骤或组件，但并不排除存在或附加一个或多个其他特征、整体、步骤或组件、或者其组合。因此，表述“包含装置 A 和 B 的设备”的范围不应当仅限于仅由组件 A 和 B 构成的设备。这意味着相对于本发明而言，设备的相关组件是 A 和 B。

[0165] 类似地，应注意如说明书或权利要求书中所使用的术语“耦合”不应当被解释为仅限于直接连接。因此，表述“设备 A 耦合至设备 B”的范围不应受限于设备 A 的输出直接连接至设备 B 的输入的设备或系统。它表示在 A 的输出与 B 的输入之间存在路径，该路径可以是包括其它设备或装置的路径。

[0166] 所描述的设备的各元件或部分可包括编码在介质中的用于执行任何种类的信息处理的逻辑。逻辑可包括编码在盘中或其他计算机可读介质中的软件和 / 或编码在专用集成电路 (ASIC)、现场可编程门阵列 (FPGA) 或者其他处理器或硬件中的指令。

[0167] 对软件的引用可涵盖用任何语言编写的可由处理器直接或间接执行的任何类型

的程序。

[0168] 对逻辑、硬件、处理器、或电路系统的引用可涵盖任何种类的逻辑或模拟电路系统，可以集成到任何程度，且不限于通用处理器、数字信号处理器、ASIC、FPGA、分立组件或晶体管逻辑门等。

[0169] 本发明的各实施例提供对会议的三个主要问题的解决方案：

[0170] a) 准备会议所花的时间。这主要通过允许任何可显示信息的“进行中”演示来实现。这一信息不必被链接到任何特定演示软件，也不必与任何这样的演示软件兼容，

[0171] b) 使用电子会议工具进行会议所花的时间。这通过缩短将计算机连接到显示器或投影系统的时间来实现。

[0172] c) 反映并审阅以及会后存档所花的时间。这通过提供以与进行会议相同的时序记录会议进程的可能性以及能够存储所呈现的所有数据以及谁呈现了该数据的可能性来实现。

[0173] 其中在显示器或投影仪上呈现视觉信息的会议一般遭受独占效应的损害：单个演示者确定显示内容并且因此具有影响会议活力以及由此影响其结果的不均衡能力。允许多个个人同时示出他们的信息的系统是已知的。

[0174] 不同地，大多数会议由某一类邀请系统（Outlook、WebEx、GoToMeeting 等）发起，它们在会议室系统的外部（通常经由电子邮件）并且由此是混淆的且不灵活的。

[0175] 尽管以上问题可能在高度结构化且熟练管理的集会（如，董事会议）中没有呈现出妨碍，但它们确实对大多数自组织会议（尤其是没有结构化议程和与会人员列表的那些会议）造成混淆和频繁延迟。

[0176] 图 1a 是可以与本发明的各实施例一起使用的具有会议桌的通用会议室 30 的示意表示。参与者 37 具有诸如膝上型计算机、平板、PDA 等某种形式的处理设备 31。处理设备 31 中的每一个可以是主机设备且具有相耦合的第一连接单元 47。第一连接单元 47 提供对网络 50 的接入，在这一情况下网络 50 是无线网络，但可以是有线网络。网络是共享资源通信网络，因为不同设备和参与者可通过该网络传送数据。每一连接单元 47 可耦合到输入设备 48，这将在下文更详细地描述。用户 37 通常将处于距处理设备 37 的在人体工学上令人满意的某一距离处。这一人体工学边界通常是约 1000 平方厘米到 4000 平方厘米的面积。这一人体工学边界通常将使用户处于该边界的一侧，并且手臂的舒适伸展将确定落在该人体工学边界内的处理设备的左侧和右侧上的区域，且该处理设备的边界的远边（通常由显示屏来定界）将确定该人体工学边界的另一侧。由该人体工学边界所限定的区域将与处理设备 31 本身重叠或包括该处理设备 31。处理设备也将具有外侧物理边界。输入设备 48 优选地被安排成在处理设备 31 的边界之外、但在人体工学边界之内操作。优选地，输入设备被安排成在它平放在桌子上时工作。输入设备优选地具有 1 和 144 平方厘米之间的激活面积的大小。

[0177] 优选地，网络 50 是局域网，即共享资源通信网络且出于安全原因优选地在会议室本地，但网络 50 可能能够访问其他局域网或广域网（如 51）或较大企业网络或因特网 43，例如经由路由器 42。网络 50 的另一节点是基节点或显示节点 36。这一节点 36 可任选地是无线接入点。基节点 36 也可以是处理设备或主机计算机，并且可耦合到提供对网络 50 的接入的第二连接单元 49，由此将所有处理设备 31、36 链接在一起。连接单元可具有上述

输入设备。或者，可以使用安装在基节点 36 上的网络连接。音频装备 46 可被提供，例如允许会议的其他成员从远程目的地呼入的电话。

[0178] 显示节点 36 耦合到并适配成允许在某一种类的显示器 44 上显示媒体。在本发明的各实施例中，显示节点是通信网络 50 的基节点。显示器 44 可以是投影仪或屏幕，该投影仪耦合到基节点 36。可任选地提供白板 45，白板 45 可任选地耦合到显示器 44 和 / 或基节点 36，例如在白板可电子地记录它上面写了什么时。可任选地，相机 35 可被提供以记录白板 45 上的条目。相机 35 可具有用于将相机 35 连接到网络 50 的第三连接单元 52，从而来自白板的数据可被记录并存储或经由路由器 42 传送到其他网络。连接单元 52 可具有输入设备，如以上参考连接单元 47 描述的。

[0179] 可任选装备可以是用于记录会议的进展的相机 39、40、41。这些相机可通过网络 51（例如，电缆网络）链接到路由器 42 和 / 或基节点 36。另一可任选项目是可被用来例如向处理设备 31 以及向附连到基节点 36 或显示器 44 的一部分的扬声器（未示出）传送音频的一个或多个话筒 38。

[0180] 处理设备 31、相机、白板等的输出中的任一个或全部可被记录并数字地存储，例如存储在节点 36 中或其他地方，以提供具有正确时序的完整记录。

[0181] 综上所述，本发明提供了一种用于在不同用户 37（具有他们自己的处理设备 31，例如 PC、移动电话、或平板）与会议室 30 中一个显示器或投影仪或者多个显示器或投影仪 44 之间传递任意媒体内容的电子会议工具。

[0182] 参考图 1a 和 1b，本发明的各实施例包括作为处理设备的基节点或显示节点 36，例如适配成接收用户所选的任意媒体内容的主机计算机，基节点 36 耦合到中央显示器 44，中央显示器 44 可以是固定格式显示器或投影仪或类似设备。该任意媒体内容可以从用户处理设备 31 中的任一个提供。基节点 36 可适配成根据一组规则（例如 FIFO、自动、根据请求或批准、强制显示、根据优先级，等等）显示接收到的用户所选的任意媒体内容。可任选地，基节点 36 适配成强制显示接收到的用户所选的任意媒体内容，即允许单独用户独立于名义上负责给出演示或主持会议的人在显示器 44 上显示自己的所选内容来参与会议强制显示也可被认为是一规则。短语“对显示设备的单方电子访问权”将这一种类的规则限定为“单方”意味着显示过程是只通过会议涉及的一个参与者的动作来获得的，无需另一个或其他参与者的同意。术语“单方”暗示显示的数据被允许盖写或替换由会议的同一或另一参与者显示在屏幕上的任何数据。该会议工具也可适配成允许优先级设置。这意味着用户可为要显示的媒体设定优先级设置。例如，优先级“1”可被基节点解释为强制显示，优先级“2”可被基节点解释为尽快显示，优先级“3”可被基节点解释为置于队列中并到时显示，等等。设置并使用显示优先级也被认为是按规则工作。为了执行规则，基节点 36 可以具有决策模块。基节点 36 可以是具有诸如微处理器和存储器等处理引擎的主机计算机。优选地，基节点 36 适配成按平等的方式来对待从连接单元 47 中的任一个或全部传递给基节点 36 的媒体内容。基节点 36 可适配成在相连接的中央显示器 44 上自动合成媒体内容，例如来自一个或多个处理设备 31 的媒体内容。

[0183] 本发明的独立方面是至少一个连接单元 47（可任选地用于接收的 49 或单元 52）适配成将用户所选的任意媒体内容传递给所述基节点 36。优选地，连接单元 47 和 / 或可任选地 49 或 52 是物理即插即用设备。连接单元的示例在图 10 中示意性地示出。

[0184] 连接单元 47 可被集成到用户处理设备 31，例如作为内部外围设备或可优选地是包括适配成耦合到用户处理设备 31 的端口的连接器的外部外围设备。处理设备 31 可具有客户机显示器、诸如微处理器等处理引擎、存储器以及操作系统。可任选连接单元 49 可被集成到基节点 36，例如作为内部外围设备或可以是包括适配成耦合到基节点 36 的端口的连接器的外部外围设备。连接单元 49 可完全集成到基节点 36，例如作为基节点 36 的内部网络接口。基节点 36 可具有处理引擎，如微处理器、存储器以及操作系统。

[0185] 用户处理设备 31、连接单元 47（可任选地 49 或 52）以及基节点 36 协作来形成用于多个处理设备 31、36 中的至少一个与中央显示设备 44 之间的链接的通信网络 50。通信网络 50 适配成接收来自多个处理设备 31 中的至少一个的任意媒体内容并将该多个处理设备 31 中的至少一个的任意媒体内容传送到中央显示设备 44。

[0186] 本发明的独立方面是适配成加载到客户机处理设备 31 上并在客户机处理设备 31 的操作系统上运行的便携式应用 60。便携式应用 60 作为客户机处理设备 31 上的进程来运行，它适配成响应于施加到输入设备 48 的用户动作来将来自客户机处理设备 31 的任意媒体内容递送给通信网络 50，该进程在终止时在处理设备 31 上留下零足迹。网络 50 是共享资源通信网络，因为不同设备和参与者可通过该网络传送数据。可任选地，便携式应用 60 被存储在每一连接单元 47 以及可任选地 49 或 52 上。优选地，便携式应用 60 适配成对客户机处理设备 31 的客户机显示器的内容进行“屏幕抓取”。可任选地，便携式应用 60 当在处理设备 31 上运行时适配成对这一客户机处理设备 31 的客户机显示器上的内容进行“屏幕抓取”并经由连接单元 47 来传送它。可任选地，便携式应用 60 当在处理设备上运行时适配成对客户机处理设备 31 的客户机显示器上的内容进行“屏幕抓取”并经由处理设备 31 的网络接口来传送它，例如在连接单元 47 不具有发射机的情况下。

[0187] 用于与所述基节点 36 通信的连接单元 47 具有网络接口，例如包括发射机 62。发射机 62 优选地是收发机。可任选地，发射机 / 接收机可以是无线发射机 / 接收机。

[0188] 用于与连接单元 47 通信的基节点 36 具有可被包括在连接单元 49 或集成到基节点 36 的接收机 63。该接收机优选地是收发机。可任选地，发射机 / 接收机可以是无线发射机 / 接收机。

[0189] 输入设备 48 允许与连接单元 47 的用户交互。优选地，输入设备 48 是耦合到连接单元 47 的物理致动器。施加到输入设备 48 的用户动作生成可触发从（与连接单元 47 相耦合的）处理设备 31 到网络 50 的数据传送的信号。优选地，输入设备 48 具有处于 100 与 14400 平方毫米之间的激活表面。任选地，输入设备 48 可以是显示在客户机处理设备 31 的客户机显示器 1 上的键。这一键可被激活，例如通过使用诸如鼠标等定点设备触发从处理设备 31 到网络 50 的数据传输。

[0190] 连接单元 47 优选地提供有视觉指示器 61，例如用于允许来自连接单元 47 的对任何活动的状态的用户反馈。

[0191] 该系统还可包括适配成被加载到基节点 36 的服务器程序 64，所述程序 64 适配成通过所述连接单元 47（可任选地 49）接收来自一个或多个客户机处理设备 31 的任意媒体内容并将该多个任意媒体内容流示出在一个或多个显示器 44 上。服务器程序 64 可适配成允许根据一个或多个规则（例如 FIFO、自动、根据请求、强制、根据优先级，等等）的显示。强制规则可被描述为允许参与者“对显示设备的单方电子访问权”。“单方”意味着显示过程

是只通过会议涉及的一个参与者的动作来获得的，而无需另一个或多个参与者的同意。术语“单方”暗示供显示的数据被允许盖写或替换由会议的同一或另一参与者显示在屏幕上的任何数据。为了执行规则，服务器程序 64 可以具有决策模块。

[0192] 优选地，服务器程序 64 适配成按平等的方式来对待从连接单元 47 中的任一个或全部传递给它的媒体内容。服务器程序64可适配成在中央显示器44上自动合成媒体内容。

[0193] 服务器程序 64 可以是适配成被加载到基节点 36 上并在基节点 36 的操作系统上运行的便携式应用。便携式应用 64 在适配成显示经由通信网络 50 从客户机处理设备 31 接收到的任意媒体内容的基节点 36 上运行进程，该进程在终止时在基节点 36 上留下零足迹。可任选地，便携式应用 64 被存储在每一连接单元 49 以及可任选地 7 上并可从中安装。

[0194] 该系统还可包括中央显示设备 44 并且可任选地包括白板 45 或其他显示装置，如打印机。显示器 44 适配成接收用户所选的任意媒体内容，并且可适配成允许根据一个或多个规则（例如 FIFO、自动、强制、根据请求或批准、根据优先级，等等）来显示接收到的用户所选的任意媒体内容。强制规则可被描述为允许参与者“对显示设备的单方电子访问权”。“单方”意味着显示过程是只通过会议涉及的一个参与者的动作来获得的，而无需另一个或多个参与者的同意。术语“单方”暗示供显示的数据被允许盖写或替换由会议的同一或另一参与者显示在屏幕上的任何数据。

[0195] 可任选地，连接单元 47 之一可适配成作为主机连接单元。这样的主机连接单元可适配成指令基节点何时可显示来自客户机处理设备 31 的媒体内容或处理设备中的哪一个可被允许发送内容以供显示。

[0196] 在本发明的各实施例中，至少一个便携式应用被用作例如客户机处理设备 31 上的或可任选地基节点 36 上的客户机软件。在这些实施例中，相关计算机设备 31、36 上的操作系统的预安装的通用驱动程序之一被用于经由连接单元 47（可任选地 49 或 52）建立从计算机设备 31、36 到网络 50 的通信。该通用驱动程序结合作为外围设备来操作的连接单元 47（可任选地 49 或 52）使用，但该使用可超出该通用驱动程序所预期的标准类型外围设备。在一些实施例中，作为外围设备来操作的连接单元 47（可任选地 49 或 52）通过使用预安装的通用驱动程序所提供的通用通信协议与相关处理设备 31、36 通信。预安装的 USB 驱动程序是示例。优选地，使用连接单元 47（可任选地 49）建立网络 50 的通信不更改或影响相关处理设备 31、36 的联网能力。例如，如果浏览器是在客户机处理设备 31 上启动的，则这一浏览器可以使用处理设备 31 上的标准网络接口。这意味着经由连接单元 47（可任选地 49）的数据传输独立于经由处理设备 31 或 36 的网络接口的数据传输。这具有以下优点：每一用户可以独立于要在会议期间显示的数据的传输来执行诸如搜索因特网以收集数据或接收邮件等等的处理。

[0197] 使用便携式应用具有可避免对注册表中或一般在操作系统中的设置的任何修改的优点，从而在任何形式的终止（例如，将电子设备断开连接，系统崩溃）之际，不留下痕迹。这一般称为“零足迹”。

[0198] 本发明具有可扩展性的优点。它可提供供会议中的多个用户使用的显示系统。会议中的每一用户因而可具有用于耦合到连接单元 47 的客户机处理设备 31。第一用户动作将客户机处理设备 31 连接到基节点 36，例如通过将连接单元 47 插入到处理设备 31 上的相关接口连接器，例如 USB 接口。包括激活输入设备上的按钮或键（例如，通过按下它）的第

二用户动作随后启动将任意媒体内容从客户机处理设备 31 传送到基节点 36 的进程。这一进程优选地包括对来自处理设备的数据进行屏幕抓取。使用屏幕抓取避免了在基节点 36 上安装特殊程序来执行从处理设备 31 发送的图形命令。在基节点 36 接收到多个任意媒体内容时，它可以允许在相连接的中央显示器上自动合成该媒体内容。

[0199] 现在将参考某些更具体实施例来进一步描述本发明。

[0200] 在一些实施例中，本发明提供了一种系统和 / 或方法，其中在一方面，在来自一个以上的源处理设备（如膝上型计算机、PDA、智能电话、计算机、平板，等等）的任意材料被呈现在显示设备上时可覆盖所有当前显示的材料。在一个方面，本发明通过与谈话类似的方法（即，全双工且具有中断或获得对显示设备的单方电子访问的选项）来控制视觉通信和信息的显示。

[0201] 本发明的一个实施例可以通过可连接外围设备（如兼容 USB 的设备）来实现，以使得在该外围设备连接到被用来提供诸如文本、视频、图片等任意信息的处理设备时，具有处理设备的每一单独用户可以获得对显示器（例如，屏幕）的访问权。通过出席会议，用户可以通过插入该外围设备来将该外围设备与处理设备配对。用户还可以将该外围设备与控制会议室中的显示器且可通过诸如有线或无线通信网络等通信网络连接到该外围设备的基节点或基单元配对。网络是共享资源通信网络，因为不同设备和参与者可通过该网络传送数据。为了实现这一点，该外围设备具有能够经由基节点将来自处理设备的任意数据传送给显示器的收发机。在一个选项中，显示在处理设备的本地显示器上的信息是经屏幕抓取的且被传送。为了允许这一点，该外围设备可包括能够在外围设备上执行且在终止时留下零足迹的便携式应用。虽然物理可连接的外围设备是方便的，但该外围设备也可经由无线连接（例如，经由蓝牙协议）耦合到处理设备。

[0202] 对于具有远程参与者的会议，不可能依赖于相同的硬件可连接的外围设备来直接提供从远程位置对会议室中的显示器的访问权。通常，在家中或在宾馆中，参与者只具有电话和膝上型计算机或某一其他种类的便携式计算设备上的因特网接入。远程参与者缺少上下文（例如，非语言交流）并且具有不及理想的音频 / 视频连接并且因此遭受权力不对称。通常，远程参与者也没有方法将他们的内容‘推送’在屏幕上，因为会议由组织演示的序列的会议组织者或主持者来控制。

[0203] 本发明的一个关键优点是提供远程协作，同时维持某种类型的‘环境意识’。这意味着所看到的与内心意识图具有直接关系。这允许跟踪多个信息流并且能够将其与任何其他信息快速相关，例如与在本地计算设备上执行的搜索进行快速相关。

[0204] 在本发明的另一方面，通过以下来避免混淆和挫折：

[0205] 1. 保留从任何位置发送到一个会议室中的一个显示器或多个会议室中的多个显示器的任何图像的高宽比（例如，长的事物还是长的事物）

[0206] 2. 在会议室中的显示设备中的任一个上不重叠图像和 / 或窗口（例如，永不必猜测或记住什么被隐藏）

[0207] 3. 在每一屏幕上示出相同的图像安排（每个人看到相同的事物并且可以引用它们），这意味着在多个屏幕中的每一屏幕上的图像拓扑安排是相同的，

[0208] 4. 最大化屏幕有效面积的使用（例如，所呈现的图像不具有包含无用信息的边界），同时优选地，不允许图像的重叠

[0209] 5. 允许缩放和平摇的局部操纵，但允许返回以上项目 3 的默认布局

[0210] 6. 将本地显示器特性纳入考虑来在每一显示器上安排各图像，这些特性诸如分辨率、像素密度、高宽比中的任一个，

[0211] 7. 可任选地，还允许所有参与者听到正在进行的音频连接，例如，语音通信将被用来更改屏幕的内容。

[0212] 在各实施例中，本发明的各组件优选地是：

[0213] 共享（例如，虚拟、数字）画布，其上存储有所有视觉信息。该画布被映射到一个或多个地理位置处的一个或多个物理显示器上并且可至少与最大显示器一样大。会议参与者可以添加或删除视觉信息，例如本地参与者可以使用根据本发明的各实施例的外围设备，他们的操作是：一个点击将用户屏幕添加到画布，另一点击移除它。可任选地，长点击只使用该用户的屏幕来替换当前画布内容。该画布被维护在所有会议参与者可电子地访问（例如，虚拟、数字）的位置，但各参与者只可在具有“令牌”的情况下才能改变该画布。通过使用单个画布，向所有参与者给予对这一画布的访问权并向其他位置广播该画布上的信息，任何参与者可以作出对该画布的可控且一致的修改。

[0214] 同时，令牌是改变画布上的信息以及作出这些改变的权限的手段。令牌是信任的符号；它们只从个人传送到其他个人。只有具有令牌的参与者可以向其他人给出附加令牌。在本地使用的硬件外围设备是令牌的示例。用户将该外围设备与处理设备以及基节点或单元配对。用户因为对该外围设备的选择以及它与处理设备的配对而与它相关联。这一过程固有地提供信任——与授予要出席会议的用户相同的信任。根据本发明的一方面，远程参与者具有与拥有令牌的任何其他人相同的权限，但物理令牌没有被远程地传递给用户。在一个方面，各会议参与者之间的第一联系是使用语音通信。语音通信是传送令牌的良好介质。它适于信任传送，因为 a. 通过知晓某人的电话号码（个人蜂窝电话号码或用户当前所处位置（如宾馆或家中）的号码），存在着个人联系的暗示以及 b. 人类语音是相当好的标识手段。

[0215] 本实施例中的令牌通过语音指令来传送并且需要传达对画布作出贡献的手段。实现令牌的一种方式是会议的 URL 加唯一会话 ID 与隐式地一个或多个会议室的组合。在一个方面，这两者的组合给出对用作两个目的的会议专用网站的访问权：1. 可任选地下载并安装屏幕捕捉软件程序以及 2. 给出对共享画布的访问权。1. 和 2. 的组合向使用诸如膝上型计算机、PDA 或智能电话等便携式处理的远程参与者提供了与本地参与者相同的功能。因为语音指令需要简洁，所以类似于 tinyURL.com（或 1ilURL 或 TightURL）的服务可被用来组合网站 + 会话 ID。为了避免错误，缩短的 URL 将使用易于发音的字符子集并且避免语言混淆（如 G&J 或 I&E 之间）。一个示例是仅限十六进制字符。

[0216] 一种用于传送令牌的另选方法是使用消息收发服务，诸如如通过短信息服务 (SMS)。这不是语音联系，但它包括与已知个人使用的移动电话号码相同的信任水平。如果有必要提高安全性，则可首先通过电话来联系该人并且只在这之后才发送 SMS 消息。如果需要，可以使用口令，由此可以使用第二口令来指示该人是被迫的，以使得 SMS 消息不应被发送。

[0217] 会议会话 ID 指示画布、令牌与屏幕之间的临时连接。在一个方面，会话 ID 是在第一物理外围设备被插入会议室中的处理设备并作出与基节点或单元的连接时自动生成的。

随后可使得这一会话 ID 对拥有外围设备的每一个人可见。这可以通过以下来实现 :a. 改变由该外围设备实现的大容量存储设备的名称,或 b. 改变该外围设备上大容量存储设备卷上的文本文件的名称或内容或 c. 外围设备上的显示(如果提供了这样的显示器),或 d. 会议室中的中央显示设备上的显示。会议 ID 或媒体会议代码使得可处于不同位置处的多个参与者易于参与媒体会议。

[0218] 例如,在会议室的显示器上,显示数字或字母数字媒体会议代码。为了共享内容,各参与者可以通过在他们的处理设备上输入媒体会议代码,例如在网页中或专用软件客户端中,将他们的诸如膝上型计算机等处理设备经由网络与会议室连接。

[0219] 会话 ID 执行以下功能 :

[0220] • 访问控制 :只有亲临会议室的人才能够看到该代码。这确保只有会议室中的人或从会议室中的某人(例如,通过电子邮件或电话)接收到该代码的人才能与该会议室连接。这提供了信任。

[0221] • 会议室位置 :输入该代码的远程人员自动与正确的会议室连接并且不必劳烦在可能会议室的列表中搜索会议室或者输入会议室的地址(IP、电话号码、……)。参与者甚至不必知晓他们在哪一会议室中。

[0222] 媒体会议可以在一个人连接到中央显示器时就开始。可任选地,只要没有人连接到中央显示器,ID 或媒体会议代码就以特定频率(例如,每分钟一次)变化。在新代码出现时,先前代码不再可使用。这确保在实际会议开始之前可能的侵入者不能偷窥媒体会议代码。ID 或代码在媒体会议的整个持续时间期间保持不变。在最后参与者断开连接时,媒体会议结束。此后,该 ID 或代码将再次改变。

[0223] ID 在单个易于使用的代码中提供多个目的(访问控制和会议室位置)的组合。当前市售产品需要分开的会议室位置代码(例如,电话号码、电子邮件地址、IP 地址、……)以及分开的控制对媒体会议的访问的手段(例如,口令、由会议主持人手动接受传入呼叫、……)。例如,为了加入 WebEx 会议,参与者需要知道会议号(=位置)以及会议口令(=访问控制)两者。视频会议设备需要远程参与者知道电话号码 /IP 地址(=位置)以及需要本地参与者接受传入呼叫(=访问控制)。

[0224] 在一实施例中,会议会话的开始优选地是不对称的,因为远程参与者不能发起会话。会议必须由拥有物理外围设备的人来开始。

[0225] 在所有令牌(本地和远程)已切断它们与画布的连接时,即所有物理外围设备被拔出并且所有远程会话与会议网站断开连接,会话结束。因为远程用户可能偶然地或秘密地保持连接,所以另选的结束会话的方式是 :在所有外围设备被拔出且预设时间已过去或者会议基站或基单元上的复位按钮已被按下时,会话结束。

[0226] 画布是存储被或可以被显示在一个或多个显示器或投影仪上的视觉位图的共享存储器。画布是可容易且便宜地实现的简单二维结构。一个另选实现是将画布存储为可由浏览器渲染的 HTML5 页面。

[0227] 画布的大小(其宽度、高度或色彩深度)优选地至少是最大显示器的大小。这确保最大显示器以其最大能力来被使用。画布映射功能优化较小显示器上的易读性。

[0228] 画布通过优化其在每一特定显示器上的视觉外观的变换函数(例如,内插、(解)交织、大小重新采样、缩放,等等)被映射到显示器上。画布映射功能首先确定它映射到的

显示器的类型，并随后选择用于典型会议室环境中的最优易读性的分辨率、帧率、色彩深度、以及色彩映射功能（伽马、亮度、对比度），并且还在显示多个图像时维持图像的拓扑安排——这意味着远程参与者可以一致地引用图像，例如“左上”。

[0229] 画布映射跨各显示器保留边界和高宽比（即，它没有拉伸也没有裁剪）。在大型固定格式显示器（如 LCD 显示器）或投影仪屏幕上的映射的典型实现中，画布优选地被调整大小以适合屏幕的完整高度或宽度。在用于智能电话的实现中，这一相同方法被使用，但最终用户可以例如通过捏合 / 拉伸来缩放各细节。

[0230] 多个贡献者可以修改画布的矩形、非重叠部分。通过将布局限于简单的矩形部分，通过语音来引用特定内容在屏幕上的位置（“请看左上图片”）以将注意力吸引到该特定内容是可能的。各画布部分可由它们的贡献者的标识来标记（如用户名或计算机名）。

[0231] 对画布的贡献的大小和位置在自动算法的控制之下。该算法是一种简单的规则，如 :1. 第一贡献填充整个画布，2. 第二贡献将屏幕水平地分成两个相等部分，其中第一贡献显示在左侧，3. 第三贡献垂直地划分画布，其中前两个贡献在顶部，以此类推。这一规则的简单性以及直接贡献者对算法定位的影响的缺失允许会议参与者预测内容将显示在何处，从而最小化（远程）参与者之间的混淆。

[0232] 画布的一个实现是具有用于更新且映射其内容的（远程）访问功能的存储在一个物理位置上的存储器。本地高速缓存结合脏分块 (dirty-tiling) 或感兴趣区域编码技术可被用来最小化通信有效载荷。或者，如在 www.shared-canvas.org 中，基于 web 的技术可被使用。

[0233] 画布的一个实现是按 XML、HTML 或类似格式的画布布局及其所有组件的逻辑描述，其中画布的物理实例化只在会话中的参与端点处发生。对画布内容和 / 或画布分辨率、会话 id、令牌、令牌与会话之间的关系的维护可作为外部服务提供给该解决方案的用户。

[0234] 一种用于传送令牌的另选方法是可由相机（如 web 相机或者智能电话或平板中的相机）拾取的视觉代码。令牌可以是代码的形式，如 2D 条形码。这样的代码是“QR”码——参见图 13 到 15。该代码可以显示在处理设备的显示器上，如计算机、膝上型计算机等。

[0235] QR(图 13) 用作方便用于电子屏幕与智能电话的组合的秘密代码。该代码中的秘密（即，QR 代码的内容）信息是哪一屏幕属于哪一会议。

[0236] 所以，本地会议室基站知道它连接到哪一屏幕。它不知道它属于哪一会议。可以提供一种机制，像在物理外围设备首次被插入本地处理设备时，可任选地在发起会议并由此作出中央显示器与会议之间的关联的合适的超时时段（见上）之后。随后可生成 QR 码。QR 码包含会议 ID 和 URL 以（在优选实施例中，间接经由共享画布）访问中央显示器。

[0237] 这一 QR 码被显示并且可由任何会议参与者拾取。这些参与者随后不需要外围设备，而是可以使用 QR 码中列出的资源来连接到他们可在其上显示其数据的在线画布。

[0238] 图 14 示出来自两个参与者的处理设备的图像，如在本地显示器或中央显示器上看到的。

[0239] 在图像中央的用户标记可在每一改变之后的几秒内可见（例如，在新处理设备被添加会议或从会议移除时）。

[0240] 用户的令牌是画布服务所知的事物，在连接到源时，它向用户 / 资源服务询问与关联于从中知晓用户标记的令牌的源相关联的用户的公共用户名。

[0241] 这在远程会话中尤其重要，因为它允许所有用户与源相关联并且因此将屏幕上的各区域与用户相关联，现在他们可以说‘我不同意 Piet 给出的数字，即使 Piet 是远程的且不在会议室中……’。

[0242] 在图 15 中示出的图像可以在任何时刻示出，以允许其他参与者获得对会话 QR 码的访问权，从而开始共享内容（如果他们在会议开始时错过机会的话）。

[0243] 对于远程参与者，提供了一种用以传递秘密（会议 ID 和 URL）的方法。如上所述，这可以是语音指令，或 SMS 消息。

[0244] 本发明的一方面是以下实现：语音通信可以是总体系统的集成组件。语音含义与视觉含义交织，并非只在演示是多媒体事件（幻灯片和讲话）的意义上，而是会议的管理可以说语音和（电子）视觉协作。例如：

[0245] • 传送令牌的一种方式是将它们口头传递给远程参与者。这假定在任何事物之前存在音频链路，并且需要短且简单的令牌串来将通信误差保持为最小。

[0246] •通过为所有会议参与者维护单个布局（拓扑结构），易于通过语音指令来引用屏幕上的元素。相反，不能以简单语言描述的所有屏幕管理被禁止。

[0247] • 在这一场景中，因为总是可以依赖音频信道的存在，所以也可以使用这一基础结构来消除或减少硬件物理外围设备和 / 或虚拟屏上按钮的数量。可以使用语音命令，结合语音识别，来更改屏幕布局。‘虚拟按钮’可以是类似 Siri 的界面：

[0248] •“显示我的屏幕”

[0249] •“放大我的屏幕”

[0250] •“隐藏我的屏幕”

[0251] •“移除右上屏幕”

[0252] •“移除所有屏幕”

[0253] 如上所述，用户可以用各种方式获得对令牌的访问权，通过语音通信、通过消息收发（如 SMS）、或通过使用相机（例如，在他们的智能电话或平板中）扫描 QR 码。根据本发明的又一方面，最后缺失的一环是将用户内容与令牌连接。

[0254] 例如，用户可具有该用户想要用作会议会话中的内容源的处理设备，诸如膝上型计算机、PC、智能电话、或平板，但该用户正在使用移动电话来检索他的令牌。用户可能尝试将令牌从电话移至便携式处理设备 PC，例如通过简单地复制它并将它输入在便携式处理设备 PC 上的网页上，但因为这是重复动作，即用户在每次他 / 她参与会议时都必须这样做。

[0255] 本发明的另一方面还提供一种用于这一问题的解决方案，如图 11 所示。在一个实施例中，本发明的系统或方法允许在用户选择的情况下在一个或多个移动设备上下载并安装应用的可能性。用户随后在中央服务处注册他 / 她自己，其中用户被分配 ID。用户可以从该应用将计算机源（用户处理设备、他的 PC 或可能多个处理设备，如 PC 或平板计算机）与用户 ID 配对。

[0256] 将处理设备计算机源配对的过程可以像从该处理设备在网页上冲浪一样简单，这将示出唯一的源 ID（例如，通过再次示出 QR 码）。参考图 16，通过用移动设备从处理设备的 PC 本地屏幕读取 QR 码，PC 本地处理设备被链接到用户 ID。该信息以 cookie 的形式或类似方法被存储在处理设备 PC 上。如果用户源处理设备 PC 不能存储永久数据，则一种另选方式是用户将他的处理设备 PC 指向 web 位置，其中用户登录到中央服务，此时源处理设

备 PC 再次与用户 ID 自动关联。

[0257] 另一实现可以是扮演与处理设备 PC 上的移动电话应用相同角色且会在用户激活时连接到中央服务的浏览器应用（示例实现可以是 Chrome 浏览器应用）。

[0258] 在用户随后使用用户移动电话应用检索令牌以参与会话时，该应用将允许用户共享计算源或选择他的本地计算源之一来添加到画布或从画布移除，该画布是用令牌所连接到的会话来引用的。

[0259] 图 11 示出平板如何连接，留下到企业网络或因特网的连接，并且没有集成无线网络来用于企业 IT 中的显示。它只需要基站的外出连接，例如可以直接引导到公司 DMZ 中的路由器。

[0260] 在此，存在从平板到会话的配对。该应用可以用于最强、非连接的无线网络。‘会话’可以是静态且命名的，例如显示的会话 ID，或通过分析屏幕上的内容，例如基站可以向服务器发送内容的指纹，该指纹可由该应用或云服务通过发送当前屏幕的图像来计算。因为存在应用，所以可以伴有与如何实现配对有关的指令。如果基站具有音频输入，则可以通过云服务所请求的合适的音频消息来完成。

[0261] 参考图 12，即插即用外围设备 1 中的存储储存在该即插即用设备经由第一即插即用接口 1a 连接到第一处理设备时由第一处理设备自动执行的代码。在即插即用设备上的按钮 2 被首次按下（第一用户动作）时，代码由第一处理设备 L11 执行以发起第一处理设备与第二计算设备（即，基单元或节点）之间的显示数据交换。该数据交换优选地无线地（例如，蓝牙、IEEE 802.11/ Wi-Fi® WiFi、IEEE 802.15.4 以及 ZigBee、……）来完成，但可以经由有线连接来完成。处理设备 L11 与接收设备 B1 之间的数据交换可以独立于因特网（例如，这两个计算设备之间的直接无线通信）或通过因特网以及中间存储设备 C 来完成。存储设备 C 通常具有从例如数据分组提取信息、对它进行排序、重新安排它、创建数据文件、写入文件、擦除文件中的特定元素、……的计算能力。除非另外指明或通过上下文显而易见的，将讨论其中现实世界在如 L11 等计算处理设备、如 B1 等基节点以及存储设备 C 之间交换的情况。在这种情况下，显示数据通过处理设备 L11 的通常可用的通信接口（Wifi、以太网……）被发送给存储设备 C。诸如路由器、LAN 硬件、因特网提供者硬件、陆线、对 GPRS 和 / 或移动电话网络的接入等支持设备被假定是可用的，且不是对本发明的限制，并且将不进一步讨论。基单元 B1 例如是配备有如下以及其他事物的计算机：图形卡，硬盘存储器，以及例如 AMD® Sempron™150（2.9GHz，1MB 高速缓存）、AMD Athlon™ II X2250（3.0GHz，1MB 高速缓存）、AMD® Athlon™ II X4645（3.1GHz，2MB 高速缓存）等处理器，例如 Windows® 7Professional，64 位等处理系统，例如 1333Mhz 的 6GB 双通道 DDR3SDRAM-3DIMM 硬盘 1000GB SATA 等存储器，用于读取 CD ROM 的光学站，例如 ATI Radeon™ HD4200 集成图形卡、512MB NVIDIA® GeForce G405 图形卡、1GB DDR3 AMD® Radeon™ HD 6450 图形卡或可现货购得的类似图形卡等等视频卡，系统卡上的 10/100/1000 以太网 -LAN；例如 Dell Wireless 1525802.11n PCIe- 网卡、VGA- 连接和 / 或 HDMI™ 连接等用于连接到显示器 D1 的无线通信接口。中央存储设备 C 也可以是与已被配置成服务器的 B1 相同或相似的计算机。

[0262] 来自第一处理设备 L11 的“经屏幕抓取”的显示数据 3 被发送给中央存储设备

C(直接由 L11 发送,或在另一实施例中,通过基单元 B1 发送)。该信息按例如 HTML5 来编码,包括标识经屏幕抓取的信息的来源(在该示例中是 L11)的标识符 id。存储设备 C 随后被基单元 B1 咨询以在显示器 D1 上显示该显示数据。

[0263] 在按钮 2 被第二次按下时,处理设备 L11 通知中央存储 C 经屏幕抓取的显示数据 3 必须被擦除。在第一实施例中,中央存储 C 通知基单元 B1 显示数据已经被更改。B1 随后咨询中央存储 C 并上传显示数据,直至在 C 上可用并在 D1 上显示它。在以上给出的简单示例中,假定在首次按下按钮 2 之前没有显示数据在 C 上可用,没有显示数据将保留在 C 上且没有数据将显示在 D1 上(例如空白屏幕,如果 D1 是液晶显示器的话)。标识符可以是可被编码在由作为 L11 的处理设备发送的数据分组中的任何实际标记。这可以是 IP 地址、MAC 地址、即插即用设备中记录的唯一标识符(例如,在通过对闪存编程、设置变光开关……来装配时分配给该即插即用设备的号码)。在本说明书中进一步描述的智能电话 P31 的情况下,唯一标识符可以是电话号码本身。生物测定也可被用来标识用户并向用户分配标识符 id。

[0264] 在第二实施例中,L11 与基单元 B1 通信,基单元 B1 进而通知 C 它必须从其存储器擦除显示数据 3。在一特定情况下,与基单元 B1 的通信是通过配备有 RF 接口的即插即用设备 1 完成的。

[0265] 在本说明书的其余部分,除非另外指明,按下按钮(或进一步描述的等效动作)以及对显示在 D1 上 / 在存储器设备 C 上可用的数据的最终影响将被称为“事件”。

[0266] 即插即用设备可被例如在处理设备 L11 上运行的代码替换。在这种情况下,按钮 2 被(良好定义的)触摸屏区域(智能电话的情况)或膝上型计算机的键盘上的键替换。将触发事件的触摸屏区域可以由所显示的图标来指示。或者,将不显示图标,并且事件将通过“刷扫”触摸屏来触发。其他另选方法包括连接到计算设备的相机作出的姿势识别、语音识别及激活、指纹感测、……。

[0267] 分别配备有计算设备(例如,“膝上型计算机”)L11、L12 或像 P13 等智能电话的若干用户(例如,U11、U12、U13)聚集在配备有基单元 B1 和显示器 D1 的第一会议室 R1 中。第一处理设备 L11 配备有外围设备 d11,而另一处理设备 L12 将依赖其键盘(或另选的传感器)上的键来触发事件,而智能电话 P13 将依赖其触摸屏。

[0268] 在地理上远离 R1 的另一会议室 R2 中,用户 U21、U22、U23……配备有计算设备 L21、L22、L23……,这些计算设备配备有即插即用设备 d21、d22、d23……或触发事件的另选方案之一。

[0269] 在又一位置,例如,宾馆房间、车……,“商旅达人”U31 使用智能电话 P13 与用户 U11、U12、……U23……通信。

[0270] 事件将由一组索引 i、j 以及 k 来标识。索引 i 和 j 表示事件的起源处的用户(示例 :i = 2 且 j = 1 表示由用户 U21 触发的事件)。索引 k 是 1(即插即用设备 d21 的按钮 2 被首次按下且在例如处理设备 L21 上经屏幕抓取的显示数据被发送 C 给并存储在 C 上、且显示在 D1、D2 以及 P31 上)或 2(按钮 2 被第二次按下并且显示数据 d21 从 C 擦除且从显示器 D1、D2、P31 消失)。

[0271] 所提出的设置允许用户中的任一个通过触发第一事件来在显示器 D1 和 D2 上以及在例如 P31 等智能电话的显示器上与所有其他用户同时共享显示数据。该设置允许任何用

户通过触发第二事件来撤消他 / 她对显示在 D1、D2 以及 P31 上的数据的贡献。

[0272] 显示在 D1、D2 以及 P31 上的数据依赖于 (a) 计算设备中的任一个发送给存储设备 C 并存储在 C 中的显示数据以及 (b) 在每一事件时更新并存储在 C 上的配置文档 CD。

[0273] 在本说明书中，存储在 C 中且由配置文档结构化的显示数据可被称为画布。

[0274] 对于事件 Eij1，来自处理设备 Lij（或 Pij）的显示器的经屏幕抓取的显示数据与标识符 idij 一起被发送给存储设备 C。

[0275] 存储设备 C 接收到显示数据的时间顺序在时间索引 m 的形式下记录。时间顺序通过例如在接收到显示数据 ddij 之际 C 处的本地时钟的时间来确定。或者，事件 Eij 的时间索引通过用 GMT 或世界时间表达的 Lij 的本地时钟的时间来确定。

[0276] 如果存储设备 C 接收到来自一个以上处理设备 Lij（或 Pij）的贡献，则配置文档被更新以反映这一点。

[0277] 在第一示例中（对于配置文档而言），配置文档将向来自处理设备 Lij/Pij 的接收到的显示数据 DDij 分配 (a) 标识符 idij(b) 时间索引 mij 以及 (c) 与源有关的元数据（例如，用户 Uij 的名称或标识符）。该元数据可叠加到显示器 D1、D2……上的对应显示数据。

[0278] 基于贡献的数量，配置文档将确定经组合的显示数据的布局。示例：如果接收到来自 2 个计算设备 Lij/Pij 的贡献，则配置文档将 D1 和 D2 上的显示空间的一半分配给每一显示数据 ddij。

[0279] 如果接收到来自 3 或 4 个计算设备 Lij/Pij 的贡献，则配置文档将 D1 和 D2 上的显示空间的四分之一分配给每一显示数据 ddij。

[0280] 如果接收到来自 4 个以上计算设备的贡献，则配置文档将 D1 和 D2 上的显示空间的四分之一分配给具有最新近时间索引 mij 的四个显示数据 ddij。

[0281] 对于事件 Eij2，来自处理设备 Lij/Pij 的显示数据从存储设备 C 擦除，对应的标识符 idij 和时间索引 mij 从配置文档 CD 消失且显示在 D1 和 D2 上的数据将例如根据以上给出的示例相应地修改。

[0282] 显示器 D1 和 D2 可具有不同的特性（分辨率、有效显示面积的尺寸……）。为了使所有用户能访问（尽可能接近）相同的视觉数据，显示器 D1 和 D2（具有或不具有来自它们的基单元的支持）使用配置文档来确定显示数据 ddij 是否必须被调整大小以填充屏幕的全高或全宽。

[0283] 更一般而言，要显示的显示数据 ddij 通过变换函数 TFi 来被映射，该变换函数根据用户 Uij 在他们的会议室 Ri 中的需求通过例如内插、解交织、大小重新采样；分辨率、帧率、色彩深度、伽马、亮度、对比度……等的选择来优化每一特定显示器上的视觉外观。高宽比和各贡献 ddij 之间的边界被保留。

[0284] 配置文档包含要显示的图像的带标签的标记语言描述。

[0285] 如果显示数据 DDij 是可变的，则对应的时间索引 mij 保持不变且等于其最早值（例如，在接收到第一数据分组之际）。

[0286] 配置文档可以是或可包含要显示的图像的带标签的标记语言描述。例如，诸如 SGML、XML、SVG 等语言 / 格式 / 样式可被使用。

[0287] 配置文档可包括要显示的图像内容的完整描述。该完整描述可通过显示数据 ddij

的网络地址被定义在文档中。

[0288] SVG 绘图的相关属性是它们可以是动态的且可交互的。对各元素的基于时间的修改可以用 SMIL(同步多媒体集成语言)来描述,或可以用脚本语言(例如,ECMAScript 或 JavaScript)来编程。W3C 明确地推荐 SMIL 作为 SVG 中动画的标准。每当事件 Eij 要求时,SVG 绘图可例如根据早先开发的示例来被编辑或变换。本说明书中所指的画布的相关示例是在被发送给“客户机”(例如,基单元)以供显示 / 渲染在客户机侧上运行的浏览器上之前由服务器侧脚本(如 PHP、Perl、JSP、或 ASP.NET)创建的动态网页。

[0289] 存储在存储设备 C 上的显示数据可被如何分发给远程显示器 D1 和 D2 的更详细示例在 Geert Nuyttens 和 Ronny Dewaele 的公开号为 US20070033289“Network displays and method of their operation(网络显示器和它们的操作方法)”的美国专利申请 11/487,357 中给出。显示 C 所发送的图形信息所需的硬件的示例也在美国专利申请 S/N.11/487,357 中给出。

[0290] 在例如会议室 1 中的显示器 D1 包括两个(或更多个)分开的显示屏(例如,并排安装的两个 82”LCD 屏幕)时,美国专利申请 S/N.11/487,357 中描述的技术尤其相关。在 C 处生成的配置文档将确定画布会如何在两个显示器上分布。在早先示例上继续,其中最大 4 个贡献被显示在(并随后单个屏幕抓取的)D1 上,具有最近时间索引 mij 的显示数据 ddij 可被显示在会议室 1 中的第一个独立显示器上,并且这样做使得最近贡献对各参与者而言更加可见,同时其他贡献 ddij 将被显示在会议室 1 中的第二独立显示器上。在会议室 2 中也这样做,假定第二屏幕也在会议室 2 中可用。US 11/487,357 中描述的技术被用来将以下因素纳入考虑:例如同一会议室中的两个或更多个显示器中的一个出现故障,并且允许在尽可能少的中断的情况下继续会议。

[0291] 在处理设备 Lij 在即插即用接口 1 的支持下通过基单元 Bi 与其他处理设备共享数据时,需要一些调适来设置 / 起草配置文档。

[0292] (1) 显示数据 ddij 被发送给基站 Bi。数据显示 dij 按 Lij 的本地时钟或 Bi 的本地时钟加时间戳。时间戳 tij 被表达为 GMT 或世界时间。

[0293] (2) 显示数据 ddij 被基站 Bi 发送给存储设备 C,其中时间索引 mij 是基于时间戳 tij 来确定的。这保证用户和他们在不同会议室中触发的事件将得到相同的优先级,而不管各会议室与存储设备 C 之间的传输时间的差异。

[0294] (3) 画布是基于显示数据 ddij 和时间索引 mij 来组装的,如在计算设备 Lij 与存储设备 C 直接通信(即,不使用 Bi 作为中介)时所完成的。

[0295] 在需要基站来访问存储设备 C 时,需要特定过程来允许“商旅达人”U31 与用户 U11、U12……、U21……共享显示数据。

[0296] 令牌(即,更改存储在 C 上的显示数据 ddij 的授权和手段)需要通过语音指令来传送并且需要传达对画布作出贡献的手段。实现令牌的一种方式是 URL 加唯一会话 ID 的组合。这两者的组合给出对用作两个目的的会议专用网站的访问权:(1) 下载并安装屏幕捕捉软件程序以及 (2) 给出对共享画布的访问权。(1) 和 (2) 的组合向使用膝上型计算机或智能电话的商旅达人 U31 等远程参与者提供与具有对基单元 B1 或 B2 的访问权的参与者相同的功能。因为语音指令需要简洁,所以类似于 tinyURL.com(或 lilURL 或 TightURL)的服务将被用来组合网站 + 会话 ID。为了避免错误,缩短的 URL 将使用易于发音的字符子

集并且避免语言混淆（如 G&J 或 I&E 之间）。一个示例是仅限十六进制字符。在 P31 的电话号码被用作 U31 的标识符时，它可以通过下载的屏幕捕捉软件程序来验证或由网站本身来访问。在后一种情况下，电话号码可被用来授权通过网站对画布 C 的访问。

[0297] 不能访问显示器 D1 或 D2 的商旅达人 U31 将必须依赖本地显示装置来查看对用户 U1j 和 U2j 可见的显示数据 dij。智能电话的屏幕远小于会议室中使用的像 D1 和 D2 的显示器的屏幕，配置文档被有利地与变换函数一起使用。例如，认识到智能电话 P31 的屏幕（地理上远离显示器 D1 和 D2）具有较小尺寸和分辨率，像时间索引等信息可被用来在智能电话 P31 的屏幕上一次只显示一个贡献 ddij。从最大 4（在以上示例中）个数据显示 ddij 之一切换到另一个可以由商旅达人 U31 通过滚动、点击他 / 她的智能电话上的特定键、或在 P31 的触摸屏上“刷扫”来完成。

[0298] 代替通过电话由语音来完成，加入参与者 U11、U12……、U21……、U31 之间的虚拟会议的邀请可通过电子邮件通过社交媒体发送。用户 U31 仅必须点击邀请中指示的 url，网站将验证 P31 的电话号码且 U31 将能够看到且与其他参与者共享显示数据。

[0299] 用户 Uij 发出的语音命令与显示数据的集成改进了参与者 Uij 的焦点，且尤其是像只能访问他 / 她的智能电话 P31 上的小显示屏的“商旅达人”U31 等特定参与者。

[0300] 为此，计算设备 Lij 配备有现货语音识别软件。在用户（例如，U12）发出语音命令时，数字信息 VC 作为语音识别软件的结果被生成。该数字信息可通过例如查找表链接到可由服务器侧脚本来解释并触发对画布（例如，上述动态网页）的实时修改的指令。示例 1 :像“放大左上角”等语音命令将造成画布的左上角（在发出语音命令之前是可见的）被放大并占据显示器 D1、D2 的全屏，且更重要地，占据智能电话 P31 的屏幕。示例 2 :如果数据显示的布局被限于最大 4 个贡献（如上所述），语音命令可以是“左上”、“右上”、“左下”、以及“右下”。基于这些信息，服务器侧脚本将裁减智能电话 P31 上所显示的数据，并且只有左上或……或右下贡献将填充在智能电话 P31 的屏幕中。

[0301] 返回图 2，在基节点 36 上运行的基节点软件 (6) 可被适配成在中央显示器上显示启动画面 (21)，示出其准备就绪来通过其接收机接收任意媒体内容。这一启动画面 (21) 还可示出与如何使用该系统有关的指令以及到达基节点 36 的配置参数（见下）。这些配置参数也在中央显示器 (22) 的底部处的透明画布中示出。

[0302] 想要使其任意媒体内容显示在连接到基节点 36 的中央显示器上的客户机处理设备 31 连接到连接单元 47。便携式应用 60 将在作为主机设备的客户机处理设备 31 上执行。第一用户交互使用连接单元 47 中的发射机和基节点 36 中的接收机创建便携式应用 60 与基节点 36 之间的连接。第二用户交互（这一次在输入设备 48 上）激活便携式应用对来自客户机处理设备显示器的任意媒体内容的屏幕抓取，这随后通过连接器单元 47 发送给基节点。

[0303] 基节点 36 接收来自一个或多个连接单元 47 的多个任意媒体内容，并将该媒体内容自动合成以渲染在中央显示器上。

[0304] 连接单元 47 上的视觉指示器 61 向用户以及会议中的其他参与者指示媒体内容正被该连接单元 47 发送给基节点 36 以供显示。

[0305] 在连接单元 47 的输入设备 48 上重复第二用户交互解除来自该连接单元 47 的媒体内容与基节点 36 的耦合。基节点 36 从中央显示器上的合成图像移除该媒体内容并在中

央显示器上重新合成其余内容。

[0306] 中央显示器 / 投影仪上的内容被自动安排，如图 2 所示。在用户 1 添加内容时，他 / 她的显示器将被缩放以尽可能多地填充可用中央显示器画布，但不影响高宽比。在用户 2 加入时，他的内容被添加到第一图像的旁边。在用户 3 添加他的内容时，排列是三角形。添加用户 4，图像变成 2 乘 2 分块，这是可用的最大值。在附加用户尝试添加内容时，他将被阻塞。在用户发起移除他 / 她的内容的动作时，他 / 她的媒体内容从中央显示器移除且在合成序列中向后移动，如图 2 所示。

[0307] 基节点软件

[0308] 基节点软件具有以下特征中的一个或多个 ：

[0309] - 用于提供用于正确地配置基节点的接收机的手段或方法步骤的第一代码。

[0310] - 用于提供用于监听尝试连接在特定端口上的连接单元的输出的手段或方法步骤的第二代码。

[0311] - 可任选地，用于提供用于管理目的的 GUI（例如，通过 web 接口提供）的手段或方法步骤的第三代码。

[0312] - 可任选地，用于提供用于使用 zeroconf 协议通过网络发布其存在的手段或方法步骤的第四代码。

[0313] - 可任选地，用于提供用于接受并安装基节点的软件更新以及连接单元的便携式应用软件的软件更新的手段或方法步骤的第五代码。

[0314] - 用于提供用于提供将连接单元配对到基节点的设施的手段或方法步骤的第六代码。

[0315] - 用于提供用于在显示器或投影仪屏幕上自动合成不同传入任意媒体流并渲染经合成的图像的手段或方法步骤的第七代码。

[0316] - 用于提供用于接收、解密、并解码传入的任意媒体内容的手段或方法步骤的第八代码。

[0317] - 可任选地，用于提供用于缩放传入的任意媒体流的手段或方法步骤的第九代码。

[0318] - 可任选地，用于提供用于根据一组一个或多个规则来显示传入的任意媒体内容的手段或方法步骤的第十代码。

[0319] 以上代码中的任一个可被存储在非瞬态机器可读存储介质上，如光盘、磁盘、磁带、固态存储器，等等。

[0320] 用于客户机处理设备的便携式应用

[0321] 便携式应用包括用于屏幕抓取的算法。屏幕抓取算法包括 VNC 和 RDP，诸如此类。该算法可包括诸如针对不同内容（例如，静态文本或视频）来优化的 VNC 和 RDP 等算法的组合。便携式应用具有以下特征中的一个或多个 ：

[0322] - 用于提供用于连接到包括基节点的网络的手段或方法步骤的第十一代码。

[0323] - 用于提供用于捕捉客户机处理设备（即，计算机 (C)）的视频帧缓冲区（也称为屏幕抓取）的手段或方法步骤的第十二代码。

[0324] - 用于提供用于编码、压缩以及可任选地加密这些视频帧并通过安全链路将它们发送到基节点的手段或方法步骤的第十三代码。只有屏幕的矩形或三角形等改变的区域需要被传送，并且不同类型的矩形或三角形可以用不同的方式（例如，RLE、JPEG……）来编码

以优化性能。

[0325] - 用于提供用于处理连接单元的手段或方法步骤的第十四代码。

[0326] - 用于提供用于发起到基节点的连接的手段或方法步骤的第十五代码。

[0327] - 用于接收来自连接单元上的输入设备的输入的第十六代码。

[0328] - 用于提供用于向连接单元上的视觉指示器发送状态改变的手段或方法步骤的第十七代码。

[0329] - 可任选地，用于提供用于向用户呈现 GUI(18) 的手段或方法步骤的第十八代码。

[0330] - 可任选地，用于呈现用于管理便携式应用的 GUI 的第十九代码。

[0331] - 可任选地，用于提供用于在客户机处理设备的显示器上显示并激活键以允许用户输入将来自客户机设备的数据开始传送到基节点的手段或方法步骤的第二十代码。

[0332] 以上代码中的任一个可被存储在非瞬态机器可读存储介质上，如光盘、磁盘、磁带、固态存储器，等等。

[0333] 在这一实施例中，便携式应用被存储在连接单元上，且在客户机处理设备上的执行上下文中执行。便携式应用不需要被复制到或安装在计算机上。它可以直接从连接单元执行。它将只被临时复制到客户机处理设备上的执行上下文中。也没有对客户机处理设备中的配置或设置的改变。这意味着在连接单元被移除时，没有什么将留在客户机处理设备上。它还暗示便携式应用将在客户机处理设备上运行，其中用户不必具有安装软件的访问权。

[0334] 便携式应用按如下方式设计：

[0335] - 不需要在客户机处理设备上安装特定驱动程序。

[0336] - 预安装驱动程序被用于例如多类外围设备。

[0337] - 它与供应商专用图形硬件无关。

[0338] - 它在至少一个且优选地在各种不同的客户机处理设备上运行，包括 Windows、Mac OS/X、Linux、Android、iOS 以及许多其他。

[0339] 优点

[0340] 本申请具有以下优点中的一个或多个：

[0341] - 会议中不需要主持人角色

[0342] - 连接单元到基节点的标准即插即用连接性

[0343] - 采用简单且公知的用户动作

[0344] - 客户机处理设备的自有联网设施不被阻塞

[0345] - 客户机处理设备上没有配置改变

[0346] - 输入设备易于访问；例如，很大的大小

[0347] - 便携式应用和服务器程序的程序更新可在本地执行

[0348] - 便携式应用被使用，无需安装、多平台、无供应商专用

[0349] - 由便携式应用完成的屏幕抓取的特定实现避免供应商专用图形设备

[0350] - 标准驱动程序被使用，因此没有必须安装的驱动程序

[0351] - 客户机处理设备上没有配置改变

[0352] - 客户机处理设备上的零足迹应用——没什么要清除或调整或复位

[0353] - 客户机处理设备的自有联网设施不被阻塞

[0354] - 用户计算机上没有配置改变

[0355] - 低病毒、恶意软件和间谍软件风险

[0356] 便携式应用可被存储在非瞬态机器可读存储介质上，如光盘、磁盘、磁带、固态存储器、USB 大容量存储，等等。

[0357] 第二实施例

[0358] 在第二实施例中，参考图 2 到 5，基节点是称为基单元 (B) 的单独的物理处理设备，包括永久存储、存储器、处理引擎、无线接入点 (4)、即插即用接口 (如 USB 端口 (11))、图形显示输出适配器 (5)(如 VGA/DP/DVI/HDMI)、以及可任选的视频输出适配器 (27)。具有诸如按钮 13 等致动器和视觉指示器 14 的输入设备是可任选的。

[0359] 连接单元是外部外围设备 (在附图中被示为“软件狗 (dongle)”D) 形式的物理设备，包括存储便携式应用 (7) 和配置参数 (12) 的持久存储、存储器、处理引擎 (例如，CPU、FPGA)、无线发射机 (如 WiFI(3))、即插即用接口 (如 USB 接口 (2))、按钮 (作为输入设备 (9))、LED 环 (作为视觉指示器 (10))。便携式应用存储在外围设备 (7) 上。

[0360] 客户机处理设备是主机设备，例如计算机或膝上型计算机，包括显示器、即插即用接口 (如 USB 端口 (2))、存储器、以及处理引擎 (如微处理器)。

[0361] 该系统因而包括 :

[0362] - 在一端上具有即插即用接口 (如 USB 接口 (2)) 且在另一端上具有通信接口 (如配置成客户端 (3) 的无线接口) 的外部外围设备 (D)。

[0363] - 在一端 (4) 具有通信接口 (如配置成接入点的无线接口) 且在另一端具有视频卡适配器 (5)(如 VGA、DVI、DP 或 HDMI) 的基单元 (B)。

[0364] - 存储在外围设备 (D) 上但在客户机处理设备 (C) 上执行的便携式应用 (7)

[0365] - 在基单元 (B) 上存储并执行的基节点软件 (6)

[0366] 外部外围设备 (D) 还优选地具有以下中的任何一个或任何组合 :

[0367] - 作为用于输入设备 (9) 的致动器的大型按钮，从而允许用户与该外围设备交互。该按钮优选地具有 100 和 14400 平方毫米之间的致动表面积。

[0368] - 视觉指示，如 LED(10)，从而允许来自外围设备的用户反馈

[0369] 本发明的各实施例的优点是以在很大程度上与操作系统无关且不留下足迹 (零足迹) 的方式经由诸如任何处理设备 (如计算机) 上的 USB 接口等外围接口提供到外围设备的数据传输。驱动程序和 / 或应用在诸如计算机等的处理设备上的安装在存在预安装通用驱动程序的情况下不是必须的。诸如计算机等处理设备上的管理员权限优选地不是必须的。为了避免对管理员权限的需要，本发明的各实施例使用其他外围设备预安装驱动程序，如所支持的 USB 类驱动程序，而无需任何额外安装。本发明的各实施例经由外围设备 (如 USB 设备) 至少将在处理设备上运行的客户机软件所呈现以供传送的经屏幕抓取的数据路由到通信网络。这绕过处理设备的任何网络接口 (并且因此绕过许多防火墙)，但只针对特定客户机软件。其他应用不受影响，且可以使用标准网络接口，即来自 / 去往 TCI/IP 栈的分组正常传送到网络设备。客户机软件从诸如 USB 合成设备或存储设备等外围设备上作为便携式应用来启动，这可避免在主机 OS 上留下任何轨迹。

[0370] 第二实施例的基本使用场景

[0371] 基节点软件 (6) 在投影仪上显示启动画面——图 5 中的 (21)，从而示出它准备就

绪来通过其接收机 (4) 接收任意媒体内容。这一启动画面 (21) 还示出与如何使用该系统有关的指令以及到达基节点的配置参数 (见下)。这些配置参数也在中央显示器 (22) 的底部处的透明画布中示出。

[0372] 为了避免用于配置外围设备与基单元之间的连接的用户交互,使用配对过程。这一配对过程向外围设备 (即,连接单元) 提供设置本地网络所需的网络参数。作为示例,外围设备可简单地插入基单元 (B) 的 USB 端口 (11)。基单元随后可任选地进行软件有效性检查,可任选地进行对存储在外围设备上的便携式应用的软件更新,并且将外围设备和基单元找到彼此所需的连接参数写到外围设备 (D) 上的永久存储 (8)。例如,在使用 WiFi 时,这将是 SSID、WEP/WPA2 密钥以及基单元接收机的 IP 地址,以及基节点软件所使用的端口号,但并非所有这些都必须被交换。

[0373] 想要使其任意媒体内容显示在连接到基节点 (5) 的中央显示器上的客户机处理设备将外围设备 (D) 经由 (2) 连接到其 USB 端口。外围设备通过接口 (2) 将自己呈现给计算机作为包括大容量存储设备和键区的合成设备。这具有不需要特定驱动程序的主要优点,因为所有这些设备在具有 USB 端口的每一个人计算机系统中都得到本机支持。如果启用了自动运行,则计算机将自动执行存储在外围设备上的大容量存储 (8) 中的客户机软件 (7)。在一般情况下提到的第一用户交互则只是外围设备到 USB 端口的连接。如果安全措施禁用自动运行,则用户需要探索外围设备的大容量存储上的大容量存储并手动启动便携式应用。

[0374] 便携式应用将使用外围设备的无线 (例如 WiFi) 接口 (3) 连接到正确的基节点。为了知道要连接的正确基单元,在上述配对过程期间,作出这一连接所需的配置参数被存储在大容量存储设备 (8) 上的数据库 (12) 中。

[0375] 一旦作出连接,外围设备就进入连接模式。这意味着现在存在从外围设备到基单元的至少一个信道。内容尚未示出。外围设备上的 LED(10) 现在转成白色以给出这一新状态的视觉指示。

[0376] 在计算机 (C) 处的用户想要示出她的内容时,她按下按钮 (9)。在按钮先前处于“连接”状态 (参见图 6) 时,它将检查基单元 (P) 的状态。如果基单元没有处于“充满”状态,则外围设备将经屏幕抓取的任意媒体内容发送到基单元 (B),该基单元 (B) 将该媒体内容添加到中央显示器上的合成中。外围设备 LED(10) 现在转成红色以指示“示出”状态 (图 6)。

[0377] 按钮 (9) 担当触发器。在用户再次按下该按钮时,计算机显示内容将从投影仪移除。LED(10) 变回白色。

[0378] 使用自动运行特征是在可能且在计算机 (C) 上启用的情况下是可任选的,以便一旦外围设备被插入就启动客户机软件 (7)。在 Windows 上,例如,这意味着将外围设备装载为大容量存储设备并使用存储在外围设备上的 autorun.inf 文件。

[0379] 然而,在许多情况下,这一自动运行特征将出于安全原因而被禁用。在这种情况下,如果可能且在计算机 (C) 上启用,将使用自动播放特征来在计算机的桌面上示出所连接的外围设备的标识。用户随后需要双击该标识来启动客户机软件。

[0380] 如果上述自动播放特征也是不可能的或没有启用的,则用户必须浏览所连接的外围设备的文件系统并手动启动该应用。这意味着双击 Windows 上的 client.exe 文件、Mac

OS/X 上的 client.app、或者轻击平板或具有触摸屏的任何移动设备上的适当应用图标。

[0381] 第三实施例：便携式应用存储在标准固态存储器上，如 USB 棒。

[0382] 在第三实施例中，便携式应用被存储在固态存储器上，如常规 USB 存储器棒（图 7）。

[0383] 对于诸如常规 USB 存储器棒等固态存储器而言，不存在以上针对连接单元描述的各类输入设备、视觉指示器或发射机。这意味着该系统需要：

[0384] - 使用来自客户机处理设备的发射机 / 接收机。

[0385] - 使用客户机处理设备上的键或按钮作为输入设备，如键盘上的物理键、特殊鼠标按压、触摸屏上的按钮区、显示在屏幕上的要用鼠标指针点击的按钮。

[0386] - 在客户机处理设备的显示器上呈现视觉指示器。

[0387] 客户机处理设备随后看起来像图 8。

[0388] 这一实施例以在很大程度上与操作系统无关的方式提供担当主机设备（如计算机）的任何处理设备上的诸如 USB 接口等外围接口。驱动程序和 / 或应用在诸如计算机等存在预安装通用驱动程序的处理设备上的安装不是必须的。诸如计算机等处理设备上的管理员权限优选地不是必须的。为了避免对管理员权限的需要，这一实施例使用其他外围设备预安装驱动程序，如所支持的 USB 类驱动程序，而无需任何额外安装。本发明的这一实施例经由处理设备的网络连接至少将在处理设备上运行的客户机软件所呈现以供传送的经屏幕抓取的数据路由到通信网络。客户机软件从外围设备（如 USB 设备）作为便携式应用来启动。

[0389] 第一用户操作随后包括：

[0390] - 插入固态设备，如 USB 存储器棒，

[0391] - 启动便携式应用（如果自动运行被禁用）

[0392] - 使用中央显示器上示出的配置参数 (22) 来配置客户机处理设备上的发射机来连接到正确的基节点

[0393] - 触发便携式应用与基节点的连接，例如通过与呈现在客户机处理设备的显示器上的便携式应用的 GUI(18) 上的元素进行交互。

[0394] 在这一实施例中，呈现对用户动作的视觉反馈也是使用客户机操作设备的显示器的 GUI 中的元素来完成的。

[0395] 在这一实施例中，零足迹的优点通过便携式应用在以下意义上部分地实现：没有软件被安装或复制到客户机操作设备，但需要配置改变来将客户机操作设备的发射机与基节点连接，这需要之后撤消。

[0396] 可任选地，便携式应用可为用户作出对发射机的配置改变。

[0397] 在这一实施例中损失的优点

[0398] - 便携式应用的零足迹性质的部分损失

[0399] - 更复杂的第一用户交互

[0400] - 用户需要更多专业知识

[0401] - 客户机操作设备显示器上需要的 GUI，这可能也在中央显示器上示出

[0402] - 在将物理键用于第二用户动作时，需要找出客户机操作设备上的空闲键

[0403] - 网络接口被便携式应用阻塞而不能用于其他用途。

[0404] 可任选地，最后一点可通过使用基单元作为到客户机操作设备想要通过其自己的接口连接到的网络的网关来避免。

[0405] 优点是：

[0406] - 通过基单元上的设置，对用户到企业网络的连接性的紧密控制

[0407] - 即使在发射机现在也被用于显示目的时，也保持网络连接性完好

[0408] 缺点是该系统的较高脆弱性，因为显示连接现在可能是进入企业网络的通道。

[0409] 剩下的优点是

[0410] - 将便携式应用分发给用户的物理介质的可用性

[0411] - 不需要将软件安装或复制到客户机操作设备

[0412] - 经由基单元维护连接单元（在此：存储器棒）上的软件更新的容易方式

[0413] - 通过基单元在连接单元上写入配置数据的可能性，例如以可由客户机操作设备读取并使用的配置简档的形式

[0414] 第四实施例：安装在客户机处理设备上的仅限软件客户机

[0415] 这一实施例类似于第三实施例，唯一差别是软件被复制在客户机操作设备上（图9）。在这种情况下，客户机操作设备上不需要即插即用端口（如 USB 端口）。

[0416] 这一实施例通常被用于平板 PC 和移动设备。在这种情况下

[0417] - 通常不存在可用的 USB 端口

[0418] - 通过应用商店的应用分发是容易且广泛接受的

[0419] 第五实施例：原始制造到投影仪或显示设备的基节点软件

[0420] 在这一实施例中，基节点没有被实现为单独的物理盒，而是集成到显示器或投影仪内部的处理单元。所有其他细节与前述相同。

[0421] 第六实施例

[0422] 在这一实施例中，基节点没有被实现为单独的物理盒，而是集成到视频会议设备的编解码器。所有其他细节与前述相同。

[0423] 第七实施例：远程会议参与者

[0424] 在这一实施例中，一个或多个客户机操作设备不在基节点的直接邻近区内，而是在远程位置。

[0425] 为了适应这一情况，需要以下适配：

[0426] - 进一步压缩和 / 或缩放任意媒体内容以允许使用低带宽连接

[0427] - 将基节点的连接参数传递给远程用户的可能性

[0428] - 基节点到远程用户连接到的 WAN 网络的连接性

[0429] 所有其他细节与前述相同。

[0430] 第八实施例：多个基节点

[0431] 在这一实施例中，使用多个基节点。这可以出于不同目的来完成：

[0432] - 多个中央显示器的连接性

[0433] - 中央显示器的实际显示面积的扩展

[0434] - 不同远程位置中的基节点的连接性

[0435] 这提供了可以从单个外围设备存在于多个基单元上的优点。这对多种情况而言是有用的：

[0436] 个人外围设备：用户可以具有与他通常使用的多个会议室配对的个人外围设备

[0437] 在具有多个基单元的会议室中使用，每一基单元控制该同一会议室中的不同显示器

[0438] 该建议使用该外围设备的称为多基外围设备的特殊变型。多基外围设备配备有围绕圆形中央“show me（给我看）”按钮的滚轮。这可以是机械滚动多位置开关或像 iPod 经典上的触摸轮那样的事物。

[0439] 外围设备的这一多基变型的配对：

[0440] 滚轮被置于对应基单元的位置。

[0441] 外围设备按正常方式与基节点配对

[0442] 配置参数被存储在永久存储位置；滚轮的每一位置具有对应的连接参数集合（例如，表中的不同各行），每一集合与特定基单元相对应

[0443] 外围设备的连接如下：

[0444] - 多基外围设备 X 被插入 PC

[0445] - 外围设备 X 上的滚轮被置于位置 A

[0446] - 外围设备 X 读取其内部存储器的位置 A 中的配置参数

[0447] - 外围设备 X 连接到基节点 A

[0448] - 基节点 A 在中央显示屏上指示多基外围设备 X 的连接

[0449] - 外围设备 X 上的滚轮被置于位置 B

[0450] - 外围设备 X 读取其内部存储器的位置 B 中的配置参数

[0451] - 外围设备 X 连接到基节点 B

[0452] - 基节点 B 在屏幕上指示多基外围设备 X 的连接

[0453] - 继续，直至用滚轮选择了正确基节点

[0454] - 点击外围设备输入设备，例如按钮，以在基节点的中央显示器上示出内容

[0455] - 滚动滚轮总是首先从最后位置的基节点点离内容

[0456] 第九实施例

[0457] 图 10 示出根据本发明的一独立实施例的包括输入设备的外围设备 47。这一实施例可以由上述实施例中的任一个一起使用。

[0458] 该外围设备被配置成连接单元并且是用于用户处理设备作为主机计算机的即插即用端口的连接器形式的物理设备，如 USB 连接、连接到连接器和基单元的灵活数据和功率连接，基单元具有致动器，例如配置成具有上述功能的输入设备的按钮。

[0459] 基单元和 / 或致动器优选地大小很大，例如具有 100 和 14400 平方毫米之间的表面积。基单元可以是方形、矩形、圆形、六边形、椭圆形、多边形的形状或任何其他适于人体工学的形状。致动器优选地是圆形的，但可以是方形、矩形、圆形、六边形、椭圆形、多边形等形状，一个基单元上可以存在一个以上致动器。

[0460] 灵活数据和功率连接（例如电缆）的长度优选地适配成将外围设备（在处于连接状态时，处于其操作位置），尤其是基单元和致动器，放置于所连接的用户处理设备的边界与如上定义的人体工学边界之间的区域中。另外，灵活数据和功率连接应当被适配成使得基单元独立于所需连接器的定向来平放在会议桌上，以将连接器插入即插即用接口。

[0461] 基单元优选地包括电子装置，如具有用于存储便携式应用和网络配置参数的永久

存储、存储器、处理引擎（例如 CPU、FPGA）、无线发射机 / 接收机（如用于 WiFi）、即插即用接口（如 USB 接口）、LED 环（作为视觉指示器）。便携式应用可被存储在外围设备上，即基单元中。视觉指示器用于允许来自连接单元的对任何活动的状态的用户反馈。

[0462] • 可以与本发明的实施例中的任一个一起使用的致动器的激活的一些示例：

[0463] o 声音激活（拍手、语音识别、计算机声音、音乐、……）

[0464] o 经由无线连接的设备的远程控制（IR、蓝牙、WiFi、……）

[0465] o 光激活

[0466] o 压力激活，例如用手指或手压下。

[0467] o 触摸激活

[0468] o 邻近度（‘接近接触’致动器或使致动器靠近某一物体）

[0469] o 生物测定阅读器，如指纹阅读器、虹膜扫描仪、DNA 分析仪

[0470] o 键区，例如用于输入密码，例如口令

[0471] 替换实施例

[0472] 在以上实施例中，一旦作出连接设备与主机计算机之间的连接，外围设备就进入连接模式。这意味着存在从外围设备到基节点的至少一个信道。根据本发明的实施例中的任一个，可在连接设备与基节点之间设置多个信道。这些信道可以是逻辑信道。

[0473] 这样的多信道安排的一些示例可包括第一信道和附加信道中的一个或多个：

[0474] o 第一信道用于所抓取的图像流（XDS）

[0475] o 第二信道用于 GPU 命令（OpenGL、DirectX）

[0476] o 第三信道用于鼠标指针坐标（绝对、相对）

[0477] o 第四信道用于鼠标指针图标

[0478] o 第五信道用于图像数据文件（JPEG、PNG、GIF、……）

[0479] o 第六信道用于多媒体数据文件或流（MPEG2、MPEG4、OGG、H.26x、……）

[0480] o 第七信道用于音频数据文件或流（MP3、MP4、AAC、WMA、……）

[0481] o 第八信道用于文本或文档数据文件（DOC、DOCX、PPT、PPTX、ODT、ODS、PDF、……）

[0482] o 第九信道用于传输上述优先级值 1、2、3、……。

[0483] 在以上实施例中，描述了将外围设备与基节点配对的特定方法。本发明的实施例中的任一个可包括以下给出其一些示例的其他配对机制。

[0484] • 配对的一些示例

[0485] o 将外围设备插入通用外围设备端口，如基节点或其他启用 USB 的设备的 USB 端口。配对信息通过通用外围接口（如 USB）传送。

[0486] o 到基节点的无线信道的信号强度被用来标识要使用哪一基节点

[0487] o 该无线信道或任何其他信道的信号强度。示例是 NFC/RFID 发射机可在会议室桌下提供。将用户处理设备（如膝上型计算机）和所插入的外围设备置于这一桌上将该外围设备与这一会议室的基节点自动配对。

[0488] o 手动配对（例如，通过输入 IP 地址、主机名、无线 ID（如 WiFi 上的 SSID））

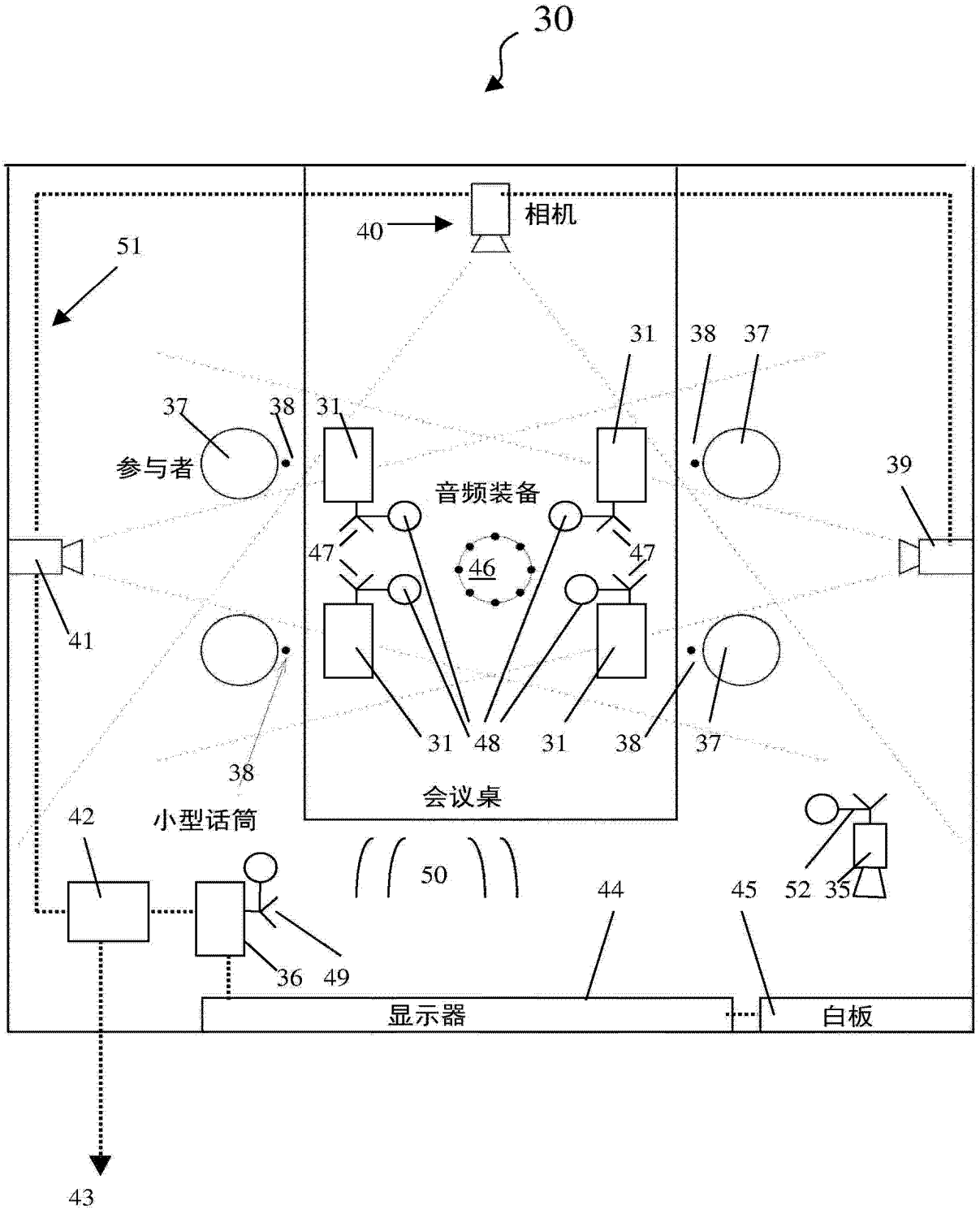

30
相机
40
51
31
38
37
参与者
音频装备
39
47
46
41
48
会议桌
42
小型话筒
50
44
45
52
35
36
49
显示器
白板
43

图 1a

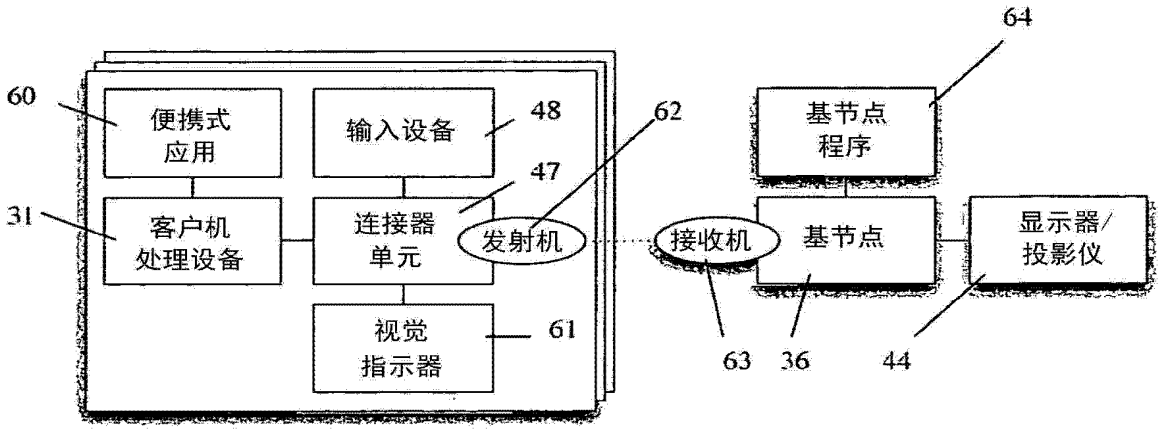

60
便携式
应用
输入设备
48
62
64
基节点
程序
47
31
客户机
处理设备
连接器
单元
发射机
接收机
基节点
显示器/
投影仪
视觉
指示器
61
63
36
44

图 1b

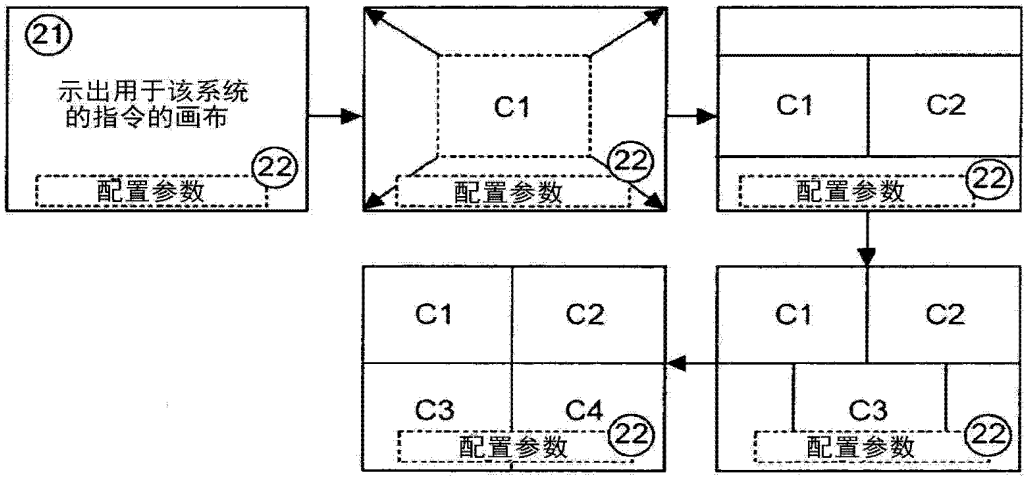

21
示出用于该系统
的指令的画布
22
配置参数
C1
C2
C3
C4

图 2

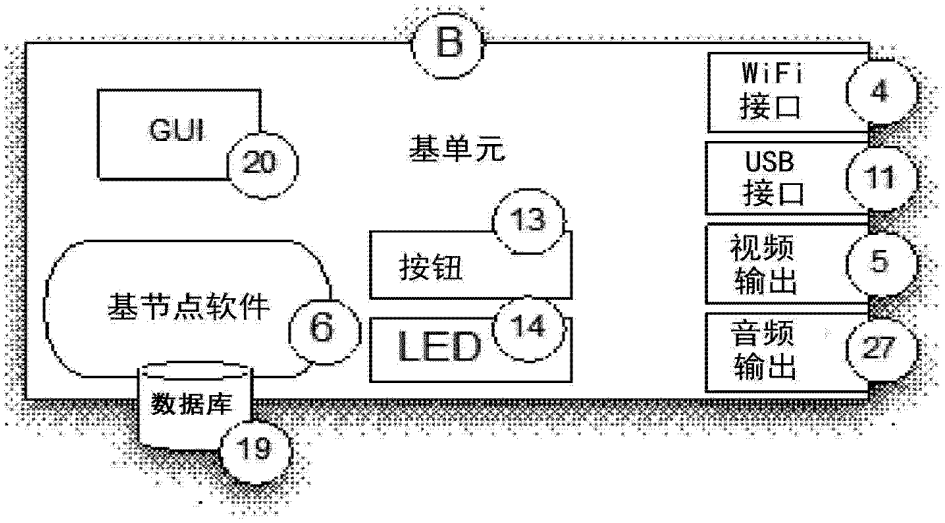

B
基单元
GUI
20
WiFi
接口
4
USB
接口
11
视频
输出
5
音频
输出
27
13
按钮
LED
14
基节点软件
6
数据库
19

图 3

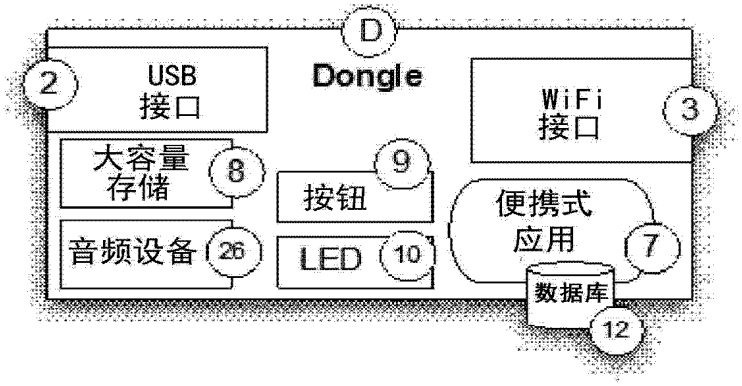

D
Dongle
2
USB
接口
WiFi
接口
3
大容量
存储
8
9
按钮
便携式
应用
7
音频设备
26
LED
10
数据库
12

图 4

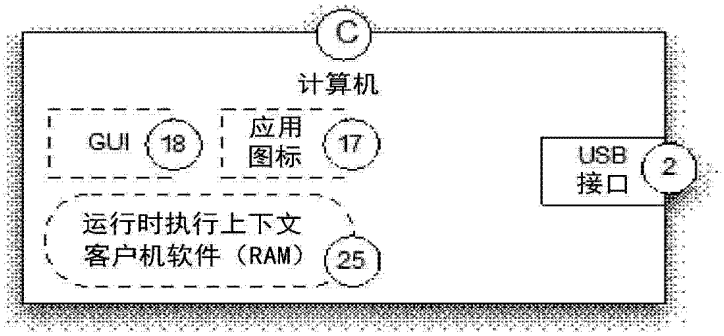

C
计算机
GUI
18
应用
图标
17
USB
接口
2
运行时执行上下文
客户机软件（RAM）
25

图 5

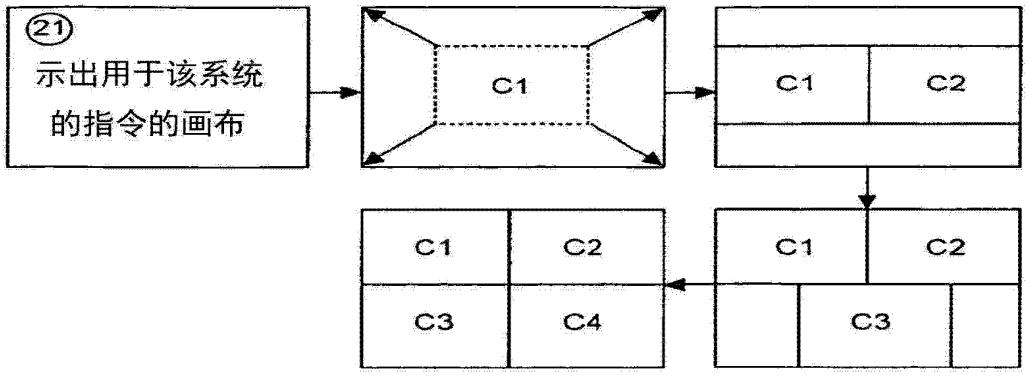

21
示出用于该系统的指令的画布
C1
C1
C2
C1
C2
C3
C4
C1
C2
C3

图 6

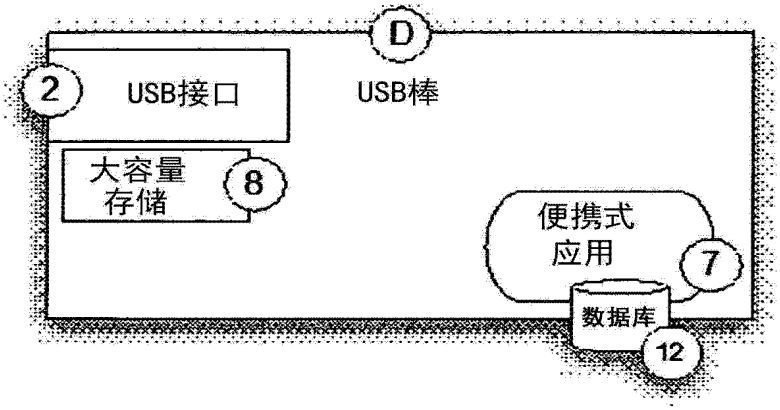

D
2
USB接口
USB棒
大容量存储
8
便携式应用
7
数据库
12

图 7

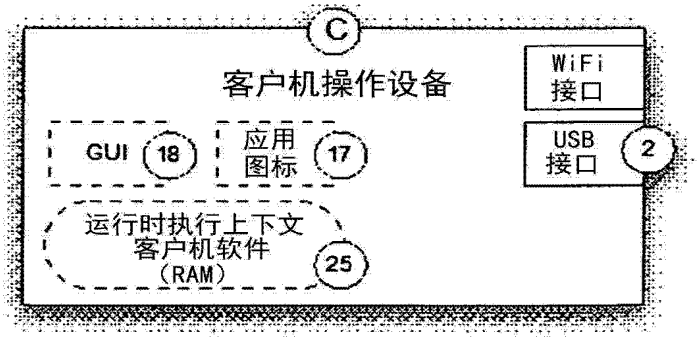

C
客户机操作设备
WiFi接口
GUI
18
应用图标
17
USB接口
2
运行时执行上下文客户机软件（RAM）
25

图 8

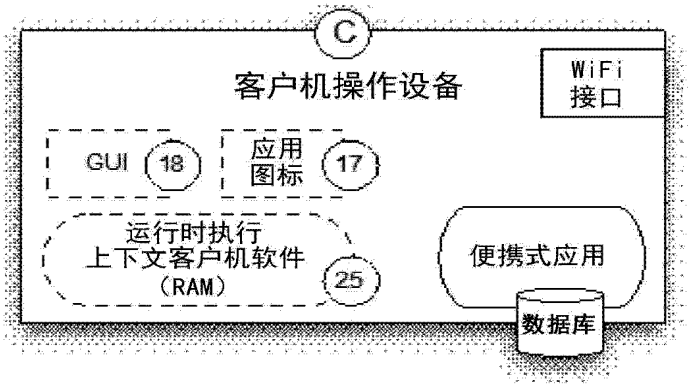

C
客户机操作设备
WiFi
接口
GUI
18
应用
图标
17
运行时执行
上下文客户机软件
(RAM)
25
便携式应用
数据库

图 9


内部WiFi天线
按钮
收发机
基节点
致动器和输入设备
视觉
指示器
存储便携式应用的
内部大容量存储设备
用于数据信号和功率的灵活连接
USB设备接口

图 10

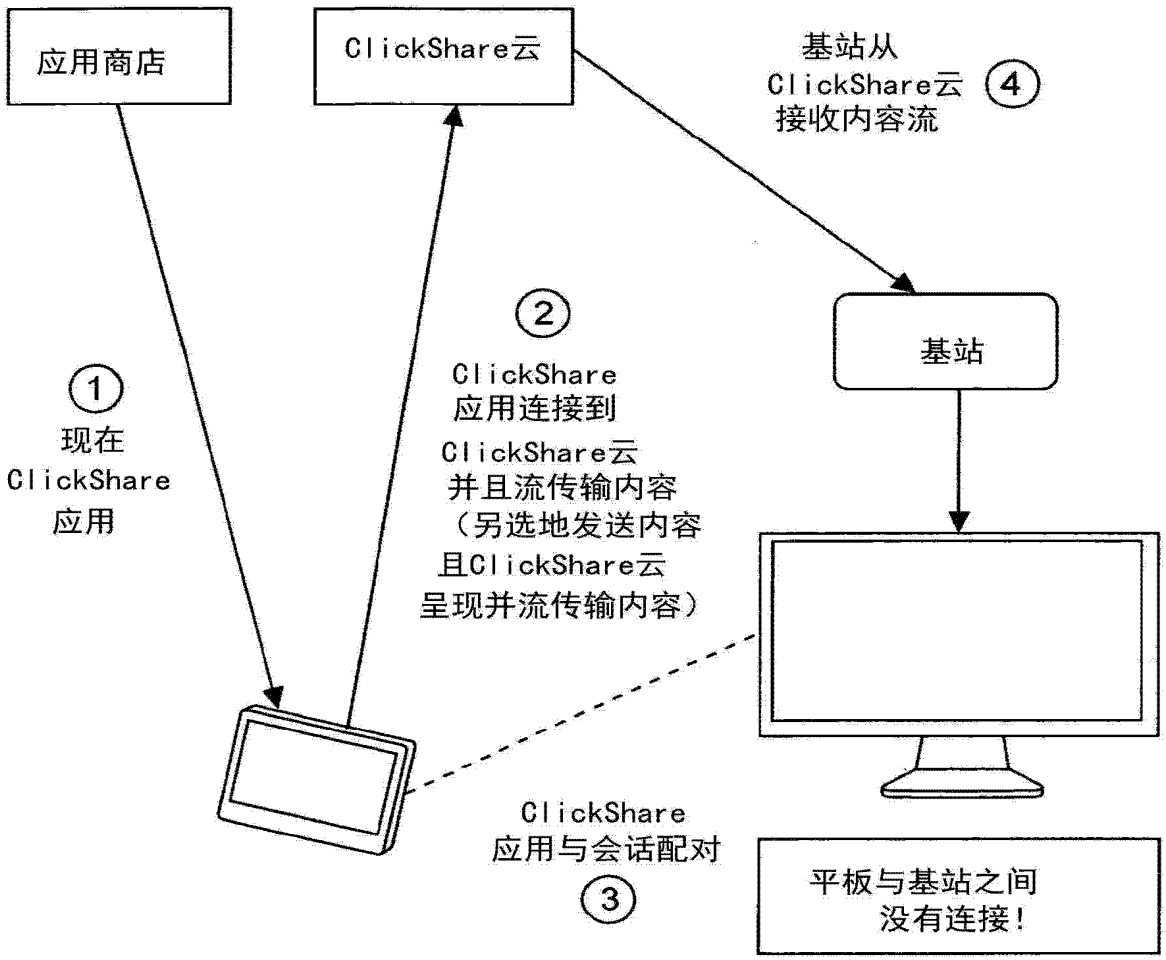

应用商店
ClickShare云
基站从
ClickShare云
接收内容流
4
2
基站
1
现在
ClickShare
应用
ClickShare
应用连接到
ClickShare云
并且流传输内容
（另选地发送内容
且ClickShare云
呈现并流传输内容）
ClickShare
应用与会话配对
3
平板与基站之间
没有连接！

图 11

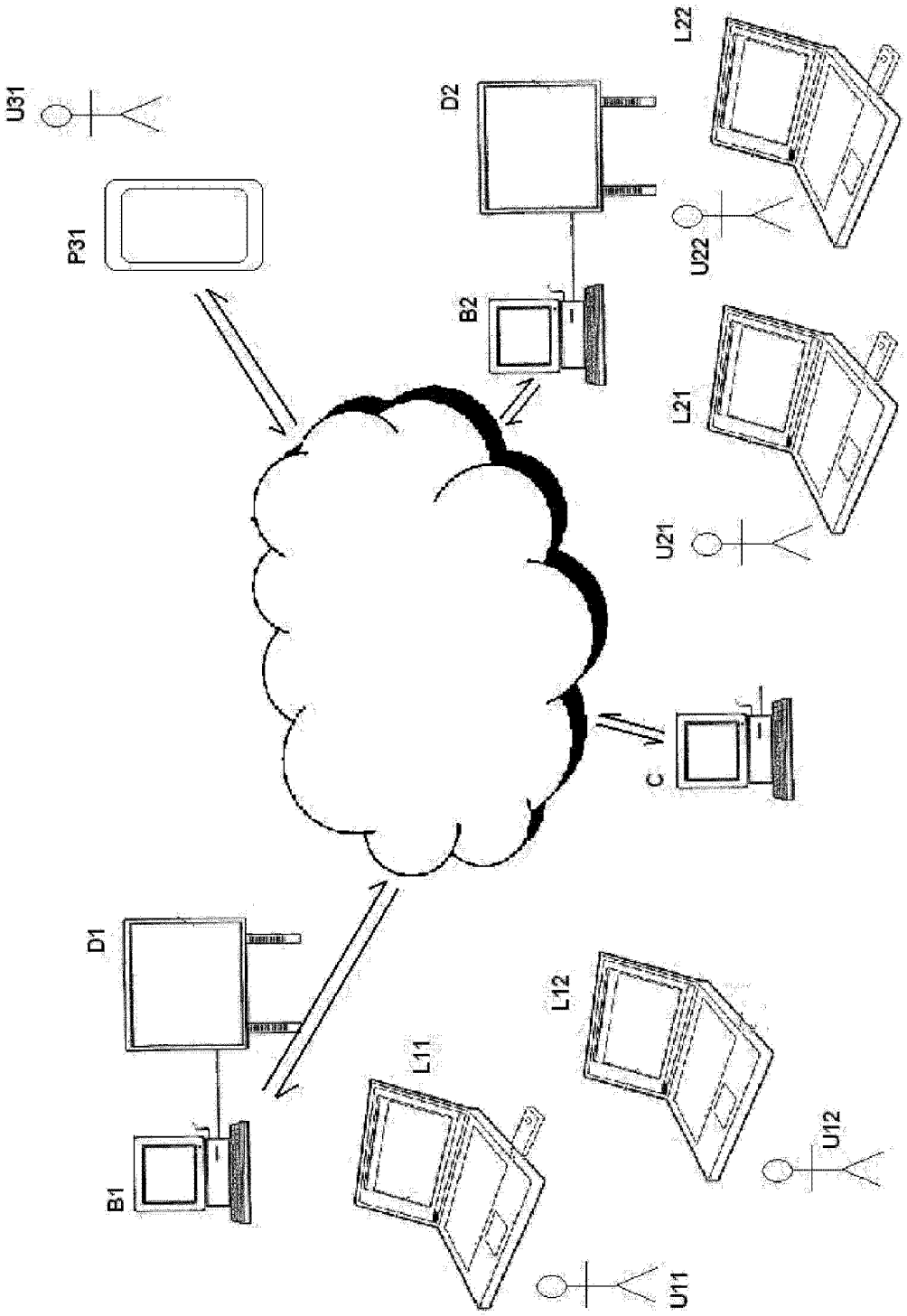


图 12



图 13

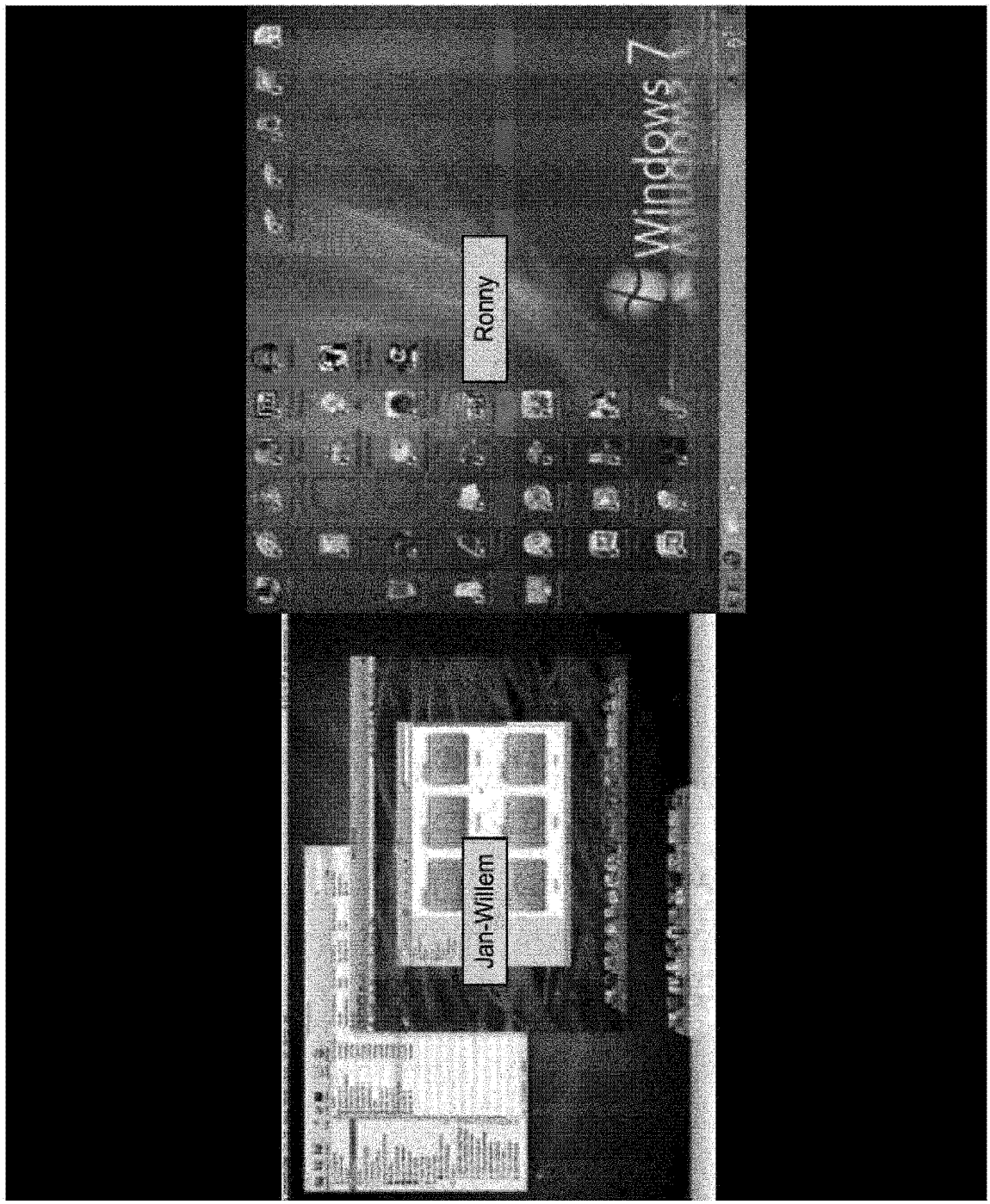


图 14

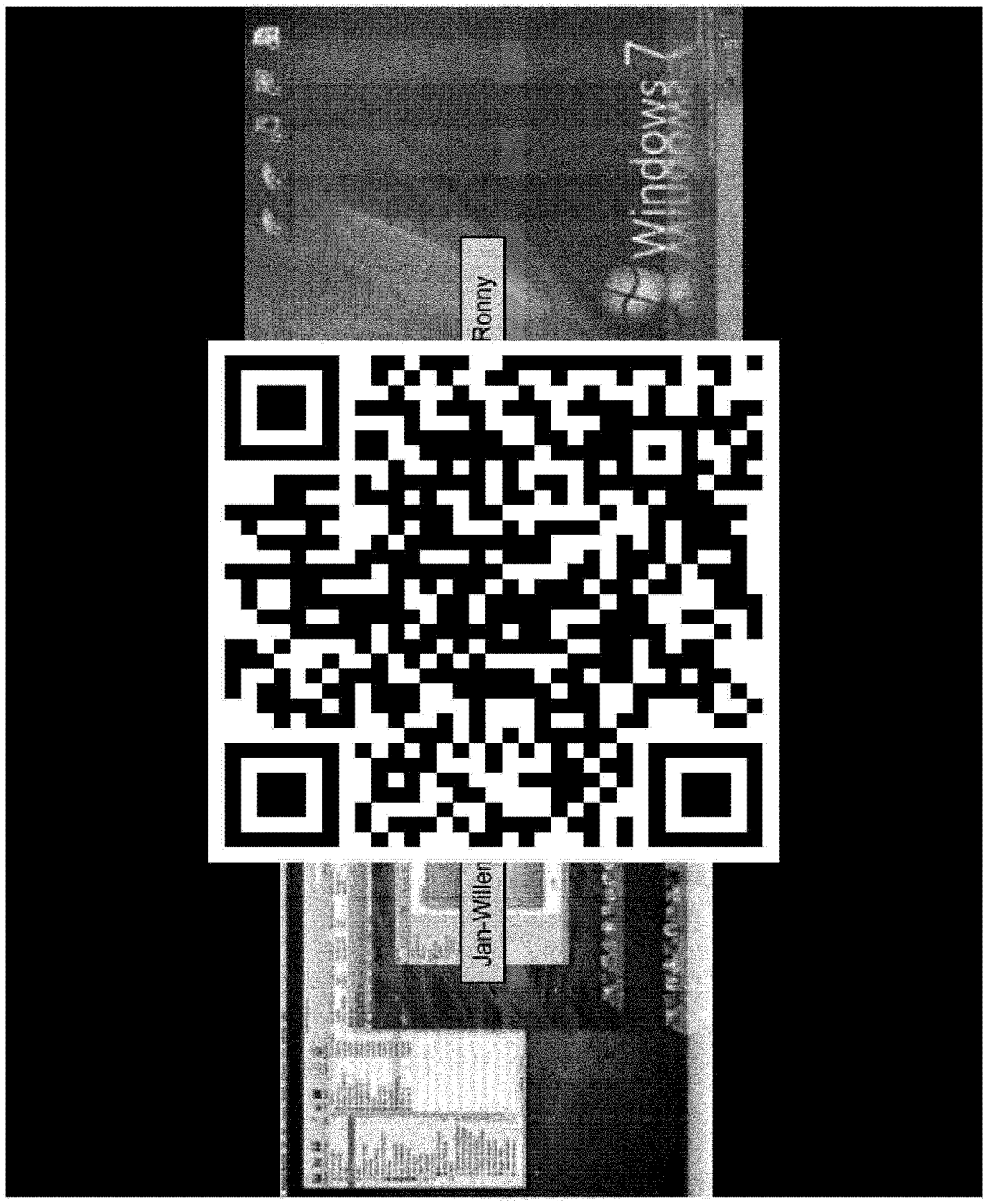


图 15

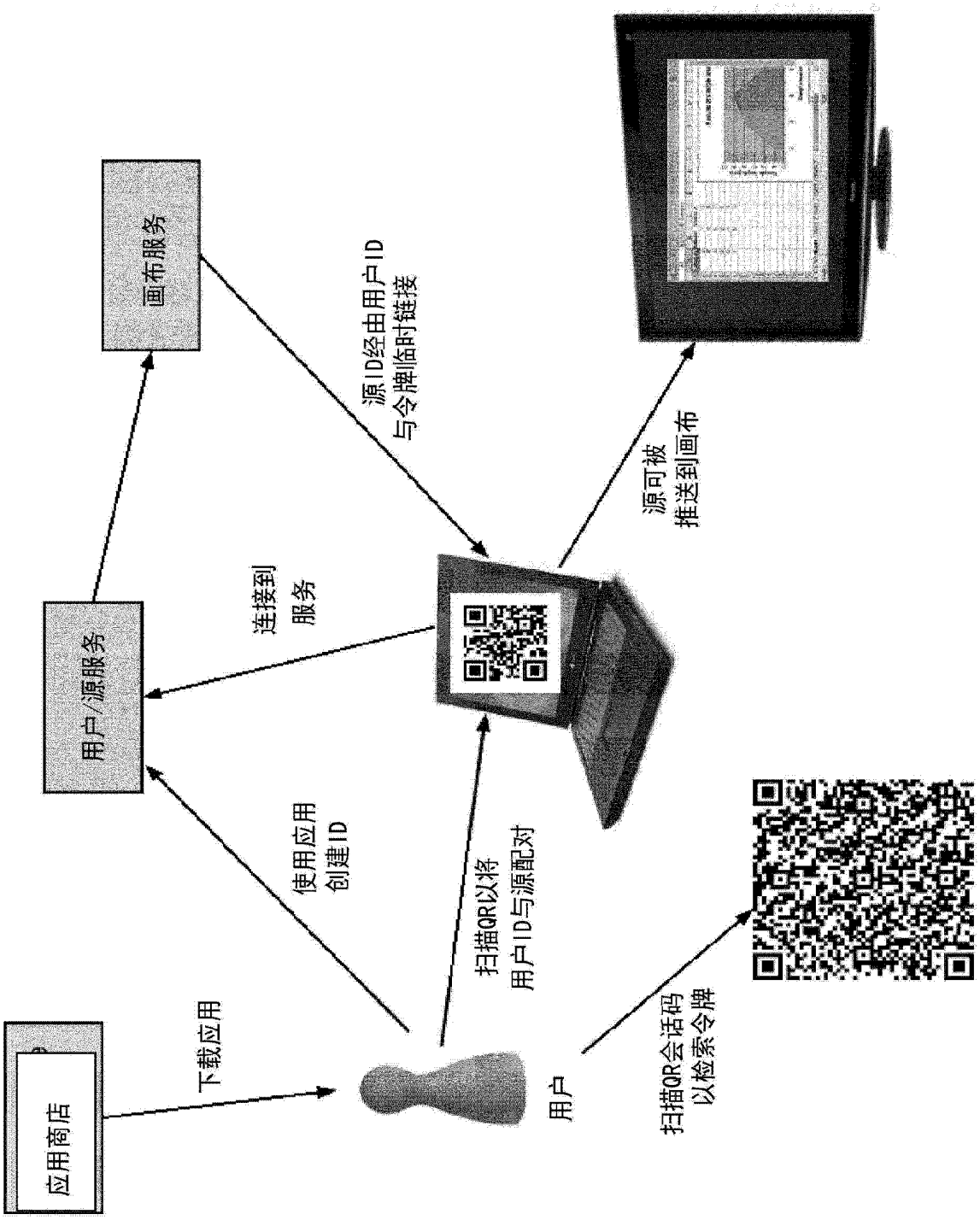

画布服务
源ID经由用户ID
与令牌临时链接
源可被
推送到画布
连接到
服务
用户/源服务
使用应用
创建ID
扫描QR以将
用户ID与源配对
下载应用
应用商店
用户
扫描QR会话码
以检索令牌

图 16

Electronic Patent Application Fee Transmittal

Application Number:	16771068
Filing Date:	09-Jun-2020
Title of Invention:	METHOD AND SYSTEM FOR MAKING FUNCTIONAL DEVICES AVAILABLE TO PARTICIPANTS OF MEETINGS
First Named Inventor/Applicant Name:	Gauthier RENARD
Filer:	Thomas Lee/Yanling Cottle
Attorney Docket Number:	21063.0018USWO

Filed as Large Entity

Filing Fees for U.S. National Stage under 35 USC 371

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
SUBMISSION- INFORMATION DISCLOSURE STMT	1806	1	260	260
		Total in USD ($)		**260**

Electronic Acknowledgement Receipt

EFS ID:	45343357
Application Number:	16771068
International Application Number:	
Confirmation Number:	1088
Title of Invention:	METHOD AND SYSTEM FOR MAKING FUNCTIONAL DEVICES AVAILABLE TO PARTICIPANTS OF MEETINGS
First Named Inventor/Applicant Name:	Gauthier RENARD
Customer Number:	52835
Filer:	Thomas Lee/Yanling Cottle
Filer Authorized By:	Thomas Lee
Attorney Docket Number:	21063.0018USWO
Receipt Date:	29-MAR-2022
Filing Date:	09-JUN-2020
Time Stamp:	14:03:01
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$260
RAM confirmation Number	E20223SE03182176
Deposit Account	
Authorized User	

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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	SB08_0018.pdf	1263477 01c14e2ef0dbfbdc8c26398231eed74462b4fb03	no	4
Warnings:					
Information:					
2	Other reference-Patent/Application/ Search Documents	OA.pdf	2484247 b074eb8be5fc4626edfabed7e5b4337aa437e9c4	no	17
Warnings:					
Information:					
3	Foreign Reference	FR1_CN104412542A.pdf	5152014 42a49bf1efb71e3d1ea079d5f762793a241a5fb5	no	55
Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	38246 bd4ea74b0c5615c5289b622c9d019f91e733e3c2	no	2
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Information:					
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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventorship:	RENARD	Examiner:	MISIURA, BRIAN T.
Serial No.:	16/771068	Group Art Unit:	2186
Filed:	June 9, 2020	Docket No.:	21063.0018USWO
Title:	METHOD AND SYSTEM FOR MAKING FUNCTIONAL DEVICES AVAILABLE TO PARTICIPANTS OF MEETINGS		

CERTIFICATE OF TRANSMISSION.
I hereby certify that this paper is being transmitted by EFS Web to the United States Patent & Trademark Office on June 13, 2022.

By: /Jessica A. Sun/
Name: Jessica A. Sun

AMENDMENT AND RESPONSE AFTER FINAL

Mail Stop: AMENDMENT
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Dear Commissioner:

In response to the Final Office Action issued March 21, 2022, please amend the above-identified application as follows:

Amendments to the Claims are reflected in the listing of claims that begins on page 2 of this paper.

Remarks begin on page 6 of this paper.

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/771,068	Filing Date 06/09/2020	☐ To be Mailed

ENTITY: ☑ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $100 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $460 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	06/13/2022	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 23	Minus	** 22	= 1		x $100 =	100
	Independent (37 CFR 1.16(h))	* 2	Minus	*** 3	= 0		x $480 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	100

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
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							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/LAVINIA D JOHNSON/
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The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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Serial No.:	16/771068	Group Art Unit:	2186
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By: /Jessica A. Sun/
Name: Jessica A. Sun

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Commissioner for Patents
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Amendments to the Claims are reflected in the listing of claims that begins on page 2 of this paper.

Remarks begin on page 6 of this paper.

AMENDMENT TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

1-57. (Cancelled)

58. (Currently Amended) A system for connecting a processing device to a functional device connected to or in a base unit of a wireless connection, the system comprising:

the base unit having a transmitter,

a first display device connected to or in the base unit,

at least one functional device connected to or in the base unit, and

the processing device having a memory, a second display device, an operating system, a third party software for a Unified Communication call, a driver and a client software configured to interact directly with the base unit over a wireless connection,

wherein the base unit, via the transmitter, is configured to transmit data over the wireless connection to the processing device,

wherein the client software, when executed by a processor of the processing device, is configured to provide any simulations or translations, as required, ~~present the first display device to the processing device and~~ to allow interaction ~~therewith~~ between the first display device and the processing device, wherein ~~in a way such that~~ the client software and the driver are configured to present the at least one functional device to the operating system as a virtual functional device, and the third party software for the Unified Communication call is presented with the virtual functional device for the Unified Communication call, the processing device being configured to host the Unified Communication between two or more other processing devices.

59. (Previously Presented) The system of claim 58, wherein the client software and the driver are configured to present a simulated speakerphone to the operating system to create a virtual microphone and a virtual speaker.

60. (Previously Presented) The system of claim 58, wherein the client software and the driver are configured to present a simulated videocam to the operating system to create a virtual videocam device.

61. (Previously Presented) The system of claim 58, wherein the client software is configured to provide video data, optionally obtained by screen scraping, directly to the base unit, wherein the base unit processes the video data.

62. (Previously Presented) The system of claim 58, wherein the processing device processes video data received from the base unit via the transmitter over the wireless connection.

63. (Previously Presented) The system of claim 62, wherein processing of the video data comprises decoding and compositing or decrypting the video data.

64. (Previously Presented) The system of claim 58, wherein the at least one functional device which is presented to the operating system as a virtual functional device, is one or more of a data capturing device, a microphone, a speakerphone, a speaker, another display, a touchscreen, a projector, a camera, a video camera, and a webcamera.

65. (Previously Presented) The system of claim 58, further comprising means for encoding, optionally encrypting the data in the base unit or the processing device.

66. (Previously Presented) The system of claim 58, wherein the virtual functional device is presented to the unified communication between the two or more other processing devices.

67. (Previously Presented) The system of claim 58, wherein the system is configured to expose the virtual functional device to the processing device.

68. (Previously Presented) The system of claim 58, further comprising at least one fixed or a configurable endpoint of the virtual functional device, wherein the at least one fixed or a

configurable endpoint is a data source or a data sink which is configured to store or emit data of the virtual functional device.

69. (Currently Amended) A method for connecting a processing device to a functional device connected to or in a base unit of a communications network, the base unit having a transmitter and a first display device, the processing device having a memory, a second display device and an operating system, a third party software for a Unified Communication call, and a driver and a client software wherein, the client software, when executed by a processor on the processing device:

interacts directly with the base unit over a wireless connection and provides any simulations or translations, as required, ~~presents the first display device to the processing device and~~ to allow interaction ~~therewith~~ between the first display device and the processing device, wherein the base unit transmits data over the wireless connection to the processing device,

the client software and a driver present the functional device to the operating system as a virtual functional device,

third party software for a Unified Communication call is presented with the virtual functional device which it then uses for the call,

wherein the processing device hosts the Unified Communication call between two or more processing devices.

70. (Previously Presented) The method of claim 69, wherein the client software and the driver present a simulated speakerphone to the operating system thus creating a virtual microphone and a virtual speaker.

71. (Previously Presented) The method of claim 69, wherein the client software and a driver present a simulated videocam to the operating system thus creating a virtual videocam device.

72. (Previously Presented) The method of claim 69, wherein the client software of processing device provides video data, optionally obtained by screen scraping, directly to the base unit where it is processed.

73. (Previously Presented) The method of claim 72, wherein the process comprises decoding and compositing or decrypting the video data and providing the video data to the first display device.

74. (Previously Presented) The method of claim 69, wherein the functional device which is presented to the operating system as the virtual functional device is any one or more of a data capturing device, a microphone, a speakerphone, a speaker, another display, a touchscreen, a projector, a camera, a video camera, a webcamera.

75. (Previously Presented) The method of claim 69, further comprising encoding, optionally encrypting the data.

76. (Previously Presented) The method of claim 69, wherein the virtual functional device is presented to the unified communication between the two or more other processing devices.

77. (Previously Presented) The method of claim 69, further exposing a same type of functional device to the processing device as is connected to the base unit which is presented to the operating system as a virtual functional device.

78. (Previously Presented) The method of claim 69, further comprising at least one fixed or a configurable endpoint of the virtual functional device, wherein the at least one fixed or a configurable endpoint is a data source or a data sink which stores or emits data of the virtual functional device.

79. (New) The method of claim 70, wherein the interaction directly with the base unit further includes presenting the first display device to the processing device.

80. (New) The system of claim 58, wherein the client software is configured to present the first display device to the processing device.

REMARKS

Applicant respectfully requests favorable reconsideration of this application in view of the above amendments and the following remarks.

Claims 58 and 69 are amended. Support for the amendments may be found, for example, at least on page 34, lines 25-29 of the specification as originally filed.

Claims 79-80 are added. Support for the claims may be found, for example, in claims 58 and 69 as previously presented.

No new matter has been added.

Claims 58-80 are pending.

Certification Under 37 C.F.R. § 116

Applicant requests that the amendments to the claims and remarks provided herein be entered since this is the first opportunity for Applicant to amend the claims in view of the newly cited prior art and could not have been presented earlier. Thus, Applicant respectfully requests entry of the amendments and remarks.

Claim Interpretation

Claim 65 is interpreted under 35 U.S.C. § 112(f) as including means-plus-function language. Applicant does not concede the correctness of this interpretation and defers the filing of any interpretation until it is necessary at a later time.

Claim Rejections - 35 U.S.C. § 103

Claims 58-78 are rejected under 35 U.S.C. 103 as being unpatentable over Brands et al. (U.S. Patent Application Publication No. 2015/0121466) ("Brands") in view of Beel et al. (U.S. Patent Application Publication No. 2015/0169477) ("Beel"). Applicant respectfully traverses the rejection. Without acquiescing to the merits of the rejection, but in order to advance prosecution independent claims 58 and 69 have been amended. While claims 58 and 69 differ in scope, claim 58 is discussed below with respect to the features that are commonly recited in the claims.

Claim 58 recites, at least in part, that the client software, when executed by a processor of the processing device, is configured to provide simulations, or translations as required to allow the first display device to interact with the processing device. Claim 58 further includes that the

client software and a driver are configured to present the at least one functional device to the operating system as a virtual functional device. Additionally, claim 58 recites that the third party software for the Unified Communication call is presented with the virtual functional device for the Unified Communication call, the processing device being configured to host the Unified Communication between two or more other processing devices.

As such, in view of the recited features, Applicant submits that a specific connection between the first display device and the processing device is provided. For example, first of all it is noticeable that a first peripheral device, which is connected to the processing device is not recited in this claim. Rather, as discussed on page 34, lines 25-29 of the specification (emphasis added):

> In Figure 12 the processing device 60' **has no first peripheral device** 130, e.g. **none is available.** In such a case client software 70' can be adapted to interact directly with base unit 100 over a wireless connection 127' and the client software 70' is adapted to provide any simulations, or translations as required to present the display device 126 to the processing unit 160' and to allow interaction therewith.

The specification further teaches at page 14, lines 13-14 that ""Host device" is a processing device that wants to share using a first peripheral device or dongle."

Neither Brands nor Beel, taken alone or in combination, teaches or suggests the same combination of features as recited in claim 58.

Rather, Brands teaches the use of a peripheral device. For example, Brands uses the word peripheral explicitly in paragraphs [0035]-[0069]. As such, Brands is directed mainly to the use of a peripheral device, e.g., plugged into a processing device, for communication between the processing device and the base unit. That is, one having ordinary skill in the art would have understood that Brands is directed to using a processing device that operates through a peripheral device commonly known as a "dongle". That is, even assuming, but not admitting that the peripheral devices of Brands present within meeting room 30 will be available to participants 37 of processing devices 31 to utilize during the media conference, such a combination of features relies on using peripheral device.

On the other hand, as discussed above, the features recited in claim 58 are at least directed to, in an embodiment, in which the processing device 60' has no first peripheral device 130, e.g., none is available (see specification, page 34, lines 25-26). The specification further teaches that in such a case, client software 70' (in the processing device) can be adapted to

interact directly with base unit 100 over a wireless connection 172'. As such, the direct interaction is without a first peripheral being used.

Instead, the client software 70' is adapted to provide any simulations, or translations that are required to allow the display device 126 to interact with the processing unit 160' (see, page 34, lines 26-29). In other words, the features recited in claim 58 are at least directed to the display device interacting with the processing device, whereas in Brands, data is transmitted from the processing device to the base unit.

Furthermore, while it is alleged on page 5 of the Office Action that Brands teaches the third party software for the unified communication is presented with the virtual functional device for the unified communication, Applicant respectfully disagrees. Rather, the specification teaches starting on page 35, line 14 the flowing:

> For the processing device 160' the client software 70' and a driver 162' can present a simulated speakerphone 92 to the OS 164' thus creating a virtual microphone and a virtual speaker. The third party software 60' for the Unified Communication such as the Skype™ call will be presented with these virtual devices which it then uses for the call.

Thus, one having ordinary skill in the art would have understood that the features recited in the claims are also at least directed to virtual functional devices, e.g., driver installed on PC 160, virtual microphone and speaker and in which the generation and exposure of the endpoints are on the virtual functional device, e.g., virtual USB endpoints, enumerate USB endpoints, load drivers to endpoints, etc.

On the other hand, Brands teaches a different system in paragraphs [0152] and [0153] that do not relate explicitly to a UC call. For example, paragraph [0152] of Brands teaches "multiple participants, who can be at different locations, to engage in a media conference," whereas, paragraph [0153] teaches "a dedicated software client." As such, one having ordinary skill in the art would have appreciated that the "dedicated software client" in paragraph [0153] of Brands is a software client that is supposed to be able to allow sharing content by participants being able to connect the laptop to the meeting room, e.g., for a media conference. The context is about reaching a web page, for example, hence one having ordinary skill in the art would have interpreted the dedicated software client to be a help in doing this, e.g. a QR code reader.

Moreover, Brands does not specifically disclose that said functional devices are exposed on the connection units 47 as at least one fixed or configurable endpoints of the functional device. Rather, Brands at least discloses the following, e.g. in Figure 1a, peripheral devices 47,

52, in Figure 5, a dongle, in Figure 4, a button, and in Figure 10, USB devices inserted in laptops L11, L21, L22. While Brands teaches in the third and fourth embodiments, a portable application or a software only client installed on the client processing device that does not include a peripheral device, it is appreciated that Brands does not teach that the software creates a virtual functional device, as would have been understood in view of the present application, and hence do not present the virtual functional device to the third party software for the Unified Communication call. Thus, one having ordinary skill in the art would have appreciated that the processing device of Brands is not configured to host the unified communication between two or more other processing devices.

Furthermore, Brands does not teach a client software, which, when executed by a processor of the processing device, is configured to provide simulations or translations as required, so as to allow the first display device to interact with the processing device, e.g., for operation as a virtual functional device. As explained in the specification, for the processing device 160' the client software 70' and a driver 162' can present a simulated videocam 91 to the OS 164' thus creating a virtual videocam device as a virtual functional device. The third party software 60' for the Unified Communication such as the Skype™ call will be presented with all of the virtual devices which it then uses for the call.

As such, Applicant submits that Brands teaches a different system and fails to disclose or suggest the features recited in amended claim 58, and Brands fails to disclose or suggest virtual functional devices, translating or simulating to present the first display device to the processing device, Unified Communication call being presented with the virtual functional device for the Unified Communication call, and the processing device being configured to host the Unified Communication between two or more other processing devices.

Beel fails to cure the deficiencies of Brands with respect to amended claim 58. For example, Beel does not disclose a UC call. Beel further fails to disclose or suggest virtual functional devices nor translating or simulating. The effect of these differences is to reduce the amount of hardware required as a peripheral device is not required and by using simulating and translating, there is no need for custom drivers.

Although it is alleged on page 6 of the Office Action that Beel discloses some of the previously presented features, Applicant respectfully disagrees. For example, the third embodiment of Beel refers to a virtual audio device but this is on a peripheral device and hence

is not relevant to amended claim 58. That is, since amended claim 58 does not use a peripheral device, Beel fails to disclose or suggest the features recited in amended claim 58.

Therefore, since neither Brands nor Beel, taken alone or in combination, teaches or suggests the same combination of features as recited in amended claim 58, obviousness of claim 58 cannot be established.

For at least the foregoing remarks, claim 58 is patentable over Brands and Beel. Claim 69 recites similar features as recited in claim 58 and is patentable over Brands and Beel for at least the same reasons as amended claim 58. The remaining claims depend on claims 58 and 69 and are patentable over Brands and Beel for at least the same reasons as claims 58 and 69. Applicant is not conceding the correctness of the rejection of the features not discussed herein. Applicant respectfully requests reconsideration and withdrawal of this rejection.

In view of the above, Applicant respectfully requests favorable reconsideration in the form of a Notice of Allowance. If any questions arise regarding this communication, the Examiner is invited to contact Applicant's representative listed below. Please charge any additional fees or credit any overpayment to Deposit Account No. 50-3478.

Respectfully submitted,

HAMRE, SCHUMANN, MUELLER & LARSON, P.C.
45 S. 7th St., Suite 2700
Minneapolis, MN 55402
(612) 455-3800

Dated: June 13, 2022

By: _____/Thomas Lee/_____
Thomas Lee
Reg. No.: 66,396
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Electronic Acknowledgement Receipt

EFS ID:	45940132
Application Number:	16771068
International Application Number:	
Confirmation Number:	1088
Title of Invention:	METHOD AND SYSTEM FOR MAKING FUNCTIONAL DEVICES AVAILABLE TO PARTICIPANTS OF MEETINGS
First Named Inventor/Applicant Name:	Gauthier RENARD
Customer Number:	52835
Filer:	Thomas Lee/Jessica Sun
Filer Authorized By:	Thomas Lee
Attorney Docket Number:	21063.0018USWO
Receipt Date:	13-JUN-2022
Filing Date:	09-JUN-2020
Time Stamp:	14:57:09
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		Response_0018.pdf	127442 e016540abd0af7842e9689a725f1638b89eb4b23	yes	10

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Response After Final Action	1	1
	Claims	2	5
	Applicant Arguments/Remarks Made in an Amendment	6	10
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16771068	06/13/2022

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I20226F001413314	1202	CLAIMS IN EXCESS OF 20	$100.00	Deposit Account

PTO/SB/06 (09-11)
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/771,068	Filing Date 06/09/2020	☐ To be Mailed

ENTITY: ☑ LARGE ☐ SMALL ☐ MICRO

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☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	06/21/2022	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
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	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
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REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL
(Submitted Only via EFS-Web)

Application Number	16/771,068	Filing Date	2020-06-09	Docket Number (if applicable)	21063.0018USWO	Art Unit	2186
First Named Inventor	Gauthier RENARD			Examiner Name	MISIURA, BRIAN THOMAS		

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.
Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV

SUBMISSION REQUIRED UNDER 37 CFR 1.114

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☒ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____

☒ Other Request for Reconsideration filed June 13, 2022

☒ Enclosed

☐ Amendment/Reply

☒ Information Disclosure Statement (IDS)

☐ Affidavit(s)/ Declaration(s)

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☐ Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months _____ (Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

☐ Other _____

FEES

☒ **The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.**
The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No 503478

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

X Patent Practitioner Signature

Applicant Signature

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Signature of Registered U.S. Patent Practitioner			
Signature	/Thomas Lee/	Date (YYYY-MM-DD)	2022-06-21
Name	Thomas Lee	Registration Number	66,396

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(Not for submission under 37 CFR 1.99)

Application Number	16771068
Filing Date	2020-06-09
First Named Inventor	Gauthier RENARD
Art Unit	2186
Examiner Name	MISIURA
Attorney Docket Number	21063.0018USWO

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	1	Communication issued in European Application No. 18 833 045.0, dated March 14, 2022	
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	Application Number	16771068
	Filing Date	2020-06-09
	First Named Inventor	Gauthier RENARD
	Art Unit	2186
	Examiner Name	MISIURA
	Attorney Docket Number	21063.0018USWO

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Name/Print	Thomas Lee	Registration Number	66396

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WO 2008/080107 A2

(54) Title: ENHANCED WIRELESS USB PROTOCOL AND HUB

(57) Abstract: The present invention provides a method for improving data throughput for a wireless USB system that includes wire adapters that wirelessly transmit data between a host system and a wired USB device. The invention also provides a Wireless USB hub that acts as a proxy for the wired USB devices and presents them to a host either as unique WUSB devices with their own addresses or as separate functions on an already existing WUSB device.

ENHANCED WIRELESS USB PROTOCOL AND HUB

TECHNICAL FIELD

The present invention relates generally to Certified Wireless Universal Serial Bus (WUSB) interfaces. More specifically, the present invention is related to improving the throughput of Certified Wireless USB Wire Adapter systems.

BACKGROUND

Universal Serial Bus (USB) is a serial bus standard for attaching electronic peripheral devices to a host computing device. It was designed for personal computers, but its popularity has prompted it to also become commonplace on video game consoles, PDAs, portable DVD players, mobile phones, and other popular electronic devices. The goal of USB is to replace older serial and parallel ports on computers, since these were not standardized and called for a multitude of device drivers to be developed and maintained.

USB was designed to allow peripherals to be connected without the need to plug expansion cards into the computer's expansion bus and to improve plug-and-play capabilities by allowing devices to be hot-swapped, wherein devices are connected or disconnected without powering down or rebooting the computer. When a device is first connected, the host enumerates and recognizes it, and loads the device driver needed for that device.

USB can connect peripherals such as mouse devices, keyboards, scanners, digital cameras, printers, external storage devices, etc., and has become the standard connection method for many of these devices.

The Wireless Universal Serial Bus Specification, revision 1.0 (published May 12, 2005; available from the USB Implementers Forum, Inc.) describes and specifies extensions to wired USB which enable the use of wireless links in extended USB/WUSB systems. These wireless extensions to the USB specification are referred to as Certified Wireless Universal Serial Bus or simply Wireless USB (WUSB). The extensions build on existing wired USB specifications and WiMedia Alliance MAC and PHY ultra-wide-band (UWB) wireless technology.

The WUSB Specification includes descriptions and specifications of devices known as Wire Adapters (WA). These devices are wired-USB-to-Wireless-USB adapters which allow "legacy" wired USB hosts and devices to be interconnected with WUSB devices in extended USB systems containing both wired and wireless links.

There are two types of Wire Adapters: Host Wire Adapter (HWA) and Device Wire Adapter (DWA) which work in conjunction with each other. HWAs have a wired "upstream" USB port and a wireless "downstream" WUSB port, allowing a wired USB host to communicate with WUSB devices.

DWAs have a wireless "upstream" WUSB port and one or more wired "downstream" USB ports, allowing wired USB devices to communicate with a Wireless USB host.

The WUSB Specification Wire Adapter Protocol is used to transfer data through WAs and to control and manage WAs. Unfortunately, the Wire Adapter Protocol as specified in the WUSB Specification in typical situations is very inefficient, resulting in unacceptably low throughput. The inefficiency of the protocol is primarily attributable to two factors: the protocol is "chatty" in that a number of non-data messages conveying control and transfer complete status information are exchanged for each block of data transferred. In addition, the protocol does not lend itself well to "pipelining" of data flow through the system, resulting in high latency during transfer of data and therefore low throughput.

Therefore, it would be desirable to have a method for improving throughput for devices in USB systems containing both wired and wireless USB devices.

BRIEF DESCRIPTION OF THE DRAWINGS

Aspects of the present disclosure are best understood from the following detailed description when read with the accompanying figures, in which:

Figure 1 shows the standard configuration of a wired USB system in accordance with the prior art;

Figure 2 shows a configuration for a Wireless USB system with a "native" WUSB device directly attached to a WUSB host;

Figure 3 shows a Device Wire Adapter connected to two wired USB devices;

Figure 4 shows a system incorporating Device Wire Adapters and a Host Wire Adapter to provide wireless USB functionality to legacy wired USB devices in accordance with the prior art;

Figure 5 shows the sequence of data packets used to communicate over the wireless USB system depicted in Figure 4;

Figures 6A and 6B are sequence diagrams illustrating the process flow for an IN request using the standard wire adapter protocol in accordance with the prior art;

Figures 7A and 7B are sequence diagrams illustrating the process flow for an OUT request using the standard wire adapter protocol in accordance with the prior art;

Figure 8 is a sequence diagram illustrating the process flow for an IN request using the enhanced wire adapter protocol as an embodiment in accordance with the present invention;

Figure 9 is a sequence diagram illustrating the process flow for an OUT request using the enhanced wire adapter protocol as an embodiment in accordance with the present invention; and

Figure 10 shows a Wireless USB hub as an embodiment in accordance with the present invention.

Figure 11 shows a diagram illustrating packet flow and processing for an OUT Transfer Request forwarding in an embodiment of the present invention.

Figure 12 shows a diagram illustrating packet flow and processing for an IN Transfer Request forwarding in an embodiment of the present invention.

DETAILED DESCRIPTION

An embodiment of the present invention provides an enhanced Wire Adapter Protocol for improving data throughput for a wireless USB system that includes wire adapters that wirelessly transmit data between a host system and a wired USB device. Using this protocol, wire adapters automatically segment incoming data transfers into smaller segments, wherein a wire adapter uses its buffer status to determine how much data to fetch. Data is transferred downstream without waiting to receive a complete data segment when a wire adapter receives a specified minimum amount of data from upstream. The enhanced protocol also dispenses with Transfer Complete messages and instead determines when a data transfer has completed by polling downstream for a transfer result. The wire adapters also employ forward pipe descriptors in conjunction with remote pipe descriptors to forward transfer requests downstream.

Another embodiment of the present invention provides a Wireless USB (WUSB) hub that allows wireless communication between wired USB devices and a host system. The WUSB hub acts as a proxy for the wired USB devices and presents them to the host system as if they were native WUSB devices. The WUSB hub presents an attached wired USB device as a unique WUSB device with its own device address or as a separate function on an already existing device (the WUSB hub for instance, which may enumerate as a Device Wire Adapter).

Embodiments of the present invention include improving the throughput of WUSB Wire Adapter systems. One embodiment includes streamlining the Wire Adapter Protocol to improve the throughout of WUSB Wire Adapter systems. Another embodiment, includes presenting wired USB devices plugged into a WUSB hub as if they are "native" WUSB devices. This embodiment is referred to as a USB Device Proxy WUSB Hub, or simply WUSB hub.

Figure 1 shows the standard configuration of a wired USB system in accordance with the prior art. In this configuration, the host system 100 includes the USB root hub hardware 101, USB root hub driver 102, and a device driver 103. The external USB device 110 includes adapter hardware of its own 111 and software 112 related to its functions. The host 100 and external device 110 are connected by a wired USB connection 120 which plugs into the respective USB adapters 101, 111.

Figure 2 shows a configuration for a Wireless USB system with a "native" WUSB device directly attached to WUSB host. The system depicted in Figure 2 is similar in layout to that depicted in Figure 1, with the major difference being that both the host 200 and the external USB device 210 have built-in wireless adapters 201, 211, respectively. These adapters 201, 211 communicate over a wireless signal provided by antennae 220, 221 instead of via a wired cable. The native Wireless USB system in Figure 2 represents the goal which much of the computer/electronics industry is attempting to reach. Currently,

however, very few devices have native wireless capability. Therefore, it is desirable for the industry to accommodate systems containing both wired and wireless USB devices and hosts.

The current solution for connecting wired USB devices into WUSB systems is to plug them into a Device Wire Adapter (DWA), depicted in Figure 3. Wired USB devices 310, 320 are plugged into the DWA 300 using standard USB cables 311, 321. The DWA 300 in turn provided a wireless antenna 301 that provides a wireless link to a USB host.

A corresponding Host Wire Adapter (HWA) may be used by the host system to communicate with the DWA, or the DWA may communicate with the host system through a "native" WUSB host adapter.

Figure 4 shows a system incorporating Device Wire Adapters and a Host Wire Adapter to provide wireless USB functionality to legacy wired USB devices. This example shows the Host Wire Adapter (HWA) 410 connected to the host 400 as an external device, which is typical of current designs. Eventually, the HWA 410 will be replaced by a native WUSB host adapter embedded inside the host 400 system.

Because the HWA 410 and DWAs 410, 420 are recognized as USB devices, the host system 400 incorporates multiple software driver layers to enable communication with wired external USB devices 421, 422, 431, 432 via the HWA 410 and DWAs 420, 430.

The host 400 has a wired USB root hub 401 to which the HWA 410 is connected (whether external or internal to the host housing). Next is the root hub driver 402. The host has a separate HWA driver 403 as well as a DWA driver 404. On top of these are device drivers 405-408 that are specific to the external USB devices 421, 422, 431, 432 at the end of the chain. Each of the device drivers 405-408 attaches to and communicates with the DWA driver 404.

Data is communicated from the host 400 to the HWA 410 through a wired connection. The HWA 410 then uses a wireless protocol to transmit the data to one of the DWAs 420, 430, which in turn sends the data to the specified USB device 421, 422, 431, or 432 over a wired connection.

Figure 5 shows the sequence of packets used to communicate over the wireless USB system depicted in Figure 4. Due to the presence of the HWA and DWA in the system, the packet sequence 500 includes control packets inserted ahead of the data to tell the DWA which port to route the data through and get an acknowledgement. This occurs for each HWA and DWA in the system between the external device and the host.

In the example shown in Figure 5, the data packet 504 is preceded by Transfer Request 503, while Transfer Request 502 is preceded by Transfer Request 501. Transfer Requests 501 and 503 direct the HWA to send Transfer Request 502 and data packet 504 to the DWA. Transfer Request 502 directs the DWA to send data packet 504 to the USB device. A transfer request only appears as such to its

intended device. For example, the DWA transfer request 502 looks like data to the HWA but looks like a transfer request to the DWA.

As explained above, the current wireless USB systems use control packets (Transfer Requests) which are generated by multiple layers of drivers between the external device and its specific driver in the host in order to direct the flow of data to or from the target USB device. Unfortunately, this design dramatically hampers throughput.

Figures 6A and 6B are sequence diagrams illustrating the process flow for an IN request using the standard wire adapter protocol. Figures 7A and 7B are sequence diagrams illustrating the process flow for an OUT request using the standard wire adapter protocol. These sequence diagrams graphically illustrate the large number of Transfer Requests necessary under the standard protocol in order to transfer data between the external USB device and its driver. Much of this complexity comes from the fact the transfer requests intended for one layer of the system are seen as data by other layers, thereby invoking acknowledgements for data receipt at each layer of the system before finally delivering the data itself to the destination.

An embodiment of the present invention includes an Enhanced Wire Adapter Protocol that improves throughput by reducing the number of messages that are exchanged as a part of data transfer, thereby reducing processing time and transfer time of the messages over the wired USB interfaces and wireless medium. Throughput is also increased by improving "pipelining" of data flow through the system, which reduces transfer latency.

The enhanced Wire Adapter Protocol eliminates the Transmit Complete message and instead uses polling for Transfer Result to determine when a transfer has completed. IN data transfers may be automatically segmented ("auto-segmentation") into smaller transfers by Wire Adapters. This pushes the intelligence functions onto the Wire Adapters and away from the host software (i.e. the DWA manages the buffer). During the auto-segmentation the size of each segment may vary, whereby the Wire Adapter dynamically and adaptively adjusts the segment size in order to maximize throughput for a given situation. The Wire Adapter automatically manages its available buffers by issuing IN tokens for pending transfers based on buffers being available to accept the IN data.

In an embodiment of the present invention, a Wire Adapter driver segments a transfer request and submits all of these at once. The DWA automatically manages memory to complete each segment. For IN data, the Wire Adapter checks for memory before starting the IN transfers and for OUT data, negative acknowledgements are used to backpressure a segment for which the Wire Adapter does not have enough memory.

In an embodiment of the present invention, multiple transfers between a USB host and an HWA over the upstream USB interface may be aggregated into a single USB transfer in order to reduce transfer latency. In particular, a USB host may aggregate multiple OUT transfers targeted for an HWA, and an

HWA may aggregate multiple IN transfers targeted for a USB host. The receiver of aggregated transfers (HWAs in the case of OUT transfers and USB hosts in the case of IN transfers) de-aggregates aggregated transfers before further processing of the data. Receivers determine data boundaries in aggregated frames by parsing the content of aggregated transfers.

For example, a USB host may aggregate an OUT Transfer Request with the following OUT transfer data. The HWA receiving the aggregated transfer expects the next transfer to be a Transfer Request. It examines the first byte of the aggregated transfer in order to determine the length of the Transfer Request contained in the aggregated transfer. The wRPipe field in the Transfer Request is used to locate the associated wRPipe Descriptor, which is then used to determine that the Transfer Request is an OUT Transfer Request. Because the Transfer Request is an OUT request, the HWA treats the data in the aggregation transfer following the Transfer Request as OUT Transfer Data.

Hosts and HWAs may aggregate transfers up to a maximum length of *wMaxPacketSize* as expressed in the Standard Endpoint Descriptor for the endpoint over which the transfer occurs. Hosts and HWAs using aggregation must be prepared for every transfer to receive up to *wMaxPacketSize* bytes. For IN transfers hosts must issue an input request for wMaxPacketSize bytes. HWAs may de-aggregate "on-the-fly" as complete Control Transfers and data transfers are received,. "On-the-fly" de-aggregation can help with buffer management and dataflow and may reduce end-to-end latency.

The decision of when to aggregate and how many transfers to aggregate is implementation dependant. Typically "opportunistic" algorithms are used to make aggregation decisions. A host or HWA aggregates available transfers up to *wMaxPacketSize*.

For OUT transfer data packets the enhanced Wire Adapter Protocol uses packets that "cut-through" rather than being passed using "store and forward" transfer. Using this new approach, whenever some minimum amount of OUT data is received from the upstream port, the Wire Adapter may transfer the data on the downstream port, rather than wait until a complete segment of data is received. Conversely, the Wire Adapter automatically manages its available data buffers by putting "backpressure" on the upstream port by issuing negative acknowledgments (NAKs) when data buffers are not available to hold incoming data.

The enhanced Wire Adapter Protocol allows forwarding of Transfer Requests by a Wire Adapter, thereby reducing the number of messages used to complete data transfer. Referring back to the example in Figure 5, under the enhanced protocol the DWA Transfer Request 502 looks like a Transfer Request to the HWA and not data. Thus the HWA realizes that the incoming Transfer Request is really for the DWA and forwards it to the DWA. Forwarding Pipe (FPipe) descriptors are used in conjunction with Remote Pipe (RPipe) descriptors to control forwarding of Transfer Request packets.

Referring to Figure 11, diagram 1100 illustrates packet flow and processing for an OUT Transfer Request forwarding in an embodiment of the present invention. Diagram 1100 focuses on DWA behavior

for completing a transfer when Transfer Request forwarding is implemented and the Transfer Complete message has been eliminated as discussed above. A USB application on the host presents to the DWA driver a request to transfer data that is targeted for a USB device 1102 attached to the DWA 1104. The data 1106 to be transferred is provided with the transfer request 1108. The DWA and HWA host drivers generate a Transfer Request OUT packet and en-queue the Transfer Request and Transfer Data for transfer to the HWA 1110 over the wired USB bus. The Transfer Request 1108 contains in the wRPipe field 1112 an FPipe Descriptor number 1114 (0x8001) which references the FPipe Descriptor 1116 in the HWA 1110 to be used to forward the Transfer Request 1108.

The HWA 1110 receives the Transfer Request OUT packet 1108, followed by the Transfer Data 1106, from the upstream wired USB bus. The HWA parses the Transfer Request 1108 and locates the wRPipe field 1112 in the Transfer Request 1108. In this particular example, the wRPipe field 1112 contains 0x8001.

The HWA 1110 determines that the wRPipe number 1114 refers to an FPipe descriptor 1116 because the most significant bit of the wRPipe number 1114 is a one. This indicates to the HWA 1110 that the corresponding pipe descriptor is found in the FPipe Descriptor table 1118 (rather than the RPipe Descriptor table), and that the Transfer Request 1108 should be forwarded. In this particular example, since the wRPipe number 1114 is 0x8001, the index of the FPipe Descriptor 1116 in the FPipe Descriptor Table 1118 is 0x0001. The HWA 1110 locates FPipe Descriptor 1116 0x0001 in the FPipe descriptor table 1118.

The wRPipeIndex field 1120 in FPipe Descriptor 0x0001 (1116) is used to locate the Transfer Request RPipe Descriptor 1122. In this particular example the RPipe Descriptor index 1124 is 0x0001. The HWA 1110 determines the transfer request target device address, device endpoint and direction using the bDeviceAddress and bEndpintAddress 1126 in the RPipe Descriptor 1122. In this example, the Transfer Request 1108 is an OUT, which indicates to that the HWA 1110 to expect Transfer Data 1106 following the Transfer Request 1108 on the upstream USB bulk IN endpoint 1128, and the HWA should use OUT RPipe Descriptor 0x0001 (1122) for delivering both the forwarding Transfer Request 1130 and the Transfer Data 1132.

The HWA 1110 uses the received Transfer Request 1108 to generate a forwarding Transfer Request 1130 by replacing the wRPipe field 1112 in the received Transfer Request 1108 with the wForwardRPipe value 1134 in the FPipe Descriptor 1116.

The HWA 1110 en-queues on the downstream wireless interface 1136 for transfer to the DWA 1104 the forwarding Transfer Request 1130 and the Transfer Data 1132 (once the data has been received on the upstream USB Bulk OUT endpoint 1128). The HWA adds the two byte WUSB header to the beginning of the Transfer Request packet and to the beginning of each data packet in the transfer before en-queuing them on the downstream wireless interface 1136.

Once the forwarding Transfer Request 1130 and Transfer Data 1132 have been transferred to the DWA 1104, the HWA 1110 examines the bControl field 1138 in the OUT RPipe descriptor 1122 (0x0001, which was used to deliver the Transfer Request 1108 and Data 1106) and determines that the Automatic Request and Forwarding of Transfer Results and Transfer Data option is enabled (bit zero in the bControl field). The HWA 1110 then uses the wTransferRPipe field 1140 in the OUT RPipe Descriptor 1122 in order to locate the RPipe Descriptor 1142 associated with the bulk IN pipe 1144 of the downstream DWA 1104. Associated with the IN RPipe Descriptor 1142 is a Pending Transfer list (not shown in the diagram 1100). The HWA 1110 adds an entry in the Pending Transfer list that indicates that a Transfer Result for an OUT transfer is expected from the downstream DWA bulk IN pipe 1144.

Because of the entry in the IN RPipe Pending list indicating that a Transfer Result 1146 is expected, the HWA 1110 begins issuing IN tokens to the bulk IN endpoint 1144 on the downstream DWA 1104 in order to receive the expected Transfer Result 1146.

When the Transfer Result 1146 is received from the DWA 1104, the HWA 1110 uses the SrcAddr field in the packet MAC header and the Endpoint Number field in the WUSB header in order to locate the RPipe descriptor associated with the device and endpoint from which the Transfer Result was received. In this particular example, the device is the DWA 1104, the endpoint is the DWA bulk IN endpoint, and the corresponding RPipe in the HWA for the DWA endpoint is RPipe Descriptor 0x0002 (1148).

The HWA 1110 locates in the RPipe Pending Transfer list the entry corresponding with the received Transfer Result 1146, based on matching Transfer IDs in the Transfer Result 1146 and Pending Transfer list. The HWA 1110 determines that from the Pending Transfer list entry that the Transfer Result 1146 is for an OUT transfer and therefore no data follows the Transfer Result 1146.

The HWA 1110 examines the bControl field 1150 in IN RPipe descriptor 0x0002 (1142) and determines that the Automatic Request and Forwarding of Transfer Results and Transfer Data option is enabled (bit zero in the bControl field). Based on this option being enabled, the HWA 1110 automatically en-queues the Transfer Result packet 1146 on the upstream USB interface bulk IN endpoint 1152 for transfer to the host. The HWA 1110 then deletes the entry in the RPipe Descriptor 0x0002 (1142) Pending Transfer list corresponding to the expected Transfer Result 1146.

The HWA host driver maintains pending transfer records similar to the Pending Transfer list in the HWA 1110. Based on the pending transfer records the HWA driver expects a Transfer Result 1146 for the previously transmitted Transfer Request 1108, and therefore the HWA driver requests an IN transfer which causes IN tokens to be sent to the HWA wired USB interface bulk IN endpoint 1152. The HWA sends the Transfer Result to the host as soon as the Transfer Result 1146 comes to the top of the bulk IN queue and an IN token is received. When the Transfer Result 1146 is passed to the HWA driver

the HWA 1110 updates its records based on the information in the Transfer Result 1146, and the WUSB transfer is complete.

Referring to Figure 12, diagram 1200 illustrates packet flow and processing for an IN Transfer Request forwarding in an embodiment of the present invention. The packet flow and processing for the IN Transfer Request forwarding is similar to the packet flow and processing for the OUT Transfer Request forwarding. The differences are as follows:

The wRPipe field 1202 (0x8002) in the IN forwarding Transfer Request 1204 references an FPipe Descriptor 1206 (0x0002) containing a wRPipeIndex field 1208 (0x0002) that references an IN RPipe 1210. Because the RPipe in this case is for an IN, the HWA 1212 does not expect Transfer Data to follow the Transfer Request 1204, and therefore forwards the Transfer Request 1204 with no following data.

The HWA 1212 uses wTransferRPipe field 1211 in the IN RPipe 1210 (0x0002) to locate the OUT RPipe 1214 that is used to deliver the Transfer Request 1204. After the Transfer Request 1204 is transferred to the DWA 1216, the HWA 1212 adds an entry in the Pending Transfer list that indicates that a Transfer Result 1218 for an IN transfer is expected from the downstream DWA bulk IN pipe 1219.

When the HWA 1212 receives the Transfer Result 1218, it then attempts to read from the downstream DWA bulk IN endpoint 1219 the number of bytes indicated in the dwTransferLength field of the received Transfer Result 1218. The HWA 1212 expects the data because the corresponding entry in the Pending Transfer list indicates an IN transfer.

After the HWA 1212 receives the expected data, it en-queues the Transfer Result 1218 and Transfer Data 1220 on the upstream wired USB bulk IN endpoint 1222, for transfer to the host. If automatic segmentation is enabled, the HWA 1212 may segment the data and en-queue a Transfer Result with each data segment. The bTransferSegment field in each Transfer Result is set to the segment number.

For Transfer Request forwarding the Wire Adapter host driver maintains an association between Transfer IDs in a Transfer Request accepted from another Wire Adapter host driver and the resulting transfer generated by the Wire Adapter. It then uses this association to modify the Transfer ID in Transfer Request and Transfer Result packets.

Transfer IDs are 32 bit values used by Wire Adapter drivers and Wire Adapters to uniquely identify transfers and to associate packets with specific transfers. For each transfer initiated by a HWA or DWA host driver, a unique Transfer ID is generated and placed in the corresponding Transfer Request. When generating Transfer Result packets, HWAs and DWAs place in the Transfer Result the Transfer ID from the Transfer Request for the transfer.

With the standard Wire Adapter Protocol, Transfer IDs are unique in the context of a DWA or HWA driver instance and corresponding Wire Adapter. Take for example the case of a DWA attached to

an HWA which in turn is attached to a host. When the DWA driver generates a Transfer Request it selects a unique Transfer ID to place in the Transfer Request. The HWA driver and HWA deliver the DWA drive Transfer Request to the DWA without examining the content of the Transfer Request (as far as the HWA sub-system is concerned, the Transfer Request is data to be transferred). When the Transfer Request is delivered to the DWA the DWA parses the Transfer Request in order to determine what to do, and uses the Transfer ID in the resulting Transfer Response.

However, in order for the HWA driver to deliver the DWA Transfer Request, the HWA driver generates its own Transfer Request for the HWA. The Transfer ID placed in the HWA Transfer Request that is used to deliver the DWA Transfer Request is unrelated to the Delivery ID in the DWA Transfer Request. Stated differently, each Wire Adapter driver "layer" maintains its own set of unique Transfer IDs and is unaware of the Transfer IDs generated and used by other Wire Adapter drivers.

However, when Enhanced Wire Adapter Protocol Transfer Request Forwarding is being used handling of Transfer IDs is necessarily different than with the standard protocol. When a Transfer Request is forwarded from one Wire Adapter to another, the Transfer Request is processed by both the forwarding and target Wire Adapters, and the Transfer ID is used by both Wire Adapters. In this case both Wire Adapters are working with the same set of Transfer IDs. The same is true of forwarded Transfer Result packets, the same Transfer ID is used by one or more Wire Adapters.

Forwarding does not require special handling of Transfer IDs by the Wire Adapters, but does require specific processing by the host drivers. If forwarding is being used by a host driver and its corresponding Wire Adapter, then when the host driver accepts a Transfer Request from another ("upstream") host driver it parses the Transfer Request to locate the Transfer ID. The host driver then generates a new Transfer ID that is unique within the scope of the driver and Wire Adapter and places the new Transfer ID in the Transfer Request before forwarding it to the next driver. The host driver also creates a record that provides the association between the Transfer ID provided by the upstream Wire Adapter and the Transfer ID generated by the host driver.

Then, when the host driver receives a Transfer Result, it looks up the Transfer Result Transfer ID it its Transfer ID association table and determines that the corresponding Transfer Request was forwarded. It then replaces the Transfer ID with the value from the Transfer ID association table (i.e. with the original Transfer ID) before passing the Transfer Result to the original requesting driver. In this way the effect of forwarding on Transfer IDs by a "downstream" driver is made transparent to a host "upstream" driver.

Alternately, implementations are possible where a single host driver manages two or more serially connected Wire Adapters (for example a DWA connected to a HWA). In this case the single host driver is fully aware of the effect of forwarding and can account for it by generating Transfer IDs that are used by both the DWA and HWA.

Under the enhanced protocol a Wire Adapter automatically polls a downstream Wire Adapter for Transfer Result packets based on a previous Transfer Request to that downstream Wire Adapter. Similarly, the Wire Adapter forwards any received Transfer Result to the upstream interface rather than generating and forwarding a Transmit Complete and new Transfer Result.

Rather than the poll for downstream data initiated by receiving a Transfer Request from the host driver, the Wire Adapter automatically polls a downstream device for IN data based on previously receiving a Transfer Result for an IN data transfer. Similarly, rather than generating and forwarding a Transmit Complete and new Transfer Result, the Wire Adapter simply forwards IN Transfer Data to the upstream interface after reception.

In one embodiment of the present invention Multiple Wire Adapter drivers (HWA and DWA) may be combined into a single Wire Adapter driver in order to reduce the number of Application Programming Interfaces (APIs) and therefore the latency incurred by passing of messages across the APIs. In addition, combining multiple Wire Adapter drivers allows consolidation in the assignment of Transfer IDs, such that when Transfer Request forwarding is being used the need to maintain the association between Transfer IDs in Transfer Request presented from an upstream driver and the Transfer IDs in issued Transfer Request is eliminated.

Figure 8 is a sequence diagram illustrating the process flow for an IN request using the enhanced wire adapter protocol as an embodiment in accordance with the present invention. Figure 9 is a sequence diagram illustrating the process flow for an OUT request using the enhanced wire adapter protocol as an embodiment in accordance with the present invention. Figures 8 and 9 illustrate the reduction in control overhead provided by the enhanced Wire Adapter Protocol in comparison to the sequence diagrams shown in Figures 6A, 6B, 7A, and 7B depicting the existing protocol.

Figure 10 shows a Wireless USB hub as an embodiment in accordance with the present invention. As explained above, the current Wire Adapter protocol is relatively inefficient, whereas the WUSB protocol for "native" WUSB devices is relatively efficient. The Proxy WUSB Hub 1000 takes advantage of this efficiency by presenting wired USB devices 1010, 1020 as if they are "native" WUSB devices.

The Proxy WUSB Hub 1000 is similar to a DWA in that it has a wireless upstream port 1001 and one or more wired USB downstream ports 1002, 1003, wherein wired USB devices 1010, 1020 may be plugged into the downstream wired USB ports. The WUSB Hub differs from a DWA in that the wired USB devices 1010, 1020 appear to the host system as if they are native WUSB devices. This is accomplished by having the WUSB Hub 1000 "proxy" the attached downstream wired devices on the wireless interface. Therefore, the WUSB hub 1000 appears to the host as one or more WUSB devices, not a DWA, which eliminates much of the control packet overhead used by the standard Wire Adapter Protocol.

An attached wired USB device either 1) is presented as a unique WUSB device with its own device address, or 2) is presented as a separate function on an already existing device (the WUSB hub for instance, which may enumerate as a DWA). With this latter approach the wired device endpoints are mapped into WUSB hub endpoints.

The WUSB Hub uses various mechanisms in order to properly proxy a USB device to the host as if it is a WUSB device. The following description applies to the case when the WUSB hub presents downstream USB devices as WUSB devices, rather than as functions on the DWA.

Each WUSB device maintains a security connection context. The connection context is negotiated during first-time connection. The WUSB Hub negotiates the security connection context for the USB devices without the knowledge or involvement of the downstream devices and stores the security connection context. A sufficient number of unique security connection contexts are negotiated and maintained in order to support the maximum number of downstream USB devices that the WUSB hub is capable of simultaneously proxying. A specific connection context is not tied to a particular downstream USB device, rather the connection contexts are applied as needed when USB devices are attached.

The WUSB hub maintains a unique WUSB device address for each attached proxy USB device, and it participates in the WUSB protocol as if it were the WUSB devices it is proxying, rather than appearing as an intervening device (like a DWA).

The WUSB Hub detects USB attachment either directly or by intercepting interrupt packets from attached downstream hubs. Upon detecting attachment of downstream devices the WUSB hub does not forward interrupt packets to the host or directly inform the host of USB attachment. Instead, the WUSB hub performs a WUSB device connection procedure on behalf of the USB device.

The WUSB hub reads the descriptors of the USB devices and modifies them so that they are consistent with descriptors for WUSB devices. For example, the maximum packet size field in the Standard Endpoint Descriptor is modified so that it is consistent with WUSB packet sizes. The bmAttributes field in the Standard Configuration Descriptor is set to indicate that the device is self-powered.

For some USB devices which do not use zero-packet-length semantics to indicate the end of transfers, the lengths of IN transfers are used so that the correct number of bytes are read. However, in the case of a WUSB hub, the length of IN transfers is not available with the WUSB protocol. Without transfer requests, there is no previously declared limit on the amount of data to read. Fortunately, the upstream wireless device is provided with the expected length of transfers.

The WUSB protocol is modified slightly in order to support the WUSB hub. Two options are available. In the first option, the maximum packet size field in IN Channel Time Allocation (CTE), Information Elements (IEs) sent in WUSB host Micro-scheduled Management Control (MMC) can be

used to indicate the expected transfer length. Alternatively, a field may be added to CTAs to indicate the expected transfer length.

In an embodiment of the present invention, the WUSB hub includes a controller 1004 to perform the functions and operations of the WUSB hub, discussed above.

For the case in which a WUSB hub proxies one or more downstream USB devices as functions on the WUSB hub/DWA, the above description generally applies, except that the security connection context and WUSB device address is shared with the WUSB hub. In addition, when a USB device attaches, the WUSB hub maps WUSB hub wireless endpoints one-for-one for USB device endpoints and treats the collection of endpoints associated with a particular USB device as a function on the WUSB hub. The WUSB hub informs the host that a new function needs to be enumerated in order to activate support for a newly attached device.

Although embodiments of the present disclosure have been described in detail, those skilled in the art should understand that they may make various changes, substitutions and alterations herein without departing from the spirit and scope of the present disclosure.

WHAT IS CLAIMED IS:

1. A method for increasing throughput for a wireless USB system having a first USB enabled device and a second USB enabled device, comprising:

aggregating a plurality of packets in said first USB enabled device;

transferring said aggregated plurality of packets from said first USB enabled device to said second USB enabled device; and

disaggregating said aggregated plurality of packets in said second USB enabled device after said transferring.

2. The method of claim 1,

including configuring said first USB enabled device as a USB enabled host device;

including configuring said second USB enabled device as a host wire adapter; and

wherein said aggregating said plurality of packets includes aggregating a plurality of OUT transfers targeted to said host wire adapter, said OUT transfers including a control message and data.

3. The method of claim 1,

including configuring said first USB enabled device as a host wire adapter;

including configuring said second USB enabled device as a USB enabled host device; and

wherein said aggregating said plurality of packets includes aggregating a plurality of IN transfers targeted to said USB enabled host device, said IN transfers including a control message and data.

4. A method for increasing throughput for a wireless USB system having a wire adapter and a USB enabled device, comprising:

determining an availability of a data buffer associated with said wire adapter for receiving a transfer from said USB enabled device;

generating a message based on said availability of said data buffer;

providing said message to said USB enabled device indicating whether said data buffer is available to receive said transfer.

5. The method of claim 4,

wherein said USB enabled device is downstream from said wire adapter; and

wherein said message includes a token that indicates said data buffer is available to receive said transfer from said USB enabled device.

6. The method of claim 5, including configuring said wire adapter as a device wire adapter.

7. The method of claim 5, including:

configuring said USB enabled device as a device wire adapter; and

configuring said wire adapter includes a host wire adapter.

8. The method of claim 5, including:

segmenting said transfer into a plurality of transfer segments; and

transferring said plurality of transfer segments from said USB enabled device to said wire adapter.

9. The method of claim 5, including:

transferring said transfer from said USB enabled device to said wire adapter; and

segmenting said transfer into a plurality of transfer segments.

10. The method of claim 9, wherein said plurality of transfer segments vary in size.

11. The method of claim 9, wherein said segmenting includes dynamically and adaptively adjusting the size of at least one of said plurality of transfer segments to maximize throughput for a given situation.

12. The method of claim 4,

wherein said USB enabled device is upstream from said wire adapter; and

wherein said message includes a negative acknowledgement that indicates said data buffer is unavailable to receive said transfer from said USB enabled device.

13. The method of claim 12, including:

configuring said USB enabled device as a host wire adapter; and

configuring said wire adapter as a device wire adapter.

14. The method of claim 12, including:

configuring said USB enabled device as a USB enabled host device; and

configuring said wire adapter as a host wire adapter.

15. The method of claim 12, including:

sending said transfer from said USB enabled device to said wire adapter;

receiving said transfer from said USB enabled device on an upstream port of said wire adapter; and

forwarding said transfer from said upstream port of said wire adapter to a downstream port of said wire adapter when a minimum amount of data is received from said upstream port of said wire adapter.

16. A method for increasing throughput for a wireless USB system having a wire adapter and a downstream wire adapter, comprising:

polling said downstream wire adapter for a packet;

receiving said packet from said downstream wire adapter on a downstream interface of said wire adapter; and

forwarding said packet to an upstream interface of said wire adapter after said receiving said packet.

17. The method of claim 16,

wherein said packet includes a transfer result packet; and

wherein said polling said downstream wire adapter for said transfer result packet is based on previously transmitting a transfer request packet to said downstream wire adapter.

18. The method of claim 16,

wherein said packet includes an incoming data packet; and

wherein said polling said downstream wire adapter for said incoming data packet is based on receiving a transfer request packet from said downstream wire adapter.

19. A method for increasing throughput for a wireless USB system having a first wire adapter and a second wire adapter, comprising:

generating a transfer request to include a descriptor indicating a data transfer type;

sending said transfer request to said first wire adapter; and

forwarding said transfer request from said first wire adapter to said second wire adapter based on said descriptor.

20. The method of claim 19, including forwarding transfer data along with said transfer request when said data transfer type is an OUT transfer.

21. A method for increasing throughput for a wireless USB system having a forwarding wire adapter and a target wire adapter, comprising:

transferring a transfer request packet from said forwarding wire adapter to said target wire adapter; and

polling said target wire adapter for a transfer result packet based on said transfer request packet.

22. A method for communicating between a wired USB enabled device and a first wireless USB enabled device in a wireless USB system, comprising:

detecting said wired USB enabled device; and

presenting said wired USB enabled device as a second wireless USB enabled device to said first wireless USB enabled device.

23. The method of claim 22, further comprising:

reading a device descriptor from said wired USB enabled device;

modifying said device descriptor so that it is consistent with a device descriptor for any wireless USB enabled device as specified by a predetermined wireless USB standard;

determining an expected amount of data to be transferred from said wired USB enabled device to said first wireless USB enabled device;

modifying a predetermined wireless USB protocol to include said expected amount of data; and

providing said expected amount of data to said first wireless USB enabled device.

24. The method of claim 23, wherein,

said device descriptor includes a standard endpoint descriptor, and

said modifying said device descriptor includes setting a maximum packet size field in said standard endpoint descriptor to be consistent with wireless USB packet sizes.

25. The method of claim 23, wherein,

said predetermined wireless USB protocol includes a predetermined wireless USB wire adapter protocol, and

said modifying said predetermined wireless USB protocol includes adding a field in a channel time allocation portion of said predetermined wireless USB wire adapter protocol, said field specifying said expected amount of data.

26. The method of claim 23, wherein,

said predetermined wireless USB protocol includes a predetermined wireless USB wire adapter protocol, and

said modifying said predetermined wireless USB protocol includes setting a maximum packet size field in a channel time allocation portion of said predetermined wireless USB wire adapter protocol, said field specifying said expected amount of data.

27. The method of claim 22, further comprising:

negotiating and maintaining a wireless USB security connection context for communication with said wireless USB enabled device; and

applying said wireless USB security connection context after detecting said wired USB enabled device.

28. The method of claim 22, further comprising maintaining a unique wireless USB device address for said wired USB enabled device, and wherein presenting said wired USB enabled device includes presenting said wired USB enabled device having said unique wireless USB device address.

29. The method of claim 22, further comprising:

mapping a first endpoint associated with said wired USB enabled device to a second endpoint associated with said first wireless USB enabled device; and

informing said first wireless USB enabled device that a new function needs to be enumerated, wherein said new function is associated with said first wireless USB enabled device.

30. The method of claim 23, further comprising:

intercepting a read descriptor request from said first wireless USB enabled device; and

providing said first wireless USB enabled device with a response to said read descriptor request after said modifying said device descriptor.

31. A wireless USB enabled hub that facilitates communication between a wired USB enabled device and a first wireless USB enabled device, comprising:

a first port configured to communicate with said wired USB enabled device;

a second port configured to communicate with said first wireless USB enabled device; and

a controller configured to:

detect said wired USB enabled device;

present said wired USB enabled device as a native wireless USB enabled device to said first wireless USB enabled device.

32. The wireless USB enabled hub of claim 31, wherein,

said controller is configured to present said hub as a device wire adapter to said first wireless USB enabled device, and

said first wireless USB enabled device includes a wireless USB enabled host.

33. The wireless USB enabled hub of claim 31, wherein the controller is configured to present said wired USB enabled device to said first wireless USB enabled device as a unique wireless USB enabled device having its own address.

34. The wireless USB enabled hub of claim 31, wherein the controller is configured to present said wired USB enabled device as a separate function on the wireless USB enabled hub by mapping a wired USB enabled device endpoint to a wireless USB enabled hub endpoint.

35. The wireless USB enabled hub of claim 31, wherein said controller is configured to:

maintain a wireless USB address for each of a plurality of downstream wired USB enabled devices; and

respond to a wireless USB packet directed to one of said plurality of downstream USB enabled devices.

36. The wireless USB enabled hub of claim 31, wherein said controller is configured to:

intercept a device descriptor request from said first wireless USB enabled device;

read a device descriptor from said wired USB enabled device;

modify said device descriptor so that it is consistent with a device descriptor for any wireless USB enabled device as specified by a predetermined wireless USB standard; and

present said wired USB enabled device as said native wireless USB enabled device by providing said modified device descriptor to said first wireless USB enabled device.

37. The wireless USB enabled hub of claim 36, wherein,

said device descriptor includes a standard endpoint descriptor, and

said controller is configured to modify said device descriptor by setting a maximum packet size field in said standard endpoint descriptor to be consistent with wireless USB packet sizes.

38. The wireless USB enabled hub of claim 31, wherein said controller is configured to:

determine an expected amount of data to be transferred from said wired USB enabled device to said first wireless USB enabled device; and

modify a predetermined wireless USB protocol to include said expected amount of data.

39. The wireless USB enabled hub of claim 38, wherein,

said predetermined wireless USB protocol includes a predetermined wireless USB wire adapter protocol, and

said controller is configured to modify said predetermined wireless USB wire adapter protocol by setting a maximum packet size field in a channel time allocation portion, said maximum packet size field specifying said expected amount of data.

40. The wireless USB enabled hub of claim 38, wherein,

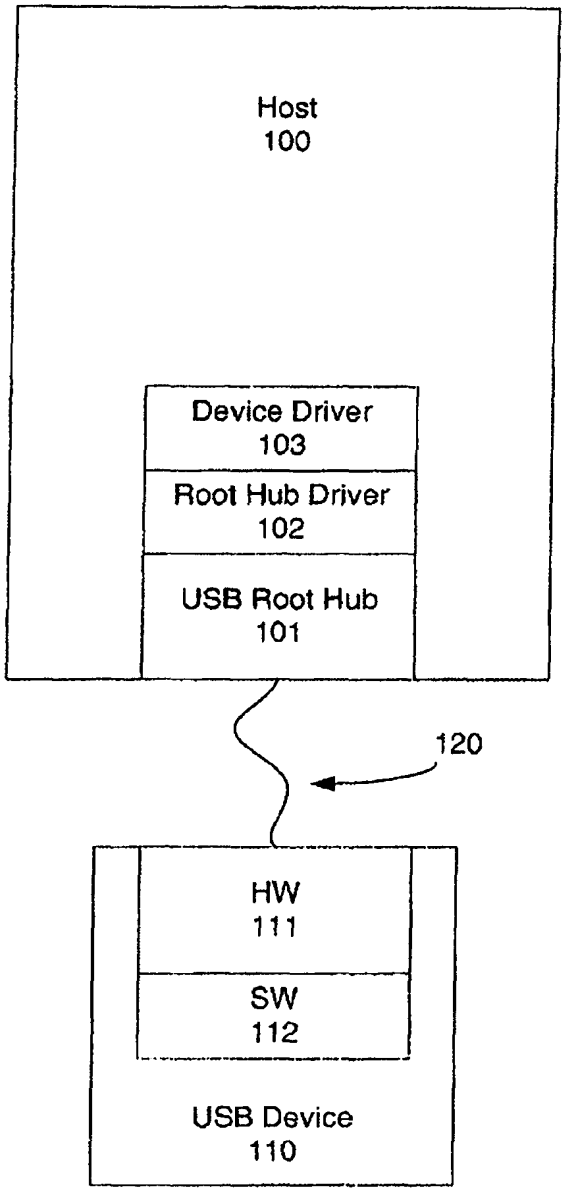
said predetermined wireless USB protocol includes a predetermined wireless USB wire adapter protocol, and

said controller is configured to modify said predetermined wireless USB wire adapter protocol by adding a field in a channel time allocation portion of said predetermined wireless USB protocol, said field specifying said expected amount of data.

41. The wireless USB enabled hub of claim 31, wherein said controller is configured to:

negotiate and maintain a wireless USB security connection context for communication with said wireless USB enabled device; and

apply said wireless USB security connection context after said controller detects said wired USB enabled device.



(Prior Art)

Fig. 1

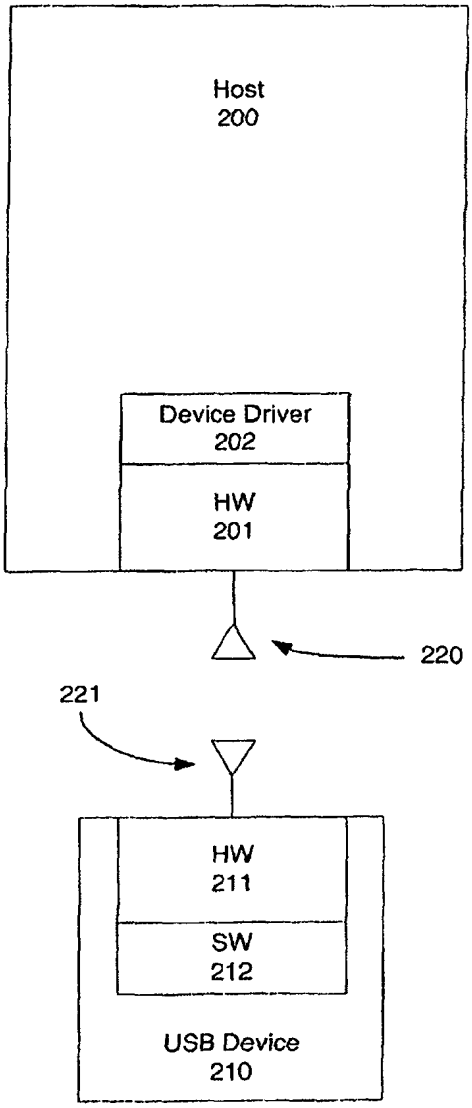

Host
200
Device Driver
202
HW
201
220
221
HW
211
SW
212
USB Device
210

Fig. 2

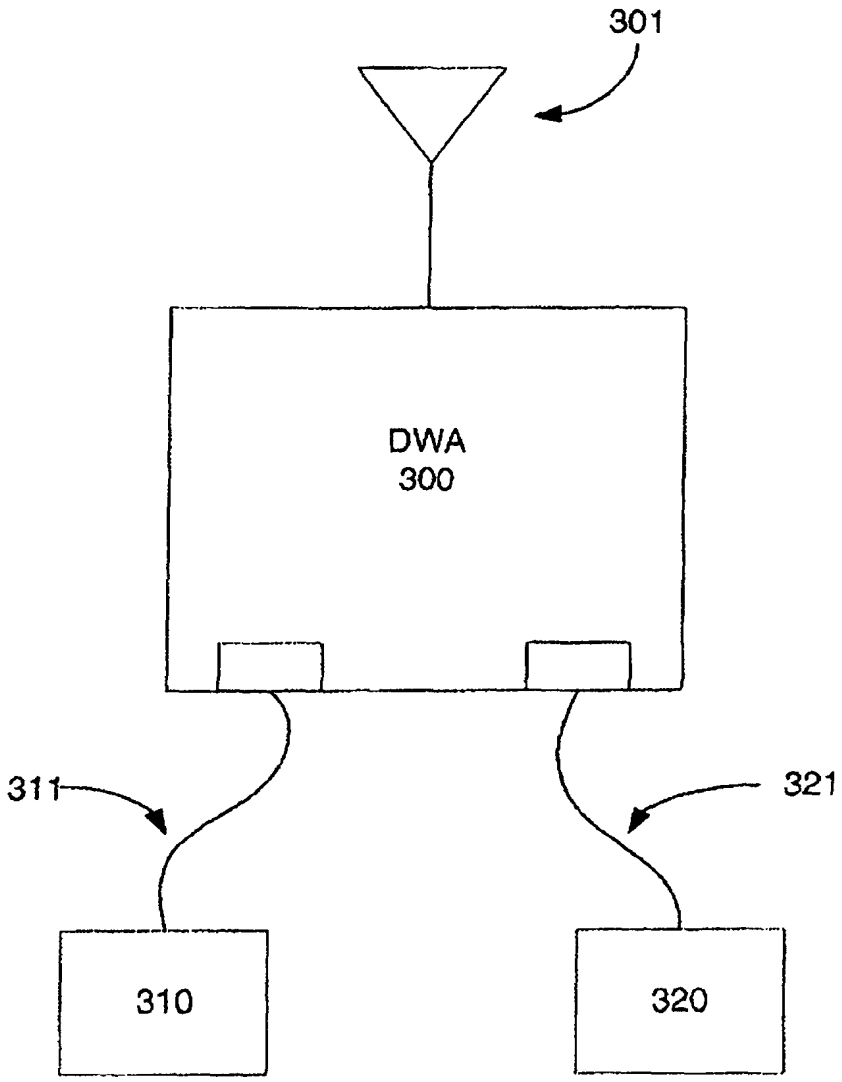


Fig. 3

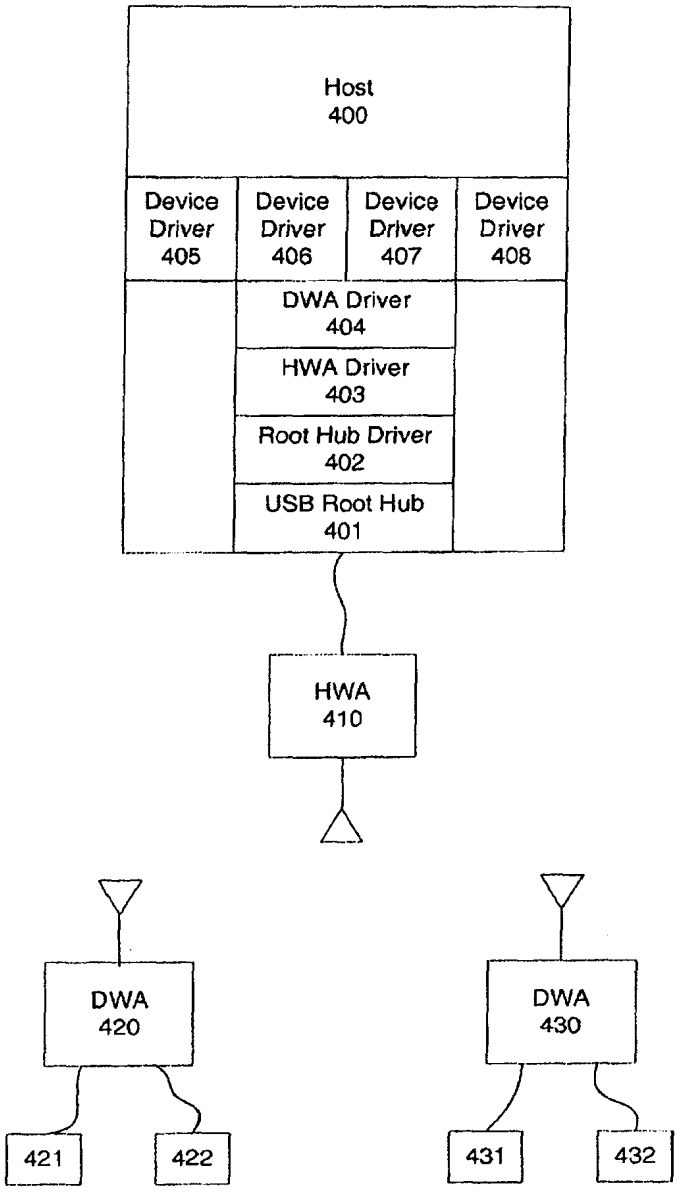

Host
400
Device Driver 405
Device Driver 406
Device Driver 407
Device Driver 408
DWA Driver 404
HWA Driver 403
Root Hub Driver 402
USB Root Hub 401
HWA 410
DWA 420
DWA 430
421
422
431
432

Fig. 4

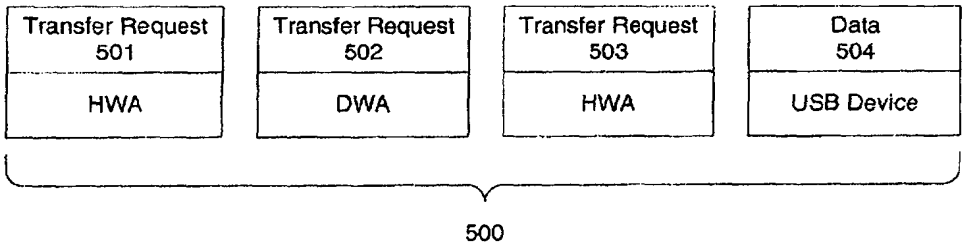

Transfer Request
501
HWA
Transfer Request
502
DWA
Transfer Request
503
HWA
Data
504
USB Device
500

Fig. 5

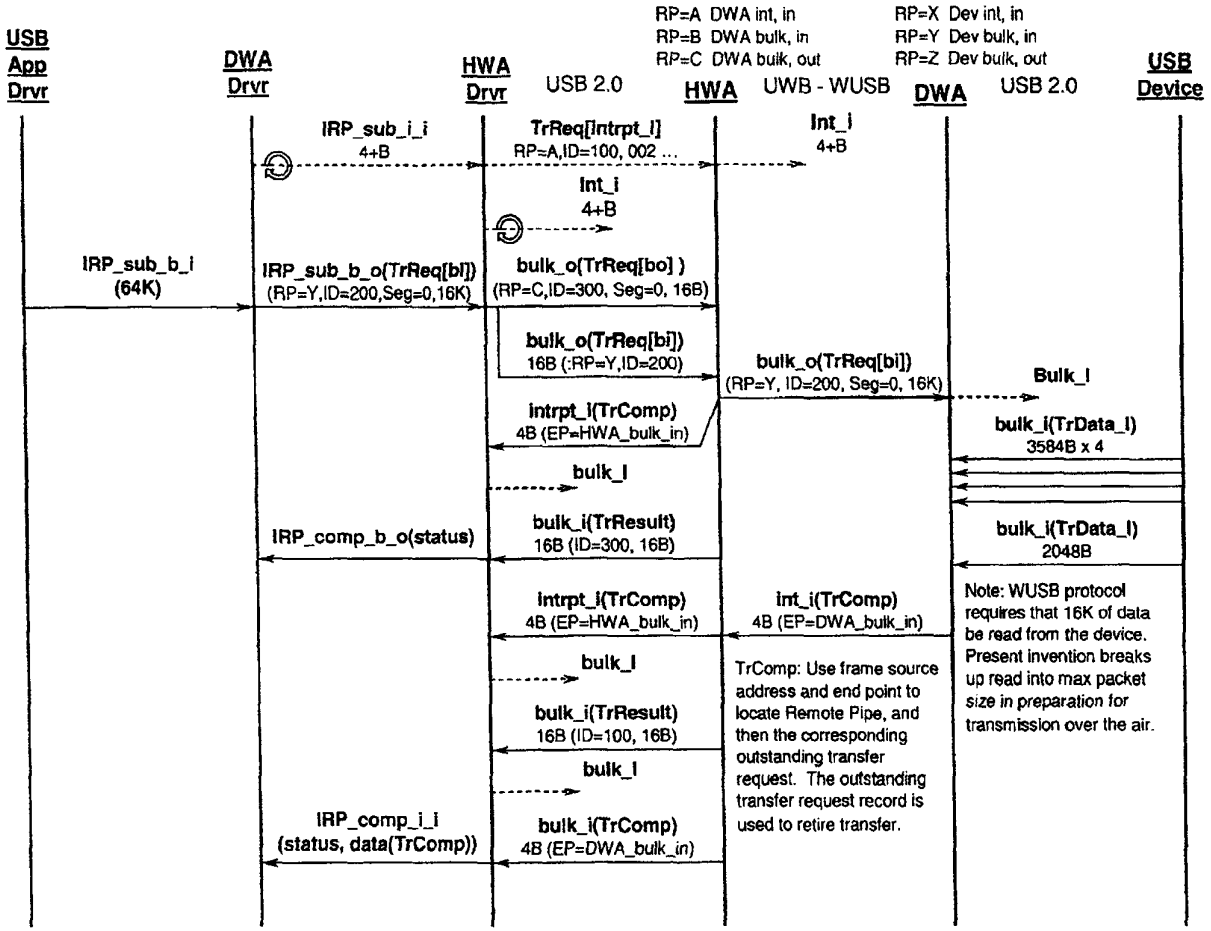

WUSB HWA+DWA IN - Message Sequence Chart
Example – Standard Protocol - 64K IN request, 4 x 16K segments
RP=A DWA int, in
RP=B DWA bulk, in
RP=C DWA bulk, out
RP=X Dev int, in
RP=Y Dev bulk, in
RP=Z Dev bulk, out
USB App Drvr
DWA Drvr
HWA Drvr
USB 2.0
HWA
UWB - WUSB
DWA
USB 2.0
USB Device
IRP_sub_i_i
4+B
TrReq[intrpt_i]
RP=A,ID=100, 002 ...
Int_i
4+B
Int_i
4+B
IRP_sub_b_i
(64K)
IRP_sub_b_o(TrReq[bi])
(RP=Y,ID=200,Seg=0,16K)
bulk_o(TrReq[bo])
(RP=C,ID=300, Seg=0, 16B)
bulk_o(TrReq[bi])
16B (:RP=Y,ID=200)
bulk_o(TrReq[bi])
(RP=Y, ID=200, Seg=0, 16K)
Bulk_I
intrpt_I(TrComp)
4B (EP=HWA_bulk_in)
bulk_i(TrData_I)
3584B x 4
bulk_I
IRP_comp_b_o(status)
bulk_i(TrResult)
16B (ID=300, 16B)
bulk_i(TrData_I)
2048B
intrpt_i(TrComp)
4B (EP=HWA_bulk_in)
int_i(TrComp)
4B (EP=DWA_bulk_in)
Note: WUSB protocol requires that 16K of data be read from the device. Present invention breaks up read into max packet size in preparation for transmission over the air.
bulk_I
TrComp: Use frame source address and end point to locate Remote Pipe, and then the corresponding outstanding transfer request. The outstanding transfer request record is used to retire transfer.
bulk_i(TrResult)
16B (ID=100, 16B)
bulk_I
IRP_comp_i_i
(status, data(TrComp))
bulk_i(TrComp)
4B (EP=DWA_bulk_in)

Fig. 6A

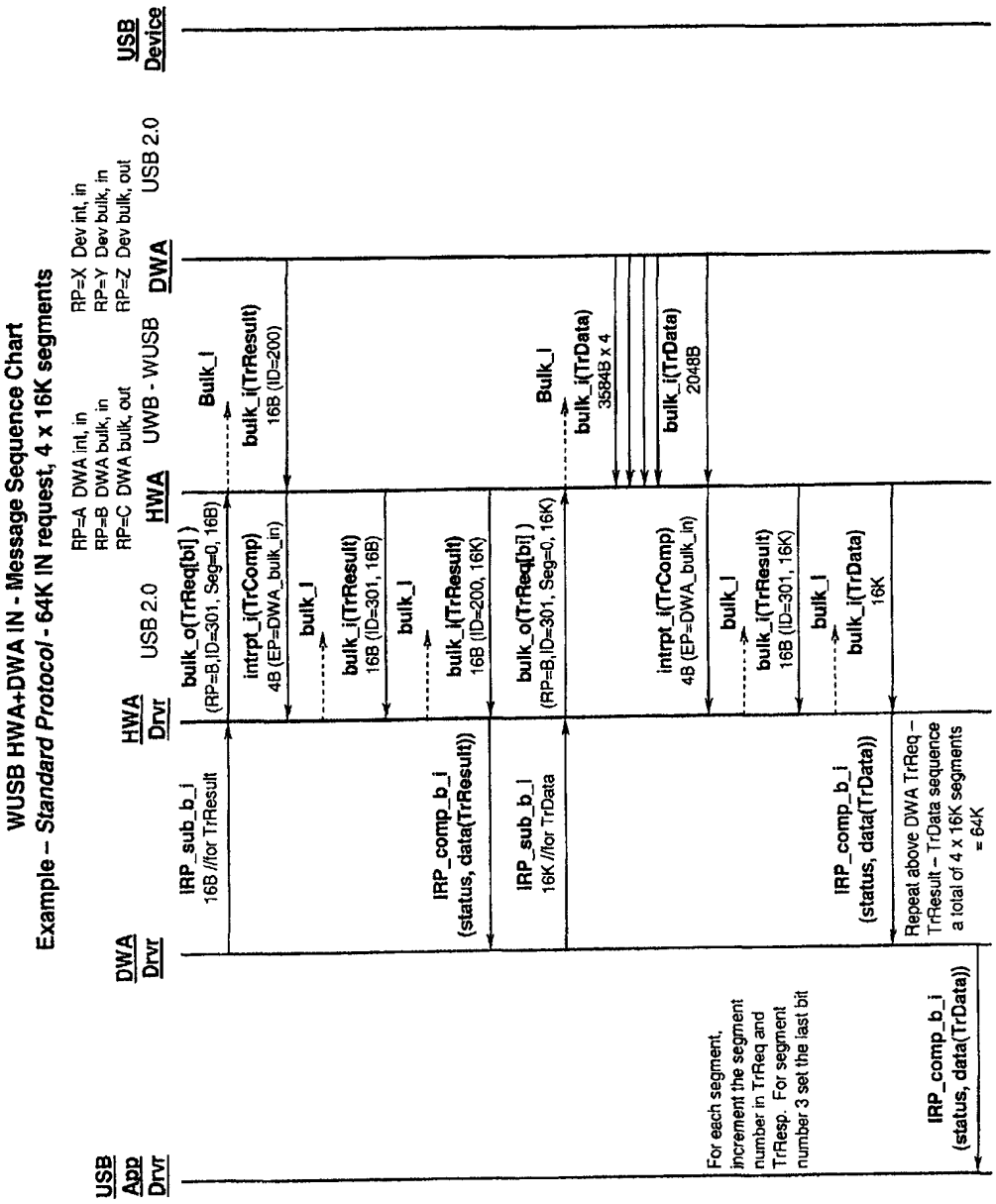

WUSB HWA+DWA IN - Message Sequence Chart
Example – Standard Protocol - 64K IN request, 4 x 16K segments
RP=A DWA int, in
RP=B DWA bulk, in
RP=C DWA bulk, out
RP=X Dev int, in
RP=Y Dev bulk, in
RP=Z Dev bulk, out
USB App Drvr
DWA Drvr
HWA Drvr
USB 2.0
HWA
UWB - WUSB
DWA
USB 2.0
USB Device
IRP_sub_b_i
16B //for TrResult
bulk_o(TrReq[bi])
(RP=B,ID=301, Seg=0, 16B)
Bulk_I
intrpt_i(TrComp)
4B (EP=DWA_bulk_in)
bulk_i(TrResult)
16B (ID=200)
bulk_I
bulk_i(TrResult)
16B (ID=301, 16B)
bulk_I
IRP_comp_b_i
(status, data(TrResult))
bulk_i(TrResult)
16B (ID=200, 16K)
IRP_sub_b_i
16K //for TrData
bulk_o(TrReq[bi])
(RP=B,ID=301, Seg=0, 16K)
Bulk_I
bulk_i(TrData)
3584B x 4
intrpt_i(TrComp)
4B (EP=DWA_bulk_in)
bulk_i(TrData)
2048B
bulk_I
bulk_i(TrResult)
16B (ID=301, 16K)
bulk_I
IRP_comp_b_i
(status, data(TrData))
bulk_i(TrData)
16K
Repeat above DWA TrReq – TrResult – TrData sequence a total of 4 x 16K segments = 64K
For each segment, increment the segment number in TrReq and TrResp. For segment number 3 set the last bit
IRP_comp_b_i
(status, data(TrData))

Fig. 6B

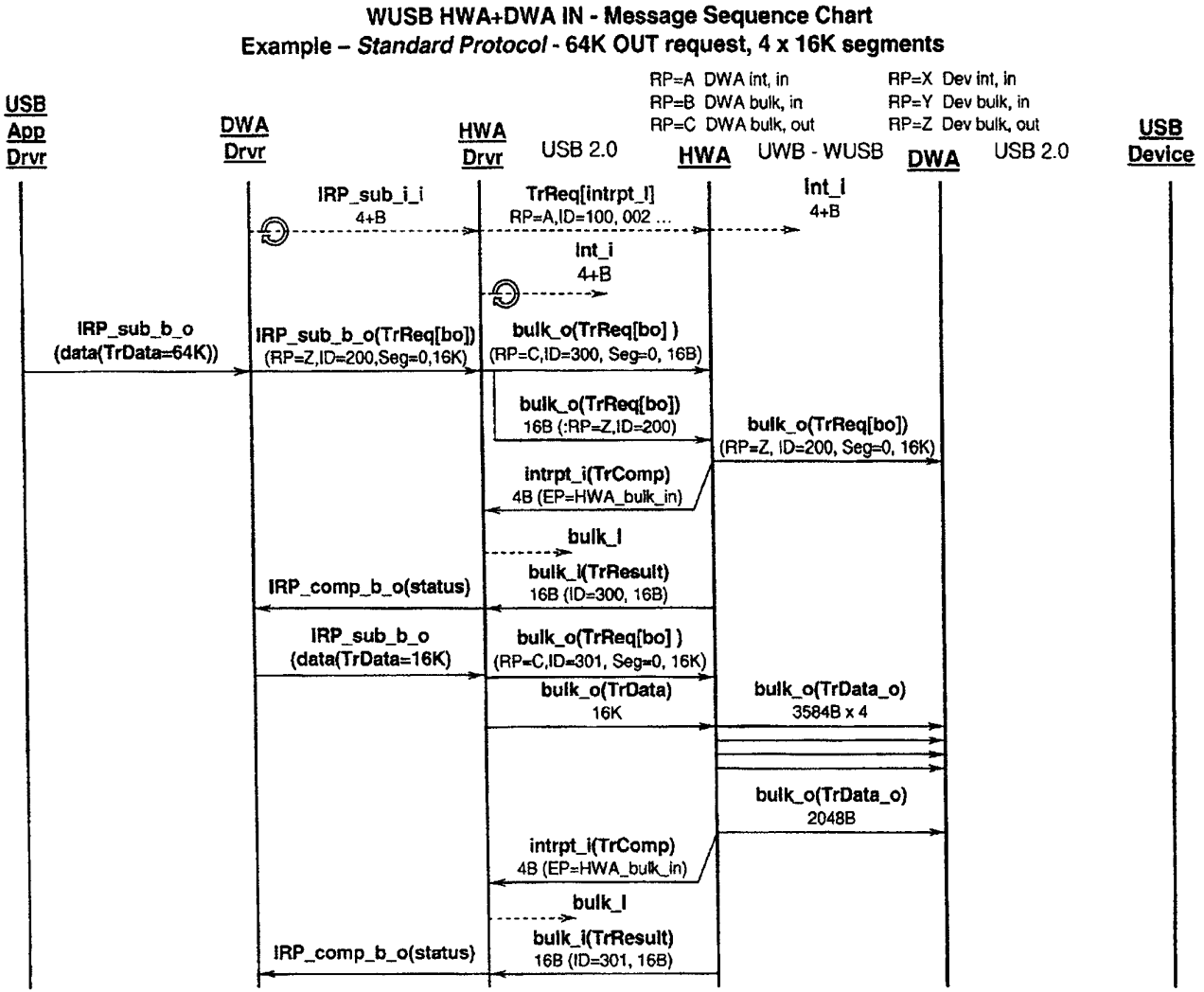

WUSB HWA+DWA IN - Message Sequence Chart
Example – Standard Protocol - 64K OUT request, 4 x 16K segments
RP=A DWA int, in
RP=B DWA bulk, in
RP=C DWA bulk, out
RP=X Dev int, in
RP=Y Dev bulk, in
RP=Z Dev bulk, out
USB App Drvr
DWA Drvr
HWA Drvr
USB 2.0
HWA
UWB - WUSB
DWA
USB 2.0
USB Device
IRP_sub_i_i
4+B
TrReq[intrpt_I]
RP=A,ID=100, 002 ...
Int_I
4+B
Int_i
4+B
IRP_sub_b_o
(data(TrData=64K))
IRP_sub_b_o(TrReq[bo])
(RP=Z,ID=200,Seg=0,16K)
bulk_o(TrReq[bo])
(RP=C,ID=300, Seg=0, 16B)
bulk_o(TrReq[bo])
16B (:RP=Z,ID=200)
bulk_o(TrReq[bo])
(RP=Z, ID=200, Seg=0, 16K)
intrpt_i(TrComp)
4B (EP=HWA_bulk_in)
bulk_I
bulk_i(TrResult)
16B (ID=300, 16B)
IRP_comp_b_o(status)
IRP_sub_b_o
(data(TrData=16K)
bulk_o(TrReq[bo])
(RP=C,ID=301, Seg=0, 16K)
bulk_o(TrData)
16K
bulk_o(TrData_o)
3584B x 4
bulk_o(TrData_o)
2048B
intrpt_i(TrComp)
4B (EP=HWA_bulk_in)
bulk_I
bulk_i(TrResult)
16B (ID=301, 16B)
IRP_comp_b_o(status)

Fig. 7A

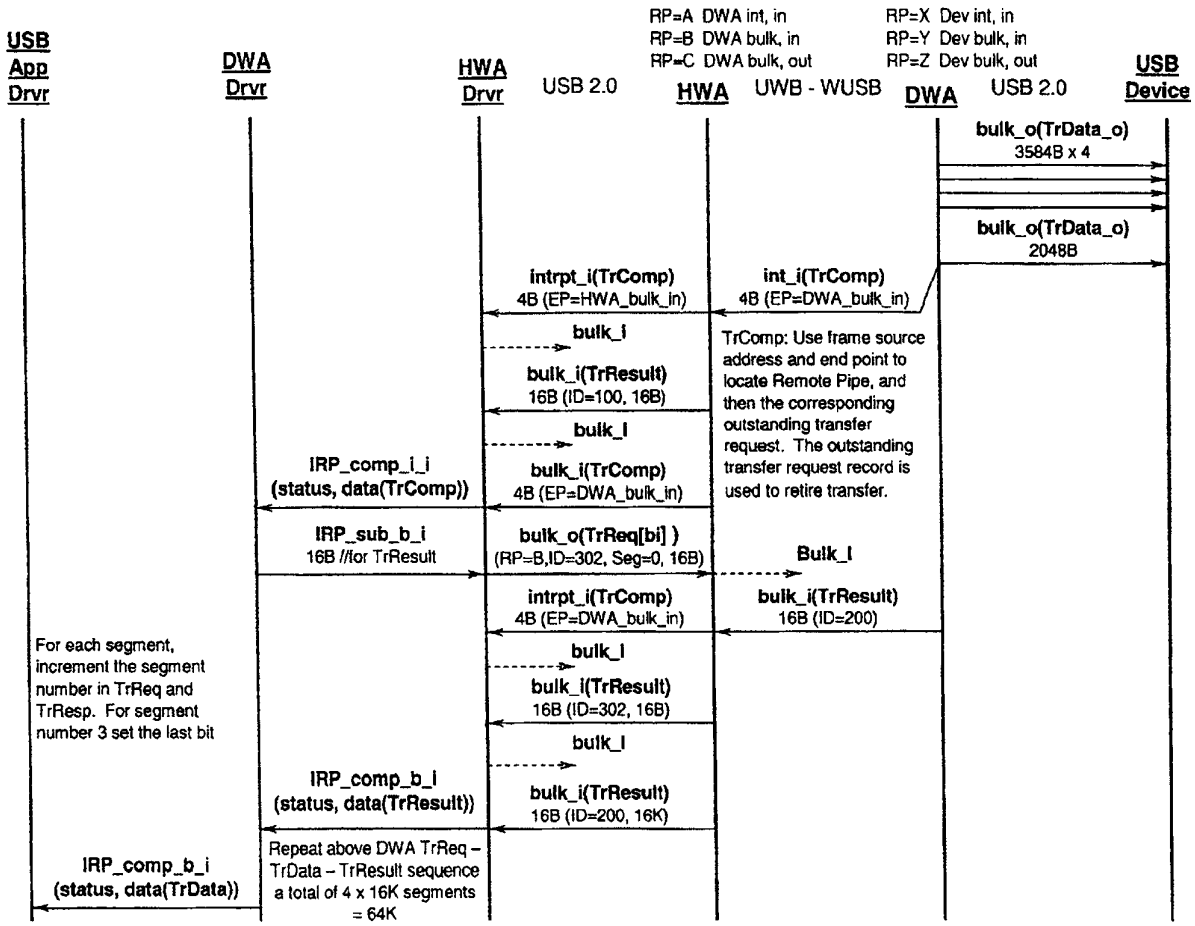

WUSB HWA+DWA IN - Message Sequence Chart
Example – Standard Protocol - 64K OUT request, 4 x 16K segments
RP=A DWA int, in
RP=B DWA bulk, in
RP=C DWA bulk, out
RP=X Dev int, in
RP=Y Dev bulk, in
RP=Z Dev bulk, out
USB App Drvr
DWA Drvr
HWA Drvr
USB 2.0
HWA
UWB - WUSB
DWA
USB 2.0
USB Device
bulk_o(TrData_o) 3584B x 4
bulk_o(TrData_o) 2048B
intrpt_i(TrComp) 4B (EP=HWA_bulk_in)
int_i(TrComp) 4B (EP=DWA_bulk_in)
bulk_I
TrComp: Use frame source address and end point to locate Remote Pipe, and then the corresponding outstanding transfer request. The outstanding transfer request record is used to retire transfer.
bulk_i(TrResult) 16B (ID=100, 16B)
bulk_I
IRP_comp_i_i (status, data(TrComp))
bulk_i(TrComp) 4B (EP=DWA_bulk_in)
IRP_sub_b_i 16B //for TrResult
bulk_o(TrReq[bi]) (RP=B,ID=302, Seg=0, 16B)
Bulk_I
intrpt_i(TrComp) 4B (EP=DWA_bulk_in)
bulk_i(TrResult) 16B (ID=200)
For each segment, increment the segment number in TrReq and TrResp. For segment number 3 set the last bit
bulk_I
bulk_i(TrResult) 16B (ID=302, 16B)
bulk_I
IRP_comp_b_i (status, data(TrResult))
bulk_i(TrResult) 16B (ID=200, 16K)
IRP_comp_b_i (status, data(TrData))
Repeat above DWA TrReq – TrData – TrResult sequence a total of 4 x 16K segments = 64K

Fig. 7B

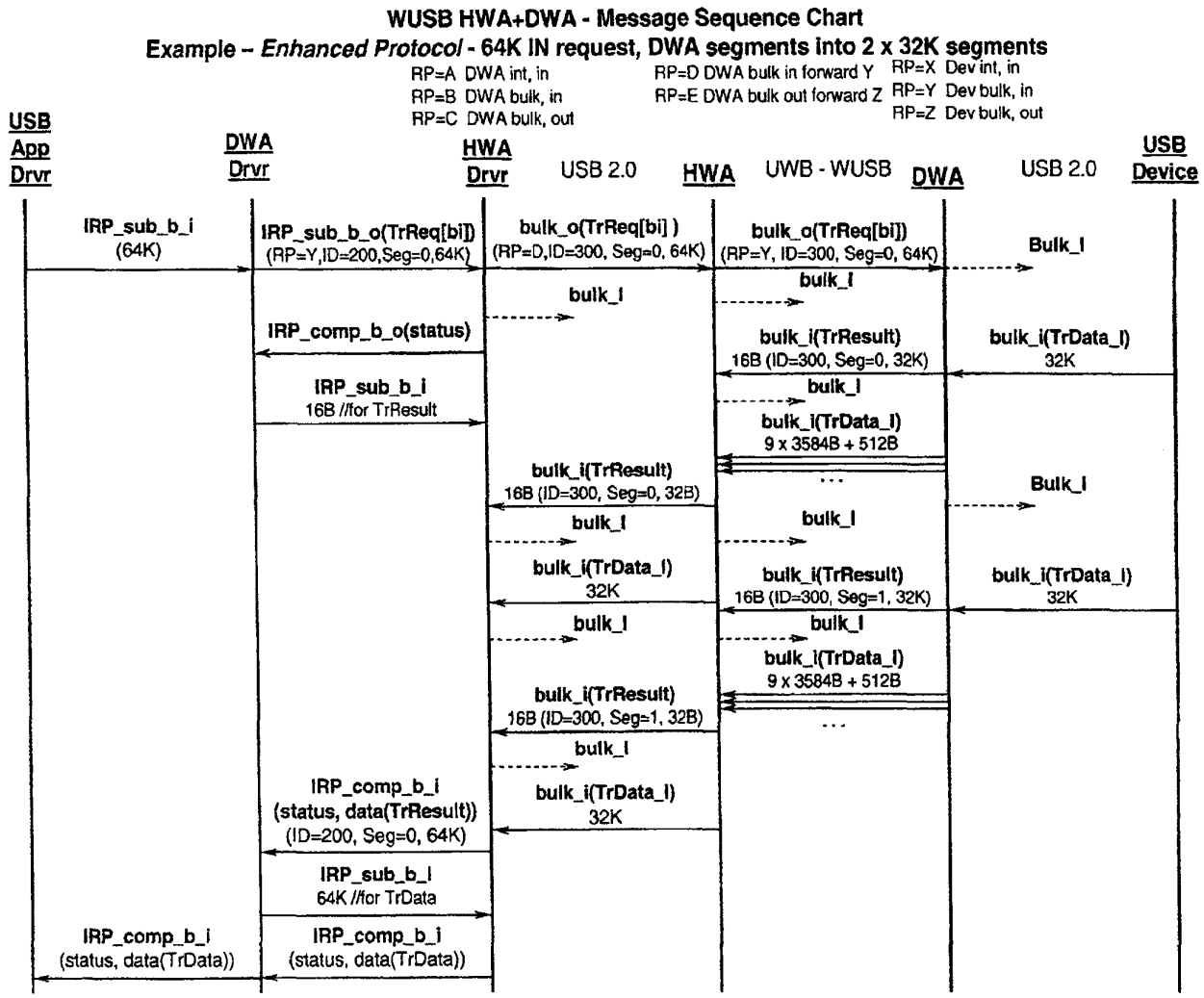

WUSB HWA+DWA - Message Sequence Chart
Example – Enhanced Protocol - 64K IN request, DWA segments into 2 x 32K segments
RP=A DWA int, in
RP=B DWA bulk, in
RP=C DWA bulk, out
RP=D DWA bulk in forward Y
RP=E DWA bulk out forward Z
RP=X Dev int, in
RP=Y Dev bulk, in
RP=Z Dev bulk, out
USB App Drvr
DWA Drvr
HWA Drvr
USB 2.0
HWA
UWB - WUSB
DWA
USB 2.0
USB Device
IRP_sub_b_i (64K)
IRP_sub_b_o(TrReq[bi]) (RP=Y,ID=200,Seg=0,64K)
bulk_o(TrReq[bi]) (RP=D,ID=300, Seg=0, 64K)
bulk_o(TrReq[bi]) (RP=Y, ID=300, Seg=0, 64K)
Bulk_I
bulk_I
IRP_comp_b_o(status)
bulk_i(TrResult) 16B (ID=300, Seg=0, 32K)
bulk_i(TrData_I) 32K
IRP_sub_b_i 16B //for TrResult
bulk_i(TrData_I) 9 x 3584B + 512B
bulk_i(TrResult) 16B (ID=300, Seg=0, 32B)
bulk_i(TrData_I) 32K
bulk_i(TrResult) 16B (ID=300, Seg=1, 32K)
bulk_i(TrResult) 16B (ID=300, Seg=1, 32B)
IRP_comp_b_i (status, data(TrResult)) (ID=200, Seg=0, 64K)
IRP_sub_b_I 64K //for TrData
IRP_comp_b_i (status, data(TrData))

Fig. 8

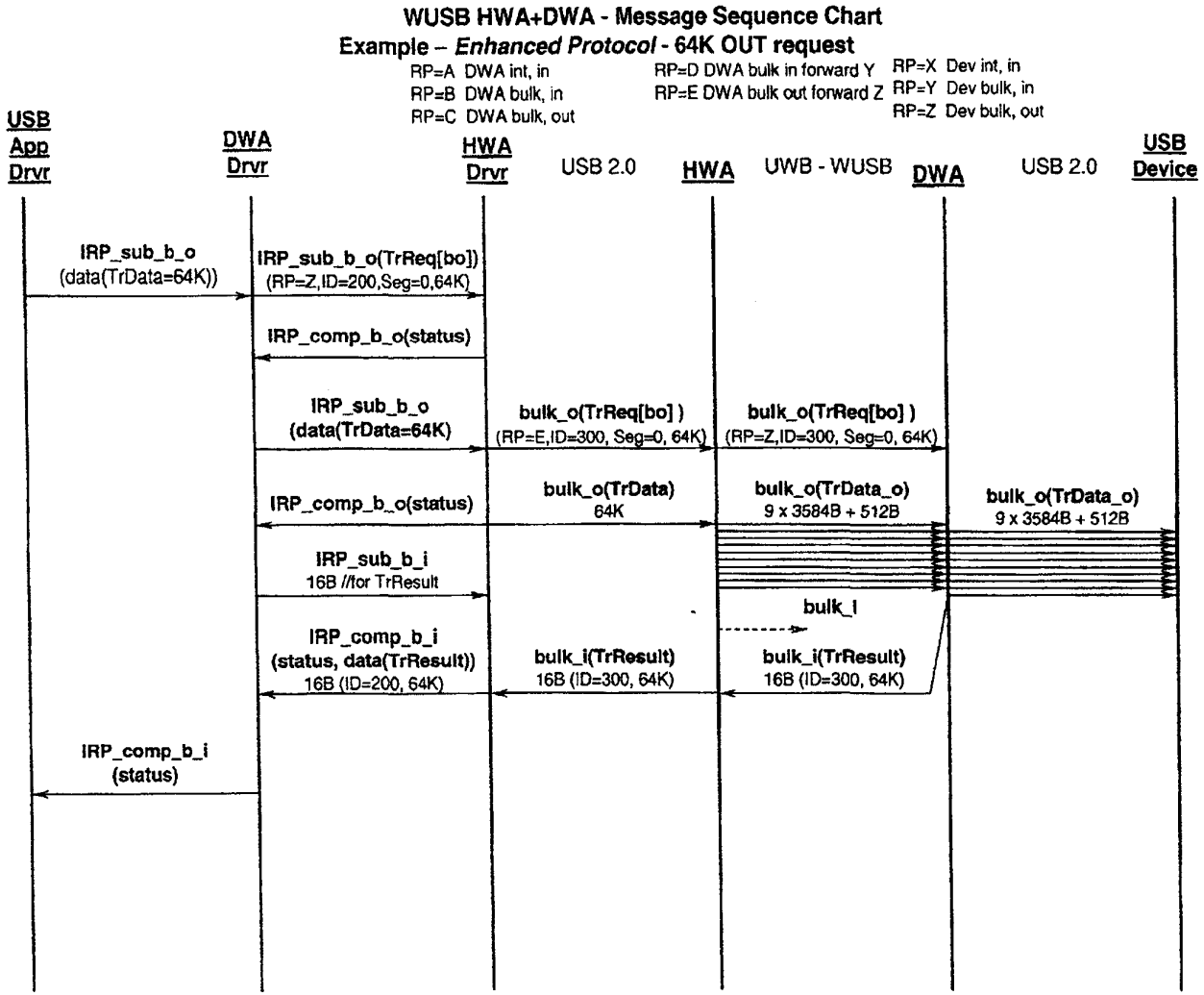

WUSB HWA+DWA - Message Sequence Chart
Example – Enhanced Protocol - 64K OUT request
RP=A DWA int, in
RP=B DWA bulk, in
RP=C DWA bulk, out
RP=D DWA bulk in forward Y
RP=E DWA bulk out forward Z
RP=X Dev int, in
RP=Y Dev bulk, in
RP=Z Dev bulk, out
USB App Drvr
DWA Drvr
HWA Drvr
USB 2.0
HWA
UWB - WUSB
DWA
USB 2.0
USB Device
IRP_sub_b_o (data(TrData=64K))
IRP_sub_b_o(TrReq[bo]) (RP=Z,ID=200,Seg=0,64K)
IRP_comp_b_o(status)
IRP_sub_b_o (data(TrData=64K)
bulk_o(TrReq[bo]) (RP=E,ID=300, Seg=0, 64K)
bulk_o(TrReq[bo]) (RP=Z,ID=300, Seg=0, 64K)
IRP_comp_b_o(status)
bulk_o(TrData) 64K
bulk_o(TrData_o) 9 x 3584B + 512B
bulk_o(TrData_o) 9 x 3584B + 512B
IRP_sub_b_i 16B //for TrResult
bulk_i
IRP_comp_b_i (status, data(TrResult)) 16B (ID=200, 64K)
bulk_i(TrResult) 16B (ID=300, 64K)
bulk_i(TrResult) 16B (ID=300, 64K)
IRP_comp_b_i (status)

Fig. 9

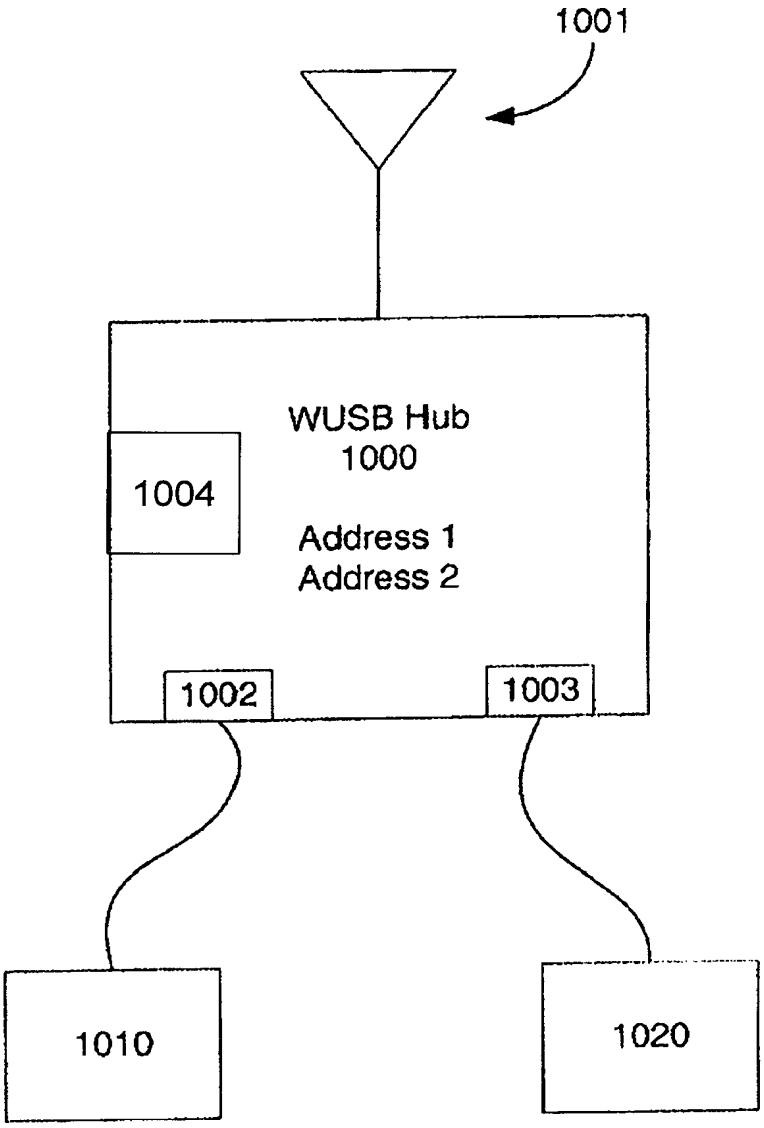

1001
WUSB Hub
1000
1004
Address 1
Address 2
1002
1003
1010
1020

Fig. 10

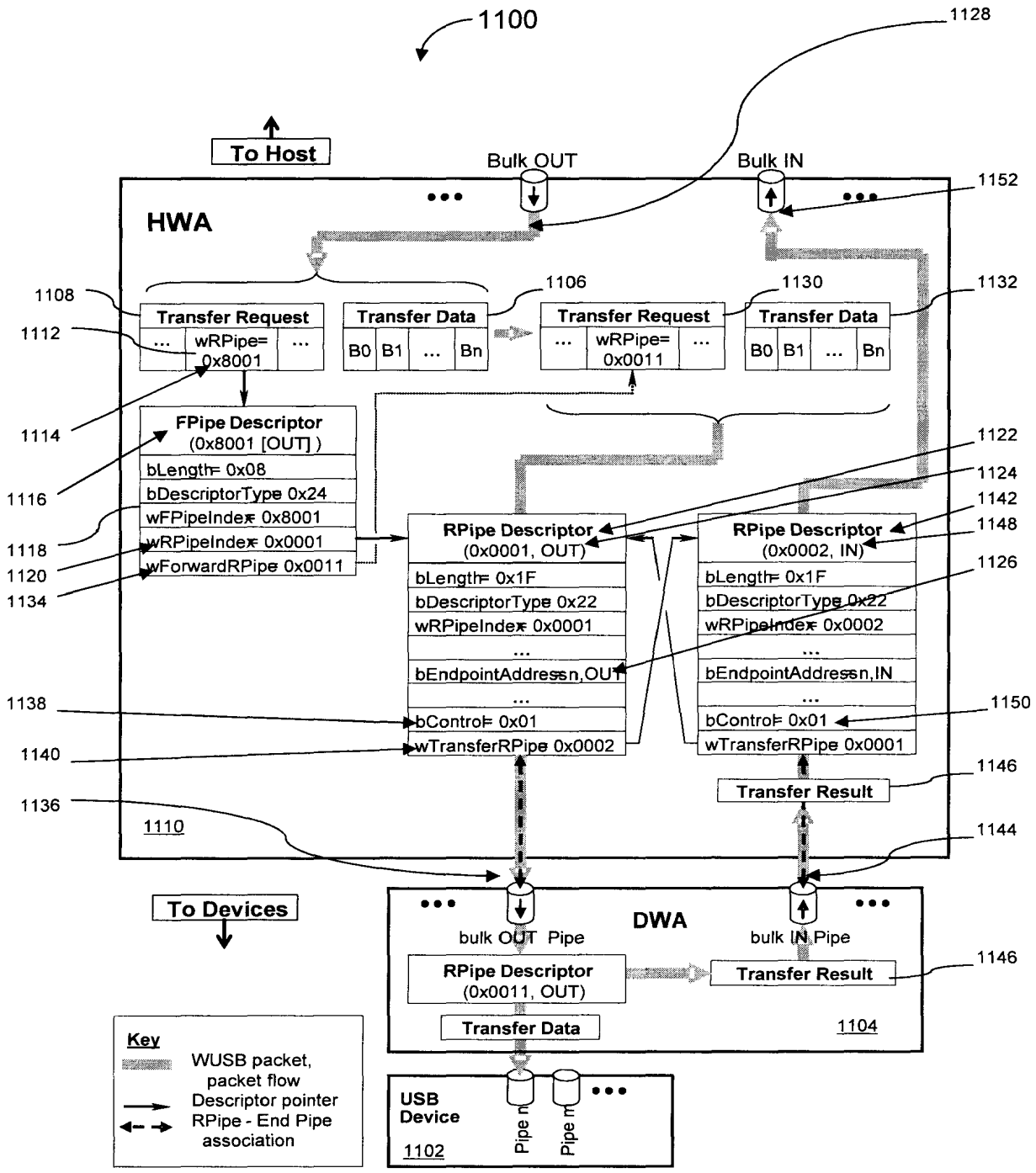

1100
1128
To Host
Bulk OUT
Bulk IN
1152
HWA
1108
1106
1130
1132
Transfer Request
Transfer Data
Transfer Request
Transfer Data
1112
... wRPipe= 0x8001 ...
B0 B1 ... Bn
... wRPipe= 0x0011 ...
B0 B1 ... Bn
1114
FPipe Descriptor (0x8001 [OUT])
1122
1124
1116
bLength= 0x08
bDescriptorType 0x24
1142
1148
1118
wFPipeIndex= 0x8001
RPipe Descriptor (0x0001, OUT)
RPipe Descriptor (0x0002, IN)
1120
wRPipeIndex= 0x0001
1126
1134
wForwardRPipe 0x0011
bLength= 0x1F
bDescriptorType 0x22
wRPipeIndex= 0x0001
bLength= 0x1F
bDescriptorType 0x22
wRPipeIndex= 0x0002
...
bEndpointAddress n,OUT
...
bEndpointAddress n,IN
...
1138
1150
bControl= 0x01
bControl= 0x01
1140
wTransferRPipe 0x0002
wTransferRPipe 0x0001
1146
Transfer Result
1136
1110
1144
To Devices
DWA
bulk OUT Pipe
bulk IN Pipe
1146
RPipe Descriptor (0x0011, OUT)
Transfer Result
Transfer Data
1104
Key
WUSB packet, packet flow
Descriptor pointer
RPipe - End Pipe association
USB Device
Pipe n
Pipe n
1102

Fig. 11

14/14

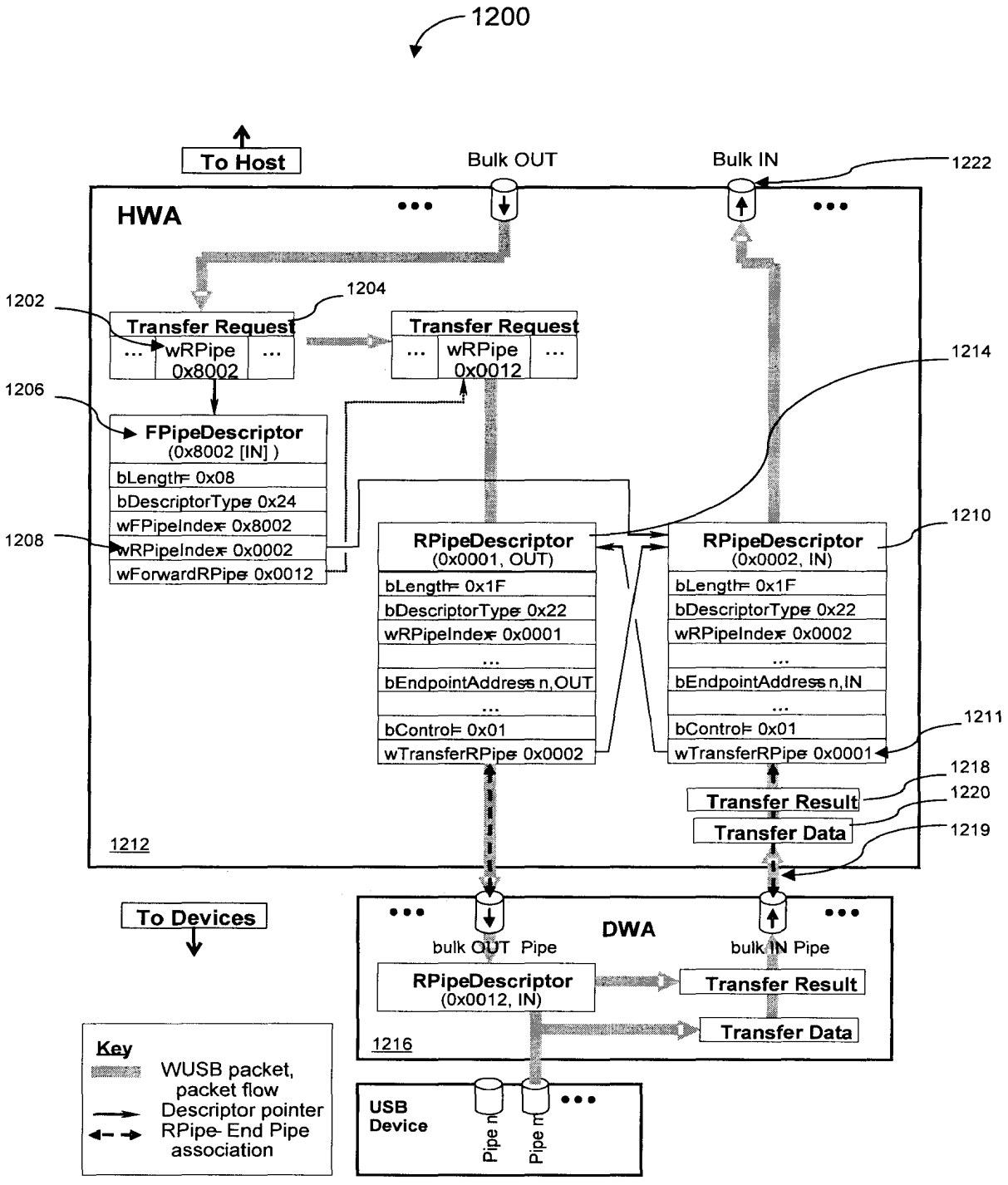

1200
To Host
Bulk OUT
Bulk IN
1222
HWA
1202
1204
Transfer Request
... wRPipe 0x8002 ...
Transfer Request
... wRPipe 0x0012 ...
1214
1206
FPipeDescriptor
(0x8002 [IN])
bLength= 0x08
bDescriptorType= 0x24
wFPipeIndex= 0x8002
1208
wRPipeIndex= 0x0002
wForwardRPipe= 0x0012
RPipeDescriptor
(0x0001, OUT)
bLength= 0x1F
bDescriptorType= 0x22
wRPipeIndex= 0x0001
...
bEndpointAddress n,OUT
...
bControl= 0x01
wTransferRPipe= 0x0002
1210
RPipeDescriptor
(0x0002, IN)
bLength= 0x1F
bDescriptorType= 0x22
wRPipeIndex= 0x0002
...
bEndpointAddress n,IN
...
bControl= 0x01
1211
wTransferRPipe= 0x0001
1218
Transfer Result
1220
Transfer Data
1219
1212
To Devices
DWA
bulk OUT Pipe
bulk IN Pipe
RPipeDescriptor
(0x0012, IN)
Transfer Result
Transfer Data
1216
USB Device
Pipe n
Pipe m
Key
WUSB packet, packet flow
Descriptor pointer
RPipe- End Pipe association

Fig. 12

Electronic Patent Application Fee Transmittal

Application Number:	16771068
Filing Date:	09-Jun-2020
Title of Invention:	METHOD AND SYSTEM FOR MAKING FUNCTIONAL DEVICES AVAILABLE TO PARTICIPANTS OF MEETINGS
First Named Inventor/Applicant Name:	Gauthier RENARD
Filer:	Thomas Lee/Yanling Cottle
Attorney Docket Number:	21063.0018USWO

Filed as Large Entity

Filing Fees for U.S. National Stage under 35 USC 371

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
RCE- 1ST REQUEST	1801	1	1360	1360
		Total in USD ($)		**1360**

Electronic Acknowledgement Receipt

EFS ID:	46006710
Application Number:	16771068
International Application Number:	
Confirmation Number:	1088
Title of Invention:	METHOD AND SYSTEM FOR MAKING FUNCTIONAL DEVICES AVAILABLE TO PARTICIPANTS OF MEETINGS
First Named Inventor/Applicant Name:	Gauthier RENARD
Customer Number:	52835
Filer:	Thomas Lee/Yanling Cottle
Filer Authorized By:	Thomas Lee
Attorney Docket Number:	21063.0018USWO
Receipt Date:	21-JUN-2022
Filing Date:	09-JUN-2020
Time Stamp:	15:27:15
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$1360
RAM confirmation Number	E20226KF27321073
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Request for Continued Examination (RCE)	RCE_0018.pdf	1667190 f023bee16c78c91f3266d8d17ee71bd5c92a3b63	no	3
Warnings:					
Information:					
2	Information Disclosure Statement (IDS) Form (SB08)	SB08_0018USWO.pdf	1035221 d3471729cf14d0918d64ddc0d52d2ad470a14a12	no	4
Warnings:					
Information:					
3	Foreign Reference	FR1_WO2008080107A2.pdf	1718765 e9212362dddddfa528cf1549310165698dab89dc	no	36
Warnings:					
Information:					
4	Other reference-Patent/Application/ Search Documents	NPL1_OA.pdf	384508 edc3fa45150143b2254f29a87944c917bda4d6a0	no	9
Warnings:					
Information:					
5	Non Patent Literature	NPL2_Wireless_USB_Wikipedia.pdf	1134387 8500ba1cda32bbf9c5535def887612102e2fc6d7	no	11
Warnings:					
Information:					
6	Other reference-Patent/Application/ Search Documents	NPL3_WrittenOpinion_.pdf	5180726 eeb78475209d0094ea626580e6e1857052ef6ce0	no	7
Warnings:					
Information:					

7	Fee Worksheet (SB06)	fee-info.pdf	38241 ff13af3d53d8bbe9620a876c67142993ea05cb18	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	11159038	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

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If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/771,068	06/09/2020	Gauthier RENARD	21063.0018USWO	1088

52835 7590 06/30/2022

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Minneapolis, MN 55402-1683

EXAMINER	
MISIURA, BRIAN THOMAS	

ART UNIT	PAPER NUMBER
2186	

NOTIFICATION DATE	DELIVERY MODE
06/30/2022	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

PTOMail@hsml.com

Advisory Action Before the Filing of an Appeal Brief	**Application No.** 16/771,068	**Applicant(s)** RENARD et al.	
	Examiner BRIAN T MISIURA	**Art Unit** 2186	**AIA (FITF) Status** Yes

--The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

THE REPLY FILED 13 June 2022 FAILS TO PLACE THIS APPLICATION IN CONDITION FOR ALLOWANCE.

NO NOTICE OF APPEAL FILED

1. ☑ The reply was filed after a final rejection. No Notice of Appeal has been filed. To avoid abandonment of this application, applicant must timely file one of the following replies: (1) an amendment, affidavit, or other evidence, which places the application in condition for allowance; (2) a Notice of Appeal (with appeal fee) in compliance with 37 CFR 41.31; or (3) a Request for Continued Examination (RCE) in compliance with 37 CFR 1.114 if this is a utility or plant application. Note that RCEs are not permitted in design applications. The reply must be filed within one of the following time periods:
   a) ☐ The period for reply expires ____ months from the mailing date of the final rejection.
   b) ☑ The period for reply expires on: (1) the mailing date of this Advisory Action; or (2) the date set forth in the final rejection, whichever is later. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of the final rejection.
   c) ☐ A prior Advisory Action was mailed more than 3 months after the mailing date of the final rejection in response to a first after-final reply filed within 2 months of the mailing date of the final rejection.The current period for reply expires ____ months from the mailing date of *the prior Advisory Action* or SIX MONTHS from the mailing date of the final rejection, whichever is earlier.
   Examiner Note: If box 1 is checked, check either box (a), (b) or (c). ONLY CHECK BOX (b) WHEN THIS ADVISORY ACTION IS THE FIRST RESPONSE TO APPLICANTS FIRST AFTER-FINAL REPLY WHICH WAS FILED WITHIN TWO MONTHS OF THE FINAL REJECTION. ONLY CHECK BOX (c) IN THE LIMITED SITUATION SET FORTH UNDER BOX (c). See MPEP 706.07(f).

Extensions of time may be obtained under 37 CFR 1.136(a). The date on which the petition under 37 CFR 1.136(a) and the appropriate extension fee have been filed is the date for purposes of determining the period of extension and the corresponding amount of the fee. The appropriate extension fee under 37 CFR 1.17(a) is calculated from: (1) the expiration date of the shortened statutory period for reply originally set in the final Office action; or (2) as set forth in (b) or (c) above, if checked. Any reply received by the Office later than three months after the mailing date of the final rejection, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

NOTICE OF APPEAL

2. ☐ The Notice of Appeal was filed on _____. A brief in compliance with 37 CFR 41.37 must be filed within two months of the date of filing the Notice of Appeal (37 CFR 41.37(a)), or any extension thereof (37 CFR 41.37(e)), to avoid dismissal of the appeal. Since a Notice of Appeal has been filed, any reply must be filed within the time period set forth in 37CFR 41.37(a).

AMENDMENTS

3. ☑ The proposed amendments filed after a final rejection, but prior to the date of filing a brief, will not be entered because
   a) ☑ They raise new issues that would require further consideration and/or search (see NOTE below);
   b) ☐ They raise the issue of new matter (see NOTE below);
   c) ☐ They are not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal; and/or
   d) ☐ They present additional claims without canceling a corresponding number of finally rejected claims.
   NOTE: See details below (See 37 CFR 1.116 and 41.33(a)).
4. ☐ The amendments are not in compliance with 37 CFR 1.121. See attached Notice of Non-Compliant Amendment (PTOL-324).
5. ☐ Applicant's reply has overcome the following rejection(s): _____
6. ☐ Newly proposed or amended claim(s) _____ would be allowable if submitted in a separate, timely filed amendment canceling the non-allowable claim(s).
7. ☑ For purposes of appeal, the proposed amendment(s):(a) ☑ will not be entered, or (b) ☐ will be entered, and an explanation of how the new or amended claims would be rejected is provided below or appended.

AFFIDAVIT OR OTHER EVIDENCE

8. ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____
9. ☐ The affidavit or other evidence filed after final action, but before or on the date of filing a Notice of Appeal will not be entered because applicant failed to provide a showing of good and sufficient reasons why the affidavit or other evidence is necessary and was not earlier presented. See 37 CFR 1.116(e).
10. ☐ The affidavit or other evidence filed after the date of filing the Notice of Appeal, but prior to the date of filing a brief, will not be entered because the affidavit or other evidence failed to overcome all rejections under appeal and/or appellant fails to provide a showing of good and sufficient reasons why it is necessary and was not earlier presented. See 37 CFR 41.33(d)(1).
11. ☐ The affidavit or other evidence is entered. An explanation of the status of the claims after entry is below or attached.

REQUEST FOR RECONSIDERATION/OTHER

12. ☑ The request for reconsideration has been considered but does NOT place the application in condition for allowance because: See Continuation Sheet.
13. ☐ Note the attached Information *Disclosure Statement*(s). (PTO/SB/08) Paper No(s). _____
14. ☐ Other: _____.

STATUS OF CLAIMS

15. The status of the claim(s) is (or will be) as follows:
    Claim(s) allowed:_____.
    Claim(s) objected to:_____.
    Claim(s) rejected:58-78.
    Claim(s) withdrawn from consideration:_____.

/BRIAN T MISIURA/ Primary Examiner, Art Unit 2186	

Continuation of REQUEST FOR RECONSIDERATION/OTHER 12.

The request for reconsideration has been considered but does NOT place the application in condition for allowance because: The amendments would require further search and or consideration of the prior art. Additionally, in a phone correspondence with the Applicant on 6/21/22, they indicated that an RCE was being filed.

DO NOT ENTER

/B.T.M/ 06/24/2022

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventorship:	RENARD	Examiner:	MISIURA, BRIAN T.
Serial No.:	16/771068	Group Art Unit:	2186
Filed:	June 9, 2020	Docket No.:	21063.0018USWO
Title:	METHOD AND SYSTEM FOR MAKING FUNCTIONAL DEVICES AVAILABLE TO PARTICIPANTS OF MEETINGS		

CERTIFICATE OF TRANSMISSION.
I hereby certify that this paper is being transmitted by EFS Web to the United States Patent & Trademark Office on June 13, 2022.

By: /Jessica A. Sun/
Name: Jessica A. Sun

AMENDMENT AND RESPONSE AFTER FINAL

Mail Stop: AMENDMENT
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Dear Commissioner:

In response to the Final Office Action issued March 21, 2022, please amend the above-identified application as follows:

Amendments to the Claims are reflected in the listing of claims that begins on page 2 of this paper.

Remarks begin on page 6 of this paper.

PTO-2326 (05-2022)
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

REQUEST FOR REFUND

Reference # *(Patent #, Application #, Trademark Serial #, Registration #, etc.)*	**Title of Invention or Mark Information**	
16/771068	METHOD AND SYSTEM FOR MAKING FUNCTIONAL DEVICES AVAILABLE TO PARTICIPANTS OF MEE	
Attorney Docket # *(if applicable)*	**Payment Date** *(mm/dd/yyyy)*	**Refund Request Amount**
21063.0018USWO	06/16/2022	$ 100.00

Refund Option *(Select one)*

- (●) If approved, issue the refund to the account associated with the original payment.
- ( ) If approved, and the original payment was a check, issue the refund to deposit account # _____.
- ( ) If approved, and the original payment was a check, issue the refund as a U.S. Treasury check.

Reason for Refund Request *Refund requests must generally be filed within 2 years of payment date (37 CFR 1.26 and 2.209)*

- [ ] Duplicate Payment
- [x] No Fee Due
- [ ] Office Error
- [ ] Small Entity Later Established* (*must be filed within 3 months of payment date, 37 CFR 1.28)
- [ ] Other _____

Rationale *(Supporting documentation may be submitted with this form)*

Our deposit account was charged for one additional claim on June 13, 2022 in which a total of 23 claims were presented in the response filed on June 13, 2022. However, as seen in the Fee Payment History, two additional dependent claims were paid for on June 9, 2020 and one additional dependent claim was paid for on January 10, 2022. As such, the application is entitled to 23 total claims and the fee payment on June 13, 2022 was not required.

Requester's Information

Company or Firm Name *(if applicable)*		
Hamre, Schumann, Mueller & Larson, P.C.		
Address Line 1	**City**	**State/Region**
45 South Seventh Street	Minneapolis	MN
Address Line 2 *(if applicable)*	**Country**	**Zip/Postal Code**
Suite 2700	USA	55402
Email Address *(You will receive an acknowledgment of receipt only if you provide a valid email address)*	**Phone Number**	
tlee@hsml.com	612-455-3800	
Requester's Name		**Registration Number** *(if applicable)*
Thomas Lee		66396
Signature		**Date** *(mm/dd/yyyy)*
/Thomas Lee/		07/22/2022

Submit online: USPTO's patent electronic filing system (Patent Center or EFS-Web), or
Fax to: 571-273-6500, or
Mail to: Mail Stop 16, Director of the U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450

Electronic Acknowledgement Receipt

EFS ID:	46251774
Application Number:	16771068
International Application Number:	
Confirmation Number:	1088
Title of Invention:	METHOD AND SYSTEM FOR MAKING FUNCTIONAL DEVICES AVAILABLE TO PARTICIPANTS OF MEETINGS
First Named Inventor/Applicant Name:	Gauthier RENARD
Customer Number:	52835
Filer:	Thomas Lee/Jessica Sun
Filer Authorized By:	Thomas Lee
Attorney Docket Number:	21063.0018USWO
Receipt Date:	22-JUL-2022
Filing Date:	09-JUN-2020
Time Stamp:	13:42:40
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Refund Request	refund_request_0018USWO.pdf	697873 52823551192675f656647e0fb1594812910 62c24	no	1

Warnings:

Information:	
Total Files Size (in bytes):	697873

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/771,068	06/09/2020	Gauthier RENARD	21063.0018USWO	1088

52835 7590 07/29/2022

HAMRE, SCHUMANN, MUELLER & LARSON, P.C.
45 South Seventh Street
Suite 2700
Minneapolis, MN 55402-1683

EXAMINER
MISIURA, BRIAN THOMAS

ART UNIT	PAPER NUMBER
2186	

NOTIFICATION DATE	DELIVERY MODE
07/29/2022	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

PTOMail@hsml.com

Office Action Summary	Application No. 16/771,068	Applicant(s) RENARD et al.	
	Examiner BRIAN T MISIURA	Art Unit 2186	AIA (FITF) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on 6/21/2022.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL.** 2b) ☑ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 58-80 is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 58-80 is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

Application Papers

10)☑ The specification is objected to by the Examiner.

11)☑ The drawing(s) filed on 6/9/2020 is/are: a)☑ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☑ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date 3/29/2022 and 6/21/2022.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

Notice of Pre-AIA or AIA Status

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Detailed Action

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 6/21/2022 has been entered.

Response to Arguments

Applicant's arguments filed 6/21/22 have been fully considered but they are not persuasive. The rejections have been updated below to address any newly presented limitations and/or claims.

Pages 6-10 of the Remarks comprise several arguments regarding Brands teaching a “peripheral device”. Page 7 recites, “First of all it is noticeable that a first peripheral device, which is connected to the processing device is not recited in this claim. Rather, as discussed on page 34, lines 25-29 of the Specification: “In Figure 12 the processing device 60’ has no first peripheral device 130, e.g. none is available”.”

The Examiner makes note that while the Specification comprises negative language regarding a peripheral device not being present, the claims are devoid of such language or any other language that precludes a peripheral device from being present within the system of Brands.

- Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Additionally, Paragraph 126 of Brands teaches that connection unit 47 may be integrated into a user processing device 31, and therefore, would not be considered a "peripheral device". Further, Figures 11 and 12 disclose processing devices that include a table and smartphone, both of which are typically devoid of peripheral devices.

The Examiner respectfully disagrees with the arguments presented on Pages 8 and 9 of the Remarks, and maintains that the dedicated software client (**Paragraph 153**) teaches the limitations of the claimed third party software. Figure 11 further discloses downloading a "ClickShare app" onto a tablet device in order to share content between the tablet and a display device. A tablet or smartphone device can download this app and utilize their local speakers and microphones as the virtual versions of said functions presented to it via the app.

The ClickShare app is also discussed in the NPL Document titled "Barco – Clickshare Brochure", provided on 6/9/2020 (**see Pages 4 and 17**).

- Upon further review of the Specification/Drawings, several informalities have been discovered and are presented below.

Specification

The disclosure is objected to because of the following informalities:

Page 25 introduces numeral 60 are referring to "communication software".

However, the following references to a "processing device" are made using the same numeral "60" or "60' ":

Page 32 line 5; “processing device 60”

Page 34 line 25; “processing device 60' ”

Page 35 lines 1 and 19; “processing device 60' ”

Appropriate correction is required.

Claim Interpretation

The following is a quotation of 35 U.S.C. 112(f):

(f) Element in Claim for a Combination. – An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.

The following is a quotation of pre-AIA 35 U.S.C. 112, sixth paragraph:

An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.

The claims in this application are given their broadest reasonable interpretation using the plain meaning of the claim language in light of the specification as it would be understood by one of ordinary skill in the art. The broadest reasonable interpretation of a claim element (also commonly referred to as a claim limitation) is limited by the description in the specification when 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph, is invoked.

As explained in MPEP § 2181, subsection I, claim limitations that meet the following three-prong test will be interpreted under 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph:

(A) the claim limitation uses the term “means” or “step” or a term used as a substitute for “means” that is a generic placeholder (also called a nonce term or a non-

structural term having no specific structural meaning) for performing the claimed function;

(B) the term "means" or "step" or the generic placeholder is modified by functional language, typically, but not always linked by the transition word "for" (e.g., "means for") or another linking word or phrase, such as "configured to" or "so that"; and

(C) the term "means" or "step" or the generic placeholder is not modified by sufficient structure, material, or acts for performing the claimed function.

Use of the word "means" (or "step") in a claim with functional language creates a rebuttable presumption that the claim limitation is to be treated in accordance with 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph. The presumption that the claim limitation is interpreted under 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph, is rebutted when the claim limitation recites sufficient structure, material, or acts to entirely perform the recited function.

Absence of the word "means" (or "step") in a claim creates a rebuttable presumption that the claim limitation is not to be treated in accordance with 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph. The presumption that the claim limitation is not interpreted under 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph, is rebutted when the claim limitation recites function without reciting sufficient structure, material or acts to entirely perform the recited function.

Claim limitations in this application (**Claim 65**) that use the word "means" (or "step") are being interpreted under 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph, except as otherwise indicated in an Office action. Conversely, claim limitations in this application that do not use the word "means" (or "step") are not being interpreted under 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph, except as otherwise indicated in an Office action.

Claim Rejections - 35 USC § 103

In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

The following is a quotation of 35 U.S.C. 103 which forms the basis for all obviousness rejections set forth in this Office action:

> A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103 are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 58-80 are rejected under 35 U.S.C. 103 as being unpatentable over **Brands** et al. U.S. PGPUB No. 2015/0121466 in view of **Beel** et al. U.S. PGPUB No. 2015/0169477.

Per Claim 58, Brands discloses:

- a system for connecting a processing device (**Paragraph 118, Processing device 31 such as a laptop computer.**) to a functional device (**Paragraphs 120-121; display 44, whiteboard 45, camera 35, microphones 38**) connected to or in a base unit (**Paragraphs 119-122; base node 36**) of a wireless network (**Paragraphs 88, 118, and 119; wireless network 50**),

- the system comprising: the base unit having a transmitter (**Paragraph 130; Base node 36 comprises a wireless transmitter/receiver.**),
- a first display device connected to or in the base unit (**Paragraphs 120 and 124, Figures 1a and 1b; "base node 36 being coupled to a central display 44"**),
- at least one functional device connected to or in the base unit (**Paragraphs 120-121; Any of the whiteboard 45, display 44, cameras 39-41, or microphones 38 can be considered a "functional device".**),
- the processing device having a memory, a second display device, and an operating system (**Paragraph 118; Devices such as laptop computers and tablet computing devices each comprise memory, displays, and OS's.**),
- a third party software for a Unified Communication call (**Paragraph 152, "multiple participants…engage in a media conference"; Paragraph 153, "a dedicated software client"**), a driver and a client software configured to interact directly with the base unit over a wireless connection (**Paragraph 128, "portable application 60"; Paragraph 138, "portable application" and "pre-installed generic drivers"**),
- wherein the base unit, via the transmitter, is configured to transmit data over the wireless connection to the processing device (**Paragraphs 128-130**),
- wherein the client software (**portable application 60**), when executed by a processor of the processing device, is configured to provide any simulations or translations, as required to allow interaction between the first display device and the processing device (**Paragraphs 128, 138-140; Paragraphs 194-196 and Figure 11 discuss a tablet connection to a base station and further discuss how a data exchange between two computing devices can be done independently of the internet (e.g. direct wireless connection between the two devices). Paragraphs 203-209 and 233, Figure 12, discuss an embodiment where a smartphone P31 can be communicably connected to and view the contents of a display D1. Smartphone P31 is capable of performing a "transform function" to transform display data received by the smartphone from other connected display devices to match an appropriate screen dimension and resolution. The smartphone further allows customization of the display. (Note: "simulations or**

translations" represents an alternative limitation scenario requiring only one of the instances listed be taught by the prior art in order to deem it unpatentable. In this instance, Brands is considered to teach at least "translations" as it is broadly presented in the claim.)),

- and the third party software for the unified communication call is presented with the virtual functional device for the unified communication call (**Paragraphs 123, 127, and 152 disclose that a media conference is conducted using the invention presented in the disclosure. Paragraph 153 discloses a "dedicated software client". The peripheral devices present within meeting room 30 will be available to participants 37 of processing devices 31 to utilize during the media conference.**),
- the processing device being configured to host the unified communication between two or more other processing devices (**Paragraphs 148-242 provide an in-depth configuration of a media conference between "multiple participants".**).

Brands discloses that base node 36 interconnects processing devices 31 with display 44, whiteboard 45, and/or other peripheral devices such as cameras, loudspeakers, and microphones. The interconnected processing and peripheral devices allow for an electronic meeting to take place by way of sharing media content from the plurality of different devices through the use of the display(s) in a meeting room 30 **(Paragraphs 119-124 and 127)**. Brands further teaches the portable application's role in coordinating the interactions between the processing devices 31 and the peripheral devices present within meeting room 30 (**Paragraphs 128 and 138-140**). Brands does not specifically disclose presenting a functional device as a virtual functional device to the processing device.

However, Beel, of common Assignee and field of endeavor, similarly teaches a media conference within a meeting room 30 comprising a client processing device 31, base unit 36, and a plurality of peripheral/functional devices (**Figure 1a, similarly labeled and referenced as Brands**). Beel further teaches that a peripheral device can be presented to the processing device as an audio out device by way of a "virtual audio

device". Upon connection to the system, the virtual audio device will be present to a user of the processing device to utilize (**Paragraphs 313 and 314**).

- It would have been obvious to one having ordinary skill in the art before the effective filing date of the claimed invention to implement the virtual device representation of Beel within the electronic meeting system of Brands because it makes it clear to the user that the audio device can now be utilized as a supplemental audio output device during the meeting.

Per Claim 59, Brands discloses the system of claim 58, wherein the client software and the driver are configured to present a simulated speakerphone to the operating system to create a virtual microphone and a virtual speakerphone (**Paragraph 121; A microphone 38 and loud speaker is provided for use by the processing devices 31.**). Similar to Claim 58, Brands does not specifically teach the virtualized devices. However, please refer to the above rejection of Claim 58 with respect to Beel teaching the virtualized presentation of the peripheral devices to the client processing system. It further would have been obvious to one having ordinary skill in the art to include the microphone and loud speakers of Brands as the virtualized devices as taught by Beel.

Per Claim 60, Brands discloses the system of claim 58, wherein the client software and the driver are configured to present a simulated videocam to the operating system to create a virtual videocam device (**Paragraph 120; camera 35**). Similar to Claim 58, Brands does not specifically teach the virtualized devices. However, please refer to the above rejection of Claim 58 with respect to Beel teaching the virtualized presentation of the peripheral devices to the client processing system. It further would have been obvious to one having ordinary skill in the art to include the video camera of Brands as the virtualized devices as taught by Beel.

Per Claim 61, Brands discloses the system of claim 58, wherein the client software is configured to provide video data, optionally obtained by screen scraping, directly to the base unit, wherein the base unit processes the video data (**Paragraph 140; Base unit**

36 receives screen scraped video data and auto composes it for the central display.).

Per Claim 62, Brands discloses the system of claim 58, wherein the processing device processes video data received from the base unit via the transmitter over the wireless connection (**Paragraphs 64 and 65; "The executable software code can comprise eleventh code for providing a means for receiving, decrypting and decoding incoming arbitrary media content." The executable software code is stored for execution on the processing device.**).

Per Claim 63, Brands discloses the system of claim 62, wherein the processing of the video data comprises decoding and compositing or decrypting the video data (**Paragraphs 64 and 65; "The executable software code can comprise eleventh code for providing a means for receiving, decrypting and decoding incoming arbitrary media content."**)

Per Claim 64, Brands discloses the system of claim 58, wherein the at least one functional device which is presented to the operating system as a virtual functional device, is one or more of a data capturing device, a microphone, a speakerphone, a speaker, another display, a touchscreen, a projector, a camera, a video camera, and a webcamera (**Paragraphs 120-122**). Please see the above rejection of Clam 58 for explanation of how Beel teaches the "virtual functional device" limitation.

Per Claim 65, Brands discloses the system according to claim 58, further comprising means for encoding, optionally encrypting the data (**Paragraphs 60, 63, and 256-259**).

Per Claim 66, Brands discloses the system according to claim 58, wherein the processing device is adapted to host a unified communication between two or more further processing devices (**Paragraph 152; Media conference featuring multiple participants**).

Per Claim 67, Beel further teaches wherein the system is configured to expose the virtual functional device to the processing device (**Paragraphs 313 and 314**).

Per Claim 68, Beel further teaches at least one fixed or a configurable endpoint of the virtual functional device, wherein the at least one fixed or a configurable endpoint is a data source or a data sink which is configured to store or emit data of the virtual functional device (**Paragraphs 313 and 314; An audio signal can be emited.**).

Per Claims 69-74 and 76-78, please refer to the above rejections of Claims 58-61, 63, 64, and 66-68, respectively, as the limitations are substantially similar and the mapping of the references is equally applicable.

Per Claim 75, Brands discloses the method of claim 69, further comprising encoding, optionally encrypting the data (**Paragraphs 60, 63, and 256-259**).

Per Claim 79, Brands teaches the method of claim 70, wherein the interaction directly with the base unit further includes presenting the first display device to the processing device (**Paragraph 196, Data exchange can be performed independently of the internet (e.g. direct wireless communication between both computing devices).**).

Per claim 80, Brands teaches the system of claim 58, wherein the client software is configured to present the first display device to the processing device (**Paragraphs 194-196 and Figure 11 discuss a tablet connection to a base station and further discuss how a data exchange between two computing devices can be done independently of the internet (e.g. direct wireless connection between the two devices). Paragraphs 203-209 and 233, Figure 12, discuss an embodiment where a smartphone P31 can be communicably connected to and view the contents of a display D1.**).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to BRIAN T MISIURA whose telephone number is (571)272-0889 - (Direct Fax: 571-273-0889). The examiner can normally be reached on M-F: 8-4:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kim Huynh can be reached on (571) 272-4174. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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/Brian T Misiura/
Primary Examiner, Art Unit 2186

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/771,068	RENARD et al.
	Examiner	Art Unit
	BRIAN T MISIURA	2186

CPC - Searched*		
Symbol	Date	Examiner
G06F13/122, 387, 4282	10/06/2021	BTM
H04L12/12, 0428, 1813	10/06/2021	BTM

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
IDS Consideration, CPC, Inventor, and EAST prior art search	10/06/2021	BTM
Review prosecution/search history of parent application no. 15/858,668	10/06/2021	BTM
IDS Consideration, Update prior art search	03/15/2022	BTM
IDS Consideration	07/25/2022	BTM

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/771,068	RENARD et al.
	Examiner	Art Unit
	BRIAN T MISIURA	2186

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (01-22)
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(Not for submission under 37 CFR 1.99)

Application Number	16771068
Filing Date	2020-06-09
First Named Inventor	RENARD
Art Unit	2186
Examiner Name	MISIURA
Attorney Docket Number	21063.0018USWO

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Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	9722986	B2	2017-08-01	Brands et al.	Corresponds to CN104412542

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	1	104412542	CN	A	2015-03-11		Corresponds to US9722986	

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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16771068
	Filing Date	2020-06-09
	First Named Inventor	RENARD
	Art Unit	2186
	Examiner Name	MISIURA
	Attorney Docket Number	21063.0018USWO

	1	Office Action issued in Chinese Application No. 201880084464.1, dated January 26, 2022, with machine tranlation	X

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First Named Inventor	RENARD
Art Unit	2186
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Attorney Docket Number	21063.0018USWO

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Signature	/Thomas Lee/	Date (YYYY-MM-DD)	2022-03-29
Name/Print	Thomas Lee	Registration Number	66396

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3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

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6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

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Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (03-15)
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Application Number	16771068
Filing Date	2020-06-09
First Named Inventor	Gauthier RENARD
Art Unit	2186
Examiner Name	MISIURA
Attorney Docket Number	21063.0018USWO

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	1	20160125838	A1	2016-05-05	Hundal et al.	
	2	20150121466	A1	2015-04-30	Brands et al.	

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	1	2008080107	WO	A2	2008-07-03			

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	1	Communication issued in European Application No. 18 833 045.0, dated March 14, 2022	
	2	Wireless USB, from Wikipedia page, last edited on 22 December 2017, 11 pages provided	
	3	Written Opinion issued in corresponding Singapore Application No. 11202005201Y, dated May 23, 2022	

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Name/Print	Thomas Lee	Registration Number	66396

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PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L165	26	("10031873"|"20020196378"|"20060075100"|"20090198839"|"20100115145"|"20100302130"|"20140148152"|"20140181325"|"20140362161"|"20150121466"|"20150169477"|"20150263905"|"20160092153"|"20160125838"|"7617342"|"7761627"|"8316138"|"8756348"|"8896656"|"9083769"|"9183164"|"9201826"|"9538138"|"9722986"|"9804977"|"9934168").PN.	(US-PGPUB; USPAT; USOCR)	ADJ	ON	ON	2022/07/25 12:12 PM
L168	2	("20150121466"|"20160125838").PN.	(US-PGPUB; USPAT; USOCR)	ADJ	ON	ON	2022/07/25 02:26 PM

PE2E SEARCH - Search History (Interference)

There are no Interference searches to show.

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Document Code:WFEE

User :Lynnell Johnson

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Effective Date	Sale Item Reference Number	Refund Total
06/13/2022	16771068	$100.00

Document Number	Fee Code	Fee Code Description	Amount Paid	Payment Method	Account Number
I202282920023930	1202	CLAIMS IN EXCESS OF 20	$100.00	DA	503478

Document Code:WFEE

User :Lynnell Johnson

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Effective Date	Sale Accounting Date	Sale Item Reference Number
06/13/2022	08/02/2022	16771068

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Application Serial No: 16/771,068

Attorney Docket No: 21063.0018USWO
Customer Number: 52835
Date of Electronic Notification: 07/29/2022

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/771,068	06/09/2020	Gauthier RENARD	21063.0018USWO	1088

52835 7590 08/10/2022

HAMRE, SCHUMANN, MUELLER & LARSON, P.C.
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EXAMINER
MISIURA, BRIAN THOMAS

ART UNIT	PAPER NUMBER
2186	

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APPLICATION NO./ CONTROL NO.	FILING DATE	FIRST NAMED INVENTOR/ PATENT IN REEXAMINATION	ATTORNEY DOCKET NO.
16/771,068	06/09/2020	RENARD et al.	21063.0018USWO

	EXAMINER	
HAMRE, SCHUMANN, MUELLER & LARSON, P.C. **45 South Seventh Street Suite 2700** **Minneapolis, MN 55402-1683**	KIMBERLY D WILLIAMS	
	ART UNIT	PAPER
	OTOR	20220804

DATE MAILED: _____

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner for Patents

PTO-90C (Rev.04-03)

United States Patent and Trademark Office

Office of the Chief Financial Officer

August 02, 2022

HAMRE, SCHUMANN, MUELLER & LARSON, P.C.
Attn: THOMAS LEE
45 SOUTH SEVENTH STREET,
SUITE 2700
NINNEAPOLIS, MN 55402

Dear Sir/Madam,

The United States Patent and Trademark Office (USPTO) has reviewed your refund request for Reference Number **16771068** - Refund Request ID **REFND-20220725-94937**. Below is the current status of your refund request assigned to the following processing area: Office of Patent Examination Support Services

Fee code	Decision	Decision Reason(s)	Refund Amount
1202	Approved	Duplicate Payment	$100.00

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For questions related to this decision, contact the Case Resolution Team at (571) 272-1720 or case.resolution@USPTO.GOV.

Thank you,
Refund Branch

PTO/SB/08a (01-22)
Approved for use through 05/31/2024. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	16771068
Filing Date	2020-06-09
First Named Inventor	RENARD
Art Unit	2186
Examiner Name	MISIURA
Attorney Docket Number	21063.0018USWO

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Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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U.S.PATENT APPLICATION PUBLICATIONS Remove

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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FOREIGN PATENT DOCUMENTS Remove

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1							

If you wish to add additional Foreign Patent Document citation information please click the Add button Add

NON-PATENT LITERATURE DOCUMENTS Remove

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
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	Filing Date	2020-06-09
	First Named Inventor	RENARD
	Art Unit	2186
	Examiner Name	MISIURA
	Attorney Docket Number	21063.0018USWO

	1	Office Action issued in Indian Application No. 202017017906, dated July 4, 2022, with English translation	X

If you wish to add additional non-patent literature document citation information please click the Add button Add

EXAMINER SIGNATURE

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

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	Filing Date	2020-06-09
	First Named Inventor	RENARD
	Art Unit	2186
	Examiner Name	MISIURA
	Attorney Docket Number	21063.0018USWO

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☒ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Thomas Lee/	Date (YYYY-MM-DD)	2022-08-10
Name/Print	Thomas Lee	Registration Number	66,396

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these record s.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

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PATENT AND TRADEMARK OFFICE

P.O. Box 1450
Alexandria, VA 22313 - 1450
www.uspto.gov

ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
16/771,068	**08/10/2022 02:24:16 PM ET**	**21063.0018USWO**

Title of Invention

METHOD AND SYSTEM FOR MAKING FUNCTIONAL DEVICES AVAILABLE TO PARTICIPANTS OF MEETINGS

Application Information

APPLICATION TYPE	Utility - U.S. National Stage under 35 USC 371	PATENT #	-
CONFIRMATION #	1088	FILED BY	Yanling Cottle
PATENT CENTER #	60860539	FILING DATE	06/09/2020
CUSTOMER #	52835	FIRST NAMED INVENTOR	Gauthier RENARD
INTL. APPLICATION #	-	INTL. FILING DATE	-
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	Thomas Lee

Documents

TOTAL DOCUMENTS: 2

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
IDS_SB08_0018USWO.pdf	4	Information Disclosure Statement (IDS) Form (SB08)	1234 KB
OA.pdf	6	Other reference-Patent/Application/Search Documents	6039 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)

IDS_SB08_0018USWO.pdf	0188AC23966E5B6078EC49F972B2C33C1504BAB8210D071BD412F7693589AFBF0EFDC0903F4166AFC716C6391C3077CC34040AA6B8C0E3650824BCE672A4B737
OA.pdf	263BDAC0B965D0ABCDE9A6233D1D757230F7C931FC87DAB6B92873EC6CAF9499B017D5F3A5CA116DBBB860C8A22EAD8476D62AAA299F17EAAC9E90A5F2881585

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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(Not for submission under 37 CFR 1.99)

Application Number	16771068
Filing Date	2020-06-09
First Named Inventor	RENARD
Art Unit	2186
Examiner Name	MISIURA
Attorney Docket Number	21063.0018USWO

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Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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NON-PATENT LITERATURE DOCUMENTS Remove

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]

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	Art Unit	2186
	Examiner Name	MISIURA
	Attorney Docket Number	21063.0018USWO

	1	Notice of Grounds of Rejection issued in corresponding Japanese Application No. 2020-536065, dated August 16, 2022, with English machine translation	☒
	2	"Skype for Business" Skype for Business product brochure, Microsoft Japan, October 29, 2015, with partial translation	☒

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EXAMINER SIGNATURE

Examiner Signature		Date Considered	

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[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

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	First Named Inventor	RENARD
	Art Unit	2186
	Examiner Name	MISIURA
	Attorney Docket Number	21063.0018USWO

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OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Thomas Lee/	Date (YYYY-MM-DD)	2022-11-01
Name/Print	Thomas Lee	Registration Number	66,396

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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The information provided by you in this form will be subject to the following routine uses:

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6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

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ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
16/771,068	**11/01/2022 04:37:08 PM ET**	**21063.0018USWO**

Title of Invention

METHOD AND SYSTEM FOR MAKING FUNCTIONAL DEVICES AVAILABLE TO PARTICIPANTS OF MEETINGS

Application Information

APPLICATION TYPE	Utility - U.S. National Stage under 35 USC 371	PATENT #	-
CONFIRMATION #	1088	FILED BY	Yanling Cottle
PATENT CENTER #	61130388	FILING DATE	06/09/2020
CUSTOMER #	52835	FIRST NAMED INVENTOR	Gauthier RENARD
INTL. APPLICATION #	-	INTL. FILING DATE	-
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	Thomas Lee

Documents

TOTAL DOCUMENTS: 3

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
NPL1_OA_JP.pdf	14	Other reference-Patent/Application/Search Documents	11513 KB
NPL2_Skype_for_Business.pdf	22	Non Patent Literature	4185 KB
SB08_0018USWO.pdf	4	Information Disclosure Statement (IDS) Form (SB08)	1234 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
NPL1_OA_JP.pdf	636410CFA89BC2E7A735B6605FCE0193A6AF4697801ADCFB2 400B6102FCC658959754BAC2AF785374464FC1C2328537D6ED 498AD904E099DD4A1DFD27775F3DA
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SB08_0018USWO.pdf	CB14B13D8CDA1CDDA7CF572176352E18A25C3F70A34EED6A 65E6775B1F92D432652FD88A1AD87739B579DA954D03A6F08B 7371940E4F2E7D59FE9FEAF462FC97

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National Stage of an International Application under 35 U.S.C. 371

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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Application Number	16771068
Filing Date	2020-06-09
First Named Inventor	Gauthier RENARD
Art Unit	
Examiner Name	
Attorney Docket Number	21063.0018USWO

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Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20040010464	A1	2004-01-15	John Boaz	cited in Office Action issued in US 17/675641

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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]

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	Filing Date	2020-06-09
	First Named Inventor	Gauthier RENARD
	Art Unit	
	Examiner Name	
	Attorney Docket Number	21063.0018USWO

	1	Office Action issued in US patent application 17/675,641, dated October 27, 2022	

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EXAMINER SIGNATURE

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16771068
	Filing Date	2020-06-09
	First Named Inventor	Gauthier RENARD
	Art Unit	
	Examiner Name	
	Attorney Docket Number	21063.0018USWO

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☒ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Thomas Lee/	Date (YYYY-MM-DD)	2023-01-25
Name/Print	Thomas Lee	Registration Number	66,396

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these record s.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

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5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

UNITED STATES
PATENT AND TRADEMARK OFFICE

P.O. Box 1450
Alexandria, VA 22313 - 1450
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ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
16/771,068	**01/25/2023 02:48:14 PM ET**	**21063.0018USWO**

Title of Invention

METHOD AND SYSTEM FOR MAKING FUNCTIONAL DEVICES AVAILABLE TO PARTICIPANTS OF MEETINGS

Application Information

APPLICATION TYPE	Utility - U.S. National Stage under 35 USC 371	PATENT #	-
CONFIRMATION #	1088	FILED BY	Yanling Cottle
PATENT CENTER #	61490501	FILING DATE	06/09/2020
CUSTOMER #	52835	FIRST NAMED INVENTOR	Gauthier RENARD
INTL. APPLICATION #	-	INTL. FILING DATE	-
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	Thomas Lee

Documents

TOTAL DOCUMENTS: 2

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
OA.pdf	58	Other reference-Patent/Application/Search Documents	2830 KB
Warning: The attached file contains comments or annotations. Comments are not recommended and may cause processing problems with the document.			
SB08_0018USWO.pdf	4	Information Disclosure Statement (IDS) Form (SB08)	1234 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
OA.pdf	04F4D1CCAE200B8A68C3762E623B255E6CDE14184EA55E698 FF6DD09662C89978674DA7235BDEC7D06DE549908C10FAEC F94A7549E9259FD5BC07410EBA45A31
SB08_0018USWO.pdf	2059A5A22354092AD0DB3A18DD5106D5E953CE166A405F35F 872F7F46CF1AB20B167DE4081D16B66AFAF608990D31B57741 EDC39F9B95EABF319BB2D073A216F

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/771,068	Filing Date 06/09/2020	☐ To be Mailed

ENTITY: ☑ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $100 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $460 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	01/27/2023	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 22	Minus	** 23	= 0		x $100 =	0
	Independent (37 CFR 1.16(h))	* 2	Minus	*** 3	= 0		x $480 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	PSS
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/MARY R HUNTER/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

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If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventorship:	RENARD	Examiner:	MISIURA, BRIAN T.
Serial No.:	16/771068	Group Art Unit:	2186
Filed:	June 9, 2020	Docket No.:	21063.0018USWO
Title:	METHOD AND SYSTEM FOR MAKING FUNCTIONAL DEVICES AVAILABLE TO PARTICIPANTS OF MEETINGS		

CERTIFICATE OF TRANSMISSION.
I hereby certify that this paper is being transmitted by EFS Web to the United States Patent & Trademark Office on January 27, 2023.

By: /Jessica A. Sun /
Name: Jessica A. Sun

AMENDMENT AND RESPONSE

Mail Stop: AMENDMENT
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Dear Commissioner:

In response to the Non-Final Office Action issued July 29, 2022, please amend the above-identified application as follows:

Amendments to the Specification are reflected in the listing of claims that beings on page 2 of this paper.

Amendments to the Claims are reflected in the listing of claims that begins on page 4 of this paper.

Remarks begin on page 8 of this paper.