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(12) EX PARTE REEXAMINATION CERTIFICATE (11946th)

United States Patent
Kurita et al.

(10) Number: US 10,129,590 C1
(45) Certificate Issued: Nov. 15, 2021

(54) **DISPLAY APPARATUS AND VIDEO PROCESSING APPARATUS**

(71) Applicant: **MAXELL, LTD.**, Kyoto (JP)

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Reexamination Request:
No. 90/014,651, Jan. 12, 2021

Reexamination Certificate for:

Patent No.:	**10,129,590**
Issued:	**Nov. 13, 2018**
Appl. No.:	**15/208,886**
Filed:	**Jul. 13, 2016**

Related U.S. Application Data

(63) Continuation of application No. 12/260,410, filed on Oct. 29, 2008, now Pat. No. 9,420,212.

(30) **Foreign Application Priority Data**

Nov. 28, 2007 (JP) 2007-306750

(51) **Int. Cl.**

H04N 5/44	(2011.01)
H04N 21/4363	(2011.01)
H04L 29/06	(2006.01)
H04N 21/41	(2011.01)
H04N 21/414	(2011.01)
H04N 21/4367	(2011.01)

(52) **U.S. Cl.**
CPC ***H04N 21/43637*** (2013.01); ***H04L 69/14*** (2013.01); ***H04N 5/44*** (2013.01); ***H04N 21/4122*** (2013.01); ***H04N 21/41407*** (2013.01); *H04N 21/4367* (2013.01)

(58) **Field of Classification Search**
None
See application file for complete search history.

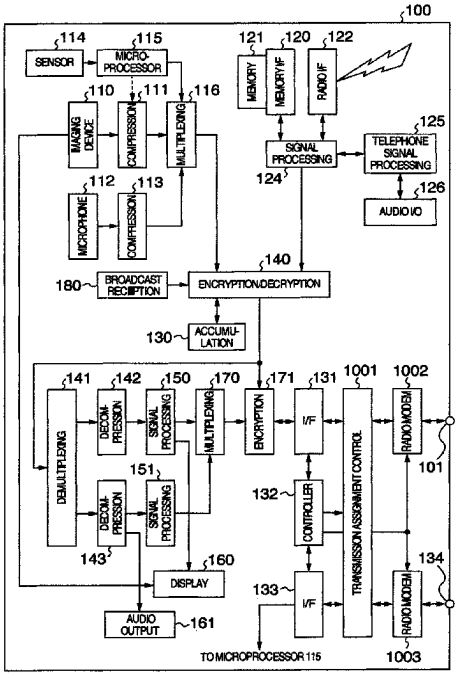
(56) **References Cited**

To view the complete listing of prior art documents cited during the proceeding for Reexamination Control Number 90/014,651, please refer to the USPTO's public Patent Application Information Retrieval (PAIR) system under the Display References tab.

Primary Examiner — My Trang Ton

(57) **ABSTRACT**

While presenting on a display apparatus videos of high picture quality obtained from portable video processing apparatuses such as a camera and a cellular, it is possible to communicate with the Internet and/or a home network. A display apparatus includes a first radio communication unit capable of receiving video information by radio from an external video processing apparatus, a second radio communication unit capable of connecting by radio to a network, and a control unit for controlling assignment of connection by radio transmission for each of the first and second radio communication units. The control unit assigns connection of the first radio communication unit with higher priority and controls the assignment of the transmission rate such that the transmission rate between the first radio communication unit and the external video processing apparatus is more than that between the second radio communication unit and the network.



EX PARTE REEXAMINATION CERTIFICATE

THE PATENT IS HEREBY AMENDED AS INDICATED BELOW.

Matter enclosed in heavy brackets [ ] appeared in the patent, but has been deleted and is no longer a part of the patent; matter printed in italics indicates additions made to the patent.

AS A RESULT OF REEXAMINATION, IT HAS BEEN DETERMINED THAT:

Claims **1**, **5**, **9** and **10** are determined to be patentable as amended.

Claims **2-4** and **6-8**, dependent on an amended claim, are determined to be patentable.

New claims **11-25** are added and determined to be patentable.

1. A video processing apparatus, comprising:

a first radio communication circuit *implementing a first transmission scheme having a first modulation scheme and a first transmission frequency band, the first radio communication circuit* capable of transmitting video information by radio or receiving information by radio *using the first transmission frequency band*;

a second radio communication circuit *implementing a second transmission scheme having a second modulation scheme different from the first modulation scheme and a second transmission frequency band different from the first transmission frequency band, the second radio communication circuit* capable of connecting by radio to an internet or a home network to transmit and receive information *using the second transmission frequency band*;

a third radio communication circuit capable of transmitting information and using a third transmission frequency band;

an imaging circuit capable of receiving video information *and still picture information* via an optical system;

a compression circuit compressing the still picture information using a first type of compression method and the video information using a second type of compression method;

an input device capable of receiving a user indication;

an accumulation circuit capable of accumulating video information received by the imaging circuit *after the video information is compressed by the compression circuit*; and

a controller *controlling assignment of connection of each of the first, second, and third radio communication circuits*,

wherein the first radio communication circuit can transmit video information accumulated in the accumulation circuit to an external device by radio,

wherein the controller controls assignment of connection for each of the first and second radio communication circuit in response to receiving an indication from a user**[**; and**]** *such that when an indication from the user indicates to transmit video information using the first radio communication circuit, the controller assigns a connection to the first radio communication circuit for transmitting the video information,*

wherein the controller controls each of the first and second radio communication circuit**[**,**]** so that the first radio communication circuit transmits video information and the second radio communication circuit connects to the internet or the home network simultaneously, *and*

wherein the second or third radio communication circuits receive a signal from the internet indicating that an update for an operating system of the video processing apparatus is available, and the video processing apparatus executes an update process such that an updated operating system of the video processing apparatus is stored in the video processing apparatus after execution of the update process.

5. A display apparatus, comprising:

a first radio communication circuit *implementing a first transmission scheme having a first modulation scheme and a first transmission frequency band, the first radio communication circuit* capable of receiving video information by radio or transmitting information by radio *using the first transmission frequency band*;

a second radio communication circuit *implementing a second transmission scheme having a second modulation scheme different from the first modulation scheme and a second transmission frequency band different from the first transmission frequency band, the second radio communication circuit* capable of connecting by radio to an internet or a home network to transmit and receive information *using the second transmission frequency band*;

a third radio communication circuit capable of transmitting information and using a third transmission frequency band;

a compression circuit capable of implementing a plurality of compression schemes including a first compression scheme, the compression circuit compressing the video information received by the first radio communication circuit using the first compression scheme;

a display capable of displaying the information received by the first radio communication circuit or the second radio communication circuit; and

a controller *controlling assignment of connection of each of the first, second, and third radio communication circuits*,

wherein the controller controls assignment of connection for each of the first and second radio communication circuits in response to receiving an indication from a user**[**; and**]** *such that when an indication from the user indicates to use the first radio communication circuit, the controller assigns a connection to the first radio communication circuit for receiving the video information or transmitting the information by radio,*

wherein the controller controls each of the first and second radio communication circuits**[**,**]** so that the first radio communication circuit receives video information and the second radio communication circuit connects to the internet or the home network simultaneously, *and*

wherein the second or third radio communication circuits receive a signal from the internet indicating that an update for an operating system of the display apparatus is available, and the display apparatus executes an update process such that an updated operating system of the display apparatus is stored in the display apparatus after execution of the update process.

9. A method for video processing, comprising:

receiving video information *and still picture information* via an optical system by an imaging circuit *of a video processing apparatus*;

compressing the still picture information using a first type of compression method and the video information using a second type of compression method;

accumulating video information received by the imaging circuit *after the video information is compressed by the compression circuit*;

implementing a first transmission scheme having a first modulation scheme and a first transmission frequency band;

transmitting, *using the first transmission frequency band,* the video information to an external device by radio, via a first radio communication circuit; [and]

implementing a second transmission scheme having a second modulation scheme different from the first modulation scheme and a second transmission frequency band different from the first transmission frequency band;

connecting, by radio, to an internet or a home network to transmit and receive information *using the second transmission frequency band,* via a second radio communication circuit;

transmitting, via a third radio communication circuit, information using a third transmission frequency band;

controlling, via a controller, assignment of connection of each of the first, second, and third radio communication circuits, wherein assignment of connection for each of the first and second radio communication circuit is controlled in response to receiving an indication from a user[; and] *such that when an indication from the user indicates to transmit video information using the first radio communication circuit, a connection is assigned to the first radio communication circuit for transmitting the video information,*

wherein the transmitting and connecting is controlled so that the first radio communication circuit is configured to transmit video information and the second radio communication circuit is configured to connect to the internet or the home network simultaneously;

receiving, via the second or third radio communication circuits a signal from the internet indicating that an update for an operating system is available;

executing the update process; and

storing an updated operating system after execution of the update process.

10. A method, comprising:

implementing a first transmission scheme having a first modulation scheme and a first transmission frequency band;

implementing a second transmission scheme having a second modulation scheme different from the first modulation scheme and a second transmission frequency band different from the first transmission frequency band;

receiving video information by radio *using the first transmission frequency band*, via a first radio communication circuit and connecting by radio to an internet or a home network to transmit and receive information *using the second transmission frequency band*, via a second radio communication circuit; [and]

compressing the video information received by the first radio communication circuit using a first compression scheme;

transmitting, via a third radio communication circuit, information using a third transmission frequency band;

displaying, via a display circuit, information received by the first radio communication circuit or the second radio communication circuit;

controlling, via a controller, assignment of connection of each of the first, second, and third radio communication circuits, wherein assignment of connection for each of the first and second radio communication circuit is controlled in response to receiving an indication from a user[; and] *such that when an indication from the user indicates to use the first radio communication circuit, the controller assigns a connection to the first radio communication circuit for receiving the video information,*

wherein the receiving and connecting is controlled so that the first radio communication circuit is configured to receive video information and the second radio communication circuit is configured to connect to the internet or the home network simultaneously;

receiving, via the second or third radio communication circuits, a signal from the internet indicating that an update for an operating system is available;

executing the update process; and

storing an updated operating system after execution of the update process.

11. The video processing apparatus of claim 1, further comprising a fourth radio communication circuit capable of transmitting information and using a fourth transmission frequency band that is different from the first, second, and third transmission frequency bands, wherein the controller controls assignment of connection of each of the first, second, third, and fourth radio communication circuits.

12. The video processing apparatus of claim 1, wherein the third transmission frequency band is different from the first and second transmission frequency bands.

13. The video processing apparatus of claim 1, wherein transmitting of the information by the third radio communication circuit comprises transmitting video information to the external device.

14. The video processing apparatus of claim 1, wherein transmitting of the information by the third radio communication circuit comprises connecting to the internet.

15. The video processing apparatus of claim 1, wherein the input device is capable of receiving a user's selection of content to be displayed on the video processing apparatus.

16. The video processing apparatus of claim 1, wherein the second or third radio communication circuits receive a signal from the internet indicating that an update for an application of the video processing apparatus is available, and the video processing apparatus executes an application update process such that an updated application of the video processing apparatus is stored in the video processing apparatus after execution of the application update process.

17. The video processing apparatus of claim 1, further comprising:

a display for displaying a screen requesting user input, wherein the displayed screen prompts the user for a user input that indicates whether the user allows a connection between the first radio communication circuit and the external device to be established, wherein in response to receiving the user input indicating allowance of the connection, the first radio communication circuit transmits the accumulated video information to the external device.

18. The video processing apparatus of claim 1, wherein the second modulation scheme comprises quadrature amplitude modulation (QAM).

19. The video processing apparatus of claim 1, wherein the second radio communication circuit is controllable to change from the second modulation scheme to a different modulation scheme.

20. The video processing apparatus of claim 1, wherein the video processing apparatus comprises a cellular phone.

21. The video processing apparatus of claim 1, wherein the second and third radio communication circuits conduct demodulation through Orthogonal Frequency Division Multiplexing (OFDM).

22. The video processing apparatus of claim 1, wherein at least the first radio communication circuit and the third radio communication circuit are implemented as a combined circuit.

23. A cellular phone, comprising:

a first radio communication circuit implementing a first transmission scheme having a first modulation scheme and first transmission frequency band, the first radio communication circuit capable of transmitting video information by radio or receiving information by radio using the first transmission frequency band;

a second radio communication circuit implementing a second transmission scheme having a second modulation scheme different from the first modulation scheme and a second transmission frequency band different from the first transmission frequency band, the second radio communication circuit capable of connecting by radio to an internet or a home network to transmit and receive information using the second transmission frequency band;

a third radio communication circuit capable of transmitting information using a third transmission frequency band;

a fourth radio communication circuit capable of transmitting information using a fourth transmission frequency band;

an imaging circuit capable of receiving video information and still picture information via an optical system;

a compression circuit compressing the still picture information using a first type of compression method and the video information using a second type of compression method;

a microphone receiving audio information corresponding to the video information received via the imaging circuit;

an accumulation circuit capable of accumulating video information received by the imaging circuit and audio information received by the microphone, wherein the first radio communication circuit can transmit video information accumulated in the accumulation circuit to an external device by radio;

a display displaying the video information received by the first radio communication circuit and displaying information received by the second radio communication circuit via the internet or home network;

a controller controlling assignment of connection of each of the first, second, third, and fourth radio communication circuits,

wherein the controller controls assignment of connection for each of the first and second radio communication circuit in response to receiving an indication from a user such that when an indication from the user indicates to transmit video information using the first radio communication circuit, the controller assigns a connection to the first radio communication circuit for transmitting the video information,

wherein the controller controls each of the first and second radio communication circuit so that the first radio communication circuit transmits video information and the second radio communication circuit connects to the internet or the home network simultaneously, and

wherein the second or third radio communication circuits receive a signal from the internet indicating that an update for an operating system of the cellular phone is available, and the cellular phone executes an update process such that an updated operating system of the cellular phone is stored in the cellular phone after execution of the update process.

24. The cellular phone of claim 23, wherein the second or third radio communication circuits receive a signal from the internet indicating that an update for an application of the cellular phone is available, and the cellular phone executes an application update process such that an updated application of the cellular phone is stored in the cellular phone after execution of the application update process.

25. The cellular phone of claim 23, wherein the first modulation scheme comprises shift keying modulation and the second modulation scheme comprises quadrature amplitude modulation (QAM).

* * * * *

Docket No.: 009379.00009
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Reexamination of:

Toshiyuki Kurita et al.

Reexamination Control No. 90/014,651

Patent Under Reexamination: U.S. Pat. No. 10,129,590 Confirmation No.: 7485

Issue Date: Nov. 13, 2018 Art Unit: 3992

Title: Display Apparatus and Video Processing Apparatus Examiner: Ton, My Trang

Mail Stop *Ex Parte* Reexam
Attn: Central Reexamination Unit
Commissioner for Patents
P.O. Box. 1450
Alexandria, VA 22313-1450

COMMENTS ON STATEMENT OF REASONS FOR PATENTABILITY AND/OR CONFIRMATION

Patent Owner thanks the Examiner for the Notice of Intent to Issue *Ex Parte* Reexamination Certificate and Statement of Reasons for Patentability And/or Confirmation mailed on October 29, 2021, indicating that claims 1-25 are patentable/confirmed. Without withdrawing any of the patentable/confirmed claims from issue, Patent Owner submits these comments.

The Examiner made characterizations and assertions about the claims and the related prior art in the Notice of Intent to Issue *Ex Parte* Reexamination Certificate. Although Patent Owner agrees with the Examiner's ultimate conclusions that the claims are patentable because the prior art does not teach or suggest the claimed features set forth in the claims, Patent Owner

does not necessarily agree with each or every characterization and assertion contained in the Examiner's statement.

It is understood that the Examiner's characterizations were for purposes of referring to the prior art, and do not in any way imply that the claims are limited by words not actually present in the claims. There are many other features in the independent and dependent claims, and the features quoted in the excerpts are not necessarily the only reasons for distinguishing the claims from the various references. Also, to the extent there is any deviation between the quoted excerpts and the language of the claims, the language of the claims will control. Therefore, unless expressly noted otherwise, Patent Owner declines to subscribe to any statement or characterization contained in the Notice of Intent to Issue *Ex Parte* Reexamination Certificate.

Furthermore, Patent Owner disagrees with the statements made in the Notice of Intent to Issue *Ex Parte* Reexamination Certificate with respect to the section entitled "CLAIM INTERPRETATION" on pages 4-17 for the same reasons as set forth in the Response to Office Action submitted on September 14, 2021. *See* Response to Non-Final Office Action dated September 14, 2021 at 18-20. Specifically, Patent Owner does not ascribe to any of the claim construction set forth by the USPTO and reserves all rights to assert that the claimed elements should be given their plain and ordinary meaning under the *Phillips v. AWH* claim construction standard. Further, Patent Owner disagrees that the terms reciting "controller"—characterized as "FP#1," "FP#2", "FP#3," "FP#4," and "FP#5" in the Notice of Intent to Issue *Ex Parte* Reexamination Certificate—invoke Section 112, ¶ 6 at least because a PHOSITA would recognize that the term "controller" denotes sufficient structure and under the *Phillips v. AWH* standard, prior court decisions have also consistently held that the term "controller" denotes sufficiently definite structure. *See e.g.*, *Sound View Innovations, LLC v. Facebook, Inc.*, 2017

WL 222177, at *5 (D. Del. May 19, 2017) ("'Controller' may be a class of structures, rather than one specific structure, and may be defined with functional terms, but that does not make it means-plus-function."); *see also Honeywell Int'l Inc. v. Universal Avionics Sys. Corp.*, 264 F. Supp. 2d 135 (D. Del. 2003) ("controller" is not an MPF term); *911EP v. Whelen Eng'g Co., Inc.*, 512 F. Supp. 2d 713, 727 (E.D. Tex. 2007) ("[t]he claim language does not merely describe a controller, but adds further structure by describing the operation of the controller. ... Accordingly, the description of the operation of a controller is sufficient to avoid section 112 P 6."); *see also SynQor, Inc. v. Artesyn Techs., Inc.*, 2010 WL 2991037, at *23 (E.D. Tex. Jul. 26, 2010), *aff'd,* 709 F.3d 1365 (Fed. Cir. 2013) (finding that "control circuitry determining …" is not an MPF term); *Maxell Ltd. v. Huawei Device USA Inc.*, 297 F. Supp. 3d 668, 748 (E.D. Tex. 2018) ("'controller' connotes structure [and] does not fall with[in] the means-plus-function analysis"). None of these decisions have been distinguished in the Notice of Intent to Issue *Ex Parte* Reexamination Certificate.

The dispute between Patent Owner and USPTO with respect to the correct claim interpretation of the claims is irrelevant as to the patentability/confirmation of claims 1-25 because the claims are distinguishable over the prior art under both the USPTO's and Patent Owner's interpretation. *See* Notice of Intent to Issue *Ex Parte* Reexamination Certificate at 20-25 (noting that the prior art of record does not teach several limitations without providing any discussion that a specific structure of the "controller" is not being taught under Section 112, ¶ 6). Moreover, Patent Owner notes that the Notice of Intent to Issue *Ex Parte* Reexamination Certificate does not apply the *Phillips v. AWH* claim construction standard but interprets claims under a different broadest reasonable interpretation standard. Thus, Patent Owner reserves all rights to set forth the proper construction under the *Phillips v. AWH* claim construction standard, where applicable.

The Examiner is thanked for his time and patience and Patent Owner agrees that the claims 1-25 are patentable over the cited references.

If there are any questions, the Examiner is invited to contact the undersigned at (202) 824-3158.

Dated: November 12, 2021

Respectfully submitted,

By: /Scott M Kelly/
Scott M. Kelly
Registration No. 65,121

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CERTIFICATE OF SERVICE

The undersigned hereby certifies that a true and accurate copy of the COMMENTS ON STATEMENT OF REASONS FOR PATENTABILITY AND/OR CONFIRMATION filed in Reexamination Control Number 90/014,651 is being served in its entirety via First Class Mail, postage prepaid, on the following counsel of record:

Robin A. Snader
ERISE IP, P.A.
7015 College Boulevard, Suite 700
Overland Park, Kansas 66211

on this November 10, 2021.

Respectfully submitted,

By: /Rachel Lichter/
Rachel Lichter

Electronic Acknowledgement Receipt

EFS ID:	44270128
Application Number:	90014651
International Application Number:	
Confirmation Number:	7485
Title of Invention:	DISPLAY APPARATUS AND VIDEO PROCESSING APPARATUS
First Named Inventor/Applicant Name:	10129590
Customer Number:	177632
Filer:	Scott M Kelly/Rachel Lichter
Filer Authorized By:	Scott M Kelly
Attorney Docket Number:	2638-19.08
Receipt Date:	12-NOV-2021
Filing Date:	12-JAN-2021
Time Stamp:	14:28:18
Application Type:	Reexam (Patent Owner)

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		590_Patent_-_Reexam_90014651-_Comments_on_RFAP_21579870.pdf	35321 07614fdd97904c5706a41eb966b27949bb2358e3	yes	5

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Patent Owner Comments after Action Closing Prosecution	1	4
	Reexam Certificate of Service	5	5
Warnings:			
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	Total Files Size (in bytes):	35321	

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.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
90/014,651	01/12/2021	10129590	2638-19.08	7485

177632 7590 10/29/2021

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EXAMINER	
TON, MY TRANG	

ART UNIT	PAPER NUMBER
3992	

MAIL DATE	DELIVERY MODE
10/29/2021	PAPER

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.

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EX PARTE REEXAMINATION COMMUNICATION TRANSMITTAL FORM

REEXAMINATION CONTROL NO. *90/014,651* .

PATENT UNDER REEXAMINATION *10129590* .

ART UNIT *3992* .

Enclosed is a copy of the latest communication from the United States Patent and Trademark Office in the above identified *ex parte* reexamination proceeding (37 CFR 1.550(f)).

Where this copy is supplied after the reply by requester, 37 CFR 1.535, or the time for filing a reply has passed, no submission on behalf of the *ex parte* reexamination requester will be acknowledged or considered (37 CFR 1.550(g)).

Notice of Intent to Issue Ex Parte Reexamination Certificate	**Control No.** 90/014,651	**Patent Under Reexamination** 10129590	
	Examiner MY TRANG TON	**Art Unit** 3992	**AIA Status** No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

1. ☑ Prosecution on the merits is (or remains) closed in this *ex parte* reexamination proceeding. This proceeding is subject to reopening at the initiative of the Office or upon petition. *Cf.* 37 CFR 1.313(a). A Certificate will be issued in view of
   (a) ☑ Patent owner's communication(s) filed: September 14, 2021.
   (b) ☐ Patent owner's failure to file an appropriate timely response to the Office action mailed: _____.
   (c) ☐ Patent owner's failure to timely file an Appeal Brief (37 CFR 41.31).
   (d) ☐ The decision on appeal by the ☐ Board of Patent Appeals and Interferences ☐ Court dated _____
   (e) ☐ Other: _____.
2. The Reexamination Certificate will indicate the following:
   (a) Change in the Specification: ☐ Yes ☑ No
   (b) Change in the Drawing(s): ☐ Yes ☑ No
   (c) Status of the Claim(s):
      (1) Patent claim(s) confirmed: _____.
      (2) Patent claim(s) amended (including dependent on amended claim(s)): 1-10
      (3) Patent claim(s) canceled: _____.
      (4) Newly presented claim(s) patentable: 11-25.
      (5) Newly presented canceled claims: _____.
      (6) Patent claim(s) ☐ previously ☐ currently disclaimed: _____
      (7) Patent claim(s) not subject to reexamination: _____.
3. ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.
4. ☑ Note the attached statement of reasons for patentability and/or confirmation. Any comments considered necessary by patent owner regarding reasons for patentability and/or confirmation must be submitted promptly to avoid processing delays. Such submission(s) should be labeled: "Comments On Statement of Reasons for Patentability and/or Confirmation."
5. ☐ Note attached NOTICE OF REFERENCES CITED (PTO-892).
6. ☐ Note attached LIST OF REFERENCES CITED (PTO/SB/08 or PTO/SB/08 substitute).
7. ☐ The drawing correction request filed on _____ is: ☐approved ☐disapproved.
8. ☑ Acknowledgment is made of the priority claim under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☑ All b) ☐ Some* c) ☐None of the certified copies have
      ☐been received.
      ☐not been received.
      ☑been filed in Application No. 15//208886.
      ☐been filed in reexamination Control No. _____.
      ☐been received by the International Bureau in PCT Application No. _____.

   * Certified copies not received: _____.
9. ☐ Note attached Examiner's Amendment.
10. ☐ Note attached Interview Summary (PTO-474).
11. ☐ Other: _____.

All correspondence relating to this reexamination proceeding should be directed to the **Central Reexamination Unit** at the mail, FAX, or hand-carry addresses given at the end of this Office action.

/MY TRANG TON/ Primary Examiner, Art Unit 3992	

cc: Requester (if third party requester)

NOTICE OF INTENT TO ISSUE EX PARTE REEXAMINATION CERTIFICATE

This is a reexamination of U.S Patent No. 10,129,590 (hereinafter "the '**590 Patent**") to Kurita, entitled "DISPLAY APPARATUS AND VIDEO PROCESSING APPARATUS".

The '590 Patent issued on November 13, 2018 based on US Patent Application No. 15/208,886 (**the base application**) filed on July 13, 2016.

RELEVANT PROSECUTION HISTORY

The following is a brief outline of the relevant prosecution history herein.

01/12/2021 The Requester filed a request for ex parte reexamination of claims 1-10 of the '590 Patent, which was assigned as the reexamination proceeding control number 90/014,651 (hereinafter "'**651 proceeding**").

01/20/2021 The Office contacted the Patent Owner by telephone for requesting waiver of the Patent Owner's statement pursuant to the pilot program for waiver of Patent Owner's statement in ex parte reexamination proceedings. USPTO personnel were unable to reach the Patent Owner.

02/10/2021 The USPTO mailed a decision granting ex parte reexamination and ordering the reexamination of claim 1-10 of the '590 Patent (hereinafter "**Order**"). Of these, claims 1, 5, 9 and 10 are independent claims.

07/14/2021 A non-final Office action was mailed (hereinafter "**July 2021 NF**") where claims 1 and 4-10 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Tee in view of the knowledge of the PHOSITA; and claims 2-3 were rejected under 35 U.S.C. 103(a) as being unpatentable over Tee in view of Honkanen.

09/14/2021 Patent Owner's response and amendment was filed (hereinafter "**September 2021 Response**"). The response included an amendment which includes amended claims 1, 5, 9, 10; original claims 2-4, 6-8; and newly added claims 11-25.

The Examiner acknowledges the September 2021 Response. This action is made in full consideration of the September 2021 Response.

STATUS OF CLAIMS

The status of the claims in this proceeding is as follows:

Claims 1, 5, 9 and 10 are amended.

Claims 2-4 and 6-8 are original as in the '590 Patent.

Claims 11-25 are newly added.

CLAIM INTERPRETATION

During examination, claims are given the broadest reasonable interpretation consistent with the specification and limitations in the specification are not read into the claims. See MPEP § 2111 et seq.

A. Lexicographic Definitions

A first exception, albeit optional, to the broadest reasonable interpretation standard occurs when there is lexicographic definition in the specification. After careful review of the original specification, the prosecution history, and unless expressly noted otherwise by the Examiner below, the Examiner finds that she is unable to locate any lexicographic definitions (either express or implied) with reasonable clarity, deliberateness, and precision. Because the Examiner is unable to locate any lexicographic definitions with reasonable clarity, deliberateness, and precision, the Examiner concludes that Patent Owner is not their own lexicographer. See MPEP § 2111.01 IVA.

B. 35 U.S.C. § 112 6th Paragraph

The following is a quotation of pre-AIA § 112 ¶6:

> 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.

A second exception is when a claimed phrase is interpreted in accordance with 35 U.S.C. § 112, 6 paragraph (**"§ 112 ¶6"**). See MPEP § 2181 *et seq.* To invoke § 112 ¶6, a claimed phrase must meet the three prong analysis (**"3 Prong Analysis"**) as set forth in MPEP § 2181 (I). The following phrases will be first identified and then analyzed using the MPEP's 3 Prong Analysis to determine if the claimed phrases invoke § 112 ¶6. If a phrase invokes § 112 ¶6, the corresponding structure will also be determined.

1/ Functional Phrase #1 (FP#1):

The Examiner determines that FP#1 meets the three prong test and thus will be interpreted as a means-plus-function limitation § 112 ¶6.

The Examiner finds that claim 1 recites functional phrase #1 which has 2 sub-phrases each with their own function: FP#1_1, FP#1_2. They are:

A controller,

[**FP#1_1**: the controller controls assignment of connection for each of the first and second radio communication circuit in response to receiving an indication from a user such that when an indication from the user indicates to transmit video information using the first radio communication circuit, the controller assigns a connection to the first radio communication circuit for transmitting the video information;

[**FP#1_2**: the controller controls each of the first and second radio communication circuit, so that the first radio communication circuit transmits video information and the second radio communication circuit connects to the internet or the home network simultaneously

- Amended Claim 1 (in part).

i. 3 Prong Analysis: Invocation Prong (A)

As an initial matter, the Examiner finds that Functional Phrase #1 does not use the term "means." Therefore the issue arising under Invocation Prong (A) then becomes whether or not FP#1, including the claimed "controller" controls (to perform the two separate claimed functions) are a generic placeholder for "means."

In assessing whether or not FP#1 invokes § 112 ¶6, the Examiner must not only consider the introductory phrase "controller," but the *entire* functional phrases (i.e. the functional phrases FP#$1_{1\text{-}2}$. "In assessing whether the claim limitation is in means-plus-function format, we do not merely consider the introductory phrase (e.g., "mechanical control assembly") in isolation, but look to the entire passage including functions performed by the introductory phrase. [Emphasis added.]" *MTD Prods. Inc. v. lancu*, 933 F.3d 1336, 1342 (Fed. Cir. 2019).

First, within the claimed "controller controls..." phrase (i.e. FP#1), (and construing the claim according to the required precepts of English grammar).

Second, the Examiner has reviewed the original specification and drawings as set forth in '590 Patent, general and subject matter specific dictionaries (e.g. IEEE 100, the Authoritative Dictionary of IEEE Standards

Terms, Seventh Edition, 2000), and the prior art now of record to determine if the "controller controls .. [perform the two functions of Function of FP#1_{1-2}]" as set forth in FP#1 in order to determine if there exists a description sufficient to inform one of ordinary skill in this particular art that the claimed "controller .. [perform the Function of FP#1_{1-2}]," denotes a particular structure.

Third and based upon the review as set forth in the paragraph immediately above and to a person of ordinary skill in this particular art, the Examiner finds that an ordinary, off-the-shelf "controller" is structure (see e.g. Honkanen, US 2006/0135076 describing a control "CNTL 104" in Figure 1; Gautier et al, US 2008/0101446 describing a control "Controller 105"; Jo et al, US 2007 /0091835 describing a control "CONTROL UNIT" 250). However, based upon a review of the *entire passage* of FP#1 (i.e. FP#1_1, FP#1_2), the claimed "controller" as set forth in FP#1 has a particular *configuration* (i.e. it is "controls to perform two claimed functions").

Fourth, the Examiner finds that '590 Patent under reexamination expressly states:

> *"The controller 132 controls the transmission rate assignment control circuit 1001 on the basis of time control information of the video signal to variably control the transmission rate of the radio modem circuit 1002. At the same time, the controller 132 variably controls the transmission rate of the radio modem circuit 1003 for radio communication with a network such as the Internet. According to the embodiment, in the assignment of the transmission rate to the demodulation circuits 1001 and 1002, the controller 132 gives preference to the demodulation circuit. In other words, the transmission rate of the demodulation circuit 1001 is more than that of the modem*

circuit 1002. Hence, within the limited range of bands for the radio transmission, the modem 1002 can transmit video information without deteriorating the video quality of the video information having high picture quality. The band of radio signals from the terminal 101 and that of radio signals from the terminal 134 are fixed. Therefore, if the band of signals from the terminal 101 is expanded, that of signals from the terminal 134 narrows to slightly lower the communication speed of the network. However, this rarely influences the system operation since information regarding the network is less frequently exchanged as compared with video information sent form the video processing apparatus 100"

- 590 Patent: C6:L58 to C7:L14

"The controller 1001 to the interface circuit 133 for networks. The controller 1001 variably controls, according to a control signal from the controller 132, the transmission rates respectively of the modems 1002 and 1003 by variably setting the modulation/demodulation methods, the frequency bands, and the number of carriers respectively for the modems 1002 and 1003. In short, the controller 132 controls distribution of the radio transmission rate of each modem by controlling the transmission rate assignment controller 1001. As a specific example of operation in which the transmission rate is controlled by changing parameters including the demodulation method and the frequency band, FIG. 9 shows the difference in the transmission rate between two schemes. According to the embodiment, the controller 132 and the transmission rate assignment controller 1001 control the radio transmission assignment such that the radio transmission rate of the modem 1002 to send the video information of high picture quality by radio to the video display apparatus 200 takes precedence over the radio transmission rate of the modem 1003 to connect to a network for communication. That is, the radio transmission rate of the modem 1002 is more than that of the modem 1003. For example, in a situation wherein the modem 1002 transmits video information to the display apparatus 200 and the modem 1003 simultaneously connects to the Internet to receive Internet information, the controller 132 controls the operation to continuously supply videos with high picture quality to the user, specifically, to set the transmission scheme of the modem 1002 to, for example, "scheme 1" shown in FIG. 9. For the radio modem 1003, the controller 132 sets the transmission scheme thereof to "scheme 2" of FIG. 9. As can be seen from FIG. 9, the transmission capacity of scheme 1 is 17 Megabits per second (Mbps) which is more than three times that of scheme 2 (5 Mbps). As above, in the limited transmission capacity for radio transmission, a higher transmission rate is assigned

> *to the communication with the display apparatus 200 in the embodiment. It is hence possible that the user continuously views videos with high picture quality on the display apparatus 100. Naturally, the variable control of the transmission rate is not limited to the example shown in FIG. 9.*
>
> *The controller 132 and the transmission rate assignment controller 1001 may variably control the radio transmission assignment to the modems 1002 and 1003 in response to an indication from the user. For example, in a situation wherein the user issues an indication to transmit video information by radio via the modem 1002 to the display apparatus 200 while acquiring information from the Internet according to scheme 1 of FIG. 9 by use of the modem 1003, the controller 132 outputs a control signal to the assignment controller 1001 such that the transmission scheme of the modem 1003 is changed from scheme 1 to scheme 2 of FIG. 9 and that of the modem 1002 is set to scheme 1 of FIG. 9 conduct communications. The transmission rate of the modem 1002 may be variably changed according to fineness or precision of the video information sent from the modem 1002 to the display apparatus 200. For example, if the fineness of the video information is altered from SD (640x480) to HD (1980x1080), the controller 132 instructs the assignment controller 1001 to heighten the transmission rate of the modem circuit 1002. It is preferable in the operation that the transmission rate of the modem 1003 is lowered in association with the variable control of the transmission rate of the modem 1002".*
>
> - 590 Patent: C7:L61 to C8:L57

Because the hardware components of a controller are old and well known to a person of ordinary skill in this particular art (see e.g. Honkanen, US 2006/0135076 describing a control "CNTL 104" in Figure 1; Gautieretal, US 2008/0101446 describing a control "Controller 105"; Jo et al, US 2007 /0091835 describing a control "CONTROL UNIT" 250) because Patent Owner's invention includes functionalities that are ***not*** coextensive with a generic controller (e.g. see the two functions of Function of FP#1 as set forth in "3 Prong Analysis: Invocation Prong (B)" below), and because there is little in the

'590 Patent that describes any new hardware component(s) or new arrangement of hardware components, the Examiner finds that Patent Owner's invention is primarily a video processing implemented invention.

In light of the above, the Examiner concludes that to a person of ordinary skill in this particular art, the claimed "controller ... [perform the Function of FP#1_{1-2}]" is not an ordinary device but a particular device requiring special instruction since the function as set forth in FP#1 (i.e. perform the two functions of Function of FP#1_{1-2}") are functionalities that is not coextensive with a generic device. In other words, because the two functions as set forth in FP#1 clearly cannot be performed by an off-the-shelf controller, an ordinary controller, or a general purpose controller, a person of ordinary skill in this particular art must conclude that the claimed "controller" (as set forth in claim 1) requires special instruction.

In summary, because claimed "controller" within the phase "controller ... [perform the two functions of Function of FP#1_{1-2}]" is a particular device requiring special instruction, the phrase is also a generic placeholder for that instruction. Because "controller" is a generic placeholder, the Examiner concludes that Functional Phrase #1 meets invocation Prong (A).

ii. <u>3 Prong Analysis</u>: Invocation Prong (B)

Based upon a review of the claim 1 itself, the Examiner concludes that the two functions within FP#1 are:

a. Function of FP#1_1 as recited in claim 1:

> "controls assignment of connection for each of the first and second radio communication circuit in response to receiving an indication from a user such that when an indication from the user indicates to transmit video information using the first radio communication circuit, the controller assigns a connection to the first radio communication circuit for transmitting the video information";

b. Function of FP#1_2 as recited in claim 1:

> "controls each of the first and second radio communication circuit, so that the first radio communication circuit transmits video information and the second radio communication circuit connects to the internet or the home network simultaneously."

Note: the Examiner will refer to two functions collectively as **FP#$1_{1\text{-}2}$.**

Ordinary principles of claim construction govern interpretation of this claim language. The Examiner finds that because nothing in the written description of '590 Patent contradicts the plain language of the wording set forth in the Function of FP#$1_{1\text{-}2}$, the Function of FP#$1_{1\text{-}2}$ will have its ordinary and accustomed meaning. Because FP#1 includes the Function of FP#$1_{1\text{-}2}$, Examiner concludes that, FP#1 meet Invocation Prong (B).

iii. 3 Prong Analysis: Invocation Prong (C)

Based upon a review of FP#1, the Examiner finds that FP# 1 does not contain sufficient structure for performing the *two functions* set forth in FP#1. In fact, the Examiner finds that FP#1 recite very little structure (if any) for performing the Function of FP# $1_{1\text{-}2}$ beyond the generic device.

Because FP#1 does not contain sufficient structure for performing *the entire* claimed function, Examiner concludes that Functional Phrase #1 meets Invocation Prong (C).

Because FP#1 meets the 3 Prong Analysis as set forth in MPEP § 2181 I., the Examiner concludes that FP#1 invoke § 112 ¶6.

iv. Corresponding Structure for Functional Phrase #1

"*The next step in construing a means-plus-function claim limitation is to look to the specification and identify the corresponding structure for that function.*" In re Aoyama, 656 F3d 1293, 99 USPQ2d 1936 (Fed. Cir. 2011) quoting Golight, Inc. v. Wal-Mart Stores, Inc., 355 F.3d 1327, 1333, 1334, [69 USPQ2d 1481, 1486] (Fed. Cir. 2004).

"*Under this second step, structure disclosed in the specification is 'corresponding' structure only if the specification or prosecution history clearly links or associates that structure to the function recited in the claim.*" In re Aoyama, , 99 USPQ2d at 1939 quoting *Med. Instrumentation & Diagnostics Corp. v. Elekta* AB, 344 F.3d 1205, 1210, [68 USPQ2d 1263, 1267] (Fed. Cir. 2003).

Based upon a review of the '590 Patent itself, the Examiner concludes that corresponding structure for "the controller" is a CONTROLLER 132 as shown in Figures 1, 4; CONTROLLER 2013 as shown in Figures 2 and 3;

TRANSMISSION-SIDE CONTROLLER 1603, RECEPTION-SIDE CONTROLLER 1606 as shown in Figure 7. This controller is programed to perform two functions: 1/controls assignment of connection for each of the first and second radio communication circuit in response to receiving an indication from the user such that when an indication from the user indicates to transmit video information using the first radio communication circuit, the controller assigns a connection to the first radio communication circuit for transmitting the video information; 2/ controls each of the first and second radio communication circuit, so that the first radio communication circuit transmits video information and the second radio communication circuit connects to the internet or the home network simultaneously -- to create a special purpose controller.

In view of these findings, pursuant to 35 U.S.C. §112 ¶6, FP#1 in claim 1 will be limited to the corresponding structure discussed above.

2) Functional Phrase #2 (FP#2)

Claim 5 recites:

A controller,

> [**FP#2$_1$**: the controller controls assignment of connection for each of the first and second radio communication circuit in response to receiving an indication from a user such that when an indication from the user indicates to use the first radio communication circuit, the controller assigns a connection to the first radio communication

circuit for receiving the video information or transmitting the information by radio,

[**FP#2$_2$**: the controller controls each of the first and second radio communication circuit, so that the first radio communication circuit transmits video information and the second radio communication circuit connects to the internet or the home network simultaneously.

- Functional Phrase #2 or FP#2.

The same § 112 ¶6 invocation analysis applied to FP#1 is the same analysis applied to FP#2. Additionally, the same corresponding structure found in FP#1 is the same corresponding structure for FP#2.

3/ Functional Phrase #3 (FP#3):

Claim 9 recites:

[**FP#3$_1$**: assignment of connection for each of the first and second radio communication circuit is controlled in response to receiving an indication from a user such that when an indication from the user such that when an indication from the user indicates to transmit video information using the first radio communication circuit, a connection is assigned to the first radio communication circuit for transmitting the video information,

[**FP#3$_2$**: the transmitting and connecting is controlled so that the first radio communication circuit is configured to transmit video information and the second radio communication circuit is configured to connect to the internet or the home network simultaneously.

- Functional Phrase #3 or FP#3.

The same § 112 ¶6 invocation analysis applied to FP#1 is the same analysis applied to FP#3. Additionally, the same corresponding structure found in FP#1 is the same corresponding structure for FP#3.

4/ Functional Phrase #4 (FP#4):

Claim 10 recites:

[**FP#4$_1$**: assignment of connection for each of the first and second radio communication circuit is controlled in response to receiving an indication from a user such that when an indication from the user indicates to use the first radio communication circuit, the controller assigns a connection to the first radio communication circuit for receiving the video information,

[**FP#4$_2$**: the receiving and connecting is controlled so that the first radio communication circuit is configured to receive video information and the second radio communication circuit is configured to connect to the internet or the home network simultaneously.

- Functional Phrase #4 or FP#4.

The same § 112 ¶6 invocation analysis applied to FP#1 is the same analysis applied to FP#4. Additionally, the same corresponding structure found in FP#1 is the same corresponding structure for FP#4.

5/ Functional Phrase #5 (FP#5):

Claim 23 recites:

[**FP#5$_1$**: the controller controls assignment of connection for each of the first and second radio communication circuit in response to receiving an indication from a user such that when an indication from the user indicates to transmit video information using the first radio communication circuit, the controller assigns a connection to the first radio communication circuit for transmitting the video information,

[**FP#5$_2$**: the controller controls each of the first and second radio communication circuit so that the first radio communication circuit transmits video information and the second radio communication circuit connects to the internet or the home network simultaneously.

- Functional Phrase #5 or FP#5.

The same § 112 ¶6 invocation analysis applied to FP#1 is the same analysis applied to FP#5. Additionally, the same corresponding structure found in FP#1 is the same corresponding structure for FP#5.

C. Sources

The Examiner hereby adopts the following interpretations under the broadest reasonable interpretation standard. In other words, the Examiner has provided the following interpretations simply as express notice of how she is interpreting particular terms under the broadest reasonable interpretation standard. Additionally, these interpretations are only a guide to claim terminology since claim terms must be interpreted in context of the surrounding claim language. In accordance with In re *Morris*, 127 F.3d 1048, 1056, 44 USPQ2d 1023, 1029 (Fed. Cir. 1997), the Examiner points to these other "sources" to support her interpretation of the claims. Finally, the following list is not intended to be exhaustive in any way:

Controller:

"(2) A device or group of devices that serves to govern, in some predetermined manner, the electric power delivered to the apparatus to which it is connected.

(4) The component of a system that functions as the system controller. A controller typically sends program messages to and receives response messages from devices.

(5) (A) A functional unit in a computer system that controls one or more units of the peripheral equipment. (B) In robotics, a processor that takes as input desired and measured position, velocity or other pertinent variables and whose output is a drive signal to a controlling motor or activator. (C) A device through which one can introduce commands to a control system.

(7) A device or group of devices used to control in a predetermined manner the electric power delivered to the apparatus to which it is connected."

The Authoritative Dictionary of IEEE Standards Terms, 7th Ed., IEEE, Inc., New York, NY, 12/2000.

If applicant does not intend to have this limitation interpreted under 35 U.S.C. §112 (6th ¶) applicant may: (1) amend the claim limitation(s) to avoid it/them being interpreted under 35 U.S.C. §112 (6th ¶) (e.g., by reciting sufficient structure to perform the claimed function); or (2) present a sufficient showing that the claim limitation recites sufficient structure to perform the claimed function so as to avoid it/them being interpreted under 35 U.S.C. §112 (6th ¶).

D. Conclusion of Claim Interpretation

In view of the forgoing, Examiner interprets FL #1 – FL #5 under 35 U.S.C. §112 (6th ¶) as discussed above. Since no further limitations invoke interpretation under 35 U.S.C. §112 (6th ¶) and no further limitations are lexicographically defined, the remaining limitations will be interpreted applying the broadest reasonable interpretation.

REFERENCES RELIED UPON IN THE REQUEST

1/ U.S. Patent Application Publication No. 2006/0203758 A1 to Tee et. al. (hereinafter "**Tee**").

2/ U.S. Patent Application Publication No. 2006/0135076 Al to Honkanen et. al. (hereinafter "**Honkanen**")

PREVIOUS REJECTIONS

The following rejections were previously made in the July 2021 NF.

Issue 1: Claims 1 and 4-10 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Tee in view of the knowledge of the PHOSITA.

Issue 2: claims 2-3 were rejected under 35 U.S.C. 103(a) as being unpatentable over Tee in view of Honaker.

RESPONSE TO ARGUMENT

Claim Interpretation: Examiner acknowledges the response regarding the claim interpretation (September 2021 Response, pages 18-20). While Examiner does not disagree that a controller is 1/ a device that coordinates and controls the operation of one or more input/output devices, such as workstations, and synchronizes the operation of such devices with the operation of the system as a whole; or 2/ a device that other devices rely on for access to a computer subsystem; or 3/ a device that controls a functional element within a computer system; or 4/ a unit that directs the operation of a subsystem within a computer; or 5/ a subsystem that governs the functions of attached devices but generally does not change the meaning of the data that may pass through it as pointed out in pages 18-19 of the September 2021 Response. However, the test for 35 U.S.C. §112 (6th ¶) is whether the limitation provided a sufficiently definite structure for **performing the entire claimed function**. Nevertheless, the claimed "controller ... [perform the Function of FP#1 - FP#5 as pointed out above]" is not an ordinary device but a particular device requiring special instruction since the function as set forth in FP#1 - FP#5 are functionalities that is **not** coextensive with a generic device. In other words, because the functions as set forth in FP#1 - FP#5 clearly cannot be performed by an off-the-shelf controller, an ordinary

controller, or a general purpose controller, a person of ordinary skill in this particular art must conclude that the claimed "controller" requires special instruction. Accordingly, Examiner maintains that FL #1 - FL #5 invoke interpretation under 35 U.S.C. §112 (6th ¶).

Prior Art Rejection: Examiner generally agrees with the Patent Owner's amendments and arguments presented on the September 2021 Response. It is agreed that the prior art references of record (Tee and Honkanen) fail to teach or suggest the presently claimed limitations in view of the amendment and response to the independent claims 1, 5, 9, 10 and 23. Therefore, the previous rejections as noted above have been withdrawn.

STATEMENT OF REASONS FOR PATENTABILITY AND/OR CONFIRMATION

The following is an examiner's statement of reasons for patentability and/or confirmation of the claims found patentable in this reexamination proceeding:

The prior art reference of record (Tee in view of PHOSITA) is not seen to teach the amendatory subject matter of independent claim 1: "*wherein the controller controls assignment of connection for each of the first and second radio communication circuit in response to receiving an indication from a user such that when an indication from the user indicates to transmit video information using the first radio communication circuit, the controller assigns a connection to the*

first radio communication circuit for transmitting the video information, … wherein the second or third radio communication circuits receive a signal from the internet indicating that an update for an operating system of the video processing apparatus is available, and the video processing apparatus executes an update process such that an updated operating system of the video processing apparatus is stored in the video processing apparatus after execution of the update process" in combination with "*a second radio communication circuit implementing a second transmission scheme having a second modulation scheme different from the first modulation scheme and a second transmission frequency band different from the first transmission frequency band, the second radio communication circuit capable of connecting by radio to an internet or a home network to transmit and receive information using the second transmission frequency band", "a third radio communication circuit capable of transmitting information and using a third transmission frequency band* ", "an imagining circuit", "a compression circuit" and "an accumulation circuit".

Dependent claims 2-4 and 11-22 include patentable subject matter for the same reason as independent claim 1 from which they depend.

The prior art reference of record (Tee in view of PHOSITA) is not seen to teach the amendatory subject matter of independent claim 5: "*wherein the controller controls assignment of connection for each of the first and second radio communication circuits in response to receiving an indication from a user such that when an indication from the user indicates to use the first radio*

communication circuit, the controller assigns a connection to the first radio communication circuit for receiving the video information or transmitting the information by radio, … wherein the second or third radio communication circuits receive a signal from the internet indicating that an update for an operating system of the display apparatus is available, and the display apparatus executes an update process such that an updated operating system of the display apparatus is stored in the display apparatus after execution of the update process" in combination with "*a second radio communication circuit implementing a second transmission scheme having a second modulation scheme different from the first modulation scheme and a second transmission frequency band different from the first transmission frequency band, the second radio communication circuit capable of connecting by radio to an internet or a home network to transmit and receive information using the second transmission frequency band", "a third radio communication circuit capable of transmitting information and using a third transmission frequency band* " and "a compression circuit".

Dependent claims 6-8 include patentable subject matter for the same reason as independent claim 5 from which they depend.

The prior art reference of record (Tee in view of PHOSITA) is not seen to teach the amendatory subject matter of independent claim 9: "*controlling, via a controller, assignment of connection of each of the first, second, and third radio*

communication circuits, wherein assignment of connection for each of the first and second radio communication circuit is controlled in response to receiving an indication from a user such that when an indication from the user indicates to transmit video information using the first radio communication circuit, a connection is assigned to the first radio communication circuit for transmitting the video information, … receiving, via the second or third radio communication circuits a signal from the internet indicating that an update for an operating system is available; executing the update process; and storing an updated operating system after execution of the update process" in combination with "*implementing a second transmission scheme having a second modulation scheme different from the first modulation scheme and a second transmission frequency band different from the first transmission frequency band; connecting, by radio, to an internet or a home network to transmit and receive information using the second transmission frequency band, via a second radio communication circuit*" and "*transmitting, via a third radio communication circuit, information using a third transmission frequency band*" and "*compressing …*", "*accumulating …*" method steps.

The prior art reference of record (Tee in view of PHOSITA) is not seen to teach the amendatory subject matter of independent claim 10: "*controlling, via a controller, assignment of connection of each of the first, second, and third radio communication circuits, wherein assignment of connection for each of the first and second radio communication circuit is controlled in response to receiving an*

indication from a user such that when an indication from the user indicates to use the first radio communication circuit, the controller assigns a connection to the first radio communication circuit for receiving the video information, … receiving, via the second or third radio communication circuits, a signal from the internet indicating that an update for an operating system is available; executing the update process; and storing an updated operating system after execution of the update process" in combination with "*implementing a second transmission scheme having a second modulation scheme different from the first modulation scheme and a second transmission frequency band different from the first transmission frequency band; connecting, by radio, to an internet or a home network to transmit and receive information using the second transmission frequency band, via a second radio communication circuit"; "transmitting, via a third radio communication circuit, information using a third transmission frequency band"; "compressing...*" and "*accumulating …*" method steps .

The prior art reference of record (Tee in view of PHOSITA) is not seen to teach the subject matter of independent claim 23: "*wherein the controller controls assignment of connection for each of the first and second radio communication circuit in response to receiving an indication from a user such that when an indication from the user indicates to transmit video information using the first radio communication circuit, the controller assigns a connection to the first radio communication circuit for transmitting the video information, … and wherein the second or third radio communication circuits receive a signal from*

the internet indicating that an update for an operating system of the cellular phone is available, and the cellular phone executes an update process such that an updated operating system of the cellular phone is stored in the cellular phone after execution of the update process" in combination with "*a second radio communication circuit implementing a second transmission scheme having a second modulation scheme different from the first modulation scheme and a second transmission frequency band different from the first transmission frequency band, the second radio communication circuit capable of connecting by radio to an internet or a home network to transmit and receive information using the second transmission frequency band", "a third radio communication circuit capable of transmitting information using a third transmission frequency band", "a fourth radio communication circuit capable of transmitting information using a fourth transmission frequency band", "a compression circuit*" and "*an accumulation circuit*".

Dependent claims 24-25 include patentable subject matter for the same reason as independent claim 23 from which they depend.

While Tee does indeed teach in Fig. 2 a mobile terminal may receive video from the internet via the WLAN or WAN transceiver and may also receive video from a remote camera via the PAN transceiver [0022], [0038]. The videos are then simultaneously relayed to an external display via the WLAN or PAN transceiver [0030], [0037]. Tee's mobile terminal streams a video from the Internet using the WLAN transceiver, determines that an external display has

better capabilities than the mobile terminal's native display, and relays the streaming video feed to the external display using the PAN transceiver (Fig. 3). However, Tee is silent upon any suggestion regarding the amendatory subject matter of independent claims 1, 5, 9, 10 and new claim 23 as noted above. Since Tee does not clearly demonstrate and/or teaches a key element of claims 1, 5, 9, 10 and 23. The amended claims 1, 5, 9, 10 and new claim 23 are allowable over Tee. Honaker is only used as secondary reference which also does not teaches the amendatory subject matter of independent claims 1, 5, 9, 10 and new claim 23. Therefore, independent claims 1, 5, 9, 10 and 23 and their dependent claims are allowed.

Any comments considered necessary by PATENT OWNER regarding the above statement must be submitted promptly to avoid processing delays. Such submission by the patent owner should be labeled: "Comments on Statement of Reasons for Patentability and/or Confirmation" and will be placed in the reexamination file.

All correspondence relating to this ex parte reexamination proceeding should be directed:

By Mail to: Mail Stop Ex Parte Reexam
Central Reexamination Unit
Commissioner for Patents
United States Patent & Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

By hand: Customer Service Window

Randolph Building
401 Dulany Street
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Any inquiry concerning this communication should be directed to the Central Reexamination Unit at telephone number (571) 272-7705.

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Reexamination	Application/Control No.	Applicant(s)/Patent Under Reexamination
	90/014,651	10129590
	Certificate Date	Certificate Number
		C1

Requester Correspondence Address: ☐ Patent Owner ☑ Third Party
ERISE IP, P.A. (GENERAL) 7015 COLLEGE BLVD. , SUITE 700 OVERLAND PARK, KS 66211

LITIGATION REVIEW ☑	mt (examiner initials)	19 October 2021 (date)
Case Name		Director Initials
NONE		

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TYPE OF PROCEEDING	NUMBER
NONE	

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	90/014,651	10129590
	Examiner	**Art Unit**
	MY TRANG TON	3992

CPC						
Symbol					**Type**	**Version**
H04N	/	21	/	43637	F	2013-01-01
H04L	/	69	/	14	I	2013-01-01
H04N	/	5	/	44	I	2013-01-01
H04N	/	21	/	4122	I	2013-01-01
H04N	/	21	/	41407	I	2013-01-01
H04N	/	21	/	4367	A	2013-01-01

CPC Combination Sets							
Symbol					**Type**	**Set**	**Ranking**	**Version**
	/		/					

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	25	
/MY TRANG TON/ Primary Examiner, Art Unit 3992	19 October 2021	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

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Part of Paper No.: 20211028

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Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	90/014,651	10129590
	Examiner	Art Unit
	MY TRANG TON	3992

INTERNATIONAL CLASSIFICATION				
CLAIMED				
H04N	/	5	/	44
H04N	/	21	/	4363

NON-CLAIMED				
	/		/	

US ORIGINAL CLASSIFICATION	
CLASS	SUBCLASS

CROSS REFERENCES(S)						
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)					

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	25	
/MY TRANG TON/ Primary Examiner, Art Unit 3992	19 October 2021	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

U.S. Patent and Trademark Office

Part of Paper No.: 20211028

Samsung - Exhibit 1006 - Page 43

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	90/014,651	10129590
	Examiner	Art Unit
	MY TRANG TON	3992

☑ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIMS

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
	1		10		19										
	2		11		20										
	3		12		21										
	4		13		22										
	5		14		23										
	6		15		24										
	7		16		25										
	8		17												
	9		18												

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	25	
/MY TRANG TON/ Primary Examiner, Art Unit 3992	19 October 2021	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

U.S. Patent and Trademark Office

Part of Paper No.: 20211028

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Bibliographic Data

Application No: 90/014,651

Foreign Priority claimed: (●) Yes ( ) No

35 USC 119 (a-d) conditions met: [✓] Yes [ ] No [ ] Met After Allowance

Verified and Acknowledged: /MY TRANG TON/ Examiner's Signature [ ] Initials

Title: DISPLAY APPARATUS AND VIDEO PROCESSING APPARATUS

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
01/12/2021	348	3992	2638-19.08
RULE			

APPLICANTS

INVENTORS

10129590,

MAXELL LTD (PATENT OWNER), KYOTO, JAPAN

APPLE INC. (3RD. PTY. REQ.), CUPERTINO, CA, UNITED STATES

CONTINUING DATA

This application is a REX of 15208886 07/13/2016 PAT 10129590

15208886 is a CON of 12260410 10/29/2008 PAT 9420212 *

(*) Data provided by applicant is not consistent with PTO record

FOREIGN APPLICATIONS

JAPAN JP2007-306750 11/28/2007

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Reexamination of:

Toshiyuki Kurita et al.

Reexamination Control No. 90/014,651

Patent Under Reexamination: U.S. Pat. No. 10,129,590	Confirmation No.: 7843
Issue Date: Nov. 13, 2018	Art Unit: 3992
Title: Display Apparatus and Video Processing Apparatus	Examiner: Ton, My Trang

DECLARATION OF TIM A. WILLIAMS, PH.D. IN RESPONSE TO JULY 14, 2021 NON-FINAL OFFICE ACTION

1. My name is Tim A. Williams. I am submitting this declaration on behalf of patent owner Maxell, Ltd. Maxell has asked me to provide my opinions regarding the Non-Final Office Action submitted on July 14, 2021, in the *ex parte* reexamination of U.S. Patent No. 10,129,590 (the "'590 Patent").

2. I was also retained by Maxell in Inv. No. 337-TA-1215, between Maxell and Apple, Inc., at the International Trade Commission, to provide my views on the infringement and validity of the '590 Patent. Accordingly, I am very familiar with the '590 Patent and the state of the art and potential prior art references in this field of art as of the priority date of the '590 Patent.

3. Though I am being compensated for my time studying these materials, forming my opinions, and providing this declaration, my compensation is in no way tied to the substance of my opinions or the outcome of this proceeding. My opinions here are my own.

1.0 Summary of Qualifications

4. I am an expert in wireless communications, telecom technology, and other areas of telecommunications. I am an entrepreneur who has participated in the organization and operation of startup companies that brought wireless Local Area Network (LAN), software for Voice over Internet Protocol (VoIP) Private Branch Exchange (PBX), and 2-way paging technology to the marketplace. I hold numerous patents in wireless and signal processing technology, and I have extensive experience as a litigation support consultant in patent infringement matters.

5. I received my Ph.D. from the University of Texas at Austin in 1985. The title of my dissertation was "Digital Signal Processing Techniques for Acoustic Log Data." Prior to that, I received a MSEE from the University of Texas at Austin in 1982 and a BSEE from Michigan Technological University in 1976.

6. From 1979 to 1991, I was a senior engineer at Motorola, Inc., where I was responsible for product development in numerous areas of wireless technology, as set forth in more

detail by my CV. Since 1991, I have worked as founder, board member, member, chief executive officer, chief technology officer, or partner in over a dozen wireless technologies as set forth in my CV. For example, I was an Interim CEO and Advisory Board member of Atheros Communications, which was purchased by Qualcomm for $3.1 billion. As an additional example, I was the Chief Technology Officer of Picazo Communications, which was purchased by Intel.

7. My primary areas of expertise are in the fields of Wireless LANs; Cellular and Personal Communications Service (PCS) Standards; Cellular Telephone Architecture; Digital Signal Processing; Telecommunications Technology; VoIP Technology; Computer Networking; and Wireless Networks and Protocols.

8. I have been a registered patent agent with the USPTO since 2001.

9. Overall, I have been part of twenty-five startups with seven successful exits ranging from $80 million to $3.1 billion. These include:

Wireless Access, Inc.
Co-Founder, Chief Technical Officer, Vice Present of Engineering and Business Strategy (1991-1998)
- Two-way paging Chipsets, Devices, and Protocols
- Sold to Glenayre Technologies Inc. for $82million

Picazo Communications
Chief Technology Officer, Advisory Board Member (1998-2000)
- VoIP telephony
- Purchased by Intel

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Atheros Communications
Interim CEO, Advisory Board Member (1999-2000)
- WiFi Chipsets
- Public, then Purchased by Qualcomm in 2011 for $3.1 billion

SiBEAM
Founder and CEO (2004-2006)
- Wireless LAN Chipsets for Gigabit per second Networking
- Purchased by Silicon Image in 2011

BEEcube Inc.
Founder and Board Member and CEO (2006-2015)
- Developed high speed Computers
- Acquired by National Instruments in 2015 to strengthen 5G offerings

10. Since 2001, I have evaluated hundreds of patents for various clients. These evaluations typically include, for example, analyzing whether products infringed certain patents; analyzing whether certain patents were valid; searching for and reviewing potential prior art; considering the importance of the technological inventions claimed; reviewing and analyzing patent specifications, prosecution histories of patents, and extrinsic evidence relevant to potential claim construction; and considering whether there are available alternatives to the claimed inventions.).

11. My curriculum vitae contains a detailed summary of my background, experience, and publications and is attached as Appendix A.

2.0 Materials Considered

12. In forming my opinions, I considered the following materials:

- the '590 Patent;
- the '590 Patent's prosecution history;
- the July 14, 2021 non-final Office Action in the '590 Patent Reexamination;
- U.S. Patent Application Publication No. 2006/0203758 A1 ("Tee");
- U.S. Patent Application Publication No. 2006/0135076 A1 ("Honkanen");

- the Request for Ex parte Reexamination of the '590 Patent, filed by Apple, Inc. on January 12, 2021; and
- any other materials I expressly refer to in this declaration.

13. In addition to these materials, I also relied upon my decades of experience and expertise in wireless communications and telecom technology. In forming my opinions, I have also taken into account the knowledge and background principles that a person of ordinary skill in the art would be familiar with.

14. I further relied upon the materials and information that I studied in connection with the '590 Patent in forming the opinions as expressed in the Rebuttal Expert Report I submitted in connection with the validity of the '590 Patent in U.S. International Trade Commission Investigation No. 337-TA-1215.

3.0 Understanding of Legal Standards

15. I am not a lawyer and am not offering any opinions regarding legal matters. However, the legal principles relevant to my opinion herein have been explained to me by Maxell's counsel. In this section, I summarize these legal principles as they have been explained to me.

16. I reserve the right to change or formulate new opinions in the event there is a change in the law concerning my opinions provided here.

3.1 Obviousness

17. I understand that a patent claim can be invalid under 35 U.S.C. § 103 if the claimed subject matter would have been "obvious" to a person of ordinary skill in the art as of the priority date of the patent based upon one or more prior art references. I understand that an obviousness analysis should consider each of the following so-called "*Graham* factors": (1) the scope and content of the prior art; (2) the differences between the claims and the prior art; (3) the level of ordinary skill in the pertinent art; and (4) secondary considerations, if any (such as unexpected

results, commercial success, long-felt but unsolved needs, failure of others, copying by others, licensing, and skepticism of experts).

18. In forming my opinions for this matter, I considered each of these *Graham* factors.

19. I understand that a conclusion of obviousness may be based upon either a single prior art reference or a combination of prior art references, particularly if the combination of elements does no more than yield predictable results.

20. However, I understand that merely demonstrating that each of the claim elements was, independently, known in the prior art does not prove that a patent composed of several claim elements is obvious. Rather, I understand that it can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in a way the claimed new invention does.

21. I further understand that, to determine obviousness, one may look to the interrelated teachings of multiple patents or other prior art references, the effects of demands known to the design community or present in the marketplace, and the background knowledge possessed by a person having ordinary skill in the art.

22. I also understand that, in determining whether a combination of prior art references renders a claim obvious, it may be helpful to consider whether there is some teaching, suggestion, or motivation to combine the references and a reasonable expectation of success in doing so. I understand, however, that the teaching, suggestion, or motivation to combine inquiry is not required and may not be relied upon in lieu of the obviousness analysis outlined above.

23. However, a claim is not obvious if the improvement is more than the predictable use of prior art elements according to their established functions. Similarly, a claim is not obvious if the application of a known technique is beyond the level of ordinary skill in the art.

24. Further, when the prior art teaches away from combining certain known elements, discovery of successful means of combining them is not obvious. I understand that similar subject matter may not be sufficient motivation for a person of skill in the art to combine references if the references have conflicting elements.

25. I understand that, in order to be used in an obviousness combination, a prior art reference must be "analogous." I understand that a prior art reference may be analogous if it is in the same field of endeavor as the other references with which it is combined, or if the reference is reasonably pertinent to the solving the problems the inventors of the patent-at-issue sought to solve.

26. I understand that obviousness of a patent claim cannot properly be established through hindsight, and that elements from different prior art references, or different embodiments of a single prior art reference, cannot be selected to create the claimed invention using the invention itself as a roadmap. I understand that the claimed invention as a whole must be compared to the prior art as a whole, and one must avoid aggregating pieces of prior art through hindsight that would not have been combined absent the inventor's insight.

27. I understand that obviousness is not established by simply combining previously known elements from the prior art. A patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art. An invention is unpatentable as obvious if the differences between the patented subject matter and the prior art would have been obvious at the time of invention to a person of ordinary skill in the art.

28. I understand that obviousness of a patent cannot properly be established by mere conclusory statements. Instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness. When an expert opines that all the

elements of a claim disparately exist in the prior art, the expert should provide the rationale to combine the disparate references. A reason for combining disparate prior art references is a critical component of an obviousness analysis. The obviousness analysis should be made explicit and needs to provide an articulated reasoning with some rational underpinning to identify the reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does.

29. I also understand that inventions in most, if not all, instances rely upon building blocks long since uncovered, and claimed discoveries almost of necessity will be combinations of what, in some sense, is already known. This is another reason why merely pointing to the elements being known in the art in separate locations is not the end of the obviousness inquiry.

30. I understand that technical experts may testify to matters like the level of skill in the art at the time of the invention and what a skilled artisan might find obvious in light of the prior art without addressing objective indicia of non-obviousness. However, where an expert purports to testify not just to certain factual components underlying the obviousness inquiry, but to the ultimate question of obviousness, the expert must consider all factors relevant to that ultimate question, including all objective evidence of non-obviousness.

3.2 Claim Construction

31. I understand that the claim construction exercise begins with the language of the claims themselves. I also understand that the intrinsic evidence (*i.e.*, the claims, the written description including the figures, and prosecution history) are the primary sources used in interpreting claim language.

32. I understand that, for purposes of a reexamination proceeding such as this one, the claims of an unexpired patent are given their broadest reasonable interpretation to a person of ordinary skill in the art in view of the patent's specification.

33. I understand that if disputed claim language is clear on its face, the intrinsic evidence should be consulted to determine whether some deviation from the broadest reasonable interpretation of the claim language is warranted. Such situations may include, for example, instances when Patent Owner has provided a definition via lexicography.

34. When the disputed claim language is not clear on its face, I understand that the intrinsic evidence should be used to resolve, if possible, the lack of clarity. I also understand that the specification is the best evidence of what the patentee intended the term to mean when there is no clear meaning of a claim term, and that the prosecution history may also shed light on the meaning of ambiguous terms. However, I understand that it is improper to import limitations from the specification into a patent claim through claim construction.

35. I have been informed that sometimes the ordinary meaning of claim language as understood by a person of ordinary skill in the art may be readily apparent even to lay persons. I understand that claim construction in such cases involves little more than the application of the widely accepted meaning of commonly understood words.

36. I further understand that a patentee may act as his own lexicographer by giving a definition for a particular claim term. I understand that, in order for this principle to apply, the patentee must clearly set forth a definition and clearly express an intent to define that term. Simply disclosing a single embodiment is not sufficient.

37. I understand that if the intrinsic evidence fails to clearly disclose the meaning of a claim term, the court may look to extrinsic evidence outside the patent and prosecution history, such as expert testimony, treatises, and dictionaries.

38. I understand that a claim term is indefinite if, when the term is viewed in light of the specification and prosecution history, it fails to inform one skilled in the art about the scope of

the invention with reasonable certainty. The definiteness requirement must take into account the inherent limitations of language; reasonable certainty in light of the subject matter, and not absolute precision, is required.

39. I further understand that, under pre-AIA 35 U.S.C. § 112, ¶ 6, a claim element 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 that such elements are called "means-plus-function" terms. I understand that a patentee's use of the word "means" in a claim element creates a presumption that the term is a means-plus-function term. I further understand that the lack of the word "means" creates a presumption that a term is not a means-plus-function term.

40. I also understand that pre-AIA 35 U.S.C. § 112, ¶ 6 does not apply when a claim recites a function, but then goes on to elaborate sufficient structure, material, or acts within the claim itself to perform entirely the recited function.

41. I understand that the presumption against means-plus-function interpretation can be overcome. However, I understand that, in order to overcome this presumption, a party must show that a claim term lacks sufficient structure and consists solely of functional terms as understood by one of skill in the art. It is my understanding that a claim term will not be interpreted as a means-plus-function element when that term recites structure that has a sufficiently definite meaning to those of skill in the art. I understand that, in determining whether a claim term recites sufficiently definite structure, the term may be used in common parlance or by persons of skill in the pertinent art to designate structure, even if the term covers a broad class of structures and even if the term identifies the structures by their function.

4.0 Background of the Technology of the '590 Patent

42. Before discussing my specific opinions on validity, I will first review the '590 Patent's disclosures as they would have been viewed by a person of ordinary skill in the art. My

discussion describes only certain examples of the inventions discussed in the '590 Patent, and my description here is in no way meant to suggest that the claimed inventions are limited to these examples. The inventions are limited only by the claims.

43. The '590 Patent is titled "Display Apparatus and Video Processing Apparatus." The '590 Patent was filed on July 13, 2016 and issued on November 13, 2018. Toshiyuki Kurita and Hitoaki Owashi of Japan are the named inventors of the '590 Patent. The '590 Patent is a continuation of U.S. Application No. 12/260,410, filed on October 29, 2008, which issued as U.S. Patent No. 9,420,212. The '590 Patent claims priority to Japanese patent application JP 2007-306750, filed November 28, 2007. I have been asked by counsel for Maxell to use November 28, 2007 as the priority date for the '590 Patent and have done so for all my analyses herein.

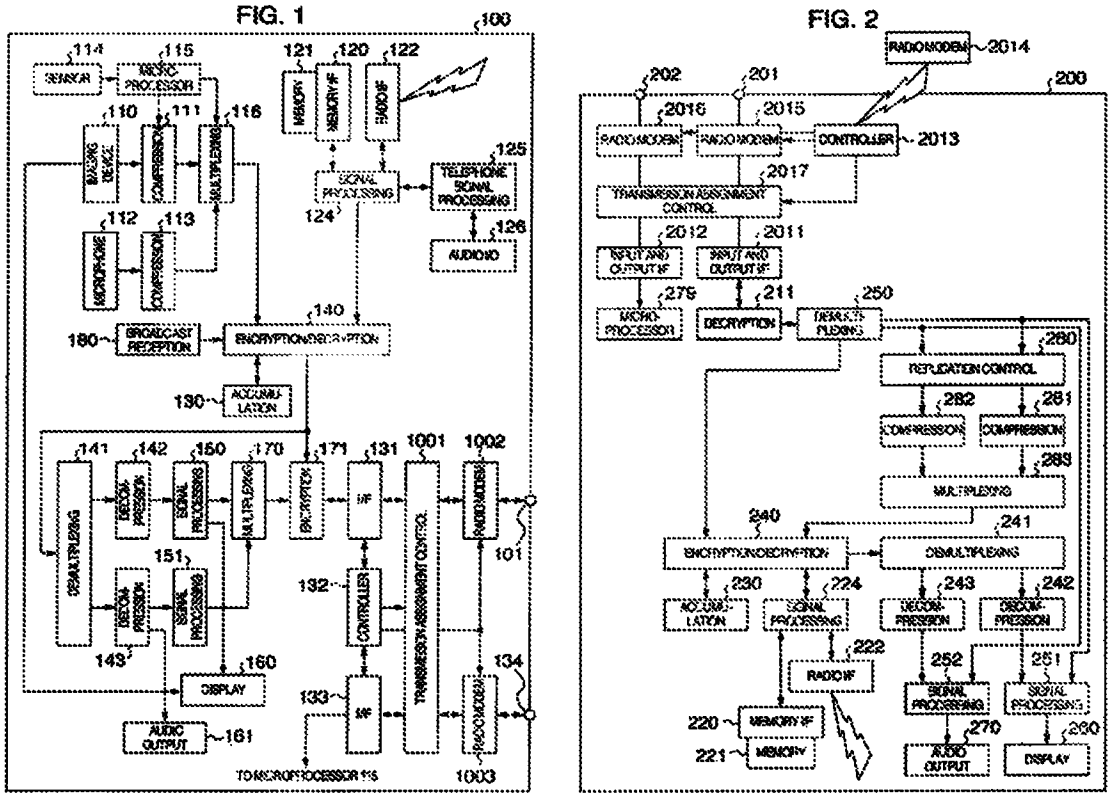
44. The '590 Patent generally relates to a technique to establish multiple wireless connections between a plurality of apparatuses and networks. '590 Patent, 1:15-17. For example, one embodiment of the '590 Patent is directed to a display apparatus and/or video processing apparatus with a first radio communication unit that can communicate video information with an external video processing apparatus, a second radio communication unit that can connect by radio to the internet or a home network, and a controller to controls the assignment of connections for the first and second radio communication unit, which together allow the display apparatus and/or video processing apparatus to display of high quality videos while also communicating with a network. '590 Patent, 2:17-42.

45. Prior to the inventions disclosed in the '590 Patent, conventional techniques connected video processing apparatuses with each other by establishing analog connections to transmit video and audio signals. '590 Patent, 1:19-23. But as digital devices became more common, the inventors realized that there was a need for the ability to connect to the internet or

home network while viewing high-quality videos where the video and audio signals are encrypted. '590 Patent, 1:23-28.

46. In view of this need, the inventors sought to "provide a technique wherein while presenting on a display apparatus videos of high picture quality obtained from portable video processing apparatuses such as a camera and a cellular phone, it is possible to communicate with the internet and/or a home network." '590 Patent, 1:45-52. Specifically, the inventors recognized that a solution to this problem would be to create and configure devices with "a first radio communication unit capable of transmitting video information by radio to an external display apparatus" and "a second radio communication unit capable of connecting by radio to a network," along with other requisite components for providing the functionality that they described. '590 Patent, 1:53-60.

47. Below are exemplary video processing apparatuses, as shown in Figure 1, and display apparatuses, as shown in Fig. 2, embodying the invention of the '590 Patent:



'590 Patent, FIGs. 1 & 2.

As shown in the figures, "[t]he frequency bands used for the transmission between the terminals 134 and 202 are limited to predetermined frequency bands. This increases the radio wave resource efficiency and prevents the problem of interference with other apparatuses." '590 Patent, 3:38-42.

48. The '590 Patent also discloses allowing the user to provide an indication such that the controller assigns connections to the circuits in response to this indication. Specifically, the '590 Patent uses a controller that the user can direct to "variably control the radio transmission assignment to modems 1002 and 1003" in response to an indication from the user. '590 Patent, 8:35-38. In one embodiment, this facilitates communications "in a situation wherein the user issues an indication to transmit video information by radio via the modem 1002...while acquiring information from the Internet according to scheme 1 of FIG . 9 by use of the modem 1003." '590

Patent, 8:38-42. As shown by, for example, Figure 9, the '590 Patent discloses different communication schemes for the video information transmission and connection to the internet:

FIG. 9

SCHEME	SCHEME 1	SCHEME 2
BANDWIDTH	6MHz	6MHz
CARRIER MODULATION SCHEME	64QAM	QPSK
CONVOLUTION CODE	3/4	2/3
GUARD INTERVAL	1/8	1/8
TRANSMISSION CAPACITY	17Mbps	5Mbps

'590 Patent, FIG. 9.

49. Thus, at a high level, the '590 Patent discloses a novel display apparatus and/or video processing apparatus wherein the user indicates to the controller to assign a connection to multiple radio communication circuits, where one of the circuits can be controlled to transfer video to another apparatus while a second circuit can be used to connect to the internet or home network.

50. The examiner of the '590 Patent found the claims to be distinguishable from a wide variety of prior art and therefore patentable. Specifically, the examiner found that numerous prior art references did not disclose the specific configuration and/or technique of a device with one circuit that transmits data simultaneously while a second circuit connects to the internet, including U.S. Pub. No. 2008/0139118 ("Sanguinetti"), U.S. Pub. No.2005/0034169 ("Maeda"), and U.S. Pub. No. 2004/0193647 ("Ueda"). *See* '590 Patent Notice of Allowance dated July 13, 2018. For example, the examiner explained that Sanguinetti actually suggested against this combination of simultaneous connections and Maeda gave examples of alternating one circuit with the other in the case that one is not functioning. *Id.*

5.0 Person of Ordinary Skill

51. I understand that patent claims are to be interpreted from the viewpoint of a person of ordinary skill in the relevant art ("PHOSITA"). To determine the level of skill that would be "ordinary," I understand that a person of ordinary skill must generally have the capability of understanding the general principles that are applicable to the pertinent art. In the case of the '590 Patent, these general principles include the concepts of wireless communications in modern mobile devices (*e.g.*, cell phones, pagers, smartphones, tablets, and the like).

52. I formed my opinions for purposes of this declaration from the perspective of a PHOSITA. In my opinion, "a person of ordinary skill in the art" in the field of the '590 Patent would have had a working knowledge of wireless communications. The person would have gained this knowledge through an undergraduate Bachelor of Science degree in electrical engineering or equivalent with at least one year of experience in the field of wireless communications. More education (*e.g.*, a Master's degree) or work experience in a relevant field may compensate for a deficit in one of the other relevant qualifications stated above. This is based on my review of the '590 Patent and my knowledge of those who were working in the field at the time of the invention.

53. I at least met this definition of a person of ordinary skill in the art at the time of the inventions of the '590 Patent (no later than November 2007).

6.0 Opinions Regarding Section 112, ¶ 6

54. For the reasons described below, it is my opinion that 35 U.S.C. §112 ¶ 6 does not apply to the term "controller." Instead, this term should be given its plain and ordinary meaning.

55. For example, the term "controller" does not use "means" or "step for" language. Thus, a person of ordinary skill in the art would understand that there is no presumption that 35 U.S.C. §112 ¶ 6 applies.

56. In addition, reading the claim term as a whole, a person of ordinary skill in the art would recognize that the claim language for "controller" recites sufficient structure and acts within the claim to perform the recited function. For example, claim 1 recites a "controller" that performs the material acts of controlling "assignment of connection for each of the first and second radio communication circuit in response to receiving an indication from a user" and "each of the first and second radio communication circuit, so that the first radio communication circuit transmits video information and the second radio communication circuit connects to the internet or the home network simultaneously." '590 Patent, at claim 1. Thus, for this additional reason 35 U.S.C. §112 ¶ 6 should not apply.

57. Further, in my opinion, a person of ordinary skill in the art would understand that the term "controller," as used in claim 1, connotes sufficiently definite structure for the stated functions.

58. It is my opinion that "controller" is well understood in the electrical engineering context to connote a variety of structures for performing particular tasks, depending on application. Evidence supporting my opinion is included below and in Appendix B:

Dictionary and Term	Definition
IBM Dictionary of Computing (1994) at 145. "controller"	"A device that coordinates and controls the operation of one or more input/output devices, such as workstations, and synchronizes the operation of such devices with the operation of the system as a whole."
Microsoft Computer Dictionary, Fifth Edition (2002) at 128. . "controller"	"A device that other devices rely on for access to a computer subsystem."
Chambers Dictionary of Science and Technology (2007) at 272. "controller"	"A device that controls a functional element within a computer system."

Comprehensive Dictionary of Electrical Engineering, Second Edition, 2005 at 148. "controller"	"A unit that directs the operation of a subsystem within a computer."
A Dictionary of Computing, Oxford University Press, Sixth Edition (2008) at 111. "controller"	"A subsystem that governs the functions of attached devices but generally does not change the meaning of the data that may pass through it."

59. Each of these technical dictionaries confirms that a person of ordinary skill in the art would understand that "controller" denotes a sufficient structure and no construction (beyond plain and ordinary meaning) would be necessary for these terms. For example, they all provide a consistent meaning that a controller is a component of a computer system that controls the operation of a subsystem within the computer system. And the accompanying modifying language in the claim, and the context from the specification, makes it clear that the claimed controllers are that of a "portable terminal" that are similarly used to control various operations of this portable terminal.

60. Based on the foregoing, it is my opinion that the term "controller" should be given its plain and ordinary meaning. The term "controller" would have connoted sufficiently definite structure, in the form of hardware and/or software, to a PHOSITA. And I see no reason or justification for diverting from the plain meaning of the term.

7.0 Opinions Regarding the Prior Art Rejections In The Non-Final Office Action

61. After considering the material available to me in this matter, in view of my experience in the fields of wireless communications and telecom technology, it is my opinion that

claims 1-10 of the '590 Patent are not rendered obvious by the prior art cited in the July 14, 2021 Office Action.[1]

62. Specifically, in my opinion, the cited combinations of U.S. Patent Application Publication No. 2006/0203758 A1 ("Tee") with the knowledge of a PHOSITA or Tee and U.S. Patent Application Publication No. 2006/0135076 A1 ("Honkanen") do not render the '590 Patent's claims invalid.

63. In my opinion, none of the cited references, either alone or in combination with the knowledge of a PHOSITA, teach the limitation of "the controller controls assignment of connection for each of the first and second radio communication circuit in response to receiving an indication from a user;" as recited by claim 1.

7.1 Opinions Regarding Obviousness Rejection

64. In my opinion, Tee does not teach "the controller controls assignment of connection for each of the first and second radio communication circuit in response to receiving an indication from a user," as required by claim 1 of the '590 Patent.

65. Tee is a U.S. Patent Application that was filed on September 27, 2005, claims priority to a provisional application that was filed on March 11, 2005, and was published on September 14, 2006. Tee is entitled "Mobile Terminal for Relaying Multimedia Data to an External Display Device." Lai King Tee, Cornelius Rensburg, and Joseph Cleveland are the listed inventors.

66. Tee is directed to solving the problems caused by a small display screen on a mobile terminal. (Tee, ¶ [0015].) The mobile terminal in Tee provides for improved viewing of video and multimedia applications by receiving video data over a first wireless interface and transmitting the

[1] My arguments, while directed to the original claims, are fully applicable to the amended claims as well.

video data over a second wireless interface to an external device having a bigger display, such as a television, a computer monitor, a laptop computer, the dashboard display of a car, or a video projection device. *Id.* The mobile terminal in Tee transmits the video data to the external display "if the mobile terminal determines the quality of the external display is superior to the quality of the local display." Tee at Abstract.

67. The Office Action states that "the controller (CONTROL PROCESSOR 210) controls assignment of connection for each of the first and second radio communication circuit (WLAN transceiver 202 and PAN transceiver 203) in response to receiving an indication from a user ¶ [0037]." Office Action at 30-31. However, in my opinion, the portions of Tee cited by the Office Action disclose assigning a connection to the communication circuits before receiving an indication from a user. Office Action at 31.

68. For example in Tee, ¶ [0037] cited by the Office Action, the mobile terminal 110 accesses base station 120 through transceiver 201 or 202 or detects the presence of an external device through transceiver 202 or 203 and only requests the authorization of the user after the connections to transceivers 202 or 203 were already assigned:

> Initially, mobile terminal 110 accesses base station 120 via an air interface (e.g., transceiver 201 or 202) and initiates a video/multimedia download from server 150 (process step 305). Alternatively, mobile terminal 110 may play back video/multimedia data stored in video/multimedia file 280. At some point, mobile terminal 110 detects the presence of a remote display device (*e.g.*, television 131) via another air interface (*e.g.*, transceiver 202 or 203) and establishes a wireless link with the remote display device (process step 310), with the authorization of the mobile terminal user.
>
> Tee, ¶ [0037].

69. As described in Tee, ¶ [0037], Figure 3 shows "flow diagram illustrating the operation of the exemplary mobile terminal." Tee, ¶ [0013]. I have reproduced Figure 3 from Tee below. Notably, this diagram does not include a step of in response to receiving an indication from a user, the controller controls assignment of connections for transceiver 202 or 203:

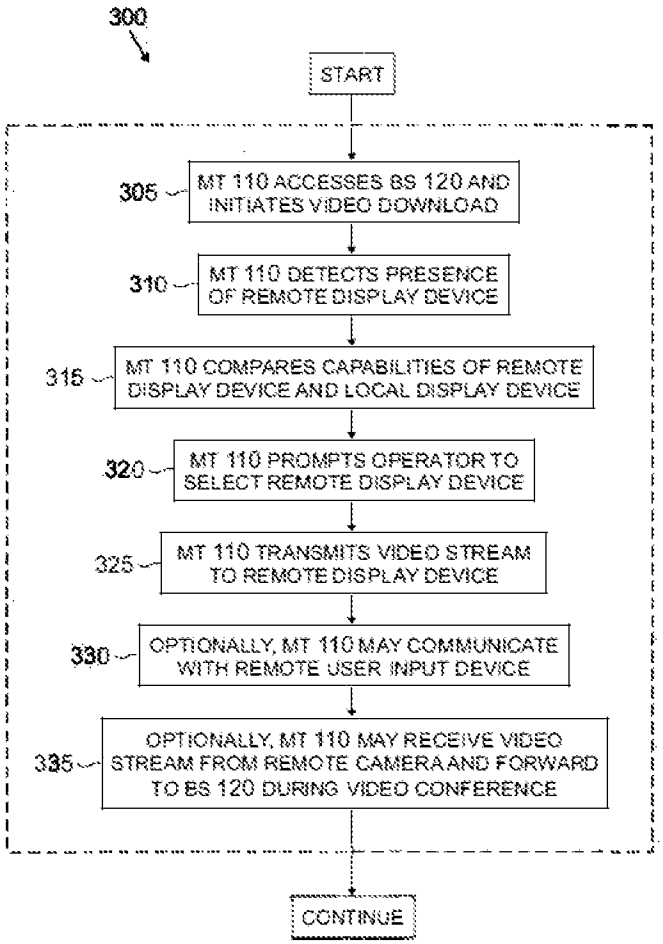


FIG. 3

Tee, FIG. 3.

70. Similarly in ¶ [0036], Tee discloses that if control processor 210 selects the display of the external device as best suited to the video/multimedia application, control processor 210 assigns a connection to one of transceiver 202 or 203 automatically:

> Under control of display select program 260, control processor 210 compares the parameters in remote display parameters file 262 to the parameters in local display parameters file 261 and selects the display best suited to video/multimedia application program 290. If the display of the external device is selected, control processor 210 transfers the video/multimedia data to the appropriate one of transceivers 202 and 203. Control processor 210 may prompt the operator of mobile terminal 110 for permission to transmit video/multimedia data to the remote display device.
>
> Tee at ¶ [0036].

71. Importantly, in this example at ¶ [0036] control processor 210 assigns a connection to transceiver 202 or 203 before receiving an indication from a user. Only after control processor 210 assigns a connection to either transceiver 202 or 203 does control processor 210 prompt the user for an indication, and that indication only relates to whether to actually transmit the video/multimedia data to the external device. Tee is silent about the user indicating whether to use one of transceivers 201, 202, or 203. Tee at Fig. 3, steps 310 and 315.

72. Thus, Tee's control processor 210 does not assign a connection to transceivers 202 or 203 in response to receiving an indication from a user when an indication from the user indicates to use the first radio communication circuit.

73. The Office Action relies on only Tee for the limitation "in response to receiving an indication from a user." Office Action at 31. But in my opinion, it also would not have been obvious for a PHOSITA to modify Tee's control processor 210 to assign the connection for the transceivers 202 or 203 in response to receiving an indication from a user when an indication from the user indicates to use the first radio communication circuit. There would be no reason for a PHOSITA to make such changes to Tee as the controller assigns the connections to the transceivers automatically. For example, Tee states that "the usefulness of small mobile terminals may be limited nonetheless by the human interface problems associated with handheld devices. The small display screens of wireless mobile terminals diminish the capabilities of some applications, particularly video applications." Tee, ¶ [0004]. Accordingly, the inventors identified "a need for a mobile terminal that can overcome the limitations of a small display screen to provide improved viewing of video and multimedia application." Tee, ¶ [0005]. Tee then discloses a particular solution which involves transferring multimedia content in response to a comparison and identification of a suitable display. *See* Tee, ¶¶ [0006]-[0007], [0036].

74. In my opinion, it would not be obvious to a PHOSITA to modify the design of Tee in view of these teachings. There would be no reason for a PHOSITA to include a manual step of assigning connections in response to an indication by a user. Such an additional step would force the user to spend more time on the "small display screen" of the mobile terminal, leading to further "human interface problems" associated with these small display screens. Indeed, Tee's solution to the problems in the art is to direct the user to a suitable external display without spending additional time on the small display screen. If Tee is modified to include the manual step of seeking a user indication prior to assigning a connection to transceivers 201, 202, or 203, the user would be continuously disturbed by prompts while watching videos because the prompts would seek an indication on whether the transceivers can continue to establish connections with other suitable external display devices to be able to connect to them and compare their capabilities to offer an alternative display device.

75. In my opinion, there is no reason why a PHOSITA would replace Tee's preferred solution of automatically assigning the connections to the transceivers 202 or 203 with a system that assigns the connections in response to an indication from the user.

76. Accordingly, neither Tee alone nor its combination with the knowledge of a PHOSITA teach the claimed controller controlling the assignment of connection for each of the first and second radio communication circuit "in response to receiving an indication from a user," as required by claim 1 of the '590 Patent.

77. Independent claims 5, 9 and 10 each recites features similar to those discussed above for independent claim 1, specifically that the assignment of connection for the first and second radio communication circuit is controlled "in response to receiving an indication from a user." Thus, for the same reasons as those discussed above for independent claim 1, in my opinion

independent claims 5, 9, and 10 are not obvious based on Tee alone or in view of the knowledge of a PHOSITA.

78. Moreover, in my opinion claims 2-4 and 6-8, which depend from independent claims 1 and 5, are also not obvious based on Tee alone or in view of the knowledge of a PHOSITA.

79. For all of the above reasons, it is my opinion that the prior art does not render obvious claims 1-10 of the '590 Patent.

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This declaration and my opinions herein are made to the best of my knowledge and understanding, and based on the material available to me, at the time of signing this declaration. I declare that all statements made herein on my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under the laws of the United States of America and may jeopardize the validity of any application or patent at issue in this matter. Also, I declare under penalty of perjury of the laws of the United States of America that the foregoing is true and correct.

Dated: September 14, 2021



Tim A. Williams, Ph.D.

APPENDIX A

Tim Arthur Williams, Ph.D.
Curriculum Vitae

Dr. Williams has 40 years of professional experience in wireless communications and telecom technology. He is an entrepreneur who has participated in the organization and operation of start up companies that brought wireless LAN, software VoIP PBX, and 2-way paging technology to the marketplace. Dr. Williams holds numerous patents in wireless and signal processing technology. He is an experienced litigation support consultant with experience in patent infringement matters. Dr. Williams is also a registered Patent Agent.

- Wireless LAN
- Cellular and PCS Standards
- Cellular Telephone Architecture
- Digital Signal Processing
- Telecommunications Technology
- VoIP Technology
- Computer Networking
- Wireless Networks & Protocols

Year	University	Degree
1991	University of Texas at Austin	MBA
1985	University of Texas at Austin	Ph.D., Dissertation: "Digital Signal Processing Techniques for Acoustic Log Data"
1982	University of Texas at Austin	MSEE, Thesis: "Cepstral Processing of Speech Signals"
1976	Michigan Technological University	BSEE

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Professional Experience

From: 2008
To: 2010
Organization: Expressume, Inc / Montage Inc. – Milwaukee, WI
Title: Board Member
Summary: This company sells software for human resource recruiting. This company was sold in June 2019.

From: 2008
To: 2014
Organization: Faculte, Inc. – San Jose, CA
Title: Board Member
Summary: This company provided SaaS (Software as a Service) web video based communication products.

From: 2008
To: 2010
Organization: BitRail Networks Inc. – Miami, FL
Title: Founder, Board Member
Summary: This company sold computer networking solutions.

From: 2008
To: Present
Organization: Calumet Venture Management – Madison, WI
Title: Member
Summary: This company provides seed capital and management expertise to small companies.

From: 2006
To: 2015
Organization: BEEcube Inc. – Fremont, CA
Title: Founder, Board Member, Board Advisor
Summary: This company built high speed processing solutions. This company was sold to National Instruments, Inc. in Feb 2015.

From: 2006
To: 2015
Organization: Topaz Equity, LLC – Danville, CA
Title: Founder, Board Member
Summary: This is a private equity investment company. It owned AtomAMPD which develops, markets and sells software based network solutions.

From: 2004
To: Present
Organization: DoceoTech Inc. – Danville, CA
Title: Founder, Chairman
Summary: This was a training company that provides training for engineers in Wireless, Networking, and Telephony technologies. It is currently owned by Beach Technologies, LLC.

From: 2004
To: 2006
Organization: SiBEAM Inc. – Sunnyvale, CA
Title: Founder, Chief Executive Officer
Summary: This is a fabless semiconductor company that develops high-speed wireless networking ICs. This company was sold to Silicon Image, Inc. in Apr 2011.

From: 2001
To: 2004
Organization: JetQue, Inc. – Danville, CA
Title: Founder, Chief Executive Officer
Summary: This company created messaging solutions for the mobile professional.

From: 1999
To: 2000
Organization: Atheros Communications, Palo Alto, CA
Title: Interim CEO, Advisory Board Member
Summary: This company builds wireless LAN ICs. Atheros became a public company in May 2004. (ATHR) This company was sold to QCOM in Jan 2011.

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From: 1998
To: 2000
Organization: Picazo Communications – San Jose, CA
Title: Chief Technology Officer, Advisory Board Member
Summary: This company built and sold software PBXs Telephony equipment using VoIP and Circuit Switched Technologies. The company was purchased by Intel.

From: 1996
To: Present
Organization: Beach Technologies, LLC – Danville, CA
Title: Chief Executive Officer
Summary: This is a consulting company that provides IP services. It owns DoceoTech LLC and Streaming Knowledge LLC, which perform the same services.

From: 1991
To: 1998
Organization: Wireless Access, Inc. – Santa Clara, CA
Title: Co-Founder, Chief Technical Officer, Vice President of Engineering, Vice President of Business Strategy
Summary: This was a startup company focusing on the Narrow Band PCS equipment market. The company developed the over the air protocols, the subscriber equipment and the ICs to deploy 2-way paging services. The company was sold to Glenarye Electronics.

From: 2014
To: Present
Organization: Through Technology, LLC. – Chicago, IL
Title: Partner
Summary: This is a private equity investment company. It owns Through Technology Group, PTE LTD, which is registered in Singapore.

From: 1979
To: 1991
Organization: Motorola, Inc. – Austin, TX – Semiconductor Sector

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Tim Arthur Williams, Ph.D.
Curriculum Vitae

Title: Sr. Engineer, Member Technical Staff, Sr. MTS

Summary: Business manager, project leader, and senior technical member of the teams which were responsible for product development of the following systems:

- ADPCM transcoder,
- ISDN U-reference point transceiver,
- CT-2 voice codec and channel modem,
- GSM voice codec and channel modem,
- TDMA voice codec and channel modem
- CDMA voice codec and channel modem, and
- Japanese Digital Cellular voice codec and channel modem.

From: 1976

To: 1979

Organization: Motorola Inc. - Chicago, IL - Communications Sector - Digital Voice Privacy Group

Title: Engineer

Summary: This group built the first commercial digitally encrypted two-way FM land mobile radio system.

Professional Certifications

- Patent Agent – U.S. Patent and Trademark Office #50,790 (Jan 2002)

Issued Patents

Patent	Date	Description
9,787,471	2017	Data Enciphering or Deciphering using a Hierarchical Assignment System
7,904,117	2011	Wireless Communication Device using Adaptive Beamforming
6,781,962	2004	Apparatus and Method for Stored Voice Message Control
6,600,481	2003	Data entry apparatus and method
6,088,457	2000	Method and apparatus for over the air programming a communication device
5,854,595	1998	Communications apparatus and method with a computer interchangeable integrated circuit card
5,557,642	1996	Direct conversion receiver for multiple protocols

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5,428,638	1995	Method and apparatus for reducing power consumption in digital communications devices
5,345,406	1994	Bandpass sigma delta converter suitable for multiple protocols
5,101,344	1992	Data processor having split level control store
5,001,661	1991	Data processor with combined adaptive LMS and general multiplication functions
4,989,169	1991	Digital tone detector using a ratio of two demodulators of differing frequency
4,972,356	1990	Systolic IIR decimation filter
4,965,762	1990	Mixed size radix recoded multiplier
4,947,363	1990	Pipelined processor for implementing the least-mean-squares algorithm
4,876,542	1989	Multiple output oversampling A/D converter with each output containing data and noise
4,862,169	1989	Oversampled A/D converter using filtered, cascaded noise shaping modulators
4,843,585	1989	Pipelineable structure for efficient multiplication and accumulation operations
4,843,390	1989	Oversampled A/D converter having digital error correction
4,796,219	1989	Serial two's complement multiplier
4,737,925	1988	Method and apparatus for minimizing a memory table for use with nonlinear monotonic arithmetic functions
4,734,876	1988	Circuit for selecting one of a plurality of exponential values to a predetermined base to provide a maximum value
4,727,508	1988	Circuit for adding and/or subtracting numbers in logarithmic representation
4,722,067	1988	Method and apparatus for implementing modulo arithmetic calculations
4,682,302	1987	Logarithmic arithmetic logic unit
4,618,946	1986	Dual page memory system having storage elements which are selectively swapped between the pages
4,406,010	1983	Receiver for CVSD modulation with integral filtering
4,398,262	1983	Time multiplexed n-ordered digital filter

Patent Applications and Continuation Applications

Appl. Num.	Pub. Date	Description
20070037528	2007	Wireless Communication Device using Adaptive Beamforming
20040252679	2004	Stored Voice message Control Extensions
15/711,590	2017	Data Enciphering or Deciphering using a Hierarchical Assignment

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Published Papers

6 Sept 2016 Putnam, Jonathan D. and Williams, Tim A., The Smallest Salable Patent-Practicing Unit (SSPPU): Theory and Evidence. Available at SSRN: https://ssrn.com/abstract=2835617

Litigation Experience

See attached.

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Case Type	Firm	Case Name	Client	Status	Deposition	Trial Testimc	Enagement	Venue	Case Number(s)
Patent Infringement wireless LANs	Morgan Miller and Blair	Proxim v. 3Com	3Com.	Complete			2001	D. Del.	1:2001-cv-00155, 1:2001-cv-00755
Patent Infringement Networking ICs	Simpson Thacher & Bartlett LLP	3Com Inc. v. D-Link/ Realtek Inc.	3Com	Complete			2002	N.D. CA	03-cv-02177
Patent Infringement Wireless LANs	Weil Gotshal & Manges	Agere Systems v. Broadcom Inc.	Broadcom	Complete			2003	E.D. PA	03-cv-03138
Patent Infringement Digital Subscriber Loop (DSL)	Heller Ehrman White & McAuliffe	GlobespanVirata v. Texas Instruments	Texas Instruments; Stanford University	Complete	Y	Y	2003	D.N.J.	03-cv-02854
Patent Infringement Cellular Phones	McKool Smith	Ericsson Inc v. Samsung Inc.	Ericsson	Complete	Y		2004	ITC	337-TA-577
Patent Infringement PBX services	Howrey	Foundry Networks v. Alcatel Inc.	Foundry Networks	Complete			2004	E.D. TX	2:04-cv-00040
Patent Infringement PBX services	Howrey	Foundry Networks v. Lucent Technologies Inc.	Foundry Networks	Complete	Y		2004	E.D. TX	2:04-cv-00040
Patent Infringement Wireless ICs	Kirkland and Ellis LLP	Intel Corp. v. Wi-LAN Inc.	Intel	Complete			2004	N.D. CA	08-cv-04555
Patent Infringement VoIP Recording	Fish and Richardson	STS Networks v. Witness Systems	Witness Systems	Complete	Y	Y	2004	N.D. Ga.	04-cv-02111
Patent Infringement Telephone Systems	Sidley Austin LLP	C2 Comm. Tech Inc. v. AT&T Inc	AT&T	Complete			2006	E.D. TX	2:06-cv-00241
Patent Infringement Networking ICs	Simpson Thacher & Bartlett LLP	Commil USA LLC v. Cisco Systems Inc.	Cisco	Complete			2006	E.D. TX	2:07-cv-341; 2:11-cv-00417; 2:11-cv-00265
Patent Infringement PBX services	Fish and Richardson	Microsoft Inc. v. Alcatel Inc.	Microsoft	Complete			2006	ITC	337-TA-598

Case Type	Firm	Case Name	Client	Status	Deposition	Trial Testimc	Enagement	Venue	Case Number(s)
Patent Infringement and Trade Secret Cellular Phones	Heller Ehrman White & McAuliffe	Qualcomm Inc v. Broadcom Inc.	Qualcomm	Complete			2006	S.D. CA	06-cv-0660
Patent Infringement Telephone Systems	Jones Day LLP	in re Katz Patents	Experian	Complete			2007	C.D. CA	07-ml-01816
Patent Infringement Telephone Systems	Howrey	in re Katz Patents	General Electric	Complete	Y		2007	C.D. CA	07-ml-01816
Patent Infringement Wireless Networks	Heller Ehrman LLP and Covington & Burling LLP	Intermec Tech. V. Palm Inc.	Palm	Complete	Y		2007	D. Del.	1:2007-cv-00272
Patent Infringement Cellular Phones	Cooley Godward Kronish LLP	Qualcomm Inc. v. Broadcom Inc.	Qualcomm	Complete			2007	S.D. CA	08-cv-01607; 08-cv-01829
Patent Infringement Cellular Phones	DLA Piper	Qualcomm Inc. v. Nokia Inc.	Qualcomm	Complete			2007	W.D. Wi; S.D. CA; S.D. CA	3:07-cv-00187; 3:07-cv-01366; 3:05-cv-02063
Patent Infringement	Howrey LLP	Minerva Inc. v Motorola Inc. et al.	Research in Motion	Complete			2007	E.D. TX	2:2007-cv-00229
Patent Infringement	Covington & Burling; Cooley; Howrey; DLA Piper	Saxon Innovations LLC. v. Nokia Corp. et al.	Samsung; Nintento; RIM; Palm	Complete			2007	E.D. TX	6:2007-cv-00490
Patent Infringement	Baker Botts LLP	AT&T v Airbiquity	AT&T	Complete			2008	N.D. TX	08-cv-01637
Patent Infringement	Quinn Emanuel LLP	ESN v Cisco	Cisco	Complete			2008	E.D. TX	5:08-cv-00020
Patent Infringement Telephone Call Processing	Jones Day LLP	in re Katz Interactive Call Processing	Citizens Communications	Complete	Y		2008	C.D. CA	07-ml-01816

Case Type	Firm	Case Name	Client	Status	Deposition	Trial Testimc	Enagement	Venue	Case Number(s)
Patent Infringement VoIP	Kilpatrick Stockton LLP	Verizon Corp. v. Cox Inc.	Cox	Complete	Y	Y	2008	E.D VA	1:08-cv-00157
Patent Infringement	Latham & Watkins LLP	Freedom Wireless Inc. v. Cricket Communications Inc et al.	Cricket Comm.	Complete	Y		2008	E.D. TX	2:06-CV-504
Patent Infringement	Irell & Manella LLP	eBay Inc. v. IDT Corp. et al.	eBay.	Complete	Y		2008	W.D. AR	4:08-cv-04015
Patent Infringement	Foley & Lardner LLP	SPH America LLC v. Kyocera Wireless Corp et al	Kyocera.	Complete			2008	S.D. CA	3:08-cv-02146; 3:09-cv-00299; 3:09-cv-00572
Patent Infringement Wireless Devices	Ropes & Grey LLP	Motorola Inc. v. Research in Motion Inc.	Motorola	Complete			2008	N.D. TX	3:08-cv-00284
Patent Infringement	Banner & Witcoff	Paradox Ltd. v. ADT Ltd.	Paradox	Complete	Y		2008	E.D. TX	2:06-cv-00462
Patent Infringement	Gibson Dunn LLP	Broadcom v Emulex	Emulex	Complete			2009	C.D. CA	09-cv-01058
Patent Infringement Wireless ICs	Keker & Van Nest LLP	Intel Corp. v. CSIRO Inc.	Intel	Complete	Y		2009	E.D. TX	06-cv-00551
Patent Infringement	Foley and Lardner LLP	SPH v Nokia	Nokia	Complete			2009	S.D. CA	3:2009-cv-02535
Patent Infringement	Fish and Richardson LLP	Tekelec v Performance Technologies Inc.	Performance Technologies; Inc.	Complete			2009	E.D. NC	09-cv-00531
Patent Infringement	McDermott Will & Emery LLP	Telecommunications Systems Inc. v Sybase 365 inc.	Sybase	Complete			2009	E.D. VA	09-cv-00387
Patent Infringement	Kecker & Van Nest LLP	Kodak v HTC	HTC	Complete			2010	ITC	337-TA-831
Patent Infringement	Howrey LLP	WiAV v Motorola	Motorola	Complete	Y		2010	E.D. VA	3:09-cv-00447
Patent Infringement	Quinn Emanuel LLP	WiAV v Sony	Sony	Complete	Y		2010	E.D. VA	3:09-cv-00447
Patent Infringement	Covington LLP	Fujitsu v Belkin et al.	Fujitsu	Complete	Y	Y	2011	N.D. CA	10-cv-03972-LHK

Case Type	Firm	Case Name	Client	Status	Deposition	Trial Testimc	Enagement	Venue	Case Number(s)
Patent Infringement	Finnegan Henderson LLP Keker & Van Nest LLP	HTC v Apple Inc.	HTC	Complete	Y	Y	2011	ITC	337-TA-721
Patent Infringement	Hogan Lovells LLP	MOSAID v Cisco Inc.	MOSAID	Complete	Y		2011	ITC	337-TA-778
Patent Infringement	Quinn Emanuel LLP	Motorola v Apple Inc.	Motorola	Complete	Y		2011	S.D. FL; D. Del.	1:2010-cv-23580 1:2010-cv-00867
Patent Infringement	Finnegan Henderson LLP	HTC v Apple Inc.	HTC	Complete	Y		2012	ITC	337-TA-808
Patent Infringement	Proskauer LLP	MMI v Apple Inc.	MMI	Complete	Y		2012	D. Del.	1:10-cv-00258
Patent Infringement	Ropes and Grey LLP	Motorola v Microsoft Inc.	Motorola	Complete	Y	Y	2012	W.D. WA.	10-cv-01823
Patent Infringement	Quinn Emanuel LLP	Samsung v Apple Inc.	Samsung	Complete	Y	Y	2012	N.D. CA	11-cv-01846
Patent Infringement	Fish and Richardson LLP	VirnetX v Avaya	Avaya	Complete	Y		2013	E.D TX	6:11-cv-00018
Patent Infringement and Trade Secret Cellular Phones	Heller Ehrman White & McAuliffe	Broadcom Inc. v Qualcomm Inc.	Qualcomm	Complete	Y		21-Jan-03	S.D. CA	05-cv-1392
Patent Infringement	Baker & McKenzie LLP and Kilpatrick Stockton LLP	Data Treasury Corp. v. Wells Fargo. et al.	Wells Fargo and Wachovia.	Complete	Y		6/27/05	E.D. TX	2:2005-cv-00291; 2:2005-cv-00293
Patent Infringement	Morrison & Foerster	Class v Apple	Apple	Complete			9/22/06	Unknown	Unknown
Patent Infringement	Cravath Swaine & Moore	Broadcom Inc. v Qualcomm Inc.	Qualcomm	Complete			10-Jan-07	C.D. CA	05-cv-00467
Patent Infringement	Cooley Godward Kronish LLP	Broadcom Inc. v Qualcomm Inc.	Qualcomm	Complete	Y	Y	13-Jan-08	ITC	337-TA-543
Arbitration	Cooley, Godward, Kronish LLP	Qualcomm v Panasonic	Qualcomm	Complete			6/24/09	Arbitration	None

Case Type	Firm	Case Name	Client	Status	Deposition	Trial Testimc	Enagement	Venue	Case Number(s)
Arbitration	Sidley Austin LLP	AT&T v. intrado	AT&T Mobility LLC (f/k/a Cingular Wireless LLC) (_AT&TÓ);	Complete	Y		3-Nov-09	Arbitration	
Patent Infringement	Nixon Peabody; K&L Gates; Alston and Bird; Greenberg Traurig; Spotts Fain; Winston & Strawn; Goodwin Proctor	SPH America v Acer Inc. et al	Sierra Wireless; Novatel; Nokia; Hewlett Packard; UT Starcom; Motorola Solutions; Motorola Mobility.	Complete	Y		4/14/10	S.D. CA	3:2009-cv-02535
Patent Interference	Foley and Lardner LLP	Application Serial No 10/304,121 and U.S. Patent No. 7,084,529, Patent Interference No. 105,755(RES)	EnOcean GMBH	Complete			21-Jul-10	USPTO	Application Serial No 10/304,121 and U.S. Patent No. 7,084,529, Patent Interference No.
Patent Infringement	Mayer Brown LLP	MOSAID v Cisco	MOSAID	Complete	Y		9/10/10	D. Del.	10-cv-00687
Patent Infringement	Kilpatrick Townsend LLP	Golden Bridge v Motorola.	Motorola	Complete			5/20/11	D. Del.	1:2010-cv-00428
Patent Infringement	Quinn Emanuel LLP	Barnes & Noble v LSI	Barnes & Noble	Complete			6/14/11	N.D. CA	11-cv-02709
Patent Infringement	Covington LLP;Fish and Richardson LLP; Brinks Hofer Gilson & Lione LLP; Alston & Bird LLP	Interdigital v Huawei et al.	Huawei; LG; ZTE; Nokia	Complete	Y	Y	8/18/11	ITC	337-TA-800
Patent Infringement	Cravath LLP	Parkervision v Qualcomm	Qualcomm	Complete	Y	Y	11/2/11	MDFL	11-cv-00179
Patent Infringement	Latham & Watkins LLP	Sprint Communications v Time Warner Cable et al	Time Warner Cable	Complete			1/30/12	D. KS	2:2011-cv-02686
Patent Infringement	Kilpatrick Townsend LLP	Digitude v Motorola	Motorola	Complete			14-Feb-12	ITC.	337-TA-827

Case Type	Firm	Case Name	Client	Status	Deposition	Trial Testimc	Engagement	Venue	Case Number(s)
Patent Infringement	Dechert LLP	Intellectual Ventures I LLC and Intellectual Ventures II LLC v. AT&T Mobility LLC; AT&T Mobility II LLC; New Cingular Wireless Services Inc.; SBC Internet Services Inc.; Wayport Inc.; T-Mobile USA Inc.; Nextel Operations Inc.; Sprint Spectrum L.P.; United States Cellular Corporation; and Telephone and Data Systems Inc.	Intellectual Ventures I LLC and Intellectual Ventures II LLC	Complete	Y		7/5/12	D. Del.	1:2012-cv-00193
Patent Infringement	McKenna Long & Aldridge LLP	Comerica v Maxim Integrated Products	Comerica	Complete			8/1/12	W.D. PA	12-mc-00244
Patent Infringement	DLA Piper LLP	Technology Properties Limited LLC ("TPL");Phoenix Digital Solutions LLC ("PDS") and Patriot Scientific Corporation ("PTSC") v Samsung Electronics Co. ltd. And Samsung Electronics America Inc.	Samsung	Complete			11/7/12	ITC	337-TA-853
Patent Infringement	Goodwin Procter LLP	WIAV Solutions v. ZTE Corporation. et at.	ZTE Corporation and ZTE (USA)	Complete			17-Dec-12	E.D. VA	1:12CV907
Patent Infringement	Fish and Richardson LLP	Ericsson v Samsung	Samsung	Complete			10-Jan-13	ITC	337-TA-862
Patent Infringement	Kirkland & Ellis LLP	SimpleAir Inc. v. Microsoft Corp. et al.	Samsung Electronics Co.; Ltd.; Samsung Electronics America; Inc.; and Samsung Telecommunicat ions America LLC	Complete			19-Mar-13	E.D. TX	2:11-cv-00416-JRG
Patent Infringement	Winston & Strawn LLP	Adaptix v Motorola Mobility LLC et al.	Motorola Mobility	Complete			22-Mar-13	E.D. TX Tyler	6:12-cv-00016-MHS
Patent Infringement	Winston & Strawn LLP	Adaptix v Motorola Mobility LLC et al.	Motorola Mobility	Complete			22-Mar-13	N.D. CA	5:13-cv-01774-PSG
Patent Infringement	Bunsow De Mory Smith & Allison LLP	Cassidian Communications v. microData GIS Inc.; microData LLC; and TeleCommunications Systems Inc.	Cassidian Communications	Complete	Y	Y	1-Apr-13	E.D. TX Marshall	2:09-cv-00395-JRG
Patent Infringement	Kilpatrick Townsend & Stockton LLP	SimpleAir Inc. v. Microsoft Corporation et al.	Google Inc.	Complete	Y	Y	2-Apr-13	E.D. TX	2:11-cv-00416-JRG
Patent Infringement	Ropes & Gray LLP	InterDigital Technology Corp.IPR Licensing Inc. and InterDigital Holdings inc	Samsung Electronics Co.; LTD.; Samsung Electronics America; Inc.; and Samsung Telecommunicat ions America; LLC	Complete	Y		8-Apr-13	ITC Del.	337-TA-868 and Case No. 13-cv-OOO I I

Case Type	Firm	Case Name	Client	Status	Deposition	Trial Testimc	Engagement	Venue	Case Number(s)
Patent Infringement	Covington & Burling LLP	InterDigital Technology Corp.IPR Licensing Inc. and InterDigital Holdings Inc	Huawei	Complete	Y		12-Jun-13	ITC Del.	337-TA-868 and Case No. 13-009 (RGA)).
Patent Infringement	Covington & Burling LLP	InterDigital Technology Corp.IPR Licensing Inc. and InterDigital Holdings Inc	Huawei	Complete			12-Jun-13	Arbitration	
Patent Infringement	Brinks Hofer Gilson & Lione	InterDigital Technology Corp.IPR Licensing Inc. and InterDigital Holdings Inc	ZTE Corporation and ZTE (USA) Inc.	Complete			12-Jun-13	ITC Del.	337-TA-868 and Case No. 13-009 (RGA)).
Patent Infringement	Alston & Bird LLP	InterDigital Technology Corp.IPR Licensing Inc. and InterDigital Holdings Inc	Nokia Corporation and Nokia Inc	Complete			20-Jun-13	ITC Del.	337-TA-868 and Case No. 13-010 (RGA)).
Patent Infringement	Tensegrity Law Group LLP	Intellectual Ventures I LLC and Intellectual Ventures II LLC v Canon Inc. Canon U.S.A. Inc. and Canon Solutions America Inc.	Intellectual Ventures I LLC and Intellectual Ventures II LLC	Complete	Y		12-Jul-13	Del.	1:13-CV-00473-SLR (D. Del)
Patent Infringement	Tensegrity Law Group LLP	Intellectual Ventures I LLC and Intellectual Ventures II LLC v Ricoh Company Ltd Ricoh Americas Corporation and Ricoh Electronics Inc	Intellectual Ventures I LLC and Intellectual Ventures II LLC	Complete			12-Jul-13	Del.	1:13-CV-00474-SLR (D. Del.)
Patent Infringement	OMelveny & Myers LLP	Commonwealth Scientific and Industrial Research Organisation v. MediaTek Inc. et al.	Samsung Electronics Co.; Ltd.; Samsung Semiconductor Inc.; and Samsung Telecommunications America; LLC	Complete			19-Jul-13	E.D. TX	6:12-cv-578-LED
Patent Infringement	Feinberg Day Alberti & Thompson LLP	Intellectual Ventures v PNC Bank, Capital One, First National Bank of Omaha, JP Morgan Chase, Fifth Third Bank, Bank of America, BBVA Compass Bank, Commerce Bank, Suntrust, and M&T	Intellectual Ventures	Complete	Y		30-Aug-13	E.D. VA	1:13-cv-740-AJT/TRJ
Patent Infringement	Feinberg Day Alberti & Thompson LLP	Intellectual Ventures v PNC Bank, Capital One, First National Bank of Omaha, JP Morgan Chase, Fifth Third Bank, Bank of America, BBVA Compass Bank, Commerce Bank, Suntrust, and M&T	Intellectual Ventures	Complete			30-Aug-13	W.D. PA	2: 13-cv-00740-AJS
Patent Infringement	Gibson Dunn	AIP Acquisition LLC v. Cablevision Systems Corporation, et al.	CSC Holdings LLC	Complete			3-Sep-13	D. Del.	1:12-cv-01688-GMS)
Patent Infringement	Cooley LLP	Monec Holding AG v. Motorola Mobility LLC, et al.,	Exedea, Inc	Complete			27-Sep-13	CA	11-798-LPS-SRF
Patent Infringement	Cooley LLP	Monec Holding AG v. Motorola Mobility LLC, et al.,	HTC Corporation	Complete	Y		27-Sep-13	CA	11-798-LPS-SRF

Case Type	Firm	Case Name	Client	Status	Deposition	Trial Testimc	Enagement	Venue	Case Number(s)
Patent Infringement	Kilpatrick Townsend & Stockton	Monec Holding AG v. Motorola Mobility LLC, et al.,	Motorola Mobility LLC	Complete	Y		27-Sep-13	CA	11-798-LPS-SRF
Patent Infringement	Fish & Richardson P.C.	Monec Holding AG v. Motorola Mobility LLC, et al.,	Samsung Electronics America, Inc. and Samsung Electronics, Inc.	Complete	Y		27-Sep-13	CA	11-798-LPS-SRF
Arbitration	Covington & Burling LLP	Sasken Communication Technologies Limited v. Spreadtrum Communications, Inc. and Spreadtrum Communications USA Inc	Spreadtrum	Complete	Y	Y	30-Sep-13	American Arbitration Association International Centre for Dispute Resolution	50-117-T-00924-12
Patent Infringement	FINNEGAN, HENDERSON,LLP and HOLLAND & HART LLP	Cellport v. ZTE et al.	HTC Corp., et al	Complete			27-Oct-13	CO	1:13-cv-173 - RBJ
Patent Infringement	Dickstein Shapiro LLP, Lathrop & Gage, LLP	Cellport v. ZTE et al.	LG Electronics, Inc., et al	Complete			27-Oct-13	CO	1:13-cv-175 - RBJ
Patent Infringement	FOX ROTHSCHILD LLP, KING & SPALDING LLP	Cellport v. ZTE et al.	Nokia Corp., et al.	Complete			27-Oct-13	CO	1:13-cv-178 - RBJ
Patent Infringement	McKENZIE LLP	Cellport v. ZTE et al.	Pantech Co. Ltd., et al	Complete			27-Oct-13	CO	1:13-cv-179 - RBJ
Patent Infringement	GREENBERG TRAURIG, LLP	Cellport v. ZTE et al	Samsung Electronics Co., Ltd., et al	Complete			27-Oct-13	CO	1:13-cv-180 - RBJ
Patent Infringement	Sheppard Mullin Richter &	Cellport v. ZTE et al.	ZTE Corporation and ZTE (USA)	Complete			27-Oct-13	CO	1:12-cv-3296
Patent Infringement	Ropes & Gray LLP	Broadcom Corp. v. NXP Semiconductors USA, Inc.	Broadcom	Complete			11-Feb-14	CDCA	CV SA 8:13-829-MRP(MANx)
Patent Infringement	Quinn Emanuel LLP	GENBAND US LLC v. Metaswitch Networks Ltd., et. al.	Metaswitch Networks Ltd.	Complete	Y	Y	27-Feb-14	E.D. TX	2:14-CV-33-JRG-RSP

Case Type	Firm	Case Name	Client	Status	Deposition	Trial Testimc	Engagement	Venue	Case Number(s)
Patent Infringement	O'Melveny & Myers LLP	Concinnitas, LLC and George Hindman v. Samsung Telecommunications America, LLC, et al,	Electronics America, inc. and Samsung	Complete			22-Apr-14	E.D. TX	2: 13-CV-824-JRG-RSP
IPR	Hill, Kertscher & Wharton,	Regarding the U.S. Patent No. 8,400,926 B2	HTC Corporation	Complete			9-May-14	USPTO	U.S. Patent No. 8,400,926 B2
IPR	Hill, Kertscher & Wharton, LLP	Regarding the U.S. Patent No. 8,134,600, 8,477,197, 8581,991	HTC Corporation	Complete			9-May-14	USPTO	U.S. Patent No. 8,134,600, 8,477,197, 8581,991
IPR	Morgan, Lewis & Bockius LLP	Regarding the U.S.Patent No. 6,819,923	NEC Casio Mobile Communications Ltd. and NEC Corp of America	Complete			25-Jun-14	USPTO	U.S.Patent No. 6,819,923
IPR	Everett Upshaw, PLLC	Regarding the U.S.Patent No. 7,215,962	ZTE Corporation and ZTE (USA)	Complete	Y		25-Jun-14	USPTO	U.S.Patent No. 7,215,962
Patent Infringement	Fenwick & West LLP	Cellular Communications Equipment LLC v. Amazon.com, inc. et al	Amazon Inc.	Complete			1-Jul-14	E.D. TX	TXED-6-13-cv-00569; consolidated with Case No. 6-13-cv-00507
Patent Infringement	Winthrop Shaw Pittman	Cellular Communications Equipment LLC v. HTC Corporation et al	HTC Corporation	Complete			1-Jul-14	E.D. TX	6:13-cv-00507
IPR	H.C. Park & Associates, PLC	Regarding the U.S.Patent No. 7,218,923	Pantech Co. Ltd., et al	Complete			2-Jul-14	USPTO	U.S.Patent No. 7,218,923
Patent Infringement	Pillsbury Winthrop Shaw Pittman	SPH America LLC v. ZTE Corp et. al.	ZTE Corporation and ZTE (USA) Inc.	Complete			10-Jul-14	ED TX	3:13-cv-02326
Patent Infringement	Pillsbury Winthrop Shaw Pittman	Novatel Wireless, Inc. v. ZTE Corp. et. al.	ZTE Corporation and ZTE (USA) Inc.	Complete			16-Jul-14	ED TX	3:12-cv-02576
Patent Analysis	Qualcomm	Analysis of Qualcomm portfolio	Qualcomm	Complete			6-Aug-14	Consulting	Analysis of Qualcomm portfolio
IPR	Pillsbury Winthrop Shaw Pittman	Regarding Vringo patents	ZTE Corporation and ZTE (USA) Inc.	Complete			21-Aug-14	USPTO	U.S. Patents

Case Type	Firm	Case Name	Client	Status	Deposition	Trial Testimc	Enagement	Venue	Case Number(s)
Patent Infringement	Finnegan, Henderson, Farabow,Garrett & Dunner, L.L.P.	OpenTV Inc. et al. v. Apple, Inc.	OpenTV, Inc. and Nagravision, SA of the Kudelski Group	Complete			22-Sep-14	N.D. CA	14-cv-01622-JST
IPR	Foley and Lardner LLP	Regarding the U.S. Patent No. 8,532,231, 8,565,346	Huawei Technologies Co., Ltd., Futurewei Technologies, Inc. and Huawei Device USA,	Complete			14-Oct-14	USPTO	Regarding the U.S. Patent No. 8,532,231, 8,565,346
Patent Infringement	Desmarais LLP	Intellectual Ventures I LLC and Intellectual Ventures II LLC v. Nikon Corp., et al	Intellectual Ventures I LLC and Intellectual Ventures II LLC	Complete			11-Nov-14	Del.	1:11-CV-1025-SLR
Patent Infringement	Cooley LLP	ParkerVision, Inc. v Qualcomm Incorporated, et al	Qualcomm	Complete			15-Dec-14	MDFL	6:14-cv-00687
Patent Infringement	DLA Piper LLP	Technology Properties Ltd LLC et al. v. Samsung Electronics Co., Ltd	Samsung Electronics Co., Ltd.	Complete			22-Jan-15	N.D. CA	3:12-cv-03879
Patent Analysis	Cravath, Swaine & Moore LLP	Patent Investigation	Qualcomm	Complete			6-Mar-15		
Patent Infringement	Paul Hastings	Summit 6 LLC v. HTC Corp.	HTC Corp and HTC America	Complete			3-Apr-15	NDTX	7:14-cv-00014
Patent Infringement	Kolpatrick Townsend & Stockton LLP	Summit 6 LLC v. Motorola	Google/Motorola	Complete			8-Apr-15	NDTX	7:14-cv-00014
Patent Infringement	Quinn Emanuel LLP	Cellular Communications Equipment LLC v. Samsung Electronics Co.Ltd et al	Samsung Electronics Co., Ltd., Samsung	Complete			8-Jun-15	E.D. TX	6:14-cv-759-JRG
IPR	Sterne, Kessler, Goldstein& Fox PLLC	Int'l Bus. Machines Corp. v IV	IV	Complete	Y		10-Jun-15	USPTO	2015-00089, 2015-00092
Patent Infringement	Novak, Druce Connolly Bove + Quigg LLP	Sonus Networks, Inc. v Inventergy, Inc. and Inventergy Global, Inc	Inventergy, Inc. and Invetergy Global, Inc	Complete			24-Jul-15	N.D. CA	15-cv-00322

Case Type	Firm	Case Name	Client	Status	Deposition	Trial Testimc	Engagement	Venue	Case Number(s)
Patent Infringement	Novak, Druce Connolly Bove + Quigg LLP	Sonus Networks, Inc. v Inventergy, Inc. and Inventergy Global, Inc	Inventergy, Inc. and Invetergy Global, Inc	Complete			24-Jul-15	MA	15-cv-10207
Patent Infringement	Novak, Druce Connolly Bove + Quigg LLP	Sonus Networks, Inc. v Inventergy, Inc. and Inventergy Global, Inc	Inventergy, Inc. and Invetergy Global, Inc	Complete			24-Jul-15	E.D. TX	14-cv612
Arbitration	Mayer Brown LLP	Nokia Technologies Ltd and LG Electronics, Inc.	LG Electronics, Inc.	Complete	Y		25-Sep-15	Arbitration	None
IPR	Sterne, Kessler, Goldstein& Fox PLLC	LM Ericsson v IV	Intellectual Ventures I LLC and Intellectual Ventures II LLC	Complete	Y		18-Dec-15	USPTO	2015-01872
IPR	Sterne, Kessler, Goldstein& Fox PLLC	Old Republic Group Inc. v IV	Intellectual Ventures I LLC and Intellectual Ventures II LLC	Complete	Y		18-Dec-15	USPTO	IPR2015-01992, CBM2015-00184
IPR	Sterne, Kessler, Goldstein& Fox PLLC	LM Ericsson v IV	Intellectual Ventures I LLC and Intellectual Ventures II LLC	Complete	Y		26-Dec-15	USPTO	2015-01873
Patent Infringement	Cooley LLP	ParkerVision, Inc. v Qualcomm Incorporated, et al	Qualcomm	Complete			1-Feb-16	ITC	337-TA-982
Patent Analysis	Norton Rose Fulbright US LLP	Patent Investigation	Qualcomm	Complete			22-Feb-16		
Patent Infringement	Fish & Richardson P.C.	TiVo Inc. v. Samsung Electronics Co., Ltd., et al.,	Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc.	Complete			14-Mar-16	EDTX	2:15-CV-1503
Patent Infringement	RuyakCherian LLC	Brocade Communications Systems, Inc.	Brocade Communications Systems, Inc.	Complete			4-May-16	None	None
IPR	Bragalone Conroy PC	Securus Technologies, Inc. v. Global Tel*Link Corporation	Securus Technologies, Inc	On Hold	Y		6-May-16	USPTO	IPR2016-01123
Patent Infringement	Cooley LLP	Skky, LLC v. Facebook, Inc. et al.	Facebook, Inc	On Hold			7-Jun-16	?	16-cv-00094-WMW-FLN

Case Type	Firm	Case Name	Client	Status	Deposition	Trial Testimc	Enagement	Venue	Case Number(s)
IPR	Winthrop Shaw Pittman	Cellular Communications Equipment LLC v. AT&T et al	HTC Corporation, HTC America	Complete	Y		7-Jul-16	USPTO	Regarding U.S. Patents 8,457,676 and 8,570,957
IPR	Pillsbury Winthrop Shaw Pittman	Cellular Communications Equipment LLC v. AT&T et al	ZTE Corporation and ZTE (USA), Inc.	Complete			7-Jul-16	USPTO	Regarding U.S. Patents 8,457,676 and 8,570,957
Patent Infringement	Desmarais LLP	Uniloc USA, Inc. and Uniloc Luxembourg S.A. v. Cisco Systems, Inc.	Cisco Systems, Inc.	On Hold			15-Jul-16	E.D. TX	6:15-CV-1175-JRG
Patent Infringement	Quinn Emanuel LLP	GENBAND US LLC v. Metaswitch Networks Ltd., et. al.	Metaswitch Networks Ltd.	Complete	Y		15-Jul-16	E.D. TX	2:16-cv-582-JRG-RSP
Patent Infringement	Duanne Morris	Ruckus Wireless, Inc. v Chrimar Systems d/b/a CMS Technologies and Chrimar Holding Company LLC	Ruckus Wireless	Complete			27-Jul-16		
Patent Infringement	Singularity IP & Foster Pepper PLLC	CommScope Technologies LLC v. Dali Wireless, Inc.,	CommScope Technologies LLC	Complete			17-Aug-16	N.D. Tx	3:16-cv-00477
Patent Infringement	Quinn Emanuel LLP	Huawei Technologies, Co. Ltd et al v. Samsung Electronics Co, Ltd. et al	Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc.	Complete	Y		23-Aug-16	NDCA	3:16-cv-02787
Patent Infringement	Foster Pepper PLLC	CommScope Technologies LLC v. Dali Wireless, Inc.,	CommScope Technologies LLC	Complete			15-Oct-16	N.D. Tx	3:16-cv-00477
Technology Review	Foster Pepper PLLC	Dali Wireless, Inc.	Dali Wireless, Inc.	Complete			28-Oct-16	None	None
Patent Analysis	Foster Pepper PLLC	Dali Wireless, Inc v. Fiplex Communications, Inc.	Dali Wireless, Inc	Complete			29-Oct-16		
Patent Infringement	Finnegan, Henderson, Farabow,Garrett & Dunner, L.L.P.	Certain Digital Cable and Satellite Products, Set-Top Boxes, Gateways, and Components Thereof	Sony Corporation	Complete			8-Dec-16	ITC	337-TA-1049
Patent Infringement	Irell & Manella, LLP	various patent disputes involving Mobile Telecommunications Technology, LLC ("MTel") and regarding United States Patents Nos. 5,590,403, 5,659,891, and 5,915,210.	Juniper Networks, Inc	Complete			29-Dec-16		

Case Type	Firm	Case Name	Client	Status	Deposition	Trial Testimc	Engagement	Venue	Case Number(s)
Patent Infringement	Dechert, LLP, Winston & Strawn	Tech Pharmacy Services, LLC v. Alixa RX LLC., et al.	Alixa RX LLC	Complete	Y		6-Jan-17	EDTX	4:15-cv-766
Patent Infringement	Sheppard Mullin Richter & Hampton LLP	Papst Licensing GMBH & Co. KG v. ZTE Corporation and ZTE (USA), Inc.	ZTE (USA), Inc.	Complete	Y		27-Jan-17	EDTX	6: 15-cv-1100
Antitrust	Freitas Angell & Weinberg LLP	Intellectual Ventures I LLC v Capital One	Intellectual Ventures	Complete			15-Feb-17	MD	8:14-cv-111 (PWG)
IPR	Knobbe, Martens, Olson, & Bear LLP	Symantec Corporation ("Symantec") v. IV's U.S. Patent No. 7,757,298	IV	Complete			16-Feb-17	USPTO	2016-01433
Patent Infringement	Cooley LLP	Uniloc USA, Inc. et al. v. Facebook, Inc. et al.	Facebook, Inc.	OnHold			17-Feb-17	EDTX	2:16-cv-00728
Patent Infringement	Feinberg Day Alberti & Thompson LLP	OpenTV Inc. v. NFL Enterprises, LLC	OpenTV, Inc.	Complete			23-Mar-17	EDTX	6:17-cv-00031
IPR	Finnegan, Henderson, Farabow,Garrett & Dunner, L.L.P.	Unified Patents (6,014,089, 7,346,313)	Unified Patents	Complete			4/8/17	USPTO	(6,014,089, 7,346,313
Patent Infringement	Irell & Manella, LLP	Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V. v. Sirius XM Radio, Inc.,	Fraunhofer	OnHold			17-May-17		17-184-VAC-SRF
Technology Review	RuyakCherian LLC	XR Communications, LLC., dba Vivato Technologies v. Ruckus Wireless, Inc.	Ruckus Wireless	Complete			13-Jun-17	CDCA	2:17-cv-02961
Patent Infringement	DLA Piper LLP	Mobile Telecommunications Technologies, LLC v. Aruba Networks, Inc., et al.,	Aruba/HPE and HP	Complete			25-Aug-17	MD	16-md-2722
Patent Infringement	Dechert, LLP	Intellectual Ventures I LLC v. T-Mobile USA, Inc., T-Mobile US, Inc., Ericsson Inc., and Telefonaktiebolaget LM Ericsson	IV	Complete	Y	Y	29-Aug-17	EDTX	2:17-cv-00577-JRG
Patent Infringement	Cooley LLP	Silver State Intellectual Tech., Inc. v. Facebook, Inc. et al.	Facebook, Inc.	OnHold			19-Sep-17	ND CA	4:17-cv-03349-JSW
Patent Infringement	Quinn Emanuel LLP	QCOM v Apple SD Cal	Qualcomm	Complete	Y		15-Nov-17	SD. Cal,	5:17-cv-0108-GPC-MDD,
Patent Infringement	Norton Rose	QCOM v Apple	Qualcomm	Complete	Y		15-Nov-17	ND Cal	5:17-md-02773-LHK,

Case Type	Firm	Case Name	Client	Status	Deposition	Trial Testimc	Engagement	Venue	Case Number(s)
Patent Infringement	Norton Rose	QCOM v Apple	Qualcomm	Complete	Y		15-Nov-17	ND Cal	5:17-cv-00220-LHK
Patent Infringement	Quinn Emanuel LLP	In the Matter of CERTAIN MOBILE ELECTRONIC DEVICES AND RADIO FREQUE	Qualcomm	Complete	Y		10-Jan-18	ITC	U.S. PATENT NO. 9,608,675
Patent Infringement	Paul Hastings	3G Licensing, S.A. et al v. HTC Corporation	HTC Corporation	OnHold			7-Mar-18	Del.	1:17-cv-00083-LPS-CJB
Patent Infringement	Fish & Richardson P.C.	Sonus Networks, Inc. v. Metaswitch Networks Ltd. et al,	Metaswitch Networks Ltd.	Complete			19-Jun-18	EDTX Marshall	18-cv-00057-RWS, 18-cv-00058-RWS, IPR
Request for Reexam	Dentons US LLP	Request for Reexam re: patent 7,814,216	Dentons	Complete			6-Sep-18	USPTO	US Patent 7,814,216
Contract Dispute	Jones Day	Qualcomm, Inc. v. Apple, Inc.	Qualcomm	Complete			28-Sep-18	San Diego Supperior Ct	37-2017-00041389-CU-BC-NC
Patent Infringement	O'Melveny & Myers LLP	Top Victory Electronics (Taiwan) Co. Ltd. v. American Patents LLC	Top Victory Electronics	OnHold			13-Dec-18	EDTX	4:18-cv-00768-ALM
Patent Infringement	Birch, Stewart, Kolasch & Birch, LLP	Blitzsafe Texas LLC v Mitsubishi Electric Corp, et al.	Mitsubishi	Complete			19-Feb-19	EDTX	2:17-cv-00430-JRG
IPR	Jones Day	Qualcomm/Intel PTAB Matters (U.S. Patent No. 9,608,675)	Qualcomm	Complete	Y		20-Feb-19	USPTO	IPR2018-01326 to 01330 and IPR2018-01340
Patent Infringement	Finnegan, Henderson, Farabow,Garrett & Dunner, L.L.P.	Uniloc Luxembourg S.A., Uniloc 2017 LLC ("Uniloc") v LG Electronics Inc., LG Electronics U.S.A., Inc., and LG Electronics MobileComm U.S.A., Inc. ("LG")	LG	OnHold			11-Mar-19	NDCA	3:18 cv-06737-JST, 5:18-cv-06738-LHK, 3:18-cv-06739-JST, 3:18-cv-06740-JST) and PTO
Ex Parte	Finnegan, Henderson, Farabow,Garrett & Dunner, L.L.P.	TCL Communication Technology Holdings Ltd. ("TCL").	TCL	Complete			13-Mar-19	USPTO	U.S. Patent No. 7,149,510
Patent Infringement	Mayer Brown LLP	Maxell, Ltd., et al., v. Apple Inc.	Maxell	Complete	Y		15-Apr-19	EDTX	5:19-cv-00036-RWS
Patent Infringement	Maschoff Brennan	ICON Health & Fitness,Inc. v. Tme Fitness Technology, inc	ICON	Complete			29-May-19	Missouri	4:18-cv-00439
Patent Infringement	Gibson Dunn	Sprint Communications Co. L.P. v. Cequel Communications, LC et al.	Altice USA	Ongoing	Y		17-Jun-19	Del.	I: 18-cv-01752-RGA

Case Type	Firm	Case Name	Client	Status	Deposition	Trial Testimc	Enagement	Venue	Case Number(s)
Patent Infringement	Charhon Callahan Robson & Garza, PLLC	United Access Technologies, LLC ("UAT") in connection with UAT's lawsuits against AT&T, Verizon, Frontier and CenturyTel,	UAT	Complete	Y		17-Jun-19		1:05-cv-00866-LPS, 1.11-cv-00338-LPS, 1:11-cv-00341-LPS
Patent Infringement	Susman Godfrey L.l.p.	Sol IP, LLC v. AT&T Mobility LLC, et al.	Sol IP	Complete	Y		24-Jul-19	E.D. Tex.	2:18-cv-00526; 2:18-cv-00527; 2:18-cv-00528
IPR	Kelley Drye & Warren LLP	Zomm / Apple PTAB Matters (U.S. Patent No. 9,608,675)	Zomm, LLC	Complete	Y		30-Jul-19	USPTO	IPR2019-275, IPR2019-277, IPR2019-1030
Patent Infringement	Fish & Richardson P.C.	Bell Northern Research, LLC v. LG Electronics Inc., et al.,	LG Electronics, Inc.	Complete			6-Aug-19	SD. Cal	18-cv-2864-CAB-BLM
Technology Consulting	Rose Fulbright US LLP	Sanyo v. Intel	Sanyo	Complete	Y		3-Dec-19	Chancery of Delaware	C.A. No. 2018-0723-MTZ
Patent Infringement	Sidley Austin LLP	LG Electronics Inc. v. Hisense Electronics Manufacturing Company of America	LG	Complete			15-Jan-20	CDCA	2:19-cv-09474-SJO-E
Patent Infringement	Ahmad, Zavitsanos, Anaipakos, Alavi, Mensing	Cellular Evolution, LLC v. AT&T Mobility, LLC and Cricket Wireless, LLC	Cellular Evolution	Complete			30-Jan-20	EDTX	19-cv-00228
Patent Infringement	Ahmad, Zavitsanos, Anaipakos, Alavi, Mensing	Cellular Evolution, LLC v. T-Mobile, US, Inc. and T-Mobile USA, Inc.,	Cellular Evolution	Complete			30-Jan-20	EDTX	19-cv-00232
Patent Infringement	Cooley LLP	ParkerVision v. Apple	Qualcomm	OnHold			11-Feb-20	MDFL	3:15-cv-01477
Patent Infringement	Cooley LLP	ParkerVision v. Qualcomm	Qualcomm	OnHold	Y		11-Feb-20	MDFL	6:14-cv-00687
IPR	Wolf Greenfield LLP	MediaTek v NTT	MediaTek	Complete	Y		2-Jul-20	USPTO	Re U.S. Patent Nos. 7,280,551 and 7,400,616
Patent Infringement	Mintz, Levin	Parus Holdings, Inc.	Parus Holdings	OnHold			31-Aug-20	WDTX	Not specified
Patent Infringement	Venable LLP	Blitzsafe Texas LLC v. Fiat Chrysler Automobiles N.V., FCA US LLC et al.	Maserati North America Inc. and FCA US LLC	Complete	Y		8-Sep-20	EDTX	2:19-cv-00378-JRG
IPR	Wolf Greenfield LLP	Bose Corporation v. KOSS Corporation	Bose	Complete	Y		20-Oct-20	USPTO	U.S. Patent No. 10,368,155
Patent Infringement	Shearman & Sterling LLP	StratosAudio, Inc. v. Volkswagen Group of America, Inc	Volkswagen	Complete	Y		13-Jan-21	WDTX	6:20-cv-1131

Case Type	Firm	Case Name	Client	Status	Deposition	Trial Testimc	Enagement	Venue	Case Number(s)
Patent Infringement		Ericsson Inc v. Samsung Electronics Co.	Samsung	Complete			11-Mar-21	ITC and EDTX	337-TA-1248 and No. 2:20-cv-380 (E.D. Tex),
Patent Infringement	Dechert, LLP	IPCom v AT&T Inc, Verizon, Sprint	IPCom	Ongoing			17-Mar-21	EDTX	IPCom Gmbh & Co. KG v. AT&T Inc. et al., Case No. 2:20-cv-00322 (E.D. Tex.); IPCom Gmbh & Co. KG v. Verizon Communications Inc. et al., Case No. 2:20-cv-00323 (E.D. Tex.); and IPCom Gmbh & Co. KG v. Sprint Spectrum L.P. et al., Case No. 2:20-cv-00321 (E.D. Tex.)
Patent Infringement	Sidley Austin LLP	WSOU v. Hewlett Packard	Hewlett Packard	Ongoing			4-Jun-21		U.S. Patent Nos. 7,280,534; 7,386,630; 7,443,832; 7,519,056; 7,646,729; 8,462,774; and 9,398,629

APPENDIX B

IBM DICTIONARY OF COMPUTING

Compiled and edited by
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control language variable A program variable declared in a control language program and available only to the program.

control(ling) command In System/36, the system action that ends a job step being run and saves any new data that has been created. The job that is running can continue with the next job entry.

controlled maintenance A method to sustain a desired quality of service by the systematic application of analysis techniques using centralized supervisory facilities and/or sampling to minimize preventive maintenance and to reduce corrective maintenance. (T)

controlled slip A slip in which a fixed number of digits are lost or gained.

controller A device that coordinates and controls the operation of one or more input/output devices, such as workstations, and synchronizes the operation of such devices with the operation of the system as a whole. See communication controller, store controller, subsystem controller. See also input/output control unit.

controller card In the AS/400 system, any of the I/O controller logic cards, such as a magnetic storage device controller, workstation controller, or communications controller.

controller configuration facility (CCF) Set of macrostatements to be coded by a user and modules in Programmable Store System Host Support, used to define and create a 3651 or 7480 Store Controller operational environment.

controller creation parameter table (CCPT) In PSS, a table containing pointers to all tables and data areas used by the controller configuration facility in defining the 3651 or 7480 Store Controller operational environment.

controller data IBM-provided modules, tables, lists, and control blocks that are used at a host system to create an operational environment for a controller.

controller description (CTLD) In the AS/400 system, an object that contains a description of the characteristics of a controller that is either directly attached to the system or attached to a communication line.

controller disk In the 3650 Retail Store System, an integral part of the retail store controller that is used for auxiliary storage of controller data, user files, and application programs.

controller function An action or series of actions built into a controller and taken by the controller in response to a request from a terminal, another controller function, or a host system.

controller information fields In the 3790 Communication System, a set of fields, assigned to each 3790 program and to which the program has access, that contain information the program may need while being executed, such as terminal operator ID, date, and record numbers of print data set and transaction data set records being used by the program.

controller storage In the 3650 Retail Store System, the generic name for auxiliary (disk) storage and active (monolithic) storage in a 3651 store controller.

controller storage save In the 3650 Retail Store System, automatic writing of the critical areas of store controller active storage onto the integrated disk when power is turned off or when a power failure is detected.

control-level indicator In RPG, an indicator used to specify certain fields as control fields and to control the operations that are to be performed at total and detail time in the RPG program cycle.

control lever Synonym for joy stick.

controlling application program In VTAM programs, an application program with which a logical unit other than a secondary application program is automatically put in session whenever the logical unit is available. See also automatic logon.

controlling logical unit In VTAM programs, a logical unit with which a secondary logical unit, other than an application program, is automatically put in session whenever the secondary logical unit is available. A controlling logical unit can be either an application program or a device-type logical unit. See also automatic logon, controlling application program.

controlling subsystem An interactive subsystem that is started automatically when the system is started and through which the system operator controls the system.

control logic In the IBM 8100 Information System, I/O hardware that can decode and perform commands addressed to it by I/O instructions.

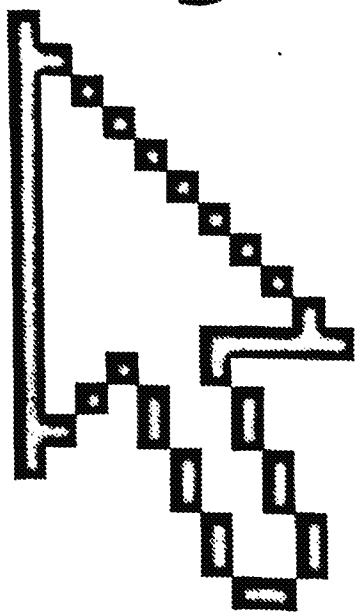
control logical unit (CLU) A logical unit that resides in a Transaction Processing Facility (TPF) type 2.1 node and that is used to pass private protocol request units between this TPF type 2.1 node and the logon manager (a VTAM application program). The communication flow between the control logical unit and the logon manager enables a logical unit controlled by VTAM to establish a session with TPF.

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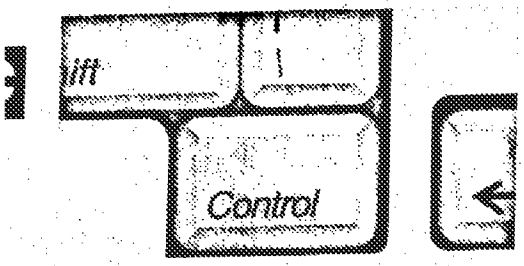
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Control key.

controller *n.* A device that other devices rely on for access to a computer subsystem. A disk controller, for example, controls access to one or more disk drives, managing physical and logical access to the drive or drives.

control logic *n.* The electronic circuitry that generates, interprets, and uses control data.

control panel *n.* In Windows and Macintosh systems, a utility that allows the user to control aspects of the operating system or hardware, such as system time and date, keyboard characteristics, and networking parameters.

control panel device *n. See* cdev.

control sequence *n. See* control code.

control signal *n.* An electronic signal used to control internal or external devices or processes.

control statement *n.* A statement that affects the flow of execution through a program. Control statements include conditional statements (CASE, IF-THEN-ELSE), iterative statements (DO, FOR, REPEAT, WHILE), and transfer statements (GOTO). *See also* conditional statement, iterative statement, statement, transfer statement.

control strip *n.* 1. An equipment calibration tool used to determine the corrections needed to restore accuracy by comparing recorded data against known values. 2. A utility that groups shortcuts to commonly used items or information, such as time, battery power level, desktop items, and programs, in an easily accessible place. *See also* shortcut.

control structure *n.* A portion of a program defined by the relationship between the statements, used in structured programming. There are three basic control structures: sequence, where one statement simply follows another; selection, where program flow depends on which criteria are met; and iteration, where an action is repeated until some condition occurs.

control unit *n.* A device or circuit that performs an arbitrating or regulating function. For example, a memory controller chip controls access to a computer's memory and is the control unit for that memory.

control variable *n.* In programming, the variable in a control statement that dictates the flow of execution. For example, the index variable in a FOR loop controls the number of times a group of statements are executed. *See also* control statement.

convenience adapter *n. See* port replicator.

convention *n.* Any standard that is used more or less universally in a given situation. Many conventions are applied to microcomputers. In programming, for example, a language such as C relies on formally accepted symbols and abbreviations that must be used in programs. Less formally, programmers usually adopt the convention of indenting subordinate instructions in a routine so that the structure of the program is more easily visualized. National and international committees often discuss and arbitrate conventions for programming languages, data structures, communication standards, and device characteristics. *See also* CCITT, ISO, NTSC, standard (definition 1).

conventional memory *n.* The amount of RAM addressable by an IBM PC or compatible machine operating in real mode. This is typically 640 kilobytes (KB). Without the use of special techniques, conventional memory is the only kind of RAM accessible to MS-DOS programs. *See also* protected mode, real mode. *Compare* expanded memory, extended memory.

convergence *n.* A coming together. Convergence can occur between different disciplines and technologies, as when telephone communications and computing converge in the field of telecommunications. It can also occur within a program, such as a spreadsheet, when a circular set of formulas are repeatedly recalculated (iterated), with the results of each iteration coming closer to a true solution.

conversational *adj.* Of, pertaining to, or characteristic of the mode of operation, typical of microcomputers, in which the computer user and the system engage in a dialogue of commands and system responses. *See also* interactive.

conversational interaction *n.* Interaction in which two or more parties alternately transmit and receive messages from each other. *See also* interactive processing.

conversational language *n.* Any programming language that allows the programmer to instruct the computer in a conversational mode, as opposed to more formal, structured languages. For example, in a COBOL program, in order to execute a procedure called CHECK 10 times, a

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Chambers Dictionary of Science and Technology

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oxygen and adjustment of the relative proportions of carbon dioxide and nitrogen. CO_2 is bacteriostatic for spoilage bacteria and slightly increases the acidity, while reducing oxygen delays spoilage due to oxidation. Abbrev *CAP*. Also *modified atmosphere packing (MAP)*.

controlled carrier (*ICT*) Transmission in which the magnitude of the carrier is controlled by the signal, so that the depth of modulation is nearly independent of the magnitude of the signal.

controlled cooling (*Eng*) Methods of heat treatment in which the cooling cycle is accurately controlled so as to impart the desired properties or structure.

controlled degradation (*Chem*) Chemical type of analysis for helping to identify polymers, esp thermosets, which often have functional groups susceptible to hydrolysis. Soluble fragments may then be identified.

controlled drugs (*Pharmacol*) Drugs that can only be prescribed under guidelines laid down in legislation. Usually drugs that have the potential to cause addiction and dependence.

controlled variable (*Eng*) Quantity or condition which is measured and controlled in eg a servo system.

controller (*ICT*) A device that controls a functional element within a computer system, eg HARD-DISK controller, CACHE CONTROLLER.

controller (*ElecEng*) An assembly of equipment for controlling the operation of electric apparatus.

control limit-switch (*ElecEng*) A limit-switch connected in the control circuit of the motor whose operation is to be limited.

control-line (*ElecEng*) A train-line used on multiple-unit trains for connecting master controllers or contactor gear on the different coaches.

control magnet (*ElecEng*) A magnet used in electric indicating instruments to provide a force for controlling the movement of the moving system.

control measure (*FoodSci*) Action required to eliminate or reduce a hazard to an acceptable level, eg a heat process step at a specified temperature and holding time will eliminate an identified microbiological hazard. See HACCP.

control panel (*ElecEng*) A panel containing a full set of indicating devices and remote-control units required for operation of industrial plant, reactor, chemical works, etc. Cf CONSOLE.

control point (*ElecEng*) The value of a controlled variable, departure from which causes a controller to operate in such a sense as to reduce the ERROR and restore an intended steady state. Also *set point*.

control points (*BioSci*) Places in the cell cycle where the cell's behaviour may be changed. Also *checkpoints*. See panel on CELL CYCLE.

control program (*ICT*) See MONITOR, OPERATING SYSTEM.

control register (*ICT*) Computer REGISTER within the CONTROL UNIT and that stores a single control instruction.

control relay (*ElecEng*) See RELAY.

control reversal (*Aero*) See REVERSAL OF CONTROL.

control rod (*NucEng*) A rod moved in and out of the reactor core to vary reactivity. May be a neutron-absorbing rod, eg boron or cadmium, or, less often, a fuel rod. Also *control absorber*. See REGULATING ROD, SHIM ROD and panel on NUCLEAR REACTORS.

control rod worth (*NucEng*) The change in reactivity of a critical reactor caused by the complete insertion or withdrawal of the control rod.

control total (*ICT*) The sum resulting from the addition of a specified field from each of a group of records, often used for checking purposes.

control track (*ImageTech*) A linear track, outside the video area of the tape, where the control or sync pulses are recorded, one per frame, to ensure accurate tracking during playback.

control turns (*ElecEng*) Those wires on the core of a magnetic amplifier or transductor which carry the control current. Also *control windings*. Cf *signal windings*.

control unit (*ICT*) Part of the CENTRAL PROCESSOR that supervises the execution of instructions.

control voltage (*ElecEng*) One which, by its magnitude, direction or relative phase, determines the operation of an item of plant and/or electrical circuit.

control windings (*ElecEng*) See CONTROL TURNS.

control word (*ICT*) One that transmits an operating instruction to a CENTRAL PROCESSOR, eg XEQ for execute. Cf CONTROL CHARACTER.

control zone (*Aero*) A volume of controlled air space, precisely defined in plan and altitude, including airports, in which flight rules additional to those in a control area pertain. ICAO defines a specific upper limit.

conus (*BioSci*) Any cone-shaped structure or organ.

conus arteriosus (*BioSci*) In some lower vertebrates, a valvular region of the TRUNCUS ARTERIOSUS, adjacent to the heart.

conus medullaris (*BioSci*) The conical termination of the spinal cord.

convection (*Geol*) The very slow mass movement of subcrustal material; believed to be the mechanism that drives tectonic plates.

convection (*Phys*) The process by which energy or mass is transmitted through a material by bulk motion of the medium itself.

convection current (*Phys*) Current in which the charges are carried by moving masses appreciably heavier than electrons.

convection of heat (*Phys*) The transfer of heat in a fluid by the circulation flow due to temperature differences. The regions of higher temperature, being less dense, rise, while the regions of lower temperature move down to take their place. The convection currents so formed help to keep the temperature more uniform than if the fluid was stagnant.

convective transfer (*Astron*) The transfer of energy from one part of a star to another by convection.

convector (*Eng*) Heater which warms the air passing over it. Cf RADIATOR.

conventional memory (*ICT*) The MAIN MEMORY delivered as standard with an IBM-COMPATIBLE AT computer using MS-DOS. This is usually considered to be the memory between ADDRESS 0 and 640 KBYTES. See fig. at MEMORY MAP.

conventional signs (*CivEng, Surv*) Standard symbols, universally understood, used in the representation on maps and plans of features which would otherwise be difficult or impossible to represent.

convention of signs (*Phys*) Sign convention used in lens calculations to ensure consistency in the derivation and use of lens formulae, in which all distances must be measured from some origin. More than one is in use, but in the *cartesian* convention all distances are measured *from* the reflecting or refracting surface being considered, or *from* the principal planes in the case of a thick lens or lens system. Distances measured in the direction in which the incident light is travelling are given a positive sign, and those in the opposite direction a negative sign. Distances measured perpendicular to the axis, eg size of image or object, are measured from the axis: above is positive, below is negative.

convergence (*EnvSci*) Negative DIVERGENCE.

convergence (*ImageTech*) In a colour TV display, alignment of the three electron or optical beams for correct image registration over the whole picture.

convergence (*MathSci*) (1) An infinite sequence $a_1, a_2 \ldots$ $a_n, \ldots$, is said to be convergent to a if, as n tends to infinity, a_n tends to the limit a, ie

$$\lim_{n\to\infty} a_n = a$$

(2) An infinite series $a_1 + a_2 + \ldots + a_n + \ldots$ is said to be convergent to the sum A, if the sum of the terms tends to the limit A, as the number of terms tends to infinity, ie

$$\lim_{n\to\infty} \sum a_n = A$$

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controlled rectifier a rectifier that uses switching elements that have forward voltage blocking capability to allow a variable voltage DC output. *See also* thyristor.

controlled source a voltage or current source whose intensity is controlled by a circuit voltage or current elsewhere in the circuit. Also called dependent source.

controlled variable (1) the quantity, usually the output of a plant or process, that is being controlled for the purpose of the desired behavior, for example, transient response or steady-state response.

(2) variable associated with the behavior of the controlled process and such that one wants this variable either to follow a desired trajectory over a given time interval or to be kept at a prescribed constant value, i.e., at a specified set-point; introduction of a set of controlled variables is necessary to define a two-layer industrial controller with the regulation direct control layer and the set point optimizing control layer.

See also controller.

controller (1) the entity that enforces the desired behavior — as specified by the control objectives — of the controlled process by adjusting the manipulated inputs. The values of these inputs are either predetermined or decided upon (computed) using on-line, i.e., real time, decision mechanism of the controller — based on the currently available information. *See also* controlled variable.

(2) a device that generates the input to the plant or process. The role of the controller is to force the controlled variable of the plant or process to behave in a desired manner.

(3) a unit that directs the operation of a subsystem within a computer. For instance, a disk controller interprets data access commands from host computer (via a bus), and sends read/write, track seeking, and other control signals to the drive. During this time, the computer can perform other tasks, until the controller signals DATA READY for transfer via the CPU bus.

convection current a current in which electrons are released for movement outside of a material.

convective heat transfer the process by which a moving fluid transfers heat to or from a wetted surface.

convergence the condition when the electron beams from a multi-beam CRT meet at a single point. For example, the correct registration of the three beams in the color picture tube.

convergence in probability for some sequences of random numbers, the tendency to a single number.

To wit, for a sequence of numbers x_n, and a random variable x, if for all $\epsilon > 0$,

$$P\{|\, x_n - x \,| > \epsilon\} \to 0$$

for $n \to \infty$, then the sequence x_n tends to x in probability.

convergent state the equilibrium state of a dynamic system described by a first order vector differential equation is said to be convergent if there exists a $\delta = \delta(t_0)$, such that,

$$\| x(t_0) - x_e \| < \delta \Rightarrow \lim_{t \to \infty} x(t) = x_e$$

See also stable state.

converter a generic term used in the area of power electronics to describe a rectifier, inverter, or other power electronic device that transforms electrical power from one frequency and voltage to another.

convex fuzzy set (1) a fuzzy set that has a convex type of membership function.

(2) a fuzzy set in which all α-level sets are convex. *See also* α-level set.

convolution the mathematical operation needed to determine the response of a system from its

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subset X of S, f maps the least upper bound of X to the least upper bound of the *image of X under f. Continuous functions are significant in *denotational semantics since they correspond to the requirement that a computational process produces arbitrarily close approximations to the final output, given arbitrarily close approximations to the total input.

A continuous function $f(x)$ has no breaks or instantaneous changes in value. In the hierarchy of mathematical functions the smoothest are those, such as $\sin x$, $\cos x$, that can be differentiated any number of times, always producing a continuous function.

continuous inkjet printer *See* INKJET PRINTER.

continuous signal, system *See* DISCRETE AND CONTINUOUS SYSTEMS.

continuous simulation *See* SIMULATION.

continuous stationery *See* STATIONERY.

continuous-tone image An image, such as a photograph, where the gray levels in the image are continuous and not discrete.

contradiction *See* TAUTOLOGY.

contrapositive of a conditional, $P \rightarrow Q$. The statement

$$\neg Q \rightarrow \neg P$$

where $\neg$ denotes negation. The contrapositive of a conditional is therefore equivalent to the original conditional. *See also* CONVERSE, INVERSE.

control bus A *bus that is dedicated to the passing of control signals.

control character A character that when typed at a keyboard or sent to a peripheral device is treated as a signal to control operating functions. *See also* CHARACTER SET, ASCII.

control circuitry Electric circuits within a computer or peripheral that regulate its operation.

Control Data Corporation *See* CDC.

control design The design of a *control unit. Control units may be designed using *random logic or *microprogramming. Microprogramming was well suited to the control of the complex sequences of register transfers required by CISC instruction sets. RISC processors with their emphasis on the rapid execution of simple instruction sets usually employ random logic control to optimize performance.

control flow The sequence of execution of statements in a program.

control-flow graph A *directed graph representing the sequence of execution in a program unit, in which nodes represent branching points or subprogram calls in a program, and arcs represent linear sequences of code. From the control-flow graph an analysis can show

the structure of the program,
starts and ends of program segments,
unreachable code and dynamic halts,
branches from within loops,
entry and exit points for loops,
paths through the program.

See also STATIC ANALYSIS.

control key *See* KEYBOARD, CONTROL CHARACTER.

controlled sharing Making used resources available to more than one using resource through an *access control mechanism.

controller A subsystem that governs the functions of attached devices but generally does not change the meaning of the data that may pass through it. The attached devices are usually peripherals or communication channels. One of the functions of the controller may involve processing the data stream in order to format it for transmission or recording.

control line A conductor in a multiwire interface that conveys a control signal.

control memory *Another name for* microprogram store.

control points Points used in the specification of curves to define the general required shape.

control record A record that contains control totals derived by summing values from other records in a file. The totals may or may not have some sensible meaning. Their purpose is to check that none of the preceding records has been lost or altered in some way. *See also* HASH TOTAL.

control sequence A string of characters used to control the operation of a peripheral

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1		590_Patent_-_Reexam_90014651-_Resp_to_1st_OA_-_FINAL_21469450.pdf	243703 dfbcedccda201bee3055cc98b9a504bc724e3dba	yes	34
	Multipart Description/PDF files in .zip description				
	Document Description		**Start**	**End**	
	Response after non-final action-owner timely		1	33	
	Reexam Certificate of Service		34	34	
Warnings:					
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2	Affidavit-traversing rejectns or objectns rule 132	590_Patent_-_Reexam_90014651_-_Williams_Declaration_w__Appendices_A-B_-_TAW_signed_21469441.pdf	18775592 78929a57ccff5eef1bc87cfed727f49da9164959	no	63
Warnings:					
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3	Fee Worksheet (SB06)	fee-info.pdf	39959 d9d95443ff18af929a1c9dac1a7c4a42401c2e11	no	2
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CERTIFICATE OF SERVICE

The undersigned hereby certifies that a true and accurate copy of the RESPONSE TO NON-FINAL OFFICE ACTION filed in Reexamination Control Number 90/014,651 is being served in its entirety via First Class Mail, postage prepaid, on the following counsel of record:

Robin A. Snader
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7015 College Boulevard, Suite 700
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on this September 14, 2021.

Respectfully submitted,

By: /Rachel Lichter/
Rachel Lichter

Docket No.: 009379.00009
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Reexamination of:

Toshiyuki Kurita et al.

Reexamination Control No. 90/014,651

Patent Under Reexamination: U.S. Pat. No. 10,129,590 Confirmation No.: 7485

Issue Date: Nov. 13, 2018 Art Unit: 3992

Title: Display Apparatus and Video Processing Apparatus Examiner: Ton, My Trang

RESPONSE TO NON-FINAL OFFICE ACTION

Mail Stop *Ex Parte* Reexam
Attn: Central Reexamination Unit
Commissioner for Patents
P.O. Box. 1450
Alexandria, VA 22313-1450

Commissioner,

Patent Owner respectfully submits this Response to the non-final Office Action mailed July 14, 2021, regarding the above-captioned *Ex parte* Reexamination.

A **listing of claims and claim amendments** begin on page 2; and

Remarks begin on page 8.

The Commissioner is hereby authorized to charge any required fees or credit any overpayment of fees to Deposit Account No. 19-0733.

LISTING OF CLAIMS

This listing of claims will replace all prior versions and listings of claims. The following amendments are not to be construed as admissions regarding the patentability of the claimed subject matter.

1. (Currently Amended) A video processing apparatus, comprising:

a first radio communication circuit implementing a first transmission scheme having a first modulation scheme and a first transmission frequency band, the first radio communication circuit capable of transmitting video information by radio or receiving information by radio using the first transmission frequency band;

a second radio communication circuit implementing a second transmission scheme having a second modulation scheme different from the first modulation scheme and a second transmission frequency band different from the first transmission frequency band, the second radio communication circuit capable of connecting by radio to an internet or a home network to transmit and receive information using the second transmission frequency band;

a third radio communication circuit capable of transmitting information and using a third transmission frequency band;

an imaging circuit capable of receiving video information and still picture information via an optical system;

a compression circuit compressing the still picture information using a first type of compression method and the video information using a second type of compression method;

an input device capable of receiving a user indication;

an accumulation circuit capable of accumulating video information received by the imaging circuit after the video information is compressed by the compression circuit; and

a controller controlling assignment of connection of each of the first, second, and third radio communication circuits,

wherein the first radio communication circuit can transmit video information accumulated in the accumulation circuit to an external device by radio,

wherein the controller controls assignment of connection for each of the first and second radio communication circuit in response to receiving an indication from a user such that when an indication from the user indicates to transmit video information using the first radio communication circuit, the controller assigns a connection to the first radio communication circuit for transmitting the video information, [; and]

wherein the controller controls each of the first and second radio communication circuit [,] so that the first radio communication circuit transmits video information and the second radio communication circuit connects to the internet or the home network simultaneously, and

wherein the second or third radio communication circuits receive a signal from the internet indicating that an update for an operating system of the video processing apparatus is available, and the video processing apparatus executes an update process such that an updated operating system of the video processing apparatus is stored in the video processing apparatus after execution of the update process.

2. (Original) The video processing apparatus according to claim 1, wherein, upon receiving an indication to transmit video information accumulated in the accumulation circuit via the first radio communication circuit, the controller assigns connection of the first radio communication circuit prior to connection of the second radio communication circuit.

3. (Original) The video processing apparatus according to claim 1, wherein, upon receiving an indication to transmit video information accumulated in the accumulation circuit via the first radio communication circuit while acquiring information from the internet via the second radio communication circuit, the controller assigns connection of the first radio communication circuit prior to connection of the second radio communication circuit.

4. (Original) The video processing apparatus according to claim 1, further comprising a radio interface capable of receiving video information by radio,

wherein the accumulation circuit accumulates the video information received via the radio interface, and

the first radio communication circuit is further capable of transmitting the accumulated video information.

5. (Currently Amended) A display apparatus, comprising:

a first radio communication circuit implementing a first transmission scheme having a first modulation scheme and a first transmission frequency band, the first radio communication circuit capable of receiving video information by radio or transmitting information by radio using the first transmission frequency band;

a second radio communication circuit implementing a second transmission scheme having a second modulation scheme different from the first modulation scheme and a second transmission frequency band different from the first transmission frequency band, the second radio

communication circuit capable of connecting by radio to an internet or a home network to transmit and receive information using the second transmission frequency band;

a third radio communication circuit capable of transmitting information and using a third transmission frequency band;

a compression circuit capable of implementing a plurality of compression schemes including a first compression scheme, the compression circuit compressing the video information received by the first radio communication circuit using the first compression scheme;

a display capable of displaying the information received by the first radio communication circuit or the second radio communication circuit; and

a controller controlling assignment of connection of each of the first, second, and third radio communication circuits,

wherein the controller controls assignment of connection for each of the first and second radio communication circuits in response to receiving an indication from a user such that when an indication from the user indicates to use the first radio communication circuit, the controller assigns a connection to the first radio communication circuit for receiving the video information or transmitting the information by radio,[; and]

wherein the controller controls each of the first and second radio communication circuits [,] so that the first radio communication circuit receives video information and the second radio communication circuit connects to the internet or the home network simultaneously, and

wherein the second or third radio communication circuits receive a signal from the internet indicating that an update for an operating system of the display apparatus is available, and the

display apparatus executes an update process such that an updated operating system of the display apparatus is stored in the display apparatus after execution of the update process.

6. (Original) The display apparatus according to claim 5, wherein, upon receiving an indication to receive the video information from an external device via the first radio communication circuit, the controller assigns connection of the first radio communication circuit prior to connection of the second radio communication circuit.

7. (Original) The display apparatus according to claim 5, wherein, upon receiving an indication to receive the video information via the first radio communication circuit while acquiring information from the internet via the second radio communication circuit, the controller assigns connection of the first radio communication circuit prior to connection of the second radio communication circuit.

8. (Original) The display apparatus according to claim 5, further comprising a radio interface capable of receiving video information by radio,

wherein the display device is further capable of displaying the video information received via the radio interface.

9. (Currently Amended) A method for video processing, comprising:

receiving video information and still picture information via an optical system by an imaging circuit of a video processing apparatus;

compressing the still picture information using a first type of compression method and the video information using a second type of compression method;

accumulating video information received by the imaging circuit after the video information is compressed by the compression circuit;

implementing a first transmission scheme having a first modulation scheme and a first transmission frequency band;

transmitting, using the first transmission frequency band, the video information to an external device by radio, via a first radio communication circuit; [and]

implementing a second transmission scheme having a second modulation scheme different from the first modulation scheme and a second transmission frequency band different from the first transmission frequency band;

connecting, by radio, to an internet or a home network to transmit and receive information using the second transmission frequency band, via a second radio communication circuit;

transmitting, via a third radio communication circuit, information using a third transmission frequency band;

controlling, via a controller, assignment of connection of each of the first, second, and third radio communication circuits, wherein assignment of connection for each of the first and second radio communication circuit is controlled in response to receiving an indication from a user such that when an indication from the user indicates to transmit video information using the first radio communication circuit, a connection is assigned to the first radio communication circuit for transmitting the video information,[; and]

wherein the transmitting and connecting is controlled so that the first radio communication circuit is configured to transmit video information and the second radio

communication circuit is configured to connect to the internet or the home network simultaneously;

receiving, via the second or third radio communication circuits a signal from the internet indicating that an update for an operating system is available;

executing the update process; and

storing an updated operating system after execution of the update process.

10. (Currently Amended) A method, comprising:

implementing a first transmission scheme having a first modulation scheme and a first transmission frequency band;

implementing a second transmission scheme having a second modulation scheme different from the first modulation scheme and a second transmission frequency band different from the first transmission frequency band;

receiving video information by radio using the first transmission frequency band, via a first radio communication circuit and connecting by radio to an internet or a home network to transmit and receive information using the second transmission frequency band, via a second radio communication circuit; [and]

compressing the video information received by the first radio communication circuit using a first compression scheme;

transmitting, via a third radio communication circuit, information using a third transmission frequency band;

displaying, via a display circuit, information received by the first radio communication circuit or the second radio communication circuit;

controlling, via a controller, assignment of connection of each of the first, second, and third radio communication circuits, wherein assignment of connection for each of the first and second radio communication circuit is controlled in response to receiving an indication from a user such that when an indication from the user indicates to use the first radio communication circuit, the controller assigns a connection to the first radio communication circuit for receiving the video information,[; and]

wherein the receiving and connecting is controlled so that the first radio communication circuit is configured to receive video information and the second radio communication circuit is configured to connect to the internet or the home network simultaneously;

receiving, via the second or third radio communication circuits, a signal from the internet indicating that an update for an operating system is available;

executing the update process; and

storing an updated operating system after execution of the update process.

11. (Newly Added) The video processing apparatus of claim 1, further comprising a fourth radio communication circuit capable of transmitting information and using a fourth transmission frequency band that is different from the first, second, and third transmission frequency bands, wherein the controller controls assignment of connection of each of the first, second, third, and fourth radio communication circuits.

12. (Newly Added) The video processing apparatus of claim 1, wherein the third transmission frequency band is different from the first and second transmission frequency bands.

13. (Newly Added) The video processing apparatus of claim 1, wherein transmitting of the information by the third radio communication circuit comprises transmitting video information to the external device.

14. (Newly Added) The video processing apparatus of claim 1, wherein transmitting of the information by the third radio communication circuit comprises connecting to the internet.

15. (Newly Added) The video processing apparatus of claim 1, wherein the input device is capable of receiving a user's selection of content to be displayed on the video processing apparatus.

16. (Newly Added) The video processing apparatus of claim 1, wherein the second or third radio communication circuits receive a signal from the internet indicating that an update for an application of the video processing apparatus is available, and the video processing apparatus executes an application update process such that an updated application of the video processing apparatus is stored in the video processing apparatus after execution of the application update process.

17. (Newly Added) The video processing apparatus of claim 1, further comprising:

a display for displaying a screen requesting user input, wherein the displayed screen prompts the user for a user input that indicates whether the user allows a connection between the first radio communication circuit and the external device to be established, wherein in response to

receiving the user input indicating allowance of the connection, the first radio communication circuit transmits the accumulated video information to the external device.

18. (Newly Added) The video processing apparatus of claim 1, wherein the second modulation scheme comprises quadrature amplitude modulation (QAM).

19. (Newly Added) The video processing apparatus of claim 1, wherein the second radio communication circuit is controllable to change from the second modulation scheme to a different modulation scheme.

20. (Newly Added) The video processing apparatus of claim 1, wherein the video processing apparatus comprises a cellular phone.

21. (Newly Added) The video processing apparatus of claim 1, wherein the second and third radio communication circuits conduct demodulation through Orthogonal Frequency Division Multiplexing (OFDM).

22. (Newly Added) The video processing apparatus of claim 1, wherein at least the first radio communication circuit and the third radio communication circuit are implemented as a combined circuit.

23. (Newly Added) A cellular phone, comprising:

a first radio communication circuit implementing a first transmission scheme having a first modulation scheme and first transmission frequency band, the first radio communication circuit capable of transmitting video information by radio or receiving information by radio using the first transmission frequency band;

a second radio communication circuit implementing a second transmission scheme having a second modulation scheme different from the first modulation scheme and a second transmission frequency band different from the first transmission frequency band, the second radio communication circuit capable of connecting by radio to an internet or a home network to transmit and receive information using the second transmission frequency band;

a third radio communication circuit capable of transmitting information using a third transmission frequency band;

a fourth radio communication circuit capable of transmitting information using a fourth transmission frequency band;

an imaging circuit capable of receiving video information and still picture information via an optical system;

a compression circuit compressing the still picture information using a first type of compression method and the video information using a second type of compression method;

a microphone receiving audio information corresponding to the video information received via the imaging circuit;

an accumulation circuit capable of accumulating video information received by the imaging circuit and audio information received by the microphone, wherein the first radio communication circuit can transmit video information accumulated in the accumulation circuit to an external device by radio;

a display displaying the video information received by the first radio communication circuit and displaying information received by the second radio communication circuit via the internet or home network;

a controller controlling assignment of connection of each of the first, second, third, and fourth radio communication circuits,

wherein the controller controls assignment of connection for each of the first and second radio communication circuit in response to receiving an indication from a user such that when an indication from the user indicates to transmit video information using the first radio communication circuit, the controller assigns a connection to the first radio communication circuit for transmitting the video information,

wherein the controller controls each of the first and second radio communication circuit so that the first radio communication circuit transmits video information and the second radio communication circuit connects to the internet or the home network simultaneously, and

wherein the second or third radio communication circuits receive a signal from the internet indicating that an update for an operating system of the cellular phone is available, and the cellular phone executes an update process such that an updated operating system of the cellular phone is stored in the cellular phone after execution of the update process.

24. (Newly Added) The cellular phone of claim 23, wherein the second or third radio communication circuits receive a signal from the internet indicating that an update for an application of the cellular phone is available, and the cellular phone executes an application update

process such that an updated application of the cellular phone is stored in the cellular phone after execution of the application update process.

25. (Newly Added) The cellular phone of claim 23, wherein the first modulation scheme comprises shift keying modulation and the second modulation scheme comprises quadrature amplitude modulation (QAM).

REMARKS

Patent Owner hereby submits the above amendments and the following remarks in response to the non-final Office Action mailed July 14, 2021. Prior to this Response, patent claims 1-10 were subject to reexamination. Claims 1, 5, 9, and 10 have been amended. In addition, new claims 11-25 have been added. No new matter has been added, and no claims have been impermissibly broadened.

Summary of Examiner Interview

Patent Owner thanks Examiners My Trang Ton, Andrew J. Fischer, and Kenneth Whittington for the courtesies extended during the interview conducted on August 31, 2021. Further, Patent Owner thanks the Examiners for the Interview Summary mailed on September 2, 2021.

During the interview, Patent Owner's representatives, with the aid of technical expert Dr. Tim Williams, explained differences between the cited art and the limitations of claim 1, in particular the distinction of the limitation "the controller controls assignment of connection for each of the first and second radio communication circuit in response to receiving an indication from a user." Specifically, Patent Owner's representatives explained that Tee does not teach these features of claim 1, along the lines set forth in the Agenda for Examiner Interview emailed to the Examiner in advance (copy attached to Examiners' Interview Summary). The Examiners provided additional guidance on how, in their view, Tee discloses a "user indication" when, for example, a user terminates a connection or turns on the mobile terminal of Tee. Patent Owner's representatives explained that the user indication of Tee does not identify a particular transceiver for assignment of connection.

In view of the productive discussion during the interview, the claims have been amended to further distinguish the pending claims over Tee and other prior art of record.

Amendments to the Claims

Claims 1, 5, 9, and 10 have been amended. In addition, new claims 11-25 have been added. No new matter has been added, and no claims have been impermissibly broadened. Exemplary support for the claim amendments and new claims is provided below:

Claim Amendments/ New Claims	**Exemplary Support**
1, 5, 9, and 10 (transmission schemes and multiple radio communication circuits)	At least Figures 4, 8, 9, 10, and 11 and corresponding description at col. 8, line 62—col. 9, line 35 (Fig. 4); col. 13, line 31—col. 14, line 9 (Fig. 8), col. 12, line 51—col. 13, line 26 (Fig. 9); col. 9, lines 4-5 (Fig. 11) disclose multiple radio communication circuits (*e.g.*, 5001, 5002, 5003, 5004, 9010, 9011, 9012, 9013) implementing multiple transmission schemes (e.g., "scheme 1" and "scheme 2") with multiple modulation schemes (e.g., "carrier modulation scheme") and multiple transmission frequency bands (e.g., "Band A," Band B," "Band C", and Band D").
1, 5, 9, and 10 (compression circuit/ compressing)	At least Figures 1 and 2 and corresponding description at col. 9, lines 50-58 (Fig. 1) and col. 11, lines 5-23 (Fig. 2) disclose compression circuits (e.g., 111, 113, 281, and 282) that implement multiple compression schemes (e.g., MPEG, JPEG, AVC, H.264) for still pictures or videos (col. 3:47-59 discussing still pictures and videos).
1, 5, 9, and 10 (controlling assignment of connection)	At least Figures 4 and 8 and corresponding description at col. 8, line 62—col. 9, line 35 and col. 13, lines 31—col. 14, line 9 disclose controller (e.g., 132 and 2013) controlling assignment of connection between four radio communication circuits.
1, 5, 9, and 10 ("user indication . . . using first radio communication circuit")	At least Figures 4 and 8 and corresponding descriptions at col. 8, lines 35-58 ("user issues an indication to transmit video information by radio **via the modem 1002**"), col. 8, lines 4-26 ("user issues an indication to receive video information by radio **via the modem 2015**") disclose the user providing an indication to use a particular modem for transmitting or receiving video.
1, 5, 9, and 10 (update process)	At least col. 6, lines 31-57 ("information obtained from the network by use of radio modem circuit 1003 . . . If the information from the network is an update program of an application program or an Operating System (OS) . . .)) and col. 11, lines 30-51 disclose receiving a signal from the Internet about updating and updating the operating system.

Claim Amendments/ New Claims	Exemplary Support
1 and 15	At least col. 4, lines 55-61 ("input key") and col. 15, line 52-55 ("input device") and col. 19, line 14-21 ("input device") disclose examples of input devices being used to select video content.
11, 12	At least Figures 4, 8, 9, and 10 and corresponding description at col. 8, line 62—col. 9, line 35 (Fig. 4); col. 13, line 31—col. 14, line 9 (Fig. 8), col. 12, line 51—col. 13, line 26 (Fig. 9) disclose multiple radio communication circuits (*e.g.*, 5001, 5002, 5003, 5004, 9010, 9011, 9012, 9013) implementing multiple transmission schemes (e.g., "scheme 1" and "scheme 2") with multiple modulation schemes (e.g., "carrier modulation scheme") and multiple transmission frequency bands (e.g., "Band A," Band B," "Band C", and Band D").
13, 14	At least col. 9, lines 7-25 disclose using any of the four radio communication circuits to transmit video information and/or connect to the Internet ("modems 5001 and 5002 are employed to transmit video information and the modems 5003 and 5004 are utilized to communicate with the network such as the Internet" or "modems 5001 to 5003 are assigned to send video information and only the modem 5004 is assigned to communicate with the network such as the Internet")
16	At least col. 6, lines 31-57 ("information obtained from the network by use of radio modem circuit 1003 . . . If the information from the network is an update program of an application program . . .)) and col. 11, lines 30-51 disclose receiving a signal from the Internet about updating and updating an application program.
17	At least Figure 1 ref 160 and corresponding disclosure in col. 15, lines 42-61 disclose a display screen requesting user input for "allowance for the connection."
18	At least Figure 9 discloses the first radio communication circuit implementing QAM.
19	At least col. 8, lines 38-48 and col. 13, lines 7-16 and disclose changing transmission scheme of radio communication circuit (e.g., "the transmission scheme of the modem 1003 is changed from scheme 1 to scheme 2").
20	At least col. 3, lines 43-45 disclose a cellular phone.
21	At least col. 7, lines 46-52 disclose modems demodulating via OFDM.
22	At least col. 9, lines 7-13 disclose combining circuits (e.g., "modems 5001 to 5004 may be appropriately combined").
23	Claim 23 includes all of the limitations of claim 1 and also includes additional narrowing limitations of a microphone, a display, and a fourth circuit. Support for these additional limitations can be found in, for example, col. 3, lines 60-63 ("microphone"), col. 5, lines 5-15 ("display 160"), and col. col. 8, line 62—col. 9, line 35 (Fig. 4) ("fourth circuit").
24	At least col. 6, lines 31-57 ("information obtained from the network by use of radio modem circuit 1003 . . . If the information from the network is an update

Claim Amendments/ New Claims	Exemplary Support
	program of an application program . . .)) and col. 11, lines 30-51 disclose receiving a signal from the Internet about updating and updating an application program.
25	At least Figure 9 discloses a modulation scheme based on quadrature amplitude modulation (QAM) and an additional modulation scheme based on phase shift keying (PSK).

Response to the Office's Claim Interpretation

Pages 8-20 of the Office Action include a section entitled "Claim Interpretation," which includes numerous statements by the Examiner interpreting the claims under the broadest reasonable interpretation standard. Patent Owner does not specifically traverse or dispute any of the claim interpretation statements provided in the Office Action. Patent Owner's silence as to any particular statement about claim interpretation should not be construed as an acquiescence. Indeed, Patent Owner specifically reserves all rights to assert that the claimed "controller" should not be construed under Section 112, ¶ 6 under the *Phillips v. AWH* claim construction standard because a PHOSITA would recognize that the term "controller" denotes sufficient structure and has a well-known meaning. Williams Decl. at ¶¶ 54-60.

Dr. Williams's opinions construing the term "controller" in accordance with its plain and ordinary meaning are supported at least by the following technical dictionaries:

Dictionary and Term	Definition
"controller" IBM Dictionary of Computing (*See* Appendix B) (1994) at 145.	"A device that coordinates and controls the operation of one or more input/output devices, such as workstations, and synchronizes the operation of such devices with the operation of the system as a whole."

"controller" Microsoft Computer Dictionary, Fifth Edition (*See* Appendix B) (2002) at 128.	"A device that other devices rely on for access to a computer subsystem."
"controller" Chambers Dictionary of Science and Technology (*See* Appendix B) (2007) at 272.	"A device that controls a functional element within a computer system."
"controller" Comprehensive Dictionary of Electrical Engineering, Second Edition, (*See* Appendix B) 2005 at 148.	"A unit that directs the operation of a subsystem within a computer."
"controller" A Dictionary of Computing, Oxford University Press, Sixth Edition, (*See* Appendix B) (2008) at 111.	"A subsystem that governs the functions of attached devices but generally does not change the meaning of the data that may pass through it."

Williams Decl. at ¶¶ 58-59. Moreover, the Office Action cites to "The Authoritative Dictionary of IEEE Standards Terms" technical dictionary, further confirming that "controller" is a well-known structure with a plain and ordinary meaning. *See* Office Action at 20.

Under the *Phillips v. AWH* standard, prior court decisions have also consistently held that the term "controller" denotes sufficiently definite structure. *See e.g.*, *Sound View Innovations, LLC v. Facebook, Inc.*, 2017 WL 222177, at *5 (D. Del. May 19, 2017) ("'Controller' may be a class of structures, rather than one specific structure, and may be defined with functional terms, but that does not make it means-plus-function."); *see also Honeywell Int'l Inc. v. Universal Avionics Sys. Corp.*, 264 F. Supp. 2d 135 (D. Del. 2003) ("controller" is not an MPF term); *911EP v. Whelen Eng'g Co., Inc.*, 512 F. Supp. 2d 713, 727 (E.D. Tex. 2007) ("[t]he claim language does not merely describe a controller, but adds further structure by describing the operation of the controller. ... Accordingly, the description of the operation of a controller is sufficient to avoid section 112 P

6."); *see also SynQor, Inc. v. Artesyn Techs., Inc.*, 2010 WL 2991037, at *23 (E.D. Tex. Jul. 26, 2010), *aff'd,* 709 F.3d 1365 (Fed. Cir. 2013) (finding that "control circuitry determining …" is not an MPF term); *Maxell Ltd. v. Huawei Device USA Inc.*, 297 F. Supp. 3d 668, 748 (E.D. Tex. 2018) ("'controller' connotes structure [and] does not fall with[in] the means-plus-function analysis").

Thus, in view of the foregoing, Patent Owner reserves all rights to assert that the plain and ordinary meaning is the proper construction of "controller," and that the term denotes sufficient structure to fall outside of 35 U.S.C. § 112, ¶ 6.

Nevertheless, the distinctions noted herein between the prior art and the claims do not turn on claim interpretation. Patent Owner submits that the prior art of record does not render obvious claims 1-25 for the following reasons.

Response to Prior Art Rejections

The Office Action rejects claims 1 and 4-10 under 35 U.S.C. § 103 as unpatentable over Tee[1] in view of the knowledge of the PHOSITA. Office Action at 22. Patent Owner respectfully traverses this rejection.

Firstly, claims 1 and 4-10 (and new claims 11-25) are patentable over the cited references because independent claim 1 recites (as amended) the limitation of a "controller controls assignment of connection for each of the first and second radio communication circuits in response to receiving an indication from a user such that when an indication from the user indicates to use the first radio communication circuit, the controller assigns a connection to the first radio communication circuit for receiving the video information or transmitting the information by radio," and because similar recitations are included in independent claims 5, 9, and 23.

[1] U.S. Patent Application Publication No. 2006/0203758 A1.

More particularly, and as discussed during the interview, Tee alone or in view of the knowledge of a PHOSITA does not teach controlling assignment of connection for any communication circuit "in response to receiving an indication from a user." In Tee, there is no indication from a user that directs the controller to control assignment of connection for any of Tee's transceivers 202 or 203. And, Tee would not have been modified to have the controller control assignment of connection for transceivers 202 or 203 in response to receiving an indication from a user, in view of a PHOSITA's knowledge.

During the interview the Examiners suggested that under a broadest reasonable interpretation the turning on of Tee's mobile device or the input by the user to not relay video could constitute the claimed user indication. While Patent Owner disagrees with this assertion, the independent claims have been amended to explicitly recite that "when an indication from the **user indicates to use the first radio communication circuit**, the controller assigns a connection to the first radio communication circuit for receiving the video information or transmitting the information by radio." Thus, as it relates to the assignment of connection of at least the first radio communication circuit, the independent claims now explicitly recite that the user indication is not just an indication of turning on a device or terminating a connection but it includes an indication to use the first radio communication circuit. Moreover, responsive to the user indication, the controller affirmatively "assigns a connection to the first radio communication circuit for transmitting the video." These are features that are neither disclosed nor rendered obvious by Tee's disclosure.

Tee relates to "a wireless mobile terminal that relays video and other data to peripheral devices." (Tee, ¶ [0002].) Tee describes "human interface problems associated with handheld devices," namely that wireless mobile terminals have small display screens that make them

unattractive for some video and multimedia applications. (Tee, ¶ [0004].) Tee states that "there is a need for a mobile terminal that can overcome the limitations of a small display screen to provide improved viewing of video and multimedia applications." (Tee, ¶ [0005].) Accordingly, Tee presents a mobile terminal and method of operating the mobile terminal in which the mobile terminal transmits multimedia data (also referred to as video data) to an external/remote display device that has a better (*e.g.*, bigger) display, such as a television. (Tee, ¶¶ [0006]-[0008], [0015].) Tee describes various scenarios for relaying a video stream with respect to Tee's Fig. 2 (reproduced below), which depicts an example of the mobile terminal 110 having a WAN transceiver 201, WLAN transceiver 202, and PAN transceiver 203. (Tee, ¶¶ [0025], [0029]-[0032].)

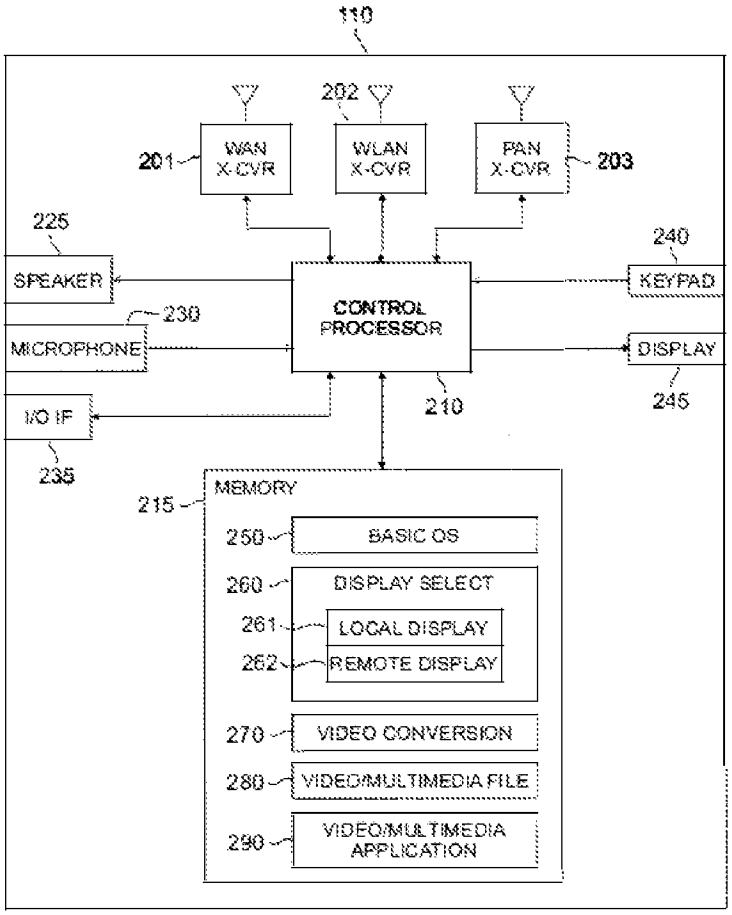


FIG. 2

Though the Office Action cites Tee's disclosure for the teaching of controlling assignment of connection "**in response to receiving an indication from a user**" (Office Action at 30-32), Patent Owner respectfully disagrees. Indeed, Tee fails to teach the control processor 210 controlling assignment of connection to transceivers 202 or 203 in response to receiving an indication from a user when the indication from the user indicates to use the first radio communication circuit. *See* Williams Decl. at ¶¶ 67-72. Tee's initiation of a video download (step 305 in Fig. 3) involves no indication from the user to use a particular one of the available transceivers, much less any control that assigns a connection on the basis of such a user indication.

Tee states that "[u]nder control of display select program 260, control processor 210 is capable of querying the remote device…to determine the quality of the display associated with the remote device, for example, by requesting the remote device to transmit parameters or attributes describing the capabilities of the remote device." (Tee, ¶ [0035].)

Importantly, Tee's user input relates to whether or not to relay a streaming video signal; and that input occurs after control processor 210 has already assigned a connection to the communication circuits. *Id.* For example, Tee discloses that control processor 210 assigns a connection to transceiver 202 or 203 **automatically** if control processor 210 selects the display of the external device as best suited to the video/multimedia application. *See* Williams Decl. at ¶¶ 70-71. For example, Tee states that:

> Under control of display select program 260, control processor 210 compares the parameters in remote display parameters file 262 to the parameters in local display parameters file 261 and selects the display best suited to video/multimedia application program 290. If the display of the external device is selected, control processor 210 transfers the video/multimedia data to the appropriate one of transceivers 202 and 203. Control processor 210 may prompt the operator of mobile terminal 110 for permission to transmit video/multimedia data to the remote display device.

(Tee, ¶ [0036].) This operator input relates only to asking the operator for permission to transmit the video to the external/remote display and occurs after the controller has already assigned a

connection to one of transceivers 202 and 203. (Tee, Fig. 3 and ¶ [0036].) Tee's disclosure at paragraph [0034] that "control processor 210 may execute display select program 260 in response to manual inputs entered by the operator of mobile terminal 110" has nothing to do with a user indicating a particular radio communication circuit to be used, but rather simply provides a mechanism for prompting execution of the display select program 260 (illustrated in Fig. 2)—which merely presents the user with the choice of whether or not to stream video to the (already identified) external/remote display.

The Office Action cites to Tee, ¶ [0037] for the claimed "in response to receiving an indication from a user." Office Action at 31. But, as explained, Tee's (only) flow diagram for the operation of the mobile terminal in Fig. 3 (reproduced below) does not include a step of the controller controlling assignment of connection **to assign a connection to the first radio communication circuit for transmitting video** in response to receiving an indication from a user that indicates use of a first radio communication circuit. (Tee, ¶ [0037].)

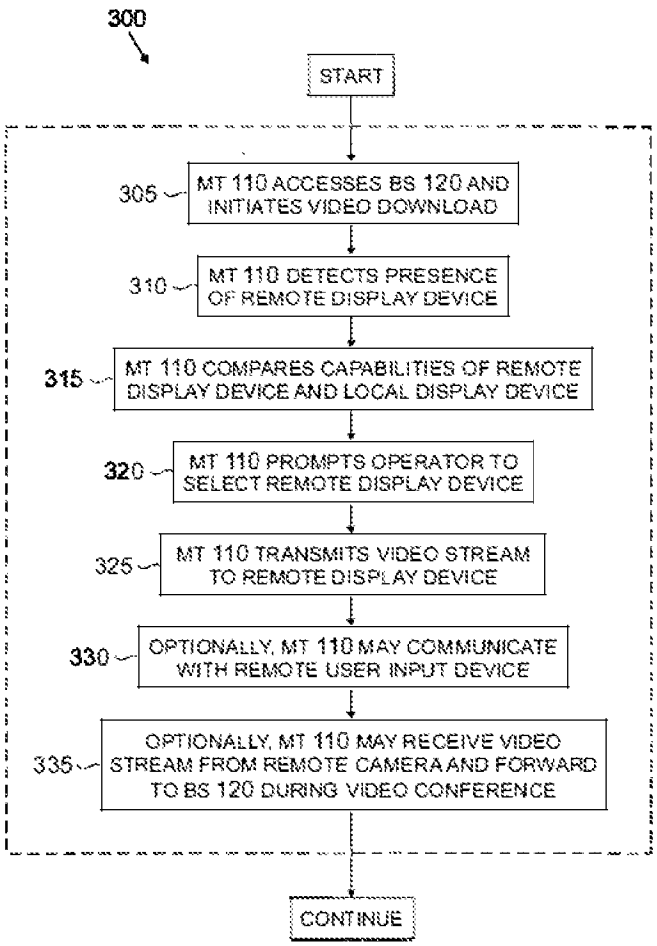


FIG. 3

Tee describes that the mobile terminal 110 accesses base station 120 and initiates video download from the server 150 via the WAN transceiver 201 or WLAN transceiver 202 and detects the presence of an external device through transceiver 202 or 203:

> Initially, mobile terminal 110 accesses base station 120 via an air interface (*e.g.*, transceiver 201 or 202) and initiates a video/multimedia download from server 150 (process step 305). Alternatively, mobile terminal 110 may play back video/multimedia data stored in video/multimedia file 280. At some point, mobile terminal 110 **detects the presence of a remote display device** (*e.g.*, television 131) via another air interface (***e.g.*, transceiver 202 or 203**) and establishes a wireless link with the remote display device (process step 310), with the authorization of the mobile terminal user.

(Tee, ¶ [0037].) In ¶ [0037], there is disclosure of establishing a wireless link with remote display device (step 310) "with the authorization of the mobile terminal user" but this authorization occurs

after the controller of Tee has already assigned a connection to "another air interface (e.g., transceiver 202 or 203)" to be able to detect "the presence of a remote display device (e.g., television 121)." *See* Williams Decl. at ¶¶ 68-71.

The flow of Tee is:

- Controller assigns connection to air interface (202 or 203) to detect presence of remote display device (Tee; Fig. 3; step 310)
- Mobile Terminal compares capabilities of detected remote display with local display by using the connection formed by the air interface (Tee; Fig. 3; step 315)
- If capabilities of detected remote display are good, mobile terminal prompts operator to select remote display device (Tee; Fig. 3; step 320)

See Williams Decl. at ¶¶ 68-71.

The response to the prompt of step 320 cannot constitute the claimed "user indication," since by the time of this step the controller has already assigned the connection to air interface (202 or 203). Such pre-assignment is required to detect the remote display device and receive its capabilities as a precondition for moving to step 320. The user response to the prompt in Tee is for electing the pre-identified/qualified remote display for relaying video, in lieu of use of the local display, not for providing a user indication in response to which "the controller controls assignment of connection." There simply is no disclosure in Tee of a user indication such that "the user indicates to use the first radio communication circuit" for transmission, nor of control that assigns a connection for transmitting video in accordance with the user indication. In fact, Tee is completely silent about the user indicating whether to use transceiver 201, 202, or 203. *See* Williams Decl. at ¶ 71.

The Office Action relies on Tee alone for the limitation "in response to receiving an indication from a user." Office Action at 31. But a PHOSITA also would not have found it obvious to modify Tee to have the controller control assignment of the transceivers 202 and/or 203 in

response to an indication from a user. Williams Decl. at ¶¶ 73-74. This would not have been obvious at least because, as explained, the controller in Tee assigns the connections to a selected one of the available transceivers automatically, without any user input going to selection of one transceiver over another for relaying video to an external display. Tee is directed to a specific solution of comparing parameters of a remote display, selecting a display best suited for the video, and transmitting the video to the external device when the suitable display is selected. (Tee, ¶ [0036].) This solution is implemented by Tee because, according to Tee, "there is a need for a mobile terminal that can overcome the limitations of a small display screen to provide improved viewing of video and multimedia application." (Tee, ¶ [0005].) Tee reinforces this solution multiple times:

- "The controller is capable of comparing display parameter information associated with the external display device to display parameter information associated with the local display and, in response to the comparison, transmitting the multimedia data to the external display device via the first transceiver." (Tee, ¶ [0006].)
- "The method comprises transmitting multimedia data to a local display of the remote terminal, detecting the presence of a remote display device, establishing a wireless communication link with the remote display device, comparing display parameter information associated with the remote display device to display parameter information associated with the local display, and, in response to the comparison, transmitting the multimedia data to the remote display device." (Tee, ¶ [0007].)
- "[T[he usefulness of small mobile terminals may be limited nonetheless by the human interface problems associated with handheld devices. The small display screens of wireless mobile terminals diminish the capabilities of some applications, particularly video applications." (Tee, ¶ [0004].)

In view of these teachings of Tee, it would not have been obvious to a PHOSITA to modify the design of Tee to include a manual step of **assigning connections to the transceivers 202 or 203 in response to an indication by a user**.[2] Specifically, this would require the user to spend

[2] As previously noted, Tee's disclosure at paragraph [0034] that "control processor 210 may execute display select program 260 in response to manual inputs entered by the operator of mobile terminal 110" has nothing to do with a user indicating a particular radio communication circuit to be used, but rather simply provides a mechanism for prompting execution of the display select

additional time on the "small display screen" of the wireless mobile terminal and would provide additional "human interface problems" associated with such small displays. The motivation of Tee's solution is to send the user to a suitably selected display, not to make the user spend more time on the small display of the mobile terminal. Williams Decl. at ¶ 74.

In fact, the user's experience of watching a video would be disturbed because requiring a user indication to assign a connection to a particular transceiver would mean that the user would be interrupted while watching the video because prior to the controller assigning a connection to the transceiver for the purposes of identifying a suitable external display, the device would seek an indication from the user asking if the connection can be assigned such that a suitable external display can be searched for and identified. Thus, the user would have to provide indications while watching a video just for the purpose of the transceivers being able to search for other suitable displays. Williams Decl. at ¶ 74.

Aside from impermissible hindsight in view of the '590 Patent disclosure, there is no reason why a PHOSITA would replace Tee's solution of automatically assigning the connections with a system that assigns the connections in response to a user indication. Williams Decl. at ¶ 75.

For at least the foregoing reasons, independent claim 1 is distinguishable from Tee in view of the knowledge of a PHOSITA and should be confirmed as patentable. Accordingly, claim 4, which depends from independent claim 1, should also be confirmed as patentable.

Each of the other independent claims recites features similar to those discussed above for independent claim 1. Thus, for essentially the same reasons as those discussed above for independent claim 1, independent claims 5, 9, 10, and 23 are patentable over Tee alone or in view

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program 260 (illustrated in Fig. 2)—which merely presents the user with the choice of whether or not to stream video to the (already identified) external/remote display.

of the knowledge of a PHOSITA and should be confirmed/found patentable. Accordingly, claims 6-8, which depend from independent claim 5, should also be confirmed as patentable.

The Office Action further rejects claims 2 and 3 under 35 U.S.C. § 103 as unpatentable over Tee in view Honkanen.[3] Office Action at 59. Patent Owner respectfully traverses this rejection.

Dependent claims 2 and 3 each recite, *inter alia*, "the controller assigns connection of the first radio communication circuit ***prior to*** connection of the second radio communication circuit." The Office Action's reliance on Honkanen does not cure (and is not alleged to cure) the deficiencies of Tee discussed above with respect to independent claim 1. Thus, at least because claims 2 and 3 depend from independent claim 1, dependent claims 2 and 3 are also patentable.

Additional Reasons For Patentability

In addition to the foregoing, claims 1-25 are also patentable over the prior art of record for the following additional and distinct reasons:

- The independent claims require the implementation of two transmission schemes with two modulation schemes and three radio communication circuits with use of three transmission frequency bands. The prior art of record is silent as to the implementation of the claimed transmission schemes with different modulation schemes and transmission frequency bands while associated with first, second, and third radio communication circuits.

- The independent claims require an imaging circuit capable of receiving video information and still picture information via an optical system and a compression circuit compressing the still picture information using a first type of compression method and the video information using a second type of compression method. No

[3] U.S. Patent Application Publication No. 2006/0135076 A1.

such compression circuit, compression methods, or receiving of both video and still picture are disclosed in the prior art of record.

- The independent claims require one of the second or third radio communication circuits receive a signal from the Internet indicating that an update for an operating system of the cellular phone is available, and the cellular phone executes an update process such that an updated operating system of the cellular phone is stored in the cellular phone after execution of the update process. No such update signal, execution of an update process, and storing an updated operating system is disclosed in the prior art of record.

- With respect to dependent claim 11, there is no disclosure in the prior art of record of a fourth radio communication circuit using a fourth transmission frequency band that is different from the first, second, and third transmission frequency bands, wherein the controller controls assignment of connection of each of the first, second, third, and fourth radio communication circuits.

- With respect to dependent claims 13 and 14, there is no disclosure in configuring three radio communication circuits in the manner as claimed such that the third radio communication circuit transmits video information to the external device (claim 13) and connects to the internet (claim 14) while the first and second radio communication circuits are also configured as claimed.

- With respect to dependent claim 16, there is no disclosure in the prior art of record of executing any update process, let alone one of the second or third radio communication circuits receiving a signal from the internet indicating that an update for an application of the video processing apparatus is available, executing an application update process, and storing the updated application.

- With respect to dependent claim 17, there is no disclosure in the prior art of record of a display for displaying a screen requesting user input, wherein the displayed screen prompts the user for a user input that indicates whether the user allows a connection between the first radio communication circuit and the external device

to be established, wherein in response to receiving the user input indicating allowance of the connection, the first radio communication circuit transmits the accumulated video information to the external device. In contrast, in Tee the user prompt (Fig. 3: step 320) occurs after the connection is already established to perform steps 310 and 316.

- With respect to dependent claim 18, there is no disclosure in the prior art of record of the second modulation scheme implemented by the second radio communication circuit comprising quadrature amplitude modulation (QAM).

- With respect to dependent claim 19, there is no disclosure in the prior art of record of any radio circuits being capable of changing from a second modulation scheme to a different modulation scheme. None of the transceivers of Tee are disclosed to change modulation scheme.

- With respect to dependent claim 21, there is no disclosure in the prior art of record of the second and third radio communication circuits conducting demodulation through Orthogonal Frequency Division Multiplexing (OFDM). While Tee discloses a second wireless interface to support MB-OFDM, Tee never discloses that two radio circuits support OFDM, nor does Tee disclose conducting demodulation through OFDM as recited by claim 21.

- With respect to dependent claim 22, there is no disclosure in the prior art of record of implementing first radio communication circuit and the third radio communication circuit are implemented as a combined circuit. Transceivers 201, 202, and 203 of Tee are shown to be implemented separately. *See* Tee at Fig. 3.

- With respect to new independent claim 23, in addition to the above-referenced reasons with respect to claim 1, there is no disclosure in the prior art of record of four radio communication circuits with different transmission schemes and/or transmission frequency bands as claimed. Further, there is no disclosure of a microphone receiving audio information corresponding to the video information received via the imaging circuit. Tee discloses a microphone 230 for receiving a

voice signal but does not disclose the microphone receiving audio information corresponding to the video information received via the imaging circuit.

- With respect to dependent claim 24, there is no disclosure in the prior art of record of executing any update process, let alone, one of the second or third radio communication circuits receiving a signal from the internet indicating that an update for an application of the video processing apparatus is available, executing an application update process, and storing the updated application.

- With respect to dependent claim 25, there is no disclosure in the prior art of record of the first modulation scheme implemented by the first radio communication circuit comprising shift keying modulation and the second modulation scheme implemented by the second radio communication circuit comprising quadrature amplitude modulation (QAM).

Accordingly, for these additional reasons, allowance of all of claims 1-25 is respectfully requested.

CONCLUSION

Accordingly, the challenged claims of the '590 Patent are novel and nonobvious over the art of record. Patent Owner thus respectfully requests that the Office promptly issue a Notice of Intent to Issue Reexamination Certificate confirming the patentability of all challenged claims of the '590 Patent and finding patentable new claims 11-25.

If there are any questions, the Examiner is invited to contact the undersigned at (202) 824-3158.

Dated: September 14, 2021

Respectfully submitted,

By: /Scott M Kelly/
Scott M. Kelly
Registration No. 65,121

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
90/014,651	01/12/2021	10129590	2638-19.08	7485

177632 7590 09/02/2021

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SUITE 1200
WASHINGTON, DC 20005-4051

EXAMINER
TON, MY TRANG

ART UNIT	PAPER NUMBER
3992	

MAIL DATE	DELIVERY MODE
09/02/2021	PAPER

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.

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EX PARTE REEXAMINATION COMMUNICATION TRANSMITTAL FORM

REEXAMINATION CONTROL NO. *90/014,651* .

PATENT UNDER REEXAMINATION *10129590* .

ART UNIT *3992* .

Enclosed is a copy of the latest communication from the United States Patent and Trademark Office in the above identified *ex parte* reexamination proceeding (37 CFR 1.550(f)).

Where this copy is supplied after the reply by requester, 37 CFR 1.535, or the time for filing a reply has passed, no submission on behalf of the *ex parte* reexamination requester will be acknowledged or considered (37 CFR 1.550(g)).

INTERVIEW SUMMARY CONTINUATION SHEET

PO representative, Mr. McKee, requested the interview to discuss the outstanding non-final Office action mailed 7/14/2021. Mr. McKee and his team provided an agenda of topic they wanted to discuss, a copy of which is attached hereto. The parties discussed at length each of the agenda items provided in the agenda. Mr. McKee explains the different feature between Tee (US 2006/0203758) and the '590 Patent: "*the controller controls assignment of connection for each of the first and second radio communication circuit in response to receiving an indication from a user*". This question was discussed but no agreement was reached.

Reminded Mr. McKee to file a timely and appropriate written statement of an interview required under § 1.560(b).

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to MY TRANG TON whose telephone number is (571) 272-1754. The Examiner can normally be reached on 7:00 AM – 5:30 PM Monday - Thursday.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Andrew Fischer, SPE Art Unit 3992, can be reached at (571) 272-6779. 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). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/MY TRANG TON/
Primary Examiner, Art Unit 3992

Conferees:

/KENNETH WHITTINGTON/
Primary Examiner, Art Unit 3992

Ex Parte Reexamination Interview Summary	Control No. 90/014,651	Patent Under Reexamination 10129590	
	Examiner MY TRANG TON	Art Unit 3992	AIA (FITF) Status No

All participants (USPTO personnel, patent owner, patent owner's representative):

(1) MY TRANG TON	(3) CHRISTOPHER L MCKEE, SAQIB J. SIDDIQUI
(2) ANDREW FISCHER, KENNETH WHITTINGTON	(4) ALISON T GELSLEICHTER, DR. TIM A. WILLIAMS

Date of Interview: 31 August 2021

Type: a) ☑ Telephonic b) ☐ Video Conference
c) ☐ Personal (copy given to: 1) ☐ patent owner 2) ☐ patent owners representative)

Exhibit shown or demonstration conducted: d) ☐ Yes e) ☑ No.
If Yes, brief description: _____

Agreement with respect to the claims f) ☐ was reached. g) ☑ was not reached. h) ☐ N/A.
Any other agreement(s) are set forth below under "Description of the general nature of what was agreed to..."

Claim(s) discussed: 1 .

Identification of prior art discussed: Tee US 2006/0203758 .

Description of the general nature of what was agreed to if an agreement was reached, or any other comments:
See the attached paper .

(A fuller description, if necessary, and a copy of the amendments which the examiner agreed would render the claims patentable, if available, must be attached. Also, where no copy of the amendments that would render the claims patentable is available, a summary thereof must be attached.)

A FORMAL WRITTEN RESPONSE TO THE LAST OFFICE ACTION MUST INCLUDE PATENT OWNER'S STATEMENT OF THE SUBSTANCE OF THE INTERVIEW. (See MPEP § 2281). IF A RESPONSE TO THE LAST OFFICE ACTION HAS ALREADY BEEN FILED, THEN PATENT OWNER IS GIVEN **ONE MONTH** FROM THIS INTERVIEW DATE TO PROVIDE THE MANDATORY STATEMENT OF THE SUBSTANCE OF THE INTERVIEW
(37 CFR 1.560(b)). THE REQUIREMENT FOR PATENT OWNERS STATEMENT CAN NOT BE WAIVED.
EXTENSIONS OF TIME ARE GOVERNED BY 37 CFR 1.550(c).

/MY TRANG TON/ Primary Examiner, Art Unit 3992	/KENNETH WHITTINGTON/ Primary Examiner, Art Unit 3992	

cc: Requester (if third party requester)

-- NOT FOR ENTRY --

In re Reexamination of:

Toshiyuki Kurita et al.

Reexamination Control No. 90/014,651

Patent Under Reexamination: U.S. Pat. No. 10,129,590 Confirmation No.: 7485

Issue Date: Nov. 13, 2018 Art Unit: 3992

Title: Display Apparatus and Video Processing Apparatus Examiner: Ton, My Trang

AGENDA FOR EXAMINER INTERVIEW

Dear Examiner Ton:

Below is an agenda for our interview in this case, scheduled for Tuesday, August 31, 2021 at 1:00 PM ET (by phone using the call-in information that you provided).

Participants: Examiners My Trang Ton (lead), Andrew J. Fischer (conferee), Kenneth Whittington (conferee), Christopher L. McKee (Banner & Witcoff, Reg. No. 32,384), Saqib J. Siddiqui (Mayer Brown LLP, Reg. No. 68,626), Alison T. Gelsleichter (Mayer Brown LLP, Reg. No. 63,225), and Dr. Tim A. Williams.

1. Seek clarification from the Examiner on what is considered to constitute the claimed "indication from a user" in Tee, as recited in claim 1 in the limitation "the controller controls assignment of connection for each of the first and second radio communication circuit in response to receiving an indication from a user."

   Pages 31-32 of the Office Action identify paragraphs [0026], [0027], and [0037] of Tee as disclosing this limitation of claim 1. Patent Owner is, however, unclear as to what is considered to constitute "receiving an indication from a user" in Tee such that in response to this indication the "controller **controls assignment of connection** for **each of** the first **and** second radio communication circuit."

Patent Owner agrees that in paragraph [0037] of Tee there is disclosure of establishing a wireless link with remote display device (step 310) "with the authorization of the mobile terminal user" but this authorization occurs **after** the controller of Tee has already assigned a connection to "another air interface (e.g., transceiver 202 or 203)" to be able to detect "the presence of a remote display device (e.g., television 121)."

The flow of Tee is:

- Controller assigns connection to air interface (202 or 203) to detect presence of remote display device (Tee; Fig. 3; step 310)
- Mobile Terminal compares capabilities of detected remote display with local display by using the connection formed by the air interface (Tee; Fig. 3; step 315)
- If capabilities of detected remote display are good, mobile terminal prompts operator to select the identified remote display device (Tee; Fig. 3; step 320)

If the response to the prompt of step 320 constitutes the claimed "user indication" by this step the controller has already assigned the connection to air interface (202 or 203) because that was a **necessary** step required to detect the remote display device and receive its capabilities to move to step 320. The user response to the prompt in Tee is for electing to use the remote display previously identified/selected without user input, not for providing an indication of a user in response to which "the controller controls assignment of connection for each of the first and second radio communication circuit."

In contrast, the flow of claim 1 is this:

- Controller receives indication from a user
- In **response to this indication**, the controller "controls assignment of connection for each of the first and second radio communication circuit"

Thus, the system of Tee automatically assigns a connection to one of the air interfaces to detect the presence of a remote display device and to compare its capabilities. In contrast, claim 1 requires the assignment of connection to be in response to an indication by the user.

There is a user indication received from a user in claim 1 to accept user's preferences **prior** to assigning a connection. No such manual intervention is relied upon by Tee.

2. Patent Owner would also like clarification on what is believed to constitute the claimed "indication from a user" in Tee in response to which the controller controls assignment of connection for **each** of the first **and** second radio communication circuit."

   If authorization to connect to a remote display is considered the "user indication" that authorization does not "control[] assignment of connection for each of the first and second radio communication circuit." At most only one previously assigned transceiver is involved in the process of a user confirming use of the identified remote display device over the local display.

3. Discuss any Examiner suggestions for advancing the reexamination.

REPRESENTATIVE CLAIM FOR DISCUSSION

1. (Original) A video processing apparatus, comprising:

a first radio communication circuit capable of transmitting video information by radio or receiving information by radio;

a second radio communication circuit capable of connecting by radio to an internet or a home network to transmit and receive information;

an imaging circuit capable of receiving video information via an optical system;

an accumulation circuit capable of accumulating video information received by the imaging circuit; and

a controller,

wherein the first radio communication circuit can transmit video information accumulated in the accumulation circuit to an external device by radio,

the controller controls assignment of connection for each of the first and second radio communication circuit in response to receiving an indication from a user; and

wherein the controller controls each of the first and second radio communication circuit, so that the first radio communication circuit transmits video information and the second radio communication circuit connects to the internet or the home network simultaneously.

CERTIFICATE OF SERVICE

The undersigned hereby certifies that a true and accurate copy of the foregoing AUTHORIZATION FOR INTERNET COMMUNICATIONS IN A PATENT APPLICATION, is being served in its entirety via First Class Mail, postage prepaid, on the following counsel of record:

Robin A. Snader
ERISE IP, P.A.
7015 College Boulevard, Suite 700
Overland Park, Kansas 66211

on this 27th day of August, 2021.

/Rachel Lichter/
Rachel Lichter

Doc Code: ECOMM.AUTH/ECOMM.WTDW
Doc Description: Internet Communications Authorized/Internet Communications Authorization Withdrawn

PTO/SB/439 (11-15)

AUTHORIZATION FOR INTERNET COMMUNICATIONS IN A PATENT APPLICATION OR REQUEST TO WITHDRAW AUTHORIZATION FOR INTERNET COMMUNICATIONS		
	Application No.	90/014,651
	Filing Date	January 12, 2021
	First Named Inventor	
	Art Unit	3992
	Examiner Name	M. T. Ton
	Practitioner Docket No.	009379.00009\US

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

I. To authorize permission for Internet Communications.

[X] Recognizing that Internet communications are not secure, I hereby authorize the USPTO to communicate with the undersigned and practitioners in accordance with 37 CFR 1.33 and 37 CFR 1.34 concerning any subject matter of this application via video conferencing, instant messaging, or electronic mail. I understand that a copy of these communications will be made of record in the application file. (MPEP 502.03)

II. To withdraw authorization for Internet Communications.

[ ] The authorization given on _____, to the USPTO to communicate with the undersigned and any practitioner in accordance with 37 CFR 1.33 and 37 CFR 1.34 concerning any subject matter of this application via Internet communications such as video conferencing, instant messaging, or electronic mail is hereby withdrawn. I understand that the withdrawal is effective when approved rather than when received.

I am the

[ ] applicant.

[X] attorney or agent of record. Registration number 65,121.

[ ] attorney or agent acting under 37 CFR 1.34. Registration number _____.

/Scott M Kelly/ — Signature

August 27, 2021 — Date

Scott M. Kelly — Typed or printed name

(202) 824-3000 — Telephone Number

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. Juristic entities must be represented by a patent practitioner (see 37 CFR 1.31, which is applicable to any paper filed on or after September 16, 2012, that is presented on behalf of a juristic entity, regardless of application filing date). Submit multiple forms if more than one signature is required, see below*.

[X] * Total of 1 forms are submitted.

Electronic Acknowledgement Receipt

EFS ID:	43619420
Application Number:	90014651
International Application Number:	
Confirmation Number:	7485
Title of Invention:	DISPLAY APPARATUS AND VIDEO PROCESSING APPARATUS
First Named Inventor/Applicant Name:	10129590
Customer Number:	177632
Filer:	Scott M Kelly/Rachel Lichter
Filer Authorized By:	Scott M Kelly
Attorney Docket Number:	2638-19.08
Receipt Date:	27-AUG-2021
Filing Date:	12-JAN-2021
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Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Reexam Certificate of Service	Certificate_of_Service_August_27_2021_21430644.pdf	11593 607052**6870b65cdb4ff5e95b5fce7f7**6fa63c**12e**	no	1

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2	Reexam Miscellaneous Incoming Letter	Internet_Communications_Authorization_-_009379_21430669.pdf	49396 8154590eedc92223ff78d03d51b68027623 5b92d	no	1
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
90/014,651	01/12/2021	10129590	2638-19.08	7485

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EXAMINER	
TON, MY TRANG	

ART UNIT	PAPER NUMBER
3992	

MAIL DATE	DELIVERY MODE
07/14/2021	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

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EX PARTE REEXAMINATION COMMUNICATION TRANSMITTAL FORM

REEXAMINATION CONTROL NO. *90/014,651* .

PATENT UNDER REEXAMINATION *10129590* .

ART UNIT *3992* .

Enclosed is a copy of the latest communication from the United States Patent and Trademark Office in the above identified *ex parte* reexamination proceeding (37 CFR 1.550(f)).

Where this copy is supplied after the reply by requester, 37 CFR 1.535, or the time for filing a reply has passed, no submission on behalf of the *ex parte* reexamination requester will be acknowledged or considered (37 CFR 1.550(g)).

Office Action in Ex Parte Reexamination	**Control No.** 90/014,651	**Patent Under Reexamination** 10129590	
	Examiner MY TRANG TON	**Art Unit** 3992	**AIA (FITF) Status** No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

a. ☑ Responsive to the communication(s) filed on 12 January 2021.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

b. ☐ This action is made FINAL.

c. ☑ A statement under 37 CFR 1.530 has not been received from the patent owner.

A shortened statutory period for response to this action is set to expire 2 month(s) from the mailing date of this letter. Failure to respond within the period for response will result in termination of the proceeding and issuance of an *ex parte* reexamination certificate in accordance with this action. 37 CFR 1.550(d). **EXTENSIONS OF TIME ARE GOVERNED BY 37 CFR 1.550(c).** If the period for response specified above is less than thirty (30) days, a response within the statutory minimum of thirty (30) days will be considered timely.

Part I THE FOLLOWING ATTACHMENT(S) ARE PART OF THIS ACTION:

1. ☐ Notice of References Cited by Examiner, PTO-892.
2. ☑ Information Disclosure Statement, PTO/SB/08.
3. ☐ Interview Summary, PTO-474.
4. ☐ _____.

Part II SUMMARY OF ACTION

1a. ☑ Claims 1-10 are subject to reexamination.
1b. ☐ Claims _____ are not subject to reexamination.
2. ☐ Claims _____ have been canceled in the present reexamination proceeding.
3. ☐ Claims _____ are patentable and/or confirmed.
4. ☑ Claims 1-10 are rejected.
5. ☐ Claims _____ are objected to.
6. ☐ The drawings, filed on _____ are acceptable.
7. ☐ The proposed drawing correction, filed on _____ has been (7a) ☐ approved (7b) ☐ disapproved.
8. ☑ Acknowledgment is made of the priority claim under 35 U.S.C. 119(a)-(d) or (f).
   a) ☑ All b) ☐ Some* c) ☐ None of the certified copies have
   1 ☐ been received.
   2 ☐ not been received.
   3 ☑ been filed in Application No. 15/208886.
   4 ☐ been filed in reexamination Control No. _____.
   5 ☐ been received by the International Bureau in PCT application No. _____.
   * See the attached detailed Office action for a list of the certified copies not received.
9. ☐ Since the proceeding appears to be in condition for issuance of an *ex parte* reexamination certificate 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.
10. ☐ Other: _____

cc: Requester (if third party requester)

EX PARTE REEXAMINATION - NON-FINAL OFFICE ACTION

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I. ACKNOWLEDGEMENTS

This Office action is a first Office action on the merits for the reexamination proceeding control number 90/014,651 (hereinafter "**the '651 Proceeding**" or "**Instant EP Reexamination**). This is a reexamination of claims 1-10 of United States Patent No. 10,129,590, entitled "DISPLAY APPARATUS AND VIDEO PROCESSING APPARATUS" (hereinafter "**the '590 Patent**"). The request for reexamination filed January 12, 2021 (hereinafter "**the Request**") which were accepted in the *Ex Parte* Order mailed February 10, 2021 (hereinafter "**the Order**").

II. PRIORITY

After careful review of the prosecution history of the '590 Patent, Examiner finds that the '590 Patent was filed on July 13, 2016 as the 15/208,886 Application (hereinafter "**the '886 Application**), and a continuation of application No. 12/260,410, filed on October 29, 2008, now Patent No. 9,420,212, which claims priority to Japanese Patent Application No. 2007-306750, filed on November 28, 2007.

III. LITIGATION

After reviewing the Request, performing a litigation search and reviewing the file history of the '590 Patent, Examiner is aware of the following related pending proceedings or litigation:

Status	Docket	Description
OPEN	6:20cv848	Maxell, Ltd. V. Apple Inc.

IV. PROSECUTION HISTORY

Here is the '590 Patent's reexamination prosecution history listed in chronological order:

07/13/2016 Patent Owner filed the '886 Application. The '886 Application was filed with 8 claims (hereinafter "**prosecuted claims**"). Of the prosecuted claims, claims 1 and 5 were independent apparatus claims.

12/11/2017 The original Examiner issued a non-final Office action (hereinafter "**December 2017 NF**") that rejected prosecuted claims 5-6 and 8 as being anticipated by U.S. Pub. No. 2007/0091835 to Jo et al; rejected prosecuted claim 7 as being unpatentable over Jo et al; and rejected claims 1-4 as being unpatentable over Jo in view of U.S. Pub. No. 2007/0072642 to Kangas et al.

03/09/2018 Patent Owner filed an amendment (hereinafter "**March 2018 Amendment**") in response to the December 2017 NF. Therein, Patent Owner amended prosecuted claims 1-8 and added new method claims 9-10. Applicant argued the patentability of independent prosecuted claims 1 and 5 over the

cited prior arts (Jo et al and Kangas et al) on the basis of the amended into the claims. Specifically, Applicant argued that Jo et al failed to teach: "*Jo fails to teach or suggest each and every element of the display apparatus disclosed in independent claim 5 including, at least, "... wherein the controller controls each of the first and second radio communication circuits, so that the first radio communication circuit receives video information and the second radio communication circuit connects to the internet or the home network simultaneously,.." Applicant further argued that Jo et al in combination with Kangas et al failed to teach: "Independent claim 1 recites, inter alia, ... wherein the controller controls each of the first and second radio communication circuit, so that the first radio communication circuit transmits video information and the second radio communication circuit connects to the internet or the home network simultaneously..." No such configuration and/or technique is disclosed or suggested by Jo or Kangas, taken alone or in any combination.*

...

Kangas fails to cure the deficiencies of Jo. Kangas discloses a method for initiating communication in a mobile terminal capable of prodding at least a first mode of communication and a second mode of communication, the mobile terminal comprising

a communication initiation element. See, Abstract, The method as taught by Kangas involves the steps of detecting a user actuation of the communication initiation element, discriminating between at least a first and a second type of the user actuation, and generating a control signal for initiating communication using the first mode of communication or the second mode of communication, depending on whether the user actuation is of the first type or the second type. See, Id.

Kangas fails to teach or suggest the video processing apparatus of claim 1 which includes, at least, "wherein the controller controls each of the first and second radio communication circuit, so that the first radio communication circuit transmits video information and the second radio communication circuit connects to the internet or the home network simultaneously..." as recited in independent claim 1. Accordingly, Jo and Kangas, taken alone or in combination, do not disclose or suggest a video processing apparatus including, at least, "wherein the controller controls each of the first and second radio communication circuit, so that the first radio communication circuit transmits video information and the second radio communication circuit connects to the internet or the home network simultaneously..." as recited in claim 1, and thus claim 1 is allowable over Jo and Kangas for at least this reason."

07/13/2018 The original Examiner issued a Notice of Allowance. Claims 1-10 were allowed. The Notice of Allowance included the following indication of allowable subject matter: "*In the prior art, U.S. Pub. No. 2008/0139118 to Sanguinetti teaches a first and a second communication device, where one device using Bluetooth receives data simultaneously as the WLAN device connects to the internet, see paragraph 70. However, Sanguinetti does not teach that the one device transmits data simultaneously as the other device connects to the internet and rather suggests against it in paragraph 71. Further in the prior art, U. S. Pub. No. 2005/0034169 to Maeda et al. teaches an apparatus, a base station 2, with a first and a second communication device, where the first device transmits data to display devices 3 via antenna 202 while the second communication device connects to the internet 1, See Figure 11. However, Maeda is silent on whether the first and second communication devices performs these functions simultaneously and gives examples of alternating one communication device with the other in the case that one is not functioning. U. S. Pub. No. 2004/0193647 to Ueda et al. also teaches two communications devices simultaneously connecting generally, see paragraph 116. The prior art does not teach all of the claimed limitations of the currently presented invention.*"

11/13/2018 The '886 Application issued as the '590 Patent. The prosecuted claims of the '886 Application were numbered as claims 1-10 of the '590 Patent (hereinafter "Patent Claims").

01/12/2021 The Requester filed a request for ex parte reexamination of claims 1-10 of the '590 Patent, which was assigned as the '651 proceeding.

01/16/2021 The Office contacted the Patent Owner by telephone for requesting waiver of the Patent Owner's statement pursuant to the pilot program for waiver of Patent Owner's statement in ex parte reexamination proceedings. USPTO personnel were unable to reach the patent owner.

02/10/2021 The Request was granted and all requested claims were determined to be subject to reexamination.

The Examiner issues the instant Non-Final First Action on the Merit.

V. STATUS OF THE CLAIMS

Claims 1-10 are original. Of these, claims 1, 5, 9 and 10 are independent claims.

VI. CLAIM INTERPRETATION

During examination, claims are given the broadest reasonable interpretation consistent with the specification and limitations in the specification are not read into the claims. See MPEP § 2111 *et seq.*

A. Lexicographic Definitions

A first exception, albeit optional, to the broadest reasonable interpretation standard occurs when there is lexicographic definition in the specification. After careful review of the original specification, the prosecution history, and unless expressly noted otherwise by the Examiner below, the Examiner finds that she is unable to locate any lexicographic definitions (either express or implied) with reasonable clarity, deliberateness, and precision. Because the Examiner is unable to locate any lexicographic definitions with reasonable clarity, deliberateness, and precision, the Examiner concludes that Patent Owner is not their own lexicographer. See MPEP § 2111.01 IV A.

B. 35 U.S.C. § 112 6th Paragraph

The following is a quotation of pre-AIA § 112 ¶ 6:

> 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.

A second exception is when a claimed phrase is interpreted in accordance with 35 U.S.C. § 112 6th paragraph ("**§ 112 ¶ 6**"). See MPEP § 2181 *et seq.* To invoke § 112 ¶ 6, a claimed phrase must meet the three prong analysis ("**3 Prong Analysis**") as set forth in MPEP § 2181 (I). The following phrases will be first identified and then analyzed using the MPEP's 3 Prong Analysis to determine if the claimed phrases invoke § 112 ¶ 6. If a phrase invokes § 112 ¶ 6, the corresponding structure will also be determined.

1/ Functional Phrase #1 (FP#1):

The Examiner determines that FP#1 meets the three prong test and thus will be interpreted as a means-plus-function limitation § 112 ¶ 6.

The Examiner finds that claim 1 recites functional phrase #1 which has 2 sub-phrases each with their own function: FP#1_1, FP#1_2. They are:

A controller,

[**FP#1_1**: the controller controls assignment of connection for each of the first and second radio communication circuit in response to receiving an indication from a user;
[**FP#1_2**: the controller controls each of the first and second radio communication circuit, so that the first radio communication circuit transmits video information and the second radio communication circuit connects to the internet or the home network simultaneously

- Claim 1 (in part) in the '590 Patent.

i. <u>3 Prong Analysis</u>: Invocation Prong (A)

As an initial matter, the Examiner finds that Functional Phrase #1 does not use the term "means." Therefore the issue arising under Invocation Prong

(A) then becomes whether or not FP#1, including the claimed "controller" controls (to perform the two separate claimed functions) are a generic placeholder for "means."

In assessing whether or not FP#1 invokes § 112 ¶ 6, the Examiner must not only consider the introductory phrase "controller," but the entire functional phrases (i.e. the functional phrases FP#$1_{1\text{-}2}$. "In assessing whether the claim limitation is in means-plus-function format, we do not merely consider the introductory phrase (e.g., 'mechanical control assembly') in isolation, but look to the entire passage including functions performed by the introductory phrase. [Emphasis added.]" *MTD Prods. Inc. v. Iancu*, 933 F.3d 1336, 1342 (Fed. Cir. 2019).

First, within the claimed "controller controls..." phrase (i.e. FP#1), (and construing the claim according to the required precepts of English grammar). Second, the Examiner has reviewed the original specification and drawings as set forth in '590 Patent, general and subject matter specific dictionaries (*e.g.* IEEE 100, the Authoritative Dictionary of IEEE Standards Terms, Seventh Edition, 2000), and the prior art now of record to determine if the "controller controls .. [perform the two functions of Function of FP#$1_{1\text{-}2}$]" as set forth in FP#1 in order to determine if there exists a description sufficient to inform one of ordinary skill in this particular art that the claimed "controller .. [perform the Function of FP#$1_{1\text{-}2}$]," denotes a particular structure.

Third and based upon the review as set forth in the paragraph immediately above and to a person of ordinary skill in this particular art, the

Examiner finds that an ordinary, off-the-shelf "controller" is structure (see *e.g.* Honkanen, US 2006/0135076 describing a control "CNTL 104" in Figure 1; Gautier et al, US 2008/0101446 describing a control "Controller 105"; Jo et al, US 2007/0091835 describing a control "CONTROL UNIT" 250). However based upon a review of the *entire passage* of FP#1 (*i.e.* FP#1_1, FP#1_2), the claimed "controller" as set forth in FP#1 has a particular *configuration* (*i.e.* it is "controls to perform two claimed functions").

Fourth, the Examiner finds that patent under reexamination expressly states:

> "*The controller 132 controls the transmission rate assignment control circuit 1001 on the basis of time control information of the video signal to variably control the transmission rate of the radio modem circuit 1002. At the same time, the controller 132 variably controls the transmission rate of the radio modem circuit 1003 for radio communication with a network such as the Internet. According to the embodiment, in the assignment of the transmission rate to the demodulation circuits 1001 and 1002, the controller 132 gives preference to the demodulation circuit In other words, the transmission rate of the demodulation circuit 1001 is more than that of the modem circuit 1002. Hence, within the limited range of bands for the radio transmission, the modem 1002 can transmit video information without deteriorating the video quality of the video information having high picture quality. The band of radio signals from the terminal 101 and that of radio signals from the terminal 134 are fixed. Therefore, if the band of signals from the terminal 101 is expanded, that of signals from the terminal 134 narrows to slightly lower the communication speed of the network. However, this rarely influences the system operation since information regarding the network is less frequently exchanged as compared with video information sent form the video processing apparatus 100*"
>
> - 590 Patent: C6:L58 to C7:L14
>
> "*The controller 1001 to the interface circuit 133 for networks. The controller 1001 variably controls, according to a control signal from the controller 132, the transmission rates respectively of the modems 1002 and 1003 by variably setting the modulation/demodulation methods, the*

frequency bands, and the number of carriers respectively for the modems 1002 and 1003. In short, the controller 132 controls distribution of the radio transmission rate of each modem by controlling the transmission rate assignment controller 1001. As a specific example of operation in which the transmission rate is controlled by changing parameters including the demodulation method and the frequency band, FIG. 9 shows the difference in the transmission rate between two schemes. According to the embodiment, the controller 132 and the transmission rate assignment controller 1001 control the radio transmission assignment such that the radio transmission rate of the modem 1002 to send the video information of high picture quality by radio to the video display apparatus 200 takes precedence over the radio transmission rate of the modem 1003 to connect to a network for communication. That is, the radio transmission rate of the modem 1002 is more than that of the modem 1003. For example, in a situation wherein the modem 1002 transmits video information to the display apparatus 200 and the modem 1003 simultaneously connects to the Internet to receive Internet information, the controller 132 controls the operation to continuously supply videos with high picture quality to the user, specifically, to set the transmission scheme of the modem 1002 to, for example, "scheme 1" shown in FIG. 9. For the radio modem 1003, the controller 132 sets the transmission scheme thereof to "scheme 2" of FIG. 9. As can be seen from FIG. 9, the transmission capacity of scheme 1 is 17 Megabits per second (Mbps) which is more than three times that of scheme 2 (5 Mbps). As above, in the limited transmission capacity for radio transmission, a higher transmission rate is assigned to the communication with the display apparatus 200 in the embodiment. It is hence possible that the user continuously views videos with high picture quality on the display apparatus 100. Naturally, the variable control of the transmission rate is not limited to the example shown in FIG. 9.

The controller 132 and the transmission rate assignment controller 1001 may variably control the radio transmission assignment to the modems 1002 and 1003 in response to an indication from the user. For example, in a situation wherein the user issues an indication to transmit video information by radio via the modem 1002 to the display apparatus 200 while acquiring information from the Internet according to scheme 1 of FIG. 9 by use of the modem 1003, the controller 132 outputs a control signal to the assignment controller 1001 such that the transmission scheme of the modem 1003 is changed from scheme 1 to scheme 2 of FIG. 9 and that of the modem 1002 is set to scheme 1 of FIG. 9 conduct communications. The transmission rate of the modem 1002 may be variably changed according to fineness or precision of the video information sent from the modem 1002 to the display apparatus 200. For example, if the fineness of the video information is altered from SD

> *(640x480) to HD (1980x1080), the controller 132 instructs the assignment controller 1001 to heighten the transmission rate of the modem circuit 1002. It is preferable in the operation that the transmission rate of the modem 1003 is lowered in association with the variable control of the transmission rate of the modem 1002".*

- 590 Patent: C7:L61 to C8:L57

Because the hardware components of a controller are old and well known to a person of ordinary skill in this particular art (see *e.g.* Honkanen, US 2006/0135076 describing a control "CNTL 104" in Figure 1; Gautier et al, US 2008/0101446 describing a control "Controller 105"; Jo et al, US 2007/0091835 describing a control "CONTROL UNIT" 250) because Patent Owner's invention includes functionalities that are ***not*** coextensive with a generic controller (e.g. see the two functions of Function of FP#1 as set forth in "3 Prong Analysis: Invocation Prong (B)" below), and because there is little in the '590 Patent that describes any new hardware component(s) or new arrangement of hardware components, the Examiner finds that Patent Owner's invention is primarily a video processing implemented invention.

In light of the above, the Examiner concludes that to a person of ordinary skill in this particular art, the claimed "controller ... [perform the Function of FP#$1_{1\text{-}2}$]" is not an ordinary device but a *particular* device requiring special instruction since the function as set forth in FP#1 (i.e. perform the two functions of Function of FP#$1_{1\text{-}2}$") are functionalities that is *not* coextensive with a generic device. In other words, because the two functions as set forth in FP#1 clearly cannot be performed by an off-the-shelf controller, an ordinary controller, or a general purpose controller, a person of ordinary skill in this

particular art must conclude that the *claimed* "controller" (as set forth in claim 1) requires special instruction.

In summary, because claimed "controller" within the phase "controller ... [perform the two functions of Function of FP#1_{1-2}]" is a particular device requiring special instruction, the phrase is also a generic placeholder for that instruction. Because "controller" is a generic placeholder, the Examiner concludes that Functional Phrase #1 meets invocation Prong (A).

ii. 3 Prong Analysis: Invocation Prong (B)

Based upon a review of the claim 1 itself, the Examiner concludes that the two functions within FP#1 are:

a. Function of FP#1_1 as recited in claim 1:

> "controls assignment of connection for each of the first and second radio communication circuit in response to receiving an indication from a user";

b. Function of FP#1_2 as recited in claim 1:

> "controls each of the first and second radio communication circuit, so that the first radio communication circuit transmits video information and the second radio communication circuit connects to the internet or the home network simultaneously."

Note: the Examiner will refer to two functions collectively as **FP#1_{1-2}**.

Ordinary principles of claim construction govern interpretation of this claim language. The Examiner finds that because nothing in the written description of '590 Patent contradicts the plain language of the wording set

forth in the Function of FP#1_{1-2}, the Function of FP#1_{1-2} will have its ordinary and accustomed meaning. Because FP#1 includes the Function of FP#1_{1-2}, Examiner concludes that, FP#1 meet Invocation Prong (B).

iii. 3 Prong Analysis: Invocation Prong (C)

Based upon a review of FP#1, the Examiner finds that FP# 1 does *not* contain sufficient structure for performing the *two functions* set forth in FP# 1. In fact, the Examiner finds that FP#1 recite very little structure (if any) for performing the Function of FP# 1_{1-2} beyond the generic device.
Because FP#1 does *not* contain sufficient structure for performing *the entire* claimed function, Examiner concludes that Functional Phrase # 1 meets Invocation Prong (C).

Because FP#1 meets the 3 Prong Analysis as set forth in MPEP § 2181 I., the Examiner concludes that FP#1 invoke § 112 ¶ 6.

iv. Corresponding Structure for Functional Phrase #1

"*The next step in construing a means-plus-function claim limitation is to look to the specification and identify the corresponding structure for that function.*" In re Aoyama, 656 F3d 1293, 99 USPQ2d 1936 (Fed. Cir. 2011) quoting Golight, Inc. v. Wal-Mart Stores, Inc., 355 F.3d 1327, 1333, 1334, [69 USPQ2d 1481, 1486] (Fed. Cir. 2004).

"*Under this second step, structure disclosed in the specification is `corresponding' structure only if the specification or prosecution history clearly*

links or associates that structure to the function recited in the claim." In re Aoyama, , 99 USPQ2d at 1939 quoting *Med. Instrumentation & Diagnostics Corp. v. Elekta AB*, 344 F.3d 1205, 1210, [68 USPQ2d 1263, 1267] (Fed. Cir. 2003).

Based upon a review of the '590 Patent itself, the Examiner concludes that corresponding structure for "the controller" is a CONTROLLER 132 as shown in Figures 1, 4; CONTROLLER 2013 as shown in Figures 2 and 3; TRANSMISSION-SIDE CONTROLLER 1603, RECEPTION-SIDE CONTROLLER 1606 as shown in Figure 7. This controller is programed to perform two functions: 1/controls assignment of connection for each of the first and second radio communication circuit in response to receiving an indication from the user"; 2/ controls each of the first and second radio communication circuit, so that the first radio communication circuit transmits video information and the second radio communication circuit connects to the internet or the home network simultaneously -- to create a special purpose controller.

In view of these findings, pursuant to 35 U.S.C. §112 ¶ 6, FP#1 in claim 1 will be limited to the corresponding structure discussed above.

v. How To Prevent FP#1 From Invoking § 112 ¶ 6

If Applicant does not intend to have the claim limitation invoke § 112 ¶ 6, Applicant may amend claim 1 so that it will clearly not invoke § 112 ¶ 6. Moreover, if Applicant believes "the controller" has a structural meaning known to a person of ordinary skill in this particular art, Applicant should in their

next appropriately filed response, expressly state on the record that "the controller" has a structural meaning known to a person of ordinary skill in this particular art ***and*** provide appropriate evidence in support thereof (*e.g.* a prior art U.S. patent).

Additionally, in order to show that FP#1 does not meet 3 Prong Analysis: Invocation Prong (C), Applicant must also state on the record and provide evidence in support thereof that the claimed structure can perform the Function of FP#1. In other words, upon receiving (1) Applicant's statement indicating that "the controller" has a structural meaning know to a person of ordinary skill in this particular art with sufficient evidence in support thereof; (2) Applicant's express statement that the claimed structure can perform the entire Function of FP#1; and (3) supporting evidence that the claimed structure can perform the Function of FP#1, the Examiner will most likely conclude that FP#1 does *not* invoke § 112 ¶ 6.

2) Functional Phrase #2 (FP#2)

Claim 5 recites:

> A controller,
>
> [**FP#2$_1$**: the controller controls assignment of connection for each of the first and second radio communication circuit in response to receiving an indication from a user;
> [**FP#2$_2$**: the controller controls each of the first and second radio communication circuit, so that the first radio communication circuit transmits video information and the second radio communication circuit connects to the internet or the home network simultaneously

- Functional Phrase #2 or FP#2.

The same § 112 ¶ 6 invocation analysis applied to FP#1 is the same analysis applied to FP#2. Additionally, the same corresponding structure found in FP#1 is the same corresponding structure for FP#2.

3/ Functional Phrase #3 (FP#3):

Claims 9 and 10 recite:

> [**FP#3$_1$**: assignment of connection for each of the first and second radio communication circuit is controlled in response to receiving an indication from a user;
> [**FP#3$_2$**: the transmitting and connecting is controlled so that the first radio communication circuit is configured to transmit video information and the second radio communication circuit is configured to connect to the internet or the home network simultaneously.

- Functional Phrase #3 or FP#3.

The same § 112 ¶ 6 invocation analysis applied to FP#1 is the same analysis applied to FP#3. Additionally, the same corresponding structure found in FP#1 is the same corresponding structure for FP#3.

C. Sources

The Examiner hereby adopts the following interpretations under the broadest reasonable interpretation standard. In other words, the Examiner has provided the following interpretations simply as express *notice* of how she is interpreting particular terms under the broadest reasonable interpretation standard. Additionally, these interpretations are only a guide to claim terminology since claim terms must be interpreted in context of the surrounding claim language. In accordance with *In re Morris*, 127 F.3d 1048,

1056, 44 USPQ2d 1023, 1029 (Fed. Cir. 1997), the Examiner points to these other "sources" to support her interpretation of the claims. Finally, the following list is not intended to be exhaustive in any way:

Controller:

"(2) A device or group of devices that serves to govern, in some predetermined manner, the electric power delivered to the apparatus to which it is connected.

(4) The component of a system that functions as the system controller. A controller typically sends program messages to and receives response messages from devices.

(5) (A) A functional unit in a computer system that controls one or more units of the peripheral equipment. (B) In robotics, a processor that takes as input desired and measured position, velocity or other pertinent variables and whose output is a drive signal to a controlling motor or activator. (C) A device through which one can introduce commands to a control system.

(7) A device or group of devices used to control in a predetermined manner the electric power delivered to the apparatus to which it is connected."

The Authoritative Dictionary of IEEE Standards Terms, 7th Ed., IEEE, Inc., New York, NY, 12/2000.

VII. REFERENCES RELIED UPON IN THE REQUEST

In the request for reexamination, the Request alleges that the '590 Patent claims 1-10 are rendered obvious under 35 U.S.C §103 in light of the following prior art references:

1/ U.S. Patent Application Publication No. 2006/0203758 A1 to Tee et al. (hereinafter "**Tee**").

2/ U.S. Patent Application Publication No. 2006/0135076 Al to Honkanen et al. (hereinafter "**Honkanen**")

Examiner noted that these references were not of record in the prosecution history of the '590 Patent and are not cumulative to the art of record in the original file.

VIII. LISTING OF REJECTIONS PROPOSED IN THE REQUEST

The Request proposes combinations of references to raise SNQs for Patent Claims 1-10 of the '590 Patent:

Issues 1 - The Request submits that claims 1 and 4-10 are rendered obvious under 35 U.S.C § 103(a) over Tee in view of the knowledge of a PHOSITA. Support for the position is provided in the Request at pages 8-36.

Issue 2 - The Request submits that claims 2-3 are rendered obvious under 35 U.S.C § 103(a) over Tee in view of Honkanen. Support for the position is provided in the Request at pages 36-47.

Issues 1-2 are discussed in detail below.

IX. 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 pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Issue 1: Tee in view of the knowledge of the person having ordinary skill in the art (PHOSITA)

Claims 1 and 4-10 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Tee in view of the knowledge of the PHOSITA.

Regarding claim 1: Tee teaches **video processing apparatus** (Figs. 1-3, Abstract, [0019]):

> *[0019] FIG. 1 illustrates exemplary mobile terminal 110 operating in a network environment according to an exemplary embodiment of the disclosure. Mobile terminal 110 is depicted in FIG. 1 as a PDA type device. However, this depiction is by way of illustration only and should not be construed so as to limit the scope of the present disclosure.* ***In fact, mobile terminal (MT) 110 may be any type of mobile wireless device that uses a display, including a cellular phone, a PDA, a handheld computer (e.g., Pocket PC™), and even a laptop computer ...***"

comprising:

Figs. 1-3 are reprinted:

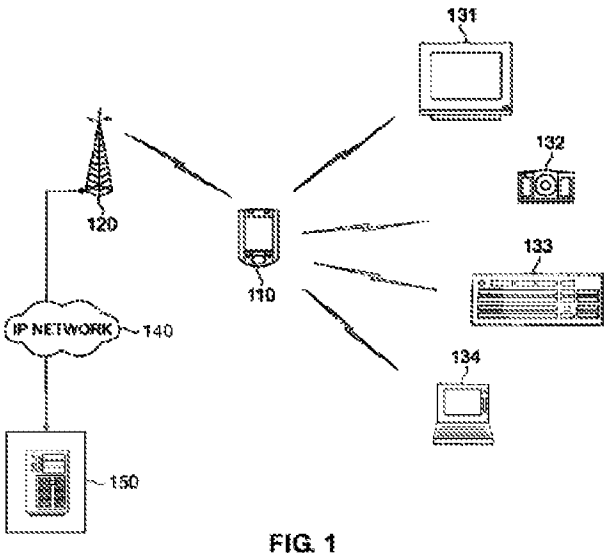


FIG. 1

1. Office Action, Figure 1: Tee, Figure 1

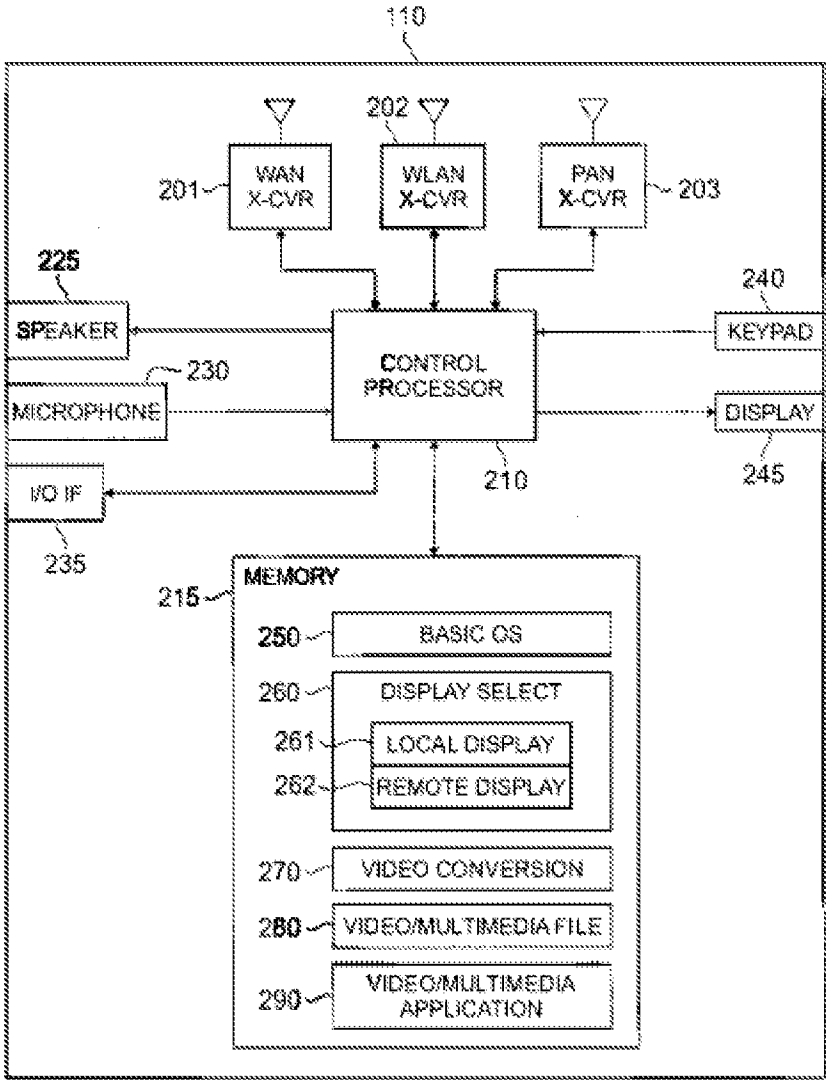


FIG. 2

2. Office Action Figure 2: Tee, Figure 2

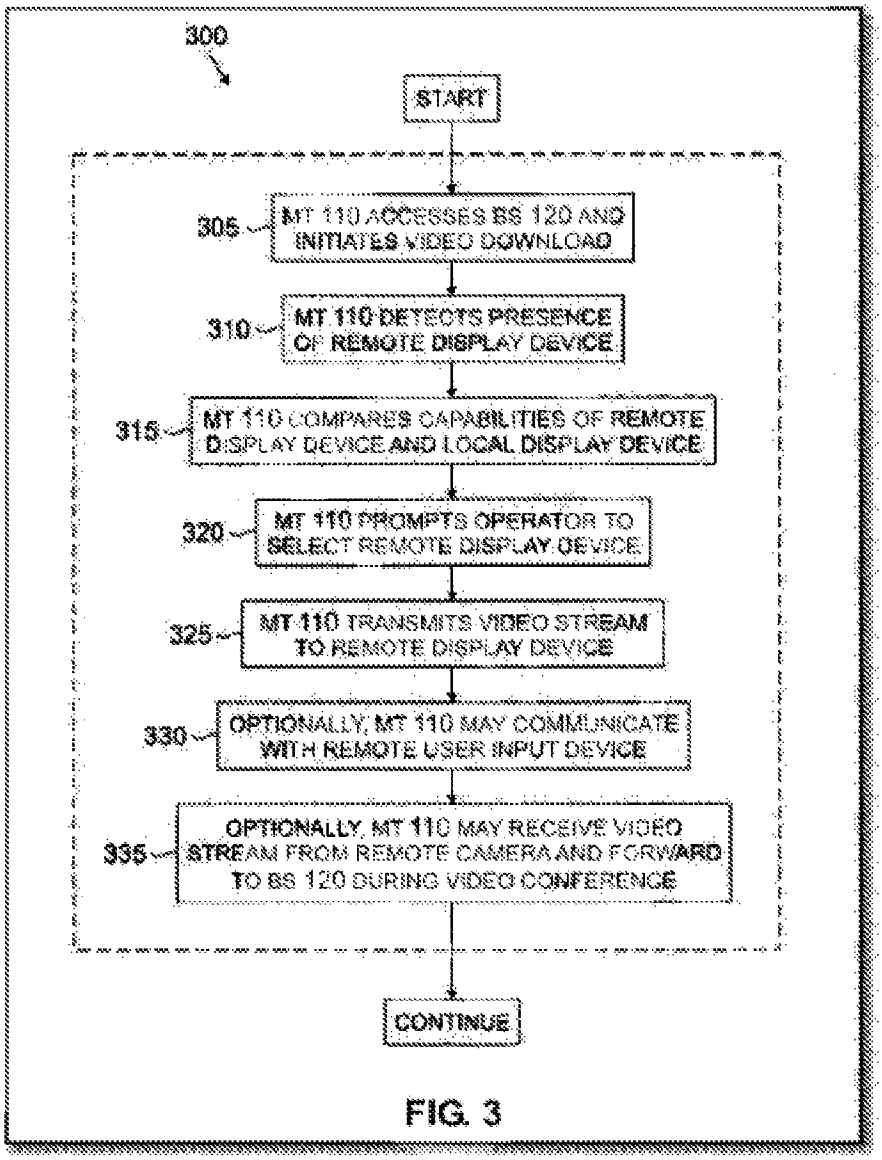


FIG. 3

3. Office Action Figure 3: Tee, Figure 3

Tee discloses:

a first radio communication circuit (PAN X-CVR 203, Fig. 2 or referred as PAN transceiver 203 in the specification) ¶[0027]) **capable of transmitting video information by radio** ¶[0031] **or receiving information by radio**

¶[0032](Tee teaches the PAN transceiver 203 may be based on software-defined radio. Accordingly, a PHOSITA would have understood that Tee's PAN transceiver 203 is capable of transmitting video information by radio or receiving information by radio);

> [0027] *Control processor 210 may use PAN transceiver 203 to communicate in a personal area network (PAN) environment, such as a Bluetooth or IEEE-802.15.3 communication link that may have a coverage of around 10-20 meters.*
>
> *[0028] ... Advantageously, one or more of transceivers 201-203 may be based on software-defined radio (SDR) technology and therefore maybe capable of communicating according to more than one wireless interface standard.*
>
> [0031] *In another example, mobile terminal 110 (not 201 as disclosed) may receive a video stream from a base station or access point of a home or office WLAN via WLAN transceiver 202 and may relay the video stream over a short distance to a remote display device via PAN transceiver 203....* (emphasis added)
>
> [0032] *In a third example, mobile terminal 110 (not 201 as disclosed) may receive a video stream from a base station, an access point, or a video source device via PAN transceiver 203 and may relay the video stream over a short distance to a remote display device via WLAN transceiver 202...* (emphasis added)

a second radio communication circuit (WLAN X-CVR 202, Fig. 2 or referred as WLAN transceiver 202 in the specification) **capable of connecting by radio to an internet or a home network to transmit and receive information** (WLANs were a well-known radio communication technology and Tee also teaches WLAN transceiver 202 maybe based on software-defined radio (SDR).

Accordingly, a PHOSITA would have understood that Tee's WLAN transceiver 202 is a radio communication circuit):

> [0027] … *Control processor 210 may use WLAN transceiver 202 to communicate in a wireless local area network (WLAN) environment, such as an office WLAN that may have a coverage area or range of several hundred feet. By way of example, WLAN transceiver 202 may be an IEEE-802.1 lx transceiver…*
>
> *[0028] … Advantageously, one or more of transceivers 201-203 may be based on software-defined radio (SDR) technology and therefore maybe capable of communicating according to more than one wireless interface standard.*

However, Tee does not specifically disclosed "an imaging circuit capable of receiving video information via an optical system" as called for in claim 1.

Nevertheless, Tee does teach that the mobile terminal 110 is used for capture video and then relay that video to an external display, allowing the camera phone to be used for video conference:

> [0018] *An exemplary mobile terminal may be used for mobile communications and as a gateway for a short-range wireless network, also called a personal area network (PAN). The mobile terminal may support a variety of mobile applications, including voice, multimedia (i.e., video, graphics, text, and audio downloads), video conferencing, web browsing, file download, VPN and Internet gaming. Advantageously, when the mobile terminal is near a higher quality display (e.g., a TV screen), the mobile terminal relays its video data to the external display device as well as to its internal display. This enables the operator of the mobile terminal to view the information on the higher quality display device, and to share the displayed information with other people at the same location, e.g., in a video conference call, or watching the latest broadcasting and streaming of News or events of common interests. Note that in the latter example, the source of information could be a remote Internet web server instead of a conventional TV broadcasting*

> *station. A remote Internet web server does not have the same geographical coverage limit as a conventional TV broadcasting station. In the case of group video conferencing using, for example, a digital camera phone, it would be more practical and ergonomically correct to have the received video data displayed on an external screen, while the phone camera captures and transmits the local user images.*

Therefore, the PHOSITA would have understood that an imaging circuit capable of receiving video information via an optical system is fundamental to digital cameras. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have include the imaging circuit capable of receiving video information via an optical system in order to support a video conference application and to convert captured video signal into a digital representation.

an accumulation circuit (MEMORY 215) **capable of accumulating video information received by the imaging circuit** (The MEMORY 215 stores video in VIDEO/MULTIMEDIA FILE 280. The PHOSITA would have understood that the images captured by Tee's imaging circuit are stored memory 215—even if just temporarily (e.g., buffered) prior to relaying the images to a remote destination in support of the video conference application. It was well understood that prior to transmitting video data over any wireless network for video streaming, it was necessary to store that video data in a buffer (e.g., a temporary storage location for information to be sent) prior to transmission in order to correctly format and compress the video for transmission):

[0025] FIG. 2 illustrates exemplary mobile terminal 110 in greater detail according to an exemplary embodiment of the disclosure. Mobile terminal 110 comprises wide-area network (WAN) transceiver (X-CVR) 201, wireless local area network (WLAN) transceiver (X-CVR) 202, and personal area network (PAN) transceiver (X-CVR) 203. In an embodiment, only one of WLAN transceiver 202 and PAN transceiver 203 may be employed. Mobile terminal 110 also comprises control processor 210, memory [redacted], speaker 225, microphone 230, input/output interface (I/O IF) 235, keypad 240 and display 245. Memory [redacted] stores basic operating system (OS) program 250, display select program 260, video conversion program 270, video/multimedia file 280, and one or more video application programs 290. Display select program 260 comprises local display parameters file 261 and remote display parameters file 262.

[0033] Control processor 210 executes video/multimedia application program 290 in order to display video data on display 245. Control processor 210 executes video conversion program 270 in order to re-format (if necessary) the video data downloaded from server 150 through the one wireless interface (e.g., WAN transceiver 201) to a suitable format for re-transmission via another wireless interface (e.g., WLAN transceiver 202 or PAN transceiver 203). Additionally, video/multimedia application program 290 may retrieve video/multimedia data from video/multimedia file 280 and transmit a video stream to a remote device via a wireless interface. Advantageously, the wireless interface may have more than one connection at the same time. For example, PAN transceiver 203 may transmit video to television 131 while simultaneously communicating with wireless keyboard 240.

a controller (CONTROL PROCESSOR 210),

[0026] Control processor 210 and memory 215 function as a controller that controls the overall operation of mobile terminal 110. Control processor 210 executes basic OS program 250 in order to control, among other things, transceivers 201, 202 and 203. Control processor 210 receives operator inputs from keypad 240 or another user input device (not shown) and displays data on display 245. If mobile terminal 110 is, for example, a cell phone, control processor 210 can receive a voice signal from microphone 230 and can send voice signals to speaker 225. I/O interface 235 allows control processor 210 to be coupled to, and communicate with, another device, including, for example, a docking station, a data cord, an operator input device, or the like.

wherein the first radio communication circuit (PAN transceiver 203) **can transmit video information accumulated in the accumulation circuit** (MEMORY 215) **to an external device by radio** (Tee teaches that video downloaded from server 150, which is relayed to an external device via PAN transceiver 203 may be reformatted prior to transmission. Tee also expressly teaches that video stored in memory is relayed to an external source via a wireless transceiver. Accordingly, the PHOSITA would have understood that in each of the described embodiments in which Tee's PAN transceiver transmits video to an external display—whether the video was captured by an internal camera or received from an external source—the transmitted video information comes from memory (i.e., an accumulation circuit);

> *[0033] Control processor 210 executes video/multimedia application program 290 in order to display video data on display 245. Control processor 210 executes video conversion program 270 in order to re-format (if necessary) the video data downloaded from server 150 through the one wireless interface (e.g., WAN transceiver 201) to a suitable format for re-transmission via another wireless interface (e.g., WLAN transceiver 202 or PAN transceiver 203). Additionally, video/multimedia application program 290 may retrieve video/multimedia data from video/multimedia file 280 and transmit a video stream to a remote device via a wireless interface. Advantageously, the wireless interface may have more than one connection at the same time. For example, PAN transceiver 203 may transmit video to television 131 while simultaneously communicating with wireless keyboard 240.*

the controller (CONTROL PROCESSOR 210) **controls assignment of connection for each of the first and second radio communication circuit**

(WLAN transceiver 202 and PAN transceiver 203) **in response to receiving an indication from a user** ¶[0037]:

Tee discloses:

> *[0026] Control processor 210 and memory 215 function as a controller that controls the overall operation of mobile terminal 110. Control processor 210 executes basic OS program 250 in order to control, among other things, transceivers 201, 202 and 203. Control processor 210 receives operator inputs from keypad 240 or another user input device (not shown) and displays data on display 245. If mobile terminal 110 is, for example, a cell phone, control processor 210 can receive a voice signal from microphone 230 and can send voice signals to speaker 225. I/O interface 235 allows control processor 210 to be coupled to, and communicate with, another device, including, for example, a docking station, a data cord, an operator input device, or the like.*
>
> [0027] … *Control processor 210 may use WLAN transceiver 202 to communicate in a wireless local area network (WLAN) environment* …
>
> *[0037] … FIG. 3 depicts flow diagram 300, which illustrates the operation of exemplary mobile terminal 110 and a remote display device according to one embodiment of the disclosure. Initially, mobile terminal 110 accesses base station 120 via air interface(e.g., transceiver 201 or 202)and initiates a video/multimedia download from server 150 (process step 305). Alternatively, mobile terminal 110 may play back video/multimedia data stored in video/multimedia file 280. At some point, mobile terminal 110 detects the presence of a remote display device (e.g., television 131) via another air interface (e.g., transceiver 202 or 203) and establishes a wireless link with the remote display device (process step 310), with the authorization of the mobile terminal user.*

Base on Tee's disclosure above, PHOSITA would have understood that the CONTROL PROCESSOR 210 controls assignment of connection for each of the first and second radio communication circuit (WLAN transceiver 202 and PAN

transceiver 203). Besides, Fig. 2 shows WLAN transceiver 202 and PAN transceiver 203 each has a direct connection with the CONTROL PROCESSOR 210, thus, the CONTROL PROCESSOR 210 is necessary responsible for assigning both the WLAN transceiver 202 and PAN transceiver 203 connection; and

wherein the controller (CONTROL PROCESSOR 210) **controls each of the first and second radio communication circuit** (Fig. 2 shows the CONTROL PROCESSOR 210 controls each of WLAN transceiver 202 and PAN transceiver 203), **so that the first radio communication circuit** (PAN transceiver 203) **transmits video information and the second radio communication circuit** (WLAN transceiver 202) **connects to the internet or the home network simultaneously** (Tee teaches that the process of relaying a video stream to an external device is an alternative to watching the stream on the mobile terminal, the PHOSITA would have understood that "relaying" the described "video stream" would have involved simultaneously (1) receiving a video "stream" via the WLAN connection and (2) transmitting the video "stream" to a remote display device via the PAN connection).

> *[0022] According to an advantageous embodiment, mobile terminal 110 may relay a video stream to a remote device in order to allow the operator of mobile terminal 110 to view the video on a better display. By way of example, mobile terminal 110 may be receiving streaming video data from server 150 via IP network 140 and base station 120. The streaming video is displayed on the display of mobile terminal 110. At some point, mobile terminal 110 may be located near to television 131 and establish a wireless communication link via the short-range wireless protocol (e.g., IEEE-802.llx/802.15.3x) with television 131. Mobile terminal 110 may then*

request information from television 131 regarding the capabilities of the display screen of television 131.

[0023] Assuming television 131 is a more desirable display than mobile terminal 110, mobile terminal 110 may relay the streaming video signal to television 131 via the short-range (or PAN) wireless communication link. This may be done automatically, or mobile terminal 110 may prompt the operator of mobile terminal 110 to select television 131 before relaying the video signal. Similarly, mobile terminal 110 may transmit a video signal over the short-range PAN connection to computer 134, projector 132, or any other remote device that has a display screen.

[0031] In another example, mobile terminal 110 (not 201 as disclosed) may receive a video stream from a base station or access point of a home or office WLAN via WLAN transceiver 202 and may relay the video stream over a short distance to a remote display device via PAN transceiver 203. This may occur when the base station or access point in the office WLAN communicates with mobile terminal 110 using, for example, an IEEE-802.11x transceiver and the remote display communicates with mobile terminal 110 using, for example, a high data rate Bluetooth transceiver that is capable of supporting the required video data throughput. (emphasis added)

[0033] Control processor 210 executes video/multimedia application program 290 in order to display video data on display 245. Control processor 210 executes video conversion program 270 in order to re-format (if necessary) the video data downloaded from server 150 through the one wireless interface (e.g., WAN transceiver 201) to a suitable format for re-transmission via another wireless interface (e.g., WLAN transceiver 202 or PAN transceiver 203). Additionally, video/multimedia application program 290 may retrieve video/multimedia data from video/multimedia file 280 and transmit a video stream to a remote device via a wireless interface. Advantageously, the wireless interface may have more than one connection at the same time. For example, PAN transceiver 203 may transmit video to television 131 while simultaneously communicating with wireless keyboard 240.

Regarding claim 4: **The video processing apparatus** (Figs. 1-3, Abstract, [0019]) **according to claim 1, further comprising a radio interface** (WAN X-CVR 201, Fig. 2 or referred as WAN transceiver 201 in the specification) **capable of receiving video information by radio** (Tee teaches that video files may be downloaded via the WAN transceiver 201. ¶¶[0030], [0037] Downloading is a well-understood term that suggests both receiving and storing information. Accordingly, the PHOSITA would have understood that downloading video from a server necessarily involves storing that video at the receiving device), **wherein the accumulation circuit** (MEMORY 215) **accumulates the video information** (Tee describes receiving video and relaying that video to an external display, and download from server 150, the video is stored in memory 215) **received via the radio interface** (WAN transceiver 201).

> *[0025] FIG. 2 illustrates exemplary mobile terminal 110 in greater detail according to an exemplary embodiment of the disclosure. Mobile terminal 110 comprises wide-area network (WAN) transceiver (X-CVR) 201, wireless local area network (WLAN) transceiver (X-CVR) 202, and personal area network (PAN) transceiver (X-CVR) 203. In an embodiment, only one of WLAN transceiver 202 and PAN transceiver 203 may be employed. Mobile terminal 110 also comprises control processor 210, memory 215, speaker 225, microphone 230, input/output interface (I/O IF) 235, keypad 240 and display 245. Memory 215 stores basic operating system (OS) program 250, display select program 260, video conversion program 270, video/multimedia file 280, and one or more video application programs 290. Display select program 260 comprises local display parameters file 261 and remote display parameters file 262.*
>
> *[0027] In the exemplary embodiment, control processor 210 uses WAN transceiver 201 to communicate over a wide area network. For example, WAN transceiver 201 may be a GSM/GPRS/EDGE transceiver, a*

CDMA2000/lxEV-DO transceiver, or an IEEE-802.16x transceiver that communicates with base station 120 of a wide-area network.
Control processor 210 may use WLAN transceiver 202 to communicate in a wireless local area network (WLAN) environment, such as an office WLAN that may have a coverage area or range of several hundred feet. By way of example, WLAN transceiver 202 may be an IEEE-802.1 lx transceiver. Control processor 210 may use PAN transceiver 203 to communicate in a personal area network (PAN) environment, such as a Bluetooth or IEEE-802.15.3 communication link that may have a coverage area or range around 10-20 meters.

[0030] *In one example, mobile terminal 110 (not 201 as disclosed) may receive a video stream from BS 120 via WAN transceiver 201 and may relay the video stream over a short distance to a remote display device via WLAN transceiver 202 or PAN transceiver 203. This may occur when mobile terminal 201 communicates with BS 120 in a cellular network and the remote display communicates with mobile terminal 110 using, for example, an IEEE-802.11x transceiver (i.e., communicates with WLAN transceiver 202) or a Bluetooth or IEEE-802.15.3x transceiver (i.e., communicates with PAN transceiver 203) (emphasis added)*

[0037] *FIG. 3 depicts flow diagram 300, which illustrates the operation of exemplary mobile terminal 110 and a remote display device according to one embodiment of the disclosure. Initially, mobile terminal 110 accesses base station 120 via an air interface (e.g., transceiver 201 or 202) and initiates a video/multimedia download from server 150 (process step 305). Alternatively, mobile terminal 110 may play back video/multimedia data stored in video/multimedia file 280. At some point, mobile terminal 110 detects the presence of a remote display device (e.g., television 131) via another air interface (e.g., transceiver 202 or 203) and establishes a wireless link with the remote display device (process step 310), with the authorization of the mobile terminal user.*

the first radio communication circuit (PAN transceiver 203) **is further capable of transmitting the accumulated video information** (the stored video content that was received via the WAN transceiver 201. Tee teaches that

video downloaded from server 150, which is relayed to an external device via PAN transceiver 203 may be reformatted prior to transmission. Tee also expressly teaches that video stored in memory is relayed to an external source via a wireless transceiver. Accordingly, the PHOSITA would have understood that in each of the described embodiments in which Tee's PAN transceiver transmits video to an external display—whether the video was captured by an internal camera or received from an external source—the transmitted video information comes from memory (i.e., an accumulation circuit).

> [0030] *In one example, mobile terminal 110 (not 201 as disclosed) may receive a video stream from BS 120 via WAN transceiver 201 and may relay the video stream over a short distance to a remote display device via WLAN transceiver 202 or PAN transceiver 203. This may occur when mobile terminal 201 communicates with BS 120 in a cellular network and the remote display communicates with mobile terminal 110 using, for example, an IEEE-802.11x transceiver (i.e., communicates with WLAN transceiver 202) or a Bluetooth or IEEE-802.15.3x transceiver (i.e., communicates with PAN transceiver 203). (emphasis added)*

> *[0033] Control processor 210 executes video/multimedia application program 290 in order to display video data on display 245. Control processor 210 executes video conversion program 270 in order to re-format (if necessary) the video data downloaded from server 150 through the one wireless interface (e.g., WAN transceiver 201) to a suitable format for re-transmission via another wireless interface (e.g., WLAN transceiver 202 or PAN transceiver 203). Additionally, video/multimedia application program 290 may retrieve video/multimedia data from video/multimedia file 280 and transmit a video stream to a remote device via a wireless interface. Advantageously, the wireless interface may have more than one connection at the same time. For example, PAN transceiver 203 may transmit video to television 131 while simultaneously communicating with wireless keyboard 240.*

[0037] FIG. 3 depicts flow diagram 300, which illustrates the operation of exemplary mobile terminal 110 and a remote display device according to one embodiment of the disclosure. Initially, mobile terminal 110 accesses base station 120 via an air interface (e.g., transceiver 201 or 202) and initiates a video/multimedia download from server 150 (process step 305). Alternatively, mobile terminal 110 may play back video/multimedia data stored in video/multimedia file 280. At some point, mobile terminal 110 detects the presence of a remote display device (e.g., television 131) via another air interface (e.g., transceiver 202 or 203) and establishes a wireless link with the remote display device (process step 310), with the authorization of the mobile terminal user.

[0038] Mobile terminal 110 then requests the capabilities of the remote display device and compares the capabilities of the remote display device and local display 245 (process step 315). Mobile terminal 110 may prompt the operator to select the remote display device (process step 320). Assuming the remote display device is selected, mobile terminal 110 then forwards (or relays or re-transmits) the video stream from base station 120 (or video/multimedia file 280) to the remote display device (process step 325). Optionally, mobile terminal 110 may wirelessly communicate with a remote user input device, such as keyboard 133 process step 330). Optionally, if video/multimedia application program 290 is a video conferencing application, mobile terminal 110 receives via the short-range air interface video/multimedia data from a remote video camera and relays the camera video data to base station 120 (process step 335).

Regarding claim 5: **A display apparatus** (Figs. 1-3, Abstract, [0019]), **comprising**:

The Abstract discloses "*A mobile terminal comprising a local display for displaying multimedia data...*"

[0019] FIG. 1 illustrates exemplary mobile terminal 110 operating in a network environment according to an exemplary embodiment of the disclosure. Mobile terminal 110 is depicted in FIG. 1 as a PDA type device.

However, this depiction is by way of illustration only and should not be construed so as to limit the scope of the present disclosure. In fact, mobile terminal (MT) 110 may be any type of mobile wireless device that uses a display, including a cellular phone, a PDA, a handheld computer (e.g., Pocket PC™), and even a laptop computer …"

a first radio communication circuit (PAN X-CVR 203, Fig. 2 or referred as PAN transceiver 203 in the specification) ¶[0027] **capable of receiving video information by radio** ¶[0031] **or transmitting information by radio** ¶[0032](Tee teaches PAN transceiver 203 may be based on software-defined radio. Accordingly, the PHOSITA would have understood that Tee's PAN transceiver 203 is capable of receiving video information by radio or transmitting information by radio):

[0027] *Control processor 210 may use PAN transceiver 203 to communicate in a personal area network (PAN) environment, such as a Bluetooth or IEEE-802.15.3 communication link that may have a coverage of around 10-20 meters.*

[0028] … Advantageously, one or more of transceivers 201-203 may be based on software-defined radio (SDR) technology and therefore maybe capable of communicating according to more than one wireless interface standard.

[0031] *In another example, mobile terminal 110 (not 201 as disclosed) may receive a video stream from a base station or access point of a home or office WLAN via WLAN transceiver 202 and may relay the video stream over a short distance to a remote display device via PAN transceiver 203….* (emphasis added)

[0032] *In a third example, mobile terminal 110 (not 201 as disclosed) may receive a video stream from a base station, an access point, or a video*

> *source device via PAN transceiver 203 and may relay the video stream over a short distance to a remote display device via WLAN transceiver 202...* (emphasis added)

a second radio communication circuit (WLAN X-CVR 202, Fig. 2 or referred as WLAN transceiver 202 in the specification) **capable of connecting by radio to an internet or a home network to transmit and receive information** (WLANs were a well-known radio communication technology and Tee also teaches WLAN transceiver 202 may be based on software-defined radio (SDR). Accordingly, the PHOSITA would have understood that Tee's WLAN transceiver 202 is a radio communication circuit capable of connecting radio to an internet or a home network to transmit and receive information):

> [0027] ... *Control processor 210 may use WLAN transceiver 202 to communicate in a wireless local area network (WLAN) environment, such as an office WLAN that may have a coverage area or range of several hundred feet. By way of example, WLAN transceiver 202 may be an IEEE-802.1 lx transceiver...*

> *[0028] ... Advantageously, one or more of transceivers 201-203 may be based on software-defined radio (SDR) technology and therefore maybe capable of communicating according to more than one wireless interface standard.*

However, Tee does not specifically disclose "a display capable of displaying the information received by the first radio communication circuit or the second radio communication circuit" as called for in claim 5.

While Tee's teaches receiving video via one wireless interface and relaying that video to an external display via a second wireless interface, the PHOSITA

would have understood that the wirelessly received video could instead be displayed on the DISPLAY 245. The DISPLAY 245 is used unless there is a better external display available that the user selects. Accordingly, the PHOSITA would have understood that Tee's DISPLAY 245 is capable of displaying video received via the first and second radio communication circuits (PAN transceiver 203 and WLAN transceiver 202). Moreover, as shown in Fig. 2, the first and second communication circuits (PAN transceiver 203 and WLAN transceiver 202) are connected to the display (DISPLAY 245) via the CONTROL PROCESSOR 210, thus it's reasonable to understood that the DISPLAY 245 is capable of displaying the information received by the first and second radio communication circuits (PAN transceiver 203 and WLAN transceiver 202). In addition, Tee also teaches:

> *[0029] Additionally, depending on the distances involved, mobile terminal 110 may receive an incoming video and/or multimedia stream from any one of WAN transceiver 201, WLAN transceiver 202, and PAN transceiver 203 and may relay the video and/or multimedia stream to an external device using, for example, WLAN transceiver 202 or PAN transceiver 203. Essentially, this air interface functions similarly to I/O interface 235, but over the wireless link.*

> *[0033] Control processor 210 executes video/multimedia application program 290 in order to display video data on display 245. Control processor 210 executes video conversion program 270 in order to re-format (if necessary) the video data downloaded from server 150 through the one wireless interface (e.g., WAN transceiver 201) to a suitable format for re-transmission via another wireless interface (e.g., WLAN transceiver 202 or PAN transceiver 203). Additionally, video/multimedia application program 290 may retrieve video/multimedia data from video/multimedia file 280 and transmit a video stream to a remote device via a wireless interface. Advantageously, the wireless interface may have more than one connection at the same time. For example, PAN transceiver*

203 may transmit video to television 131 while simultaneously communicating with wireless keyboard 240.

a controller (CONTROL PROCESSOR 210),

[0026] Control processor 210 and memory 215 function as a controller that controls the overall operation of mobile terminal 110. Control processor 210 executes basic OS program 250 in order to control, among other things, transceivers 201, 202 and 203. Control processor 210 receives operator inputs from keypad 240 or another user input device (not shown) and displays data on display 245. If mobile terminal 110 is, for example, a cell phone, control processor 210 can receive a voice signal from microphone 230 and can send voice signals to speaker 225. I/O interface 235 allows control processor 210 to be coupled to, and communicate with, another device, including, for example, a docking station, a data cord, an operator input device, or the like.

wherein the controller (CONTROL PROCESSOR 210) **controls assignment of connection for each of the first and second radio communication circuits** (Fig. 2 shows the CONTROL PROCESSOR 210 controls each of WLAN transceiver 202 and PAN transceiver 203) **in response to receiving an indication from a user** ¶[3700].

Tee discloses:

[0026] … *Control processor 210 executes basic OS program 250 in order to control, among other things, transceivers 201, 202, and 203…*

[0027] … *Control processor 210 may use WLAN transceiver 202 to communicate in a wireless local area network (WLAN) environment* …

[0037] … FIG. 3 depicts flow diagram 300, which illustrates the operation of exemplary mobile terminal 110 and a remote display device according to one embodiment of the disclosure. Initially, mobile terminal 110 accesses

base station 120 via air interface (e.g., transceiver 201 or 202) and initiates a video/multimedia download from server 150 (process step 305). Alternatively, mobile terminal 110 may play back video/multimedia data stored in video/multimedia file 280. At some point, mobile terminal 110 detects the presence of a remote display device (e.g., television 131) via another air interface (e.g., transceiver 202 or 203) and establishes a wireless link with the remote display device (process step 310), with the authorization of the mobile terminal user.

Base on Tee's disclosure, the PHOSITA would have understood that the CONTROL PROCESSOR 210 control assignment of connection for each of the first and second radio communication circuit (WLAN transceiver 202 and PAN transceiver 203). Besides, Fig. 2 shows WLAN transceiver 202 and PAN transceiver 203 each has a direct connection with the CONTROL PROCESSOR 210, thus, the CONTROL PROCESSOR 210 is necessary responsible for assigning both the WLAN transceiver 202 and PAN transceiver 203 connection; and

wherein the controller (CONTROL PROCESSOR 210) **controls each of the first and second radio communication circuits** (Fig. 2 shows the CONTROL PROCESSOR 210 controls each of the WLAN transceiver 202 and PAN transceiver 203), **so that the first radio communication circuit** (PAN transceiver 203) **receives video information and the second radio communication circuit** (WLAN transceiver 202) **connects to the internet or the home network simultaneously** (Tee teaches receiving a video stream via the PAN transceiver 203 and relaying the video stream to an external device using the WLAN transceiver 202. ¶[0029]. The PHOSITA would have

understood that "relaying" a video "stream" involves actively receiving the video data over a first connection while simultaneously relaying the video data over a second connection).

> *[0022] According to an advantageous embodiment, mobile terminal 110 may relay a video stream to a remote device in order to allow the operator of mobile terminal 110 to view the video on a better display. By way of example, mobile terminal 110 may be receiving streaming video data from server 150 via IP network 140 and base station 120. The streaming video is displayed on the display of mobile terminal 110. At some point, mobile terminal 110 may be located near to television 131 and establish a wireless communication link via the short-range wireless protocol (e.g., IEEE-802.llx/802.15.3x) with television 131. Mobile terminal 110 may then request information from television 131 regarding the capabilities of the display screen of television 131.*
>
> *[0023] Assuming television 131 is a more desirable display than mobile terminal 110, mobile terminal 110 may relay the streaming video signal to television 131 via the short-range (or PAN) wireless communication link. This may be done automatically, or mobile terminal 110 may prompt the operator of mobile terminal 110 to select television 131 before relaying the video signal. Similarly, mobile terminal 110 may transmit a video signal over the short-range PAN connection to computer 134, projector 132, or any other remote device that has a display screen.*
>
> *[0031] In another example, mobile terminal 110 (not 201 as disclosed) may receive a video stream from a base station or access point of a home or office WLAN via WLAN transceiver 202 and may relay the video stream over a short distance to a remote display device via PAN transceiver 203. This may occur when the base station or access point in the office WLAN communicates with mobile terminal 110 using, for example, an IEEE-802.11x transceiver and the remote display communicates with mobile terminal 110 using, for example, a high data rate Bluetooth transceiver that is capable of supporting the required video data throughput. (emphasis added)*
>
> *[0033] Control processor 210 executes video/multimedia application program 290 in order to display video data on display 245. Control processor 210 executes video conversion program 270 in order to re-format (if necessary) the video data downloaded from server 150 through the*

one wireless interface (e.g., WAN transceiver 201) to a suitable format for re-transmission via another wireless interface (e.g., WLAN transceiver 202 or PAN transceiver 203). Additionally, video/multimedia application program 290 may retrieve video/multimedia data from video/multimedia file 280 and transmit a video stream to a remote device via a wireless interface. Advantageously, the wireless interface may have more than one connection at the same time. For example, PAN transceiver 203 may transmit video to television 131 while simultaneously communicating with wireless keyboard 240.

Regarding claim 6: **The display apparatus** (Figs. 1-3, Abstract, [0019]), **according to claim 5, wherein upon receiving an indication to receive the video information from an external device via the first radio communication circuit** (PAN transceiver 203), **the controller** (CONTROL PROCESSOR 210) **assigns connection of the first radio communication circuit** (PAN transceiver 203) **prior to connection of the second radio communication circuit** (WLAN transceiver 202. Tee teaches various setting in which video is received from a local camera via a short-range connection, such as the PAN transceiver 203 (first radio communication circuit) and is transmitted to base station 120 using the WLAN transceiver 202 (second radio communication circuit). The PHOSITA would have understood that the PAN connection should be provisioned before the WLAN connection. If there is no video data received by the PAN transceiver 203, there is nothing to relay via the WLAN transceiver 202. Accordingly, the PHOSITA would have been motivated to establish the PAN connection (e.g., to ensure the video stream is being effectively received) before establishing the WLAN connection—after it is confirmed that a video stream exists to relay via the WLAN connection.

[0023] Assuming television 131 is a more desirable display than mobile terminal 110, mobile terminal 110 may relay the streaming video signal to television 131 via the short-range (or PAN) wireless communication link. This may be done automatically, or mobile terminal 110 may prompt the operator of mobile terminal 110 to select television 131 before relaying the video signal. Similarly, mobile terminal 110 may transmit a video signal over the short-range PAN connection to computer 134, projector 132, or any other remote device that has a display screen.

[0038] Mobile terminal 110 then requests the capabilities of the remote display device and compares the capabilities of the remote display device and local display 245 (process step 315). Mobile terminal 110 may prompt the operator to select the remote display device (process step 320). Assuming the remote display device is selected, mobile terminal 110 then forwards (or relays or re-transmits) the video stream from base station 120 (or video/multimedia file 280) to the remote display device (process step 325). Optionally, mobile terminal 110 may wirelessly communicate with a remote user input device, such as keyboard 133 process step 330). Optionally, if video/multimedia application program 290 is a video conferencing application, mobile terminal 110 receives via the short-range air interface video/multimedia data from a remote video camera and relays the camera video data to base station 120 (process step 335).

Regarding claim 7: **The display apparatus** (Figs. 1-3, Abstract, [0019]), **according to claim 5, wherein, upon receiving an indication to receive the video information via the first radio communication circuit** (PAN transceiver 203) **while acquiring information from the internet via the second radio communication circuit** (WLAN transceiver 202), the controller (CONTROL PROCESSOR 210) **assigns connection of the first radio communication circuit** (PAN transceiver 203) **prior to connection of the second radio communication circuit** (WLAN transceiver 202. Tee teaches various setting in which video is received from a local camera via a short-range connection, such as the PAN transceiver 203 (first radio communication circuit)

and is transmitted to base station 120 using the WLAN transceiver 202 (second radio communication circuit). The PHOSITA would have understood that the PAN transceiver video connection is established first (e.g., to ensure the video stream is being effectively received) prior to the WLAN video connection - after it is confirmed that a video stream exists to relay via the WLAN connection. If there is no video data received by the PAN transceiver 203, there is nothing to relay via the WLAN transceiver 202.

> *[0023] Assuming television 131 is a more desirable display than mobile terminal 110, mobile terminal 110 may relay the streaming video signal to television 131 via the short-range (or PAN) wireless communication link. This may be done automatically, or mobile terminal 110 may prompt the operator of mobile terminal 110 to select television 131 before relaying the video signal. Similarly, mobile terminal 110 may transmit a video signal over the short-range PAN connection to computer 134, projector 132, or any other remote device that has a display screen.*

> *[0038] Mobile terminal 110 then requests the capabilities of the remote display device and compares the capabilities of the remote display device and local display 245 (process step 315). Mobile terminal 110 may prompt the operator to select the remote display device (process step 320). Assuming the remote display device is selected, mobile terminal 110 then forwards (or relays or re-transmits) the video stream from base station 120 (or video/multimedia file 280) to the remote display device (process step 325). Optionally, mobile terminal 110 may wirelessly communicate with a remote user input device, such as keyboard 133 process step 330). Optionally, if video/multimedia application program 290 is a video conferencing application, mobile terminal 110 receives via the short-range air interface video/multimedia data from a remote video camera and relays the camera video data to base station 120 (process step 335).*

Regarding claim 8: **The display apparatus** (Figs. 1-3, Abstract, [0019]), **according to claim 5, further comprising a radio interface** (WAN X-CVR 201, Fig. 2 or referred as WAN transceiver 201 in the specification) **capable of**

receiving video information by radio (Tee teaches that video files may be downloaded via the WAN transceiver 201. ¶¶[0030], [0037] Downloading is a well-understood term that suggests both receiving and storing information. Tee also teaches that the WAN transceiver 201 may be based on software-defined radio ¶[0028]. Accordingly, the PHOSITA would have understood that the WAN transceiver 201 is capable of receiving video information by radio), **wherein the display device** (Figs. 1-2) **is further capable of displaying the video information received via the radio interface** (WAN transceiver 201).

> *[0027] In the exemplary embodiment, control processor 210 uses WAN transceiver 201 to communicate over a wide area network. For example, WAN transceiver 201 may be a GSM/GPRS/EDGE transceiver, a CDMA2000/lxEV-DO transceiver, or an IEEE-802.16x transceiver that communicates with base station 120 of a wide-area network. Control processor 210 may use WLAN transceiver 202 to communicate in a wireless local area network (WLAN) environment, such as an office WLAN that may have a coverage area or range of several hundred feet. By way of example, WLAN transceiver 202 may be an IEEE-802.1 lx transceiver. Control processor 210 may use PAN transceiver 203 to communicate in a personal area network (PAN) environment, such as a Bluetooth or IEEE-802.15.3 communication link that may have a coverage area or range around 10-20 meters.*

> *[0028] ... Advantageously, one or more of transceivers 201-203 may be based on software-defined radio (SDR) technology and therefore maybe capable of communicating according to more than one wireless interface standard.*

Regarding claim 9: **A method for video processing** (the Abstract, Figs. 1-3), **comprising:**

receiving video information via an optical system by an imaging circuit;

Tee does teach that the mobile terminal 110 is used for capture video and then relay that video to an external display, allowing the camera phone to be used for video conference:

> [0018] *An exemplary mobile terminal may be used for mobile communications and as a gateway for a short-range wireless network, also called a personal area network (PAN). The mobile terminal may support a variety of mobile applications, including voice, multimedia (i.e., video, graphics, text, and audio downloads), video conferencing, web browsing, file download, VPN and Internet gaming. Advantageously, when the mobile terminal is near a higher quality display (e.g., a TV screen), the mobile terminal relays its video data to the external display device as well as to its internal display. This enables the operator of the mobile terminal to view the information on the higher quality display device, and to share the displayed information with other people at the same location, e.g., in a video conference call, or watching the latest broadcasting and streaming of News or events of common interests. Note that in the latter example, the source of information could be a remote Internet web server instead of a conventional TV broadcasting station. A remote Internet web server does not have the same geographical coverage limit as a conventional TV broadcasting station. In the case of group video conferencing using, for example, a digital camera phone, it would be more practical and ergonomically correct to have the received video data displayed on an external screen, while the phone camera captures and transmits the local user images.*

Therefore, the PHOSITA would have understood that an imaging circuit capable of receiving video information via an optical system is fundamental to digital cameras. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have include the imaging circuit capable of receiving video information via an optical system in order to support a video

conference application and to convert captured video signal into a digital representation.

accumulating (MEMORY 215) **video information received by the imaging circuit** (The MEMORY 215 stores video in VIDEO/MULTIMEDIA FILE 280. The PHOSITA would have understood that the images captured by Tee's imaging circuit are stored memory 215 - even if just temporarily (e.g., buffered) prior to relaying the images to a remote destination in support of the video conference application. It was well understood that prior to transmitting video data over any wireless network for video streaming, it was necessary to store that video data in a buffer (e.g., a temporary storage location for information to be sent) prior to transmission in order to correctly format and compress the video for transmission):

> *[0025] FIG. 2 illustrates exemplary mobile terminal 110 in greater detail according to an exemplary embodiment of the disclosure. Mobile terminal 110 comprises wide-area network (WAN) transceiver (X-CVR) 201, wireless local area network (WLAN) transceiver (X-CVR) 202, and personal area network (PAN) transceiver (X-CVR) 203. In an embodiment, only one of WLAN transceiver 202 and PAN transceiver 203 may be employed. Mobile terminal 110 also comprises control processor 210, memory [redacted], speaker 225, microphone 230, input/output interface (I/O IF) 235, keypad 240 and display 245. Memory [redacted] stores basic operating system (OS) program 250, display select program 260, video conversion program 270, video/multimedia file 280, and one or more video application programs 290. Display select program 260 comprises local display parameters file 261 and remote display parameters file 262.*
>
> *[0033] Control processor 210 executes video/multimedia application program 290 in order to display video data on display 245. Control processor 210 executes video conversion program 270 in order to re-format*

(if necessary) the video data downloaded from server 150 through the one wireless interface (e.g., WAN transceiver 201) to a suitable format for re-transmission via another wireless interface (e.g., WLAN transceiver 202 or PAN transceiver 203). Additionally, video/multimedia application program 290 may retrieve video/multimedia data from video/multimedia file 280 and transmit a video stream to a remote device via a wireless interface. Advantageously, the wireless interface may have more than one connection at the same time. For example, PAN transceiver 203 may transmit video to television 131 while simultaneously communicating with wireless keyboard 240.

transmitting the video information to an external device by radio, via a first radio communication circuit (PAN transceiver 203, Tee teaches the PAN transceiver 203 may be based on software-defined radio. Accordingly, a PHOSITA would have understood that Tee's PAN transceiver 203 is capable of transmitting video information by radio or receiving information by radio);

[0027] *Control processor 210 may use PAN transceiver 203 to communicate in a personal area network (PAN) environment, such as a Bluetooth or IEEE-802.15.3 communication link that may have a coverage of around 10-20 meters.*

[0028] ... Advantageously, one or more of transceivers 201-203 may be based on software-defined radio (SDR) technology and therefore maybe capable of communicating according to more than one wireless interface standard.

[0031] *In another example, mobile terminal 110 (not 201 as disclosed) may receive a video stream from a base station or access point of a home or office WLAN via WLAN transceiver 202 and may relay the video stream over a short distance to a remote display device via PAN transceiver 203....* (emphasis added)

[0032] *In a third example, mobile terminal 110 (not 201 as disclosed) may receive a video stream from a base station, an access point, or a video*

source device via PAN transceiver 203 and may relay the video stream over a short distance to a remote display device via WLAN transceiver 202... (emphasis added)

and

connecting, by radio, to an internet or a home network to transmit and receive information, via a second radio communication circuit (WLAN transceiver 202, WLANs were a well-known radio communication technology and Tee also teaches WLAN transceiver 202 maybe based on software-defined radio (SDR). Accordingly, a PHOSITA would have understood that Tee's WLAN transceiver 202 is a radio communication circuit):

[0027] ... *Control processor 210 may use WLAN transceiver 202 to communicate in a wireless local area network (WLAN) environment, such as an office WLAN that may have a coverage area or range of several hundred feet. By way of example, WLAN transceiver 202 may be an IEEE-802.1 lx transceiver...*

[0028] ... Advantageously, one or more of transceivers 201-203 may be based on software-defined radio (SDR) technology and therefore maybe capable of communicating according to more than one wireless interface standard.

wherein assignment of connection for each of the first and second radio communication circuit (PAN transceiver 203 and WLAN transceiver 202) **is controlled** (CONTROL PROCESSOR 210) **in response to receiving an indication from a user** ¶[0037];

Tee discloses:

[0026] ... *Control processor 210 executes basic OS program 250 in order to control, among other things, transceivers 201, 202, and 203...*

> [0027] … *Control processor 210 may use WLAN transceiver 202 to communicate in a wireless local area network (WLAN) environment* …
>
> *[0037] … FIG. 3 depicts flow diagram 300, which illustrates the operation of exemplary mobile terminal 110 and a remote display device according to one embodiment of the disclosure. Initially, mobile terminal 110 accesses base station 120 via air interface (e.g., transceiver 201 or 202) and initiates a video/multimedia download from server 150 (process step 305). Alternatively, mobile terminal 110 may play back video/multimedia data stored in video/multimedia file 280. At some point, mobile terminal 110 detects the presence of a remote display device (e.g., television 131) via another air interface (e.g., transceiver 202 or 203) and establishes a wireless link with the remote display device (process step 310), with the authorization of the mobile terminal user.*

Base on Tee's disclosure, the PHOSITA would have understood that the CONTROL PROCESSOR 210 control assignment of connection for each of the first and second radio communication circuit (WLAN transceiver 202 and PAN transceiver 203). Besides, Fig. 2 shows WLAN transceiver 202 and PAN transceiver 203 each has a direct connection with the CONTROL PROCESSOR 210, thus, the CONTROL PROCESSOR 210 is necessary responsible for assigning both the WLAN transceiver 202 and PAN transceiver 203 connection;

and wherein the transmitting and connecting is controlled so that the first radio communication circuit (PAN transceiver 203) **is configured to transmit video information and the second radio communication circuit** (WLAN transceiver 202) **is configured to connect to the internet or the home network simultaneously** (Tee teaches that the process of relaying a

video stream to an external device is an alternative to watching the stream on the mobile terminal, the PHOSITA would have understood that "relaying" the described "video stream" would have involved simultaneously (1) receiving a video "stream" via the WLAN connection and (2) transmitting the video "stream" to a remote display device via the PAN connection).

> *[0022] According to an advantageous embodiment, mobile terminal 110 may relay a video stream to a remote device in order to allow the operator of mobile terminal 110 to view the video on a better display. By way of example, mobile terminal 110 may be receiving streaming video data from server 150 via IP network 140 and base station 120. The streaming video is displayed on the display of mobile terminal 110. At some point, mobile terminal 110 may be located near to television 131 and establish a wireless communication link via the short-range wireless protocol (e.g., IEEE-802.llx/802.15.3x) with television 131. Mobile terminal 110 may then request information from television 131 regarding the capabilities of the display screen of television 131.*
>
> *[0023] Assuming television 131 is a more desirable display than mobile terminal 110, mobile terminal 110 may relay the streaming video signal to television 131 via the short-range (or PAN) wireless communication link. This may be done automatically, or mobile terminal 110 may prompt the operator of mobile terminal 110 to select television 131 before relaying the video signal. Similarly, mobile terminal 110 may transmit a video signal over the short-range PAN connection to computer 134, projector 132, or any other remote device that has a display screen.*
>
> *[0031] In another example, mobile terminal 110 (not 201 as disclosed) may receive a video stream from a base station or access point of a home or office WLAN via WLAN transceiver 202 and may relay the video stream over a short distance to a remote display device via PAN transceiver 203. This may occur when the base station or access point in the office WLAN communicates with mobile terminal 110 using, for example, an IEEE-802.11x transceiver and the remote display communicates with mobile terminal 110 using, for example, a high data rate Bluetooth transceiver that is capable of supporting the required video data throughput. (emphasis added)*

[0033] Control processor 210 executes video/multimedia application program 290 in order to display video data on display 245. Control processor 210 executes video conversion program 270 in order to re-format (if necessary) the video data downloaded from server 150 through the one wireless interface (e.g., WAN transceiver 201) to a suitable format for re-transmission via another wireless interface (e.g., WLAN transceiver 202 or PAN transceiver 203). Additionally, video/multimedia application program 290 may retrieve video/multimedia data from video/multimedia file 280 and transmit a video stream to a remote device via a wireless interface. Advantageously, the wireless interface may have more than one connection at the same time. For example, PAN transceiver 203 may transmit video to television 131 while simultaneously communicating with wireless keyboard 240.

Regarding claim 10: **A method, comprising:**

receiving video information by radio, via a first radio communication circuit (PAN X-CVR 203, Fig. 2 or refereed as PAN transceiver 203 in the specification, Tee teaches the PAN transceiver 203 may be based on software-defined radio. Accordingly, a PHOSITA would have understood that Tee's PAN transceiver 203 is capable of transmitting video information by radio or receiving information by radio);

[0027] *Control processor 210 may use PAN transceiver 203 to communicate in a personal area network (PAN) environment, such as a Bluetooth or IEEE-802.15.3 communication link that may have a coverage of around 10-20 meters.*

[0028] … Advantageously, one or more of transceivers 201-203 may be based on software-defined radio (SDR) technology and therefore maybe capable of communicating according to more than one wireless interface standard.

[0031] *In another example, mobile terminal 110 (not 201 as disclosed) may receive a video stream from a base station or access point of a home*

or office WLAN via WLAN transceiver 202 and may relay the video stream over a short distance to a remote display device via PAN transceiver 203…. (emphasis added)

[0032] *In a third example, mobile terminal 110 (not 201 as disclosed) may receive a video stream from a base station, an access point, or a video source device via PAN transceiver 203 and may relay the video stream over a short distance to a remote display device via WLAN transceiver 202…* (emphasis added)

and connecting by radio to an internet or a home network to transmit and receive information, via a second radio communication circuit (WLAN X-CVR 202, Fig. 2 or referred as WLAN transceiver 202 in the specification. WLANs were a well-known radio communication technology and Tee also teaches WLAN transceiver 202 maybe based on software-defined radio (SDR). Accordingly, a PHOSITA would have understood that Tee's WLAN transceiver 202 is a radio communication circuit):

[0027] … *Control processor 210 may use WLAN transceiver 202 to communicate in a wireless local area network (WLAN) environment, such as an office WLAN that may have a coverage area or range of several hundred feet. By way of example, WLAN transceiver 202 may be an IEEE-802.1 lx transceiver…*

[0028] … Advantageously, one or more of transceivers 201-203 may be based on software-defined radio (SDR) technology and therefore maybe capable of communicating according to more than one wireless interface standard.

and

displaying, via a display circuit (DISPLAY 245), **information received by the first radio communication circuit** (PAN transceiver 203) **or the second radio communication circuit** (WLAN transceiver 202)(While Tee's

teaches receiving video via one wireless interface and relaying that video to an external display via a second wireless interface, the PHOSITA would have understood that the wirelessly received video could instead be displayed on the DISPLAY 245. The DISPLAY 245 is used unless there is a better external display available that the user selects. Accordingly, the PHOSITA would have understood that Tee's DISPLAY 245 is capable of displaying video received via PAN transceiver 203 and WLAN transceiver 202. Moreover, as shown in Fig. 2, the first and second communication circuits (PAN transceiver 203 and WLAN transceiver 202) are connected to the display (DISPLAY 245) via the CONTROL PROCESSOR 210, thus it's reasonable to understood that the DISPLAY 245 is capable of displaying the information received by the first and second radio communication circuits (PAN transceiver 203 and WLAN transceiver 202);

> *[0033] Control processor 210 executes video/multimedia application program 290 in order to display video data on display 245. Control processor 210 executes video conversion program 270 in order to re-format (if necessary) the video data downloaded from server 150 through the one wireless interface (e.g., WAN transceiver 201) to a suitable format for re-transmission via another wireless interface (e.g., WLAN transceiver 202 or PAN transceiver 203). Additionally, video/multimedia application program 290 may retrieve video/multimedia data from video/multimedia file 280 and transmit a video stream to a remote device via a wireless interface. Advantageously, the wireless interface may have more than one connection at the same time. For example, PAN transceiver 203 may transmit video to television 131 while simultaneously communicating with wireless keyboard 240.*

wherein assignment of connection for each of the first and second radio communication circuit (PAN transceiver 203 and WLAN transceiver

202) **is controlled in response to receiving an indication from a user**

¶[0037];

Tee discloses:

> [0026] … *Control processor 210 executes basic OS program 250 in order to control, among other things, transceivers 201, 202, and 203…*
>
> *[0037] … FIG. 3 depicts flow diagram 300, which illustrates the operation of exemplary mobile terminal 110 and a remote display device according to one embodiment of the disclosure. Initially, mobile terminal 110 accesses base station 120 via air interface (e.g., transceiver 201 or 202) and initiates a video/multimedia download from server 150 (process step 305). Alternatively, mobile terminal 110 may play back video/multimedia data stored in video/multimedia file 280. At some point, mobile terminal 110 detects the presence of a remote display device (e.g., television 131) via another air interface (e.g., transceiver 202 or 203) and establishes a wireless link with the remote display device (process step 310), with the authorization of the mobile terminal user.*

Base on Tee's disclosure, the PHOSITA would have understood that the CONTROL PROCESSOR 210 control assignment of connection for each of the first and second radio communication circuit (WLAN transceiver 202 and PAN transceiver 203). Besides, Fig. 2 shows WLAN transceiver 202 and PAN transceiver 203 each has a direct connection with the CONTROL PROCESSOR 210, thus, the CONTROL PROCESSOR 210 is necessary responsible for assigning both the WLAN transceiver 202 and PAN transceiver 203 connection.

and

wherein the receiving and connecting is controlled (CONTROL PROCESSOR 210) **so that the first radio communication circuit** (PAN

transceiver 203) **is configured to receive video information and the second radio communication circuit** (WLAN transceiver 202) **is configured to connect to the internet or the home network simultaneously** (Tee teaches that the process of relaying a video stream to an external device is an alternative to watching the stream on the mobile terminal. The PHOSITA would have understood that "relaying" the described "video stream" would have involved simultaneously (1) receiving a video "stream" via the WLAN connection and (2) transmitting the video "stream" to a remote display device via the PAN connection).

> *[0022] According to an advantageous embodiment, mobile terminal 110 may relay a video stream to a remote device in order to allow the operator of mobile terminal 110 to view the video on a better display. By way of example, mobile terminal 110 may be receiving streaming video data from server 150 via IP network 140 and base station 120. The streaming video is displayed on the display of mobile terminal 110. At some point, mobile terminal 110 may be located near to television 131 and establish a wireless communication link via the short-range wireless protocol (e.g., IEEE-802.11x/802.15.3x) with television 131. Mobile terminal 110 may then request information from television 131 regarding the capabilities of the display screen of television 131.*
>
> *[0023] Assuming television 131 is a more desirable display than mobile terminal 110, mobile terminal 110 may relay the streaming video signal to television 131 via the short-range (or PAN) wireless communication link. This may be done automatically, or mobile terminal 110 may prompt the operator of mobile terminal 110 to select television 131 before relaying the video signal. Similarly, mobile terminal 110 may transmit a video signal over the short-range PAN connection to computer 134, projector 132, or any other remote device that has a display screen.*
>
> *[0031] In another example, mobile terminal 110 (not 201 as disclosed) may receive a video stream from a base station or access point of a home or office WLAN via WLAN transceiver 202 and may relay the video stream over a short distance to a remote display device via PAN transceiver 203.*

This may occur when the base station or access point in the office WLAN communicates with mobile terminal 110 using, for example, an IEEE-802.11x transceiver and the remote display communicates with mobile terminal 110 using, for example, a high data rate Bluetooth transceiver that is capable of supporting the required video data throughput. (emphasis added)

[0033] Control processor 210 executes video/multimedia application program 290 in order to display video data on display 245. Control processor 210 executes video conversion program 270 in order to re-format (if necessary) the video data downloaded from server 150 through the one wireless interface (e.g., WAN transceiver 201) to a suitable format for re-transmission via another wireless interface (e.g., WLAN transceiver 202 or PAN transceiver 203). Additionally, video/multimedia application program 290 may retrieve video/multimedia data from video/multimedia file 280 and transmit a video stream to a remote device via a wireless interface. Advantageously, the wireless interface may have more than one connection at the same time. For example, PAN transceiver 203 may transmit video to television 131 while simultaneously communicating with wireless keyboard 240.

Issue 2: Tee in view of Honkanen

Claims 2-3 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Tee in view of Honkanen.

Regarding claim 2: **The video processing apparatus according to claim 1, wherein, upon receiving an indication to transmit video information accumulated in the accumulation circuit via the first radio communication circuit, the controller assigns connection of the first radio communication circuit prior to connection of the second radio communication circuit**.

As noted above, Tee teaches various setting in which video is received from a local camera via a short-range connection, such as the PAN transceiver 203 (first radio communication circuit) and is transmitted to base station 120 using the WLAN transceiver 202 (second radio communication circuit). The PHOSITA would have understood that the PAN transceiver video connection is established first (e.g., to ensure the video stream is being effectively received) prior to the WLAN video connection - after it is confirmed that a video stream exists to relay via the WLAN connection, such that both connections are simultaneously.

> *[0023] Assuming television 131 is a more desirable display than mobile terminal 110, mobile terminal 110 may relay the streaming video signal to television 131 via the short-range (or PAN) wireless communication link. This may be done automatically, or mobile terminal 110 may prompt the operator of mobile terminal 110 to select television 131 before relaying the video signal. Similarly, mobile terminal 110 may transmit a video signal over the short-range PAN connection to computer 134, projector 132, or any other remote device that has a display screen.*

> *[0038] Mobile terminal 110 then requests the capabilities of the remote display device and compares the capabilities of the remote display device and local display 245 (process step 315). Mobile terminal 110 may prompt the operator to select the remote display device (process step 320). Assuming the remote display device is selected, mobile terminal 110 then forwards (or relays or re-transmits) the video stream from base station 120 (or video/multimedia file 280) to the remote display device (process step 325). Optionally, mobile terminal 110 may wirelessly communicate with a remote user input device, such as keyboard 133 process step 330). Optionally, if video/multimedia application program 290 is a video conferencing application, mobile terminal 110 receives via the short-range air interface video/multimedia data from a remote video camera and relays the camera video data to base station 120 (process step 335).*

If not inherent by Tee, Examiner finds that Honkanen discloses a method of allocating radio resources for simultaneous radio connections to minimize interference. The PHOSITA would have been motivated to minimize interference when establishing a Bluetooth (PAN) connection for simultaneous communications with the existing WiFi connection (WLAN) and would further have been motivated to ensure the Bluetooth connection takes priority such that the video stream relayed to the external monitor via the PAN/Bluetooth connection experiences sufficiently high fidelity. The PHOSITA would thus have been motivated to modify Tee's wireless mobile terminal by programming Tee's control processor 210 to implement the functionality provided by Honkanen's multi-radio controller, such that, when there is an active WLAN connection over which video is received and the user requests the video be relayed to an external display via the PAN transceiver, the system allocates the PAN connection and then re-allocates the WLAN connection with parameters designed to minimize interference (e.g., lowering the WLAN transmission power). One having ordinary skill in the art would do so to ensuring that a consistent and high-quality video stream is relayed to the external display in order to support both connections and minimizing interference.

Regarding claim 3: **The video processing apparatus according to claim 1, wherein, upon receiving an indication to transmit video information accumulated in the accumulation circuit via the first**

radio communication circuit while acquiring information from the internet via the second radio communication circuit, the controller assigns connection of the first radio communication circuit prior to connection of the second radio communication circuit.

As noted above, Tee teaches various setting in which video is received from a local camera via a short-range connection, such as the PAN transceiver 203 (first radio communication circuit) and is transmitted to base station 120 using the WLAN transceiver 202 (second radio communication circuit). The PHOSITA would have understood that the PAN transceiver video connection is established first (e.g., to ensure the video stream is being effectively received) prior to the WLAN video connection - after it is confirmed that a video stream exists to relay via the WLAN connection, such that both connections are simultaneously.

> *[0023] Assuming television 131 is a more desirable display than mobile terminal 110, mobile terminal 110 may relay the streaming video signal to television 131 via the short-range (or PAN) wireless communication link. This may be done automatically, or mobile terminal 110 may prompt the operator of mobile terminal 110 to select television 131 before relaying the video signal. Similarly, mobile terminal 110 may transmit a video signal over the short-range PAN connection to computer 134, projector 132, or any other remote device that has a display screen.*

> *[0038] Mobile terminal 110 then requests the capabilities of the remote display device and compares the capabilities of the remote display device and local display 245 (process step 315). Mobile terminal 110 may prompt the operator to select the remote display device (process step 320). Assuming the remote display device is selected, mobile terminal 110 then forwards (or relays or re-transmits) the video stream from base station 120 (or video/multimedia file 280) to the remote display device (process step*

> *325). Optionally, mobile terminal 110 may wirelessly communicate with a remote user input device, such as keyboard 133 process step 330). Optionally, if video/multimedia application program 290 is a video conferencing application, mobile terminal 110 receives via the short-range air interface video/multimedia data from a remote video camera and relays the camera video data to base station 120 (process step 335).*

If not inherent by Tee, Examiner finds that Honkanen discloses a method of allocating radio resources for simultaneous radio connections to minimize interference. The PHOSITA would have been motivated to minimize interference when establishing a Bluetooth (PAN) connection for simultaneous communications with the existing WiFi connection (WLAN) and would further have been motivated to ensure the Bluetooth connection takes priority such that the video stream relayed to the external monitor via the PAN/Bluetooth connection experiences sufficiently high fidelity. It would have been obvious to implement Honkanen's interference mitigation process in Tee's mobile terminal such that, when there is an active WLAN connection over which video is received and the user requests the video be relayed to an external display via the PAN transceiver, the system first provisions the PAN connection and then re-provisions the WLAN connection with parameters designed to minimize interference (e.g., lowering the WLAN transmission power).

X. INFORMATION DISCLOSURE STATEMENT

The IDS submission of 05/05/2021 has been considered. It is to be noted, however, that where patents, publications, and other such items of information are submitted in compliance with the requirements of the rules, the requisite degree of consideration to be given to such information will be limited by the degree to which a requester has explained the content and relevance of the information. In instances where no explanation of citations (items of information) is required and none is provided for an information citation, only a cursory review of that information is required. The examiner need only perform a cursory evaluation of each unexplained item of information, to the extent that he/she needs in order to determine whether he/she will evaluate the item further. If the cursory evaluation reveals the item not to be useful, the examiner may simply stop looking at it. This review may often take the form of considering the documents in the same manner as other documents in Office search files are considered by the examiner while conducting a search of the prior art in a proper field of search. The initials of the examiner, in this proceeding, placed adjacent to the citations on the PTO-1449 or PTO/SB/08A and 08B or its equivalent, without an indication in the record to the contrary in the record, do not signify that the information has been considered by the examiner any further than to the extent noted above. See MPEP 609, seventh paragraph, Revision 5, Aug. 2006 [page 600-141].

XI. DUTY TO DISCLOSE

The Patent Owner is reminded of the continuing responsibility under 37 C.F.R. § 1.565(a) to apprise the Office of any litigation activity, or other prior or concurrent proceeding, throughout the course of this reexamination proceeding involving the '590 Patent. The Third Party Requester is also reminded of the ability to similarly apprise the Office of any such activity or proceeding throughout the course of this reexamination proceeding. See MPEP §§2207, 2282 and 2286.

XII. SERVICE OF PAPERS

After the filing of a request for reexamination by a Third Party Requester, any document filed by either the Patent Owner or the Third Party Requester must be served on the other party (or parties where two or more third party requester proceedings are merged) in the reexamination proceeding in the manner provided in 37 CFR 1.248 (See 37 CFR 1.550).

XIII. CONCLUSION

Claims 1-10 are rejected.

Extensions of time under 37 C.F.R. §1.136(a) will not be permitted in these proceedings because the provisions of 37 C.F.R. §1.136 apply only to "an Patent Owner" and not to parties in a reexamination proceeding. Additionally, 35 U.S.C. §305 requires that reexamination proceedings "will be conducted with special dispatch" (37 C.F.R. §1.550(a)). Extension of time in

reexamination proceedings are provided for in 37 C.F.R. §1.550(c). After the filing of a request for reexamination by a third party requester, any document filed by either the patent owner of the third party requester must be served on the other party (or parties where two or more third-party-requester proceedings are merged) in the reexamination proceeding in the manner provided in 37 C.F.R. §1.248. See 37 C.F.R. §1.550(f).

Any inquiry concerning this communication or earlier communications from the Reexamination Legal Advisor or Examiner, or as to the status of this proceeding, should be directed to the Central Reexamination Unit at telephone number (571) 272-7705.

Signed:

/MY TRANG TON/
Primary Examiner, Art Unit 3992

Conferees:

/KENNETH WHITTINGTON/
Primary Examiner, Art Unit 3992

/ANDREW J. FISCHER/
Supervisory Patent Reexamination Specialist, Art Unit 3992

Reexamination	Application/Control No.	Applicant(s)/Patent Under Reexamination
	90/014,651	10129590
	Certificate Date	Certificate Number

Requester Correspondence Address: ☐ Patent Owner ☑ Third Party
ERISE IP, P.A. (GENERAL) 7015 COLLEGE BLVD. , SUITE 700 OVERLAND PARK, KS 66211

LITIGATION REVIEW ☑	mt (examiner initials)	25 June 2021 (date)
Case Name		Director Initials
Maxell, Ltd, V. Apple Inc. (6:20cv646) (open)		

COPENDING OFFICE PROCEEDINGS	
TYPE OF PROCEEDING	NUMBER
N/a	

Doc Code: IDS
Document Description: Information Disclosure Statement filed

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Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office; U. S. DEPARTMENT OF COMMERCE
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37 CFR 1.501 INFORMATION DISCLOSURE CITATION IN A PATENT

(Sheet 1 of 3)

Docket Number (Optional)	Patent Number
009379.00009\US	10,129,590
Applicant	
Issue Date	Art Unit
November 13, 2018	3992

U.S. PATENT DOCUMENTS

EXAMINER INITIAL	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
/M.T/	2004/0045030	03-04-2004	Reynolds et al.	725	110	09-26-2002
	2004/0048572	03-11-2004	Godfrey	455	41.2	05-23-2003
	2004/0077313	04-22-2004	Oba et al.	455	41.2	11-10-2003
	2005/0013694	01-20-2005	Kovalsky et al.	416	226	07-16-2003
	2005/0014532	01-20-2005	Immendorf et al.	455	557	07-15-2003
	2005/0062945	03-24-2005	Shin-Pin	353	122	11-01-2004
	2005/0064860	03-24-2005	DeLine	455	420	09-05-2003
	2005/0130586	06-16-2005	Gnuschke et al.	455	3.06	11-15-2004
	2006/0025674	02-02-2006	Kiraly et al.	600	410	07-29-2005
	2006/0072757	04-06-2006	Renkis	380	270	09-24-2004
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	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION YES	TRANSLATION NO
/M.T/	2007/069210	06-21-2007	World Intellectual Property Organization (WIPO)				√
	2007/091202	08-16-2007	World Intellectual Property Organization (WIPO)				√
	1893654	01-10-2007	China			√	
	0771095	05-02-1997	European Patent Office				√
/M.T/	1708467	10-04-2006	European Patent Office				√

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/M.T/		JOHANSSON, P., et al., Bluetooth: An Enabler for Personal Area Networking, IEEE Network, (~~January~~ September/October 2001).
/M.T/		FIELDING, R. et. al., Hypertext Transfer Protocol --HTTP/1.2 RFC2068, (January 1997).
/M.T/		Mac G5 User's Guide, Copyright 2005.

EXAMINER	/MY TRANG TON/	DATE CONSIDERED	06/24/2021

Doc Code: IDS
Document Description: Information Disclosure Statement filed

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37 CFR 1.501 INFORMATION DISCLOSURE CITATION IN A PATENT

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009379.00009\US	10,129,590
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Issue Date	Art Unit
November 13, 2018	3992

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EXAMINER INITIAL	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
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	2007/0070960	03-29-2007	Barak et al.	370	338	09-27-2005
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/M.T/	1747616	01-06-2016	European Patent Office				√
	2003-333050	11-21-2003	Japan			√	
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/M.T/		BUSATTO, Fabio, TCP Keepalive HOWTO, TCP Keeplive Overview Rev. 1.0, (May 4, 2007).
/M.T/		Transmission Control Protocol, RFC 793, (Sept. 1981).

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37 CFR 1.501 INFORMATION DISCLOSURE CITATION IN A PATENT

(Sheet 3 of 3)

Docket Number (Optional)	Patent Number
009379.00009\US	10,129,590
Applicant	
Issue Date: November 13, 2018	Art Unit: 3992

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EXAMINER INITIAL	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
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/M.T/	2008/072057	06-19-2008	World Intellectual Property Organization (WIPO)				√

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/M.T/		FCC Part 15 Test Report for the Apple Airport Extreme and Bluetooth 2.0+EDR Module, (March 31, 2005).

EXAMINER	/MY TRANG TON/	DATE CONSIDERED	06/24/2021

Doc Code: IDS
Document Description: Information Disclosure Statement filed

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Applicant	
Issue Date	Art Unit
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	1708467	10-04-2006	European Patent Office				√

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EXAMINER	DATE CONSIDERED

Doc Code: IDS
Document Description: Information Disclosure Statement filed

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37 CFR 1.501 INFORMATION DISCLOSURE CITATION IN A PATENT (Sheet 2 of 3)	Docket Number (Optional) 009379.00009\US	Patent Number 10,129,590
	Applicant	
	Issue Date November 13, 2018	Art Unit 3992

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	2003-333050	11-21-2003	Japan			√	
	2004-222136	08-05-2004	Japan			√	
	2006-050549	02-16-2006	Japan			√	
	2009-503926	01-29-2009	Japan			√	

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	—	Transmission Control Protocol, RFC 793, (Sept. 1981).

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(Sheet 3 of 3)

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	7,787,882	08-31-2010	Feher	455	440	03-28-2008
	7,970,350	06-28-2011	Sheynman et al.	455	41.1	10-31-2007
	7,978,774	07-12-2011	Feher	375	260	10-21-2007
	7,983,678	07-19-2011	Feher	455	440	12-05-2010
	8,045,922	10-25-2011	Sherman et al.	455	41.2	11-23-2007
	8,306,525	11-06-2012	Feher	455	420	05-16-2012
	8,311,509	11-13-2012	Feher	455	404.2	10-31-2007
	8,693,950	04-08-2014	Desai	455	41.2	03-23-2006
	9,344,237	05-17-2016	Margulis	1	1	05-09-2014

FOREIGN PATENT DOCUMENTS

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	2007/010444	01-25-2007	World Intellectual Property Organization (WIPO)				√
	2008/072057	06-19-2008	World Intellectual Property Organization (WIPO)				√

OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)

		FCC Part 15 Test Report for the Apple Airport Extreme and Bluetooth 2.0+EDR Module, (March 31, 2005).

EXAMINER	DATE CONSIDERED

Electronic Acknowledgement Receipt

EFS ID:	42646453
Application Number:	90014651
International Application Number:	
Confirmation Number:	7485
Title of Invention:	DISPLAY APPARATUS AND VIDEO PROCESSING APPARATUS
First Named Inventor/Applicant Name:	10129590
Customer Number:	177632
Filer:	Scott M Kelly/Brooklyn Grossbard
Filer Authorized By:	Scott M Kelly
Attorney Docket Number:	2638-19.08
Receipt Date:	05-MAY-2021
Filing Date:	12-JAN-2021
Time Stamp:	16:25:38
Application Type:	Reexam (Patent Owner)

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	Foreign Reference	WO2007069210A2_21222404.pdf	848363 6a8419589f0aff8fc7e818776997dbaf5292ed07	no	20

Warnings:

Information:					
2	Foreign Reference	WO2007091202A2_21222412.pdf	1050820 87d7d**894cb123ea8429bac1c93cdff7**5b8f637029	no	21
Warnings:					
Information:					
3	Foreign Reference	CN1893654A_21222414.pdf	1640189 8d8cd**fa811e7266b2e66**f1152f2aef0a6f1a92af	no	31
Warnings:					
Information:					
4	Foreign Reference	Translation_of_CN1893654A_21222453.pdf	395704 a49d1**f0e69191eca8d2debb3478716**b7093aeb53	no	19
Warnings:					
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5	Foreign Reference	EP0771095A2_21222481.pdf	698821 b6b7**5d019f545768f1978df768037e**dba30a7d34	no	12
Warnings:					
Information:					
6	Foreign Reference	EP1708467A1_21222489.pdf	364845 39361**bac**20fd**add84835aefc97c912**5dd020267f	no	16
Warnings:					
Information:					
7	Foreign Reference	EP1747616B1_21222491.pdf	548099 78abe**630f14247962576d7e296dd38**80aab6e6e5	no	28
Warnings:					
Information:					
8	Foreign Reference	JP2003333050A_21222492.pdf	1241120 1c419**86436cc72097ebdf25**a92cc02fe121fae12	no	22
Warnings:					
Information:					

9	Foreign Reference	Translation_of_JP2003333050A_21222494.pdf	411234 fc6edc5cafff5f9055**725e2545868c19**c5aac6bd	no	24
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10	Foreign Reference	JP2004222136A_21222495.pdf	734005 063d**5435e918fc9a483ff1d3644343c**695d7**703a**	no	14
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Information:					
11	Foreign Reference	Translation_of_JP2004222136A_21222500.pdf	330330 a8458**b5b43efe8b4b3456c3f928d6a**0e44fb**7fa1**	no	9
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13	Foreign Reference	Translation_of_JP2006050549A_21222513.pdf	395076 0cf0b2fc50**28445b2346f3ad88aad26**fcc2ad**892**	no	18
Warnings:					
Information:					
14	Foreign Reference	JP2009503926A_21222517.pdf	598857 99f73**741a7e663eaad7a4cc14d6679**466fe4**6027**	no	16
Warnings:					
Information:					
15	Foreign Reference	Translation_of_JP2009503926A_21222528.pdf	329154 48a50**398f6f307a9a85f81ad3c4efcf**fed6a2f**6c**	no	10
Warnings:					
Information:					

16	Foreign Reference	KR20020016101A_21222532.pdf	483814 fd6673c7f29ce009d40356c81e5c80aff0f3e640	no	12
Warnings:					
Information:					
17	Foreign Reference	KR_20020016101_A_-_English_Translation_of_Application_21222551.PDF	383252 85fd087b1b6a079c6908c0bea069abe4fab6ff86	no	23
Warnings:					
Information:					
18	Foreign Reference	WO2007010444A1_21222543.pdf	855805 044fbcd6c870e2b0cde5440fbd4ceca07d313414	no	22
Warnings:					
Information:					
19	Foreign Reference	WO2008072057A2_21222546.pdf	3961147 e6496890c1964f8eb03088869760105d1255ad87	no	81
Warnings:					
Information:					
20	Non Patent Literature	JOHANSSON_P_et_al_Bluetooth_An_Enabler_for_Personal_Area_Networking_21222556.PDF	2117601 de9174edb3cb8dc314ae3e24fd8435f5089bcd3a	no	10
Warnings:					
Information:					
21	Non Patent Literature	FIELDING_R_et_al_Hypertext_Transfer_Protocol_--HTTP12_RFC2068_Ja_21222555.PDF	550458 8d9ceec6e3b832e7286a814b4b68d3b1376f8040	no	162
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Information:					
22	Non Patent Literature	Mac_G5_Users_Guide_Copyright_2005_21222581.PDF	2494382 36d0e345660991bf2d789a1963c041bc5584da29	no	96
Warnings:					
Information:					

23	Non Patent Literature	MacBook_Pro_Users_Guide_Copyright_2006_21222572.PDF	1695338 54ea54826b9b2360d2a79efbf2eaed9ddc40b7cc	no	144
Warnings:					
Information:					
24	Non Patent Literature	BUSATTO_Fabio_TCP_Keepalive_HOWTO_TCP_Keeplive_Overview_Rev_10_Ma_21222554.PDF	164832 7110e408651335275f815d8dd29b9401483 6fb6b	no	12
Warnings:					
Information:					
25	Non Patent Literature	Transmission_Control_Protocol_RFC_793_Sept_1981_21222560.PDF	163666 27bf1beea4f6577d8f56be89393af71f50da0ccf	no	89
Warnings:					
Information:					
26		Notice_of_Concurrent_Proceedings_00009_21224434.pdf	30515 249dfdff632286b3a3bad5ceede99cdd02754025	yes	4

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Notice of concurrent proceeding(s)	1	3
	Reexam Certificate of Service	4	4

Warnings:					
Information:					
27		Waiver_of_Optional_Patent_Owner_Statement_009379_21224435.pdf	21743 67423c3b99df7fdbf4c5077e383e230495f18364	yes	3

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Reexam Timely Patent Owner's Stmnt in Resp to Order	1	2
	Reexam Certificate of Service	3	3

Warnings:	
Information:	

28	Information Disclosure Statement (IDS) Form (SB08)	PTO_SB_42_21224436.pdf	36189 520aa7ccd5fb2fe5610e19e8bd42c2f972e172b8	no	3
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
29	Non Patent Literature	FCCPart15TestReport.pdf	2542318 b165549519f1192e955a27a456c8fce16b53c1e1	no	126
Warnings:					
Information:					
		Total Files Size (in bytes):	25937510		

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.

Docket No.: 009379.00009\US
(*EX PARTE* REEXAMINATION)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re *Ex parte* Reexamination of:
U.S. Patent No.: 10,129,590

Examiner: Ton, My Trang

Control No.: 90/014,651

Group Art Unit: 3992

Inventor: Toshiyuki Kurita et al.

Confirmation No.: 7485

Application Serial No.: 15/208,886
Filed: July 13, 2016
Issue Date: November 13, 2018

For: Display Apparatus And Video Processing Apparatus

NOTICE OF PRIOR AND CONCURRENT PROCEEDINGS, AND INFORMATION DISCLOSURE STATEMENT

Mail Stop *Ex Parte* Reexam
ATTN: Central Reexamination Unit
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Pursuant to 37 C.F.R. § 1.565, Patent Owner hereby provides notice of proceedings involving the subject '590 patent, both prior and concurrent. Further, pursuant to 37 C.F.R. § 1.555, the attention of the Office is hereby directed to the references listed in the attached Form PTO/SB/42. The listed references are not yet of record in this proceeding (e.g., as cited by Requester), or included among the "References Cited" on the subject patent. Pursuant to 37 C.F.R. § 1.98, copies of those of the listed references that are neither U.S. patents nor published applications are submitted.

The listed references were cited in documents from related proceedings, as identified below. Except as otherwise indicated, copies of the citing documents are not included, due to their voluminous and non-material argumentative nature (e.g., third party invalidity contentions).

This is believed to be consistent with MPEP 2282 addressing the notification requirement for prior and concurrent proceedings and providing that "papers filed in the court from litigations or other proceedings involving the patent will not be entered into the record (and will be expunged if already entered) if they provide a party's arguments."

I. USPTO Proceedings

A. *Apple v. Maxell*, IPR2021-00400 (PTAB, petition filed January 12, 2021).

1. Status: proceedings terminated pre-institution; joint motion to terminate filed April 8, 2021, pursuant to settlement agreement between the parties entered into on March 22, 2021. Joint motion granted and proceedings terminated by Board Decision entered April 9, 2021.

B. Application No. 12/260,410 (parent), now US 9,420,212.

C. Application No. 15/891,085 (child), now US 10,244,284.

D. Application No. 16/269,662 (child).

1. Pending, non-final Office action mailed March 18, 2021.

E. Application No. 16/269,724 (child).

1. Pending, non-final Office action mailed March 18, 2021.

F. Application No. 16/713,182 (child), now US 10,958,971.

G. Application No. 16/738,059 (child).

1. Pending, non-final Office action mailed March 18, 2021.

II. District Court and ITC Proceedings

A. *Maxell, Ltd. v. Apple Inc.*, 6-20-cv-00646 (WDTX).

1. Status: joint motion to dismiss filed March 24, 2021 pursuant to settlement agreement between the parties entered into on March 22, 2021. Joint motion to dismiss granted April 1, 2021 (case dismissed).

B. *In the Matter of: Certain Mobile Electronic Devices and Laptop Computers*, Investigation No. ITC-337-TA-1215.

1. Status: joint motion to terminate filed March 24, 2021 pursuant to settlement agreement between the parties (Complainant Maxell, Ltd. and Respondent Apple Inc.) entered into on March 22, 2021. Initial Determination

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Granting Joint Motion To Terminate Investigation Based On Settlement entered March 29, 2021.

2. Respondent Apple Inc.'s Disclosure of Invalidity Contentions served November 2, 2020.

3. Respondent Apple Inc.'s Disclosure of Second Supplemental Invalidity Contentions served January 21, 2021.

4. Expert Report of Dr. Michael Kotzin, Regarding Invalidity of U.S. Patent No. 10,129,590 served February 19, 2021.

III. Corresponding Foreign Applications/Patents[1]

A. Japanese Patent No. 5033598 [Japanese Patent Application No. 2007-306750].

B. Chinese Patent No. 104540008 [Chinese Patent Application No. 201410395041].

C. Chinese Patent No. 105407104 [Chinese Patent Application No. 201510969210].

D. Chinese Patent No. 101447902 [Chinese Patent Application No. 200810175595].

Patent Owner submits this information so that the Office may determine any materiality thereof to the claimed invention. It is respectfully requested that the listed references be formally considered during this reexamination and be made of record herein.

Respectfully submitted,

By: /Scott M Kelly/
Scott M. Kelly
Registration No. 65,121

BANNER & WITCOFF, LTD
1100 13th Street, N.W.
Suite 1200
Washington, D.C. 20005
(202) 824-3000
(202) 824-3001 Fax

Dated: May 5, 2021

[1] As shown on Espacenet and/or JPO websites.

CERTIFICATE OF SERVICE

The undersigned hereby certifies that a true and accurate copy of the foregoing NOTICE OF CONCURRENT PROCEEDINGS, AND INFORMATION DISCLOSURE STATEMENT, including submitted references (provided on USB flash drive), is being served in its entirety via First Class Mail, postage prepaid, on the following counsel of record:

Robin A. Snader
ERISE IP, P.A.
7015 College Boulevard, Suite 700
Overland Park, Kansas 66211

on this 5th day of May, 2021.

/Brooklyn Grossbard/
Brooklyn Grossbard

Samsung - Exhibit 1006 - Page 245

Docket No.: 009379.00009\US
(*EX PARTE* REEXAMINATION)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re *Ex parte* Reexamination of:
U.S. Patent No.: 10,129,590

Control No.: 90/014,651

Inventor: Toshiyuki Kurita et al.

Application Serial No.: 15/208,886
Filed: July 13, 2016
Issue Date: November 13, 2018

For: Display Apparatus And Video Processing Apparatus

Examiner: Ton, My Trang

Group Art Unit: 3992

Confirmation No.: 7485

WAIVER OF OPTIONAL PATENT OWNER STATEMENT

Mail Stop *Ex Parte* Reexam
ATTN: Central Reexamination unit
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Patent Owner acknowledges with appreciation the Office's grant of a one-month extension of time for filing a Patent Owner Statement in this reexamination proceeding (decision entered April 5, 2021, extending deadline to May 10, 2021). The extension of time was sought in good faith with the intent to obtain additional time reasonably required for preparing and filing a Statement in the circumstances described in the petition filed by Patent Owner.

On further consideration and in view of present circumstances, Patent Owner has decided to waive the Statement, opting instead to await a first Office action to see what if any issues need to be addressed at that stage. Patent Owner is grateful to the Office for its prompt consideration and grant of the requested additional time, which afforded Patent Owner the time necessary for it to fully consider this matter.

Patent Owner is concurrently filing herewith a Notice of Prior and Concurrent Proceedings, and Information Disclosure Statement. This reexamination is ready to proceed to first action.

Respectfully submitted,

By: /Scott M Kelly/
Scott M. Kelly
Registration No. 65,121

BANNER & WITCOFF, LTD
1100 13th Street, N.W.
Suite 1200
Washington, D.C. 20005
(202) 824-3000
(202) 824-3001 Fax

Dated: May 5, 2021

Samsung - Exhibit 1006 - Page 247

CERTIFICATE OF SERVICE

The undersigned hereby certifies that a true and accurate copy of the foregoing WAIVER OF OPTIONAL PATENT OWNER STATEMENT is being served in its entirety via First Class Mail, postage prepaid, on the following counsel of record:

Robin A. Snader
ERISE IP, P.A.
7015 College Boulevard, Suite 700
Overland Park, Kansas 66211

on this 5th day of May, 2021.

/Brooklyn Grossbard/
Brooklyn Grossbard

Samsung - Exhibit 1006 - Page 248

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.
90/014,651	01/12/2021	10129590	2638-19.08	7485

177632 7590 04/05/2021

BANNER & WITCOFF, LTD.
1100 13th STREET, N.W.
SUITE 1200
WASHINGTON, DC 20005-4051

EXAMINER
TON, MY TRANG

ART UNIT	PAPER NUMBER
3992	

MAIL DATE	DELIVERY MODE
04/05/2021	PAPER

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.

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patents and Trademark Office
P.O.Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

THIRD PARTY REQUESTER'S CORRESPONDENCE ADDRESS

ERISE IP, P.A.
7015 COLLEGE BLVD
SUITE 700
OVERLAND PARK, KS 66211

Date: April 5, 2021

EX PARTE REEXAMINATION COMMUNICATION TRANSMITTAL FORM

REEXAMINATION CONTROL NO. : 90014651
PATENT NO. : 10129590
ART UNIT : 3992

Enclosed is a copy of the latest communication from the United States Patent and Trademark Office in the above identified ex parte reexamination proceeding (37 CFR 1.550(f)).

Where this copy is supplied after the reply by requester, 37 CFR 1.535, or the time for filing a reply has passed, no submission on behalf of the ex parte reexamination requester will be acknowledged or considered (37 CFR 1.550(g)).

Decision on Petition for Extension of Time in Reexamination	**Application No.** 90/014,651	**Applicant(s)** 10,129,590 B2	
	Examiner My Trang TON	**Art Unit** 3992	

1. THIS IS A DECISION ON THE PETITION FILED March 31, 2021.

2. THIS DECISION IS ISSUED PURSUANT TO:
   - A. ☒ 37 CFR 1.550(c) – The time for taking any action by a patent owner in a third party requested *ex parte* reexamination proceeding will be extended only for sufficient cause and for a reasonable time specified.
   - B. ☐ 37 CFR 1.550(c) – The time for taking action by a patent owner in a patent owner requested *ex parte* reexamination proceeding will only be extended for more than two months for sufficient cause and for a reasonable time specified.
   - C. ☐ 37 CFR 1.956 – The time for taking any action by a patent owner in an *inter partes* reexamination proceeding will be extended only for sufficient cause and for a reasonable time specified.

   The petition is before the Central Reexamination Unit for consideration.

3. FORMAL MATTERS
   Patent Owner requests that the period for filing an optional Patent Owner's Statement after the "***Order Granting Request For Ex Parte Reexamination***" mailed on February 10, 2021, which is a two (2) month period pursuant to 37 CFR 1.530(b) (i.e., due April 10, 2021), be extended by an additional one (1) month (i.e., due May 10, 2021).

   - A. Petition fee per 37 CFR §1.17(g)):
     - i. ☒ Petition includes authorization to debit a deposit account.
     - ii. ☐ Petition includes authorization to charge a credit card account.
     - iii. ☐ Other: _____.
   - B. ☒ Proper certificate of service was provided. (Not required in reexamination where patent owner is requester.)
   - C. ☒ Petition was timely filed.
   - D. ☒ Petition properly signed.

4. DECISION (See MPEP 2265 and 2665)
   - A. ☒ Granted or ☐ Granted-in-part for **one (1) month**. (See 37 CFR 1.550(c) and 37 CFR 1.956).
     - i. ☒ Other/comment: See CONCLUSION below.
   - B. ☐ Dismissed because:
     - i. ☐ Formal matters (See unchecked box(es) (A, B, C and/or D) in section 4 above).
     - ii. ☐ Petitioner failed to provide a factual accounting of reasonably diligent behavior by all those responsible for preparing a response to the outstanding Office action within the statutory time period.
     - iii. ☐ Petitioner failed to explain why, in spite of the action taken thus far, the requested additional time is needed.
     - iv. ☐ The statements provided fail to establish sufficient cause to warrant extension of the time for taking action (See attached).
     - v. ☐ The petition is moot.
     - vi. ☐ Other/comment: _____

5. CONCLUSION: **The time period for filing an optional Patent Owner's Statement after the mailing of the February 10, 2021 "*Order Granting Request For Ex Parte Reexamination*" is hereby extended by one (1) additional month from April 10, 2021 to May 10, 2021. Accordingly, the optional Patent Owner's Statement is now due by the end of the day on Monday, May 10, 2021**.

   Telephone inquiries with regard to this decision should be directed to Gay Ann Spahn at 571-272-7731 in the CRU.

	/Gay Ann Spahn/ Supervisory Patent Reexamination Specialist Central Reexamination Unit

Docket No.: 009379.00009\US
(*EX PARTE* REEXAMINATION)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re *Ex parte* Reexamination of:
U.S. Patent No.: 10,129,590

Examiner: Ton, My Trang

Control No.: 90/014,651

Group Art Unit: 3992

Inventor: Toshiyuki Kurita et al.

Confirmation No.: 7485

Application Serial No.: 15/208,886
Filed: July 13, 2016
Issue Date: November 13, 2018

For: Display Apparatus And Video Processing Apparatus

PETITION FOR EXTENSION OF TIME UNDER 37 C.F.R. § 1.550(c)

Mail Stop *Ex Parte* Reexam
ATTN: Central Reexamination unit
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Patent Owner respectfully petitions for an extension of the due date for filing a Patent Owner Statement in the above-captioned *ex parte* reexamination. The Order granting the reexamination dated February 10, 2021 set a two month period for filing of an (optional) Patent Owner Statement which would expire April 10, 2021 (April 12, 2021 in view of the weekend). A one month extension of this deadline, to May 10, 2021, for good cause shown, is respectfully requested.

This is one of twelve (all now granted) reexaminations requested by Apple against ten patents owned by Maxell, Ltd. within the past several months. These reexaminations, the patent, their request filing dates, the date of a grant of the request and the Patent Owner Statement deadline are listed in attached Appendix A. As noted therein, similar petitions for extension of time have

already been granted in listed reexamination Control Nos. 90/014,628, 90/014,632 and 90/014,641. Concurrently, similar petitions for extension of time are being filed in listed reexamination Control Nos. 90/014,639 and 90/014,662.

Each of these patents was asserted by Maxell against Apple in district court and/or ITC litigation (venue(s) of assertion indicated in Appendix A). The subject '590 patent is asserted in the ITC case (Investigation No. 337-TA-1215) and the WDTX case: *Maxell, Ltd. v. Apple, Inc.*, 6:20-cv-00646-ADA (WDTX) . As trial in the EDTX case started on March 22, 2021, the parties reached a settlement of the disputes between them. Joint motions to dismiss were subsequently filed in each of these three actions, on March 24, 2021. Copies of the dismissal papers are attached as Appendices B-D. In addition, in accordance with the agreement, the parties will be jointly moving to terminate the co-pending IPRs. As pertains to the instant reexamination/patent, IPR2021-00400 brought by Apple is currently pending, pre-institution.

Patent owner Maxell has been consumed with preparing for and conducting the EDTX trial in one of the now-settled disputes with Apple that led to the instant reexaminations. The work leading up to trial has understandably limited Maxell's availability for consultation on the reexaminations of their patents. With the settlement that just occurred last week, such a constraint is now lifted.

The undersigned's law-firm Banner & Witcoff, Ltd. was newly engaged to represent Maxell in connection with these reexaminations as the USPTO began granting the requests. Its attorneys, including the undersigned, have worked diligently to come up to speed on the patents and their prosecution histories, and in evaluation of the grounds asserted in the reexamination requests since (and before) the Orders granting the reexaminations issued. Substantial time and effort has also been devoted to a review and consideration of voluminous documents from the related district court, ITC and IPR proceedings.

Reflecting the scale of the overall effort, the undersigned is heading-up a team of nine Banner & Witcoff attorneys, and multiple paralegals, collectively working on these reexamination matters. Three Banner & Witcoff attorneys are principally involved with, and have devoted substantial time to, this particular reexamination over the past couple of months.

Patent Owner desires for this reexamination to proceed to completion expeditiously, efficiently and justly. Having studied the matter, Patent Owner and its counsel believe at this point

Samsung - Exhibit 1006 - Page 253

that the filing of a (optional) Patent Owner Statement herein may be a useful means toward achieving these goals. The requested additional time is believed to be reasonably necessary to allow counsel to complete and file a Patent Owner Statement in optimal form while balancing other pressing work demands. While Banner & Witcoff attorneys have been diligent in preparing remarks for a Patent Owner Statement, resource limitations associated with the now-settled dispute between Apple and Maxell have limited Patent Owner's ability to prepare a complete and thorough Patent Owner Statement for consideration by the Office.

The amount of additional time requested (one month) for preparing and filing a Patent Owner Statement is believed reasonable and justified in the circumstances, consistent with the need for the reexamination to be conducted with "special dispatch." Patent Owner respectfully submits that there is less of any countervailing concern here given the settlement of the disputes between it and Requester Apple. With this development, and insofar as extensions of time are concerned, this third party-requested *ex parte* reexamination has become more akin to a patent owner requested or Director initiated reexamination, which would have a two-month extension of time available as a matter of right. *See* 37 C.F.R. §1.550(c)(3) (as amended in 2013). *See also* MPEP 2265.

In the circumstances, it is respectfully submitted that good and sufficient cause has been shown for the grant of the requested reasonable extension of time (1 month) to allow Patent Owner to complete and file a Patent Owner Statement. Please charge the petition fee due under 37 C.F.R. § 1.17(g) to our Deposit Account No. 19-0733.

Respectfully submitted,

By: /Scott M Kelly/
Scott M. Kelly
Registration No. 65,121

BANNER & WITCOFF, LTD
1100 13th Street, N.W., Suite 1200
Washington, D.C. 20005
(202) 824-3000; (202) 824-3001 Fax

Dated: March 31, 2021

Encl.: Appendices A-D

CERTIFICATE OF SERVICE

The undersigned hereby certifies that a true and accurate copy of the foregoing PETITION FOR EXTENSION OF TIME UNDER 37 C.F.R. § 1.550(c) is being served in its entirety via First Class Mail, postage prepaid, on the following counsel of record:

Robin A. Snader
ERISE IP, P.A.
7015 College Boulevard, Suite 700
Overland Park, Kansas 66211

on this 31st day of March, 2021.

/Brooklyn Grosbard/
Brooklyn Grossbard

Samsung - Exhibit 1006 - Page 255

Appendix A

Appendix A
Apple Requested *Ex Parte* Reexaminations
Of Maxell Patents

EPR	EPR Filing Date	Patent	Asserted In	Decision on Request	Optional Patent Owner Statement Due Date
90/014,628	12/10/2020	8,339,493	EDTX	**Request Granted 1/28/2021**	**4/28/2021 (extended)**
90/014,631	12/15/2020	7,203,517	ITC/WDTX	**Request Granted 1/15/2021**	**past**
90/014,632	12/18/2020	6,408,193	EDTX	**Request Granted 2/1/2021**	**5/1/2021 (extended)**
90/014,638	12/23/2020	8,982,086	ITC/WDTX	**Request Granted 1/22/2021**	**past**
90/014,639	12/23/2020	6,748,317	EDTX	**Request Granted 2/16/2021**	**4/16/2021**
90/014,662	1/27/2021	6,748,317	EDTX	**Request Granted 2/12/2021**	**4/12/2021**
90/014,640	12/23/2020	6,580,999	EDTX	**Request Granted 1/21/2021**	**past**
90/014,661	1/27/2021	6,580,999	EDTX	**Request Granted 2/26/2021**	**4/26/2021**
90/014,641	12/23/2020	10,176,848	ITC/WDTX	**Request Granted 1/29/2021**	**4/29/2021 (extended)**
90/014,651	1/12/2021	10,129,590	ITC/WDTX	**Request Granted 2/10/2021**	**4/10/2021**
90/014,673	2/3/2021	6,430,498	EDTX	**Request Granted 3/9/2021**	**5/9/2021**
90/014,678	2/12/2021	7,116,438	EDTX	**Request Granted 3/4/2021**	**5/4/2021**

Appendix B

IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
WACO DIVISION

MAXELL, LTD., *Plaintiff*, v. APPLE INC., *Defendant*.	Case No. 6:20-cv-00646-ADA

JOINT MOTION TO DISMISS

Pursuant to Rule 41(a) of the Federal Rules of Civil Procedure, Plaintiff Maxell, Ltd. ("Maxell") and Defendant Apple Inc. (Maxell and Apple are collectively, "the Parties"), hereby jointly move for dismissal with prejudice of all claims by Maxell against Apple. The Parties further move for an order that all costs and expenses relating to this litigation up to the time of dismissal shall be borne by the party incurring same. A proposed order accompanies this motion.

Respectfully submitted,

Dated: March 24, 2021

/s/ *Robert S. Harrell*
Robert S. Harrell
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700 Louisiana Street
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Houston, TX 77002
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Jamie B. Beaber
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MAYER BROWN LLP
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Robert G. Pluta
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71 S. Wacker Drive
Chicago, IL 60606
(312) 782-0600
rpluta@mayerbrown.com

Counsel for Plaintiff Maxell, Ltd.

Dated: March 24, 2021

Respectfully Submitted

By: */s/ John M. Guaragna*

John M. Guaragna
Texas Bar No. 24043308
DLA PIPER LLP (US)
401 Congress Avenue, Suite 2500
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john.guaragna@dlapiper.com

Counsel for Defendant Apple Inc.

CERTIFICATE OF SERVICE

The undersigned certifies that all counsel of record who are deemed to have consented to electronic service are being served this 24th day of March, 2021, with a copy of this document via the Court' s CM/ECF system per Local Rule CV-5(a)(3).

/s/ Robert S. Harrell
Robert S. Harrell

IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
WACO DIVISION

MAXELL, LTD., *Plaintiff*, v. APPLE INC., *Defendant*.	Case No. 6:20-cv-00646-ADA

PROPOSED ORDER

Before the Court is the Parties' Joint Motion to Dismiss. Plaintiff MAXELL, LTD. and Defendant APPLE INC., announced to the Court that they have settled their respective claims for relief asserted in this cause. The Court, having considered this request, is of the opinion that their request for dismissal should be granted.

IT IS THEREFORE ORDERED that all claims for relief asserted against APPLE INC. by MAXELL, LTD. herein are dismissed, with prejudice; and

IT IS FURTHER ORDERED that all attorneys' fees, costs of court and expenses shall be borne by each party incurring the same.

SO ORDERED this the _____ day of _____, 2021.

_____
HON. ALAN D. ALBRIGHT
UNITED STATES DISTRICT JUDGE

Appendix C

IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
TEXARKANA DIVISION

MAXELL, LTD., *Plaintiff*, v. APPLE INC., *Defendant*.	Case No. 5:19-cv-00036-RWS **LEAD CASE** **JURY TRIAL DEMANDED**

JOINT MOTION TO DISMISS

Pursuant to Rule 41(a) of the Federal Rules of Civil Procedure, Plaintiff Maxell, Ltd. ("Maxell") and Defendant Apple Inc. (Maxell and Apple are collectively, "the Parties"), hereby jointly move for dismissal with prejudice of all claims by Maxell against Apple. The Parties further move for an order that all costs and expenses relating to this litigation up to the time of dismissal shall be borne by the party incurring same. A proposed order accompanies this motion.

Respectfully submitted,

Dated: March 24, 2021

/s/ *Jamie B. Beaber*

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Counsel for Plaintiff Maxell, Ltd.

Dated: March 24, 2021

Respectfully Submitted

By: */s/ Mark D. Fowler*

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COUNSEL FOR DEFENDANT APPLE INC.

CERTIFICATE OF SERVICE

The undersigned certifies that all counsel of record who are deemed to have consented to electronic service are being served this 24th day of March, 2021, with a copy of this document via the Court' s CM/ECF system per Local Rule CV-5(a)(3).

/s/ Jamie B. Beaber
Jamie B. Beaber

IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
TEXARKANA DIVISION

MAXELL, LTD., *Plaintiff*, v. APPLE INC., *Defendants*.	Case No. 5:19-cv-00036-RWS **JURY TRIAL DEMANDED**

PROPOSED ORDER

Before the Court is the Parties' Joint Motion to Dismiss. Plaintiff MAXELL, LTD. and Defendant APPLE INC., announced to the Court that they have settled their respective claims for relief asserted in this cause. The Court, having considered this request, is of the opinion that their request for dismissal should be granted.

IT IS THEREFORE ORDERED that all claims for relief asserted against APPLE INC. by MAXELL, LTD. herein are dismissed, with prejudice; and

IT IS FURTHER ORDERED that all attorneys' fees, costs of court and expenses shall be borne by each party incurring the same.

Appendix D

UNITED STATES INTERNATIONAL TRADE COMMISSION
WASHINGTON, D.C.

Before the Honorable Dee Lord
Administrative Law Judge

In the Matter of: **CERTAIN MOBILE ELECTRONIC DEVICES AND LAPTOP COMPUTERS**	Investigation No. 337-TA-1215

JOINT MOTION TO TERMINATE THE INVESTIGATION BASED ON SETTLEMENT

Pursuant to 19 C.F.R. § 210.21(b), Complainant Maxell, Ltd. ("Maxell") and Respondent Apple Inc. ("Apple") respectfully move to terminate the Investigation based on settlement.

Pursuant to 19 C.F.R. § 210.21(b)(1), Maxell and Apple state that there are no other agreements, written or oral, express or implied, relating to the subject matter of this Investigation.

A redacted, public version of the Settlement Agreement is attached hereto as Exhibit 1 to this motion. An unredacted copy of the agreement is being filed separately as a confidential submission because it contains Confidential Business Information within the meaning of Commission Rule 201.6. Accordingly, the parties request that the unredacted Settlement Agreement be treated as containing the parties' Confidential Business Information under the Protective Order.

There is no longer a basis to continue this Investigation as the Settlement Agreement resolves the disputes identified in the Complaint. Because such issues are no longer in dispute, the public interest and administrative economy will be served by granting this motion and preserving resources for both the Commission and the private parties. For this same reason,

Samsung - Exhibit 1006 - Page 271

motions to terminate an investigation based on settlement are routinely granted and not reviewed by the Commission. *See, e.g., Certain Child Carriers, Components Thereof and Products Containing the Same*, Inv. No. 337-TA-1154, Order No. 33 at 2-3 (Nov. 19, 2019); *Certain Lithography Machines and Systems, and Components Thereof (II)*, Inv. No. 337-TA-1129, Order No. 17 at 1- 2 (Mar. 18, 2019).

Moreover, termination of this Investigation will not adversely affect the public health and welfare, competitive conditions of the U.S. economy, the production of like or directly competitive articles in the United States, or U.S. consumers.

Based on the foregoing, Maxell and Apple respectfully request that the Administrative Law Judge issue an initial determination terminating this Investigation.

Ground Rule 3.2 Certification

Pursuant to Ground Rule 3.2, the parties have discussed this motion multiple times since March 22, 2021, resulting in the filing of this Joint Motion. Maxell discussed this motion with Staff on March 23, 2021. Staff will take a position after reviewing the papers.

Dated: March 24, 2021

Respectfully submitted,

/s/ Jamie B. Beaber

Jamie B. Beaber
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Kfir B. Levy
James A. Fussell, III
Baldine B. Paul
Tiffany A. Miller
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Samsung - Exhibit 1006 - Page 272

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Samsung - Exhibit 1006 - Page 273

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Counsel for Respondent Apple, Inc.

Samsung - Exhibit 1006 - Page 274

CERTAIN MOBILE ELECTRONIC DEVICES AND LAPTOP COMPUTERS
Inv. No. 337-TA-1215

CERTIFICATE OF SERVICE

I, Robert E. Rude II, hereby certify that on March 24th, 2021, a copy of the foregoing **JOINT MOTION TO TERMINATE THE INVESTIGATION BASED ON SETTLEMENT (PUBLIC VERSION)** document was served upon the following parties as indicated:

The Honorable Dee Lord Administrative Law Judge U.S. International Trade Commission 500 E Street, S.W. Washington, DC 20436	☐ Via First Class Mail ☐ Via Hand Delivery ☐ Via Electronic Filing (EDIS) ☐ Via Overnight Courier ☐ Via Fax ☑ Via E-mail *(PDF)* *Edward.Jou@usitc.gov* *Michael.Maas@usitc.gov*
Lisa Murray, Esq. Office of Unfair Import Investigations U.S. International Trade Commission 500 E Street, S.W. Washington, DC 20436	☐ Via First Class Mail ☐ Via Hand Delivery ☐ Via Overnight Courier ☐ Via Facsimile ☑ Via E-mail *(PDF)* *Lisa.Murray@usitc.gov*
Mark Fowler Monica De Lazzari DLA Piper LLP (US) 2000 University Avenue East Palo Alto, CA 94303-2214 Tel: 650.833.2000 Fax: 650.833.2001 Sean C. Cunningham Erin P. Gibson Peter Maggiore DLA Piper LLP (US) 401 B Street, Suite 1700 San Diego, CA 92101 Tel: 619.699.2700 Fax: 619.699.2701 Aaron Fountain DLA Piper LLP (US)	☐ Via First Class Mail ☐ Via Hand Delivery ☐ Via Overnight Courier ☐ Via Facsimile ☑ Via E-mail *(PDF)* *Sean.Cunningham@us.dlapiper.com* *dlaapple-maxellitc@dlapiper.com* *hcannom@wscllp.com*

401 Congress Avenue, Suite 2500 Austin, TX 78701-3799 Tel: 512.457.7000 Fax: 512.457.7001 Ferlillia Roberson Stephanie Lim DLA Piper LLP (US) 444 West Lake Street, Suite 900 Chicago, IL 60606-0089 Tel: 312.368.4000 Fax: 312.236.7516 Patrick Park Nandan Padmanabhan Martin Ellison DLA Piper LLP (US) 2000 Avenue of the Stars Suite 400, North Tower Los Angeles, CA 90067-4704 Tel: 310.595.3000 Fax: 310.595.3300 Hannah Cannom Walker Stevens Cannom LLP 500 Molino Street, Suite 118 Los Angeles, California 90013 Tel: 213.712.9145 *Counsel for Respondent Apple Inc.*	

/s/ Robert E. Rude II
Robert E. Rude II
MAYER BROWN LLP

CERTIFICATE OF SERVICE

The undersigned hereby certifies that a true and accurate copy of the foregoing PETITION FOR EXTENSION OF TIME UNDER 37 C.F.R. § 1.550(c) is being served in its entirety via First Class Mail, postage prepaid, on the following counsel of record:

Robin A. Snader
ERISE IP, P.A.
7015 College Boulevard, Suite 700
Overland Park, Kansas 66211

on this 31st day of March, 2021.

/Brooklyn Grosbard/
Brooklyn Grossbard

Samsung - Exhibit 1006 - Page 277

Electronic Patent Application Fee Transmittal

Application Number:	90014651
Filing Date:	12-Jan-2021
Title of Invention:	DISPLAY APPARATUS AND VIDEO PROCESSING APPARATUS
First Named Inventor/Applicant Name:	10129590
Filer:	Scott M Kelly/Brooklyn Grossbard
Attorney Docket Number:	2638-19.08

Filed as Large Entity

Filing Fees for ex parte reexam

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($)
PETITION FEE- 37 CFR 1.17(G) (GROUP II)	1463	1	220	220
Miscellaneous:				
		Total in USD ($)		**220**

Electronic Acknowledgement Receipt

EFS ID:	42337032
Application Number:	90014651
International Application Number:	
Confirmation Number:	7485
Title of Invention:	DISPLAY APPARATUS AND VIDEO PROCESSING APPARATUS
First Named Inventor/Applicant Name:	10129590
Customer Number:	177632
Filer:	Scott M Kelly/Brooklyn Grossbard
Filer Authorized By:	Scott M Kelly
Attorney Docket Number:	2638-19.08
Receipt Date:	31-MAR-2021
Filing Date:	12-JAN-2021
Time Stamp:	17:08:43
Application Type:	Reexam (Patent Owner)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	$220
RAM confirmation Number	E20213UH09283242
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	Reexam Request for Extension of Time	Petition_for_Extension_of_Time_with_Appendices_00009_21160635.PDF	367794 c45426c42c298af2c99a1ec1f61c0043175d7ddf	no	25
Warnings:					
Information:					
2	Reexam Certificate of Service	Certificate_of_Service_-_3_31_2021_21160631.PDF	94800 84d4060ef2f79b810c6095a9d99179382c304604	no	1
Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	30432 c8c4ea29c16eb87b456f74cee5c409e7c6055352	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	493026		

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 NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
90/014,651	01/12/2021	10129590	2638-19.08

CONFIRMATION NO. 7485

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Date Mailed: 02/25/2021

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 02/18/2021.

- The Power of Attorney to you in this application has been revoked by the assignee who has intervened as provided by 37 CFR 3.71. Future correspondence will be mailed to the new address of record(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**.

/pavolpe/

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
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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
90/014,651	01/12/2021	10129590	2638-19.08

CONFIRMATION NO. 7485

POA ACCEPTANCE LETTER

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Date Mailed: 02/25/2021

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 02/18/2021.

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**.

/pavolpe/

CERTIFICATE OF SERVICE

The undersigned hereby certifies that a true and accurate copy of the REEXAMINATION PATENT OWNER POWER OF ATTORNEY and STATEMENT UNDER 37 CFR 3.73(c) filed in Reexamination Control Number 90/014,651 on February 18, 2021 is being served in its entirety via First Class Mail, postage prepaid, on the following counsel of record:

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Overland Park, Kansas 66211

on this 22 day of February, 2021.

/Brooklyn Grossbard/
Brooklyn Grossbard

Electronic Acknowledgement Receipt

EFS ID:	41982093
Application Number:	90014651
International Application Number:	
Confirmation Number:	7485
Title of Invention:	DISPLAY APPARATUS AND VIDEO PROCESSING APPARATUS
First Named Inventor/Applicant Name:	10129590
Customer Number:	177632
Filer:	Scott M Kelly/Brooklyn Grossbard
Filer Authorized By:	Scott M Kelly
Attorney Docket Number:	2638-19.08
Receipt Date:	22-FEB-2021
Filing Date:	12-JAN-2021
Time Stamp:	13:23:18
Application Type:	Reexam (Patent Owner)

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	Reexam Certificate of Service	CERTIFICATE_OF_SERVICE_-_009379_21060783.pdf	20707 553ea9696247fca8404f8a82545c49bde2640f8a	no	1

Warnings:

Information:	
Total Files Size (in bytes):	20707

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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United States Patent and Trademark Office
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Alexandria, Virginia 22313-1450
www.uspto.gov

BIB DATA SHEET

CONFIRMATION NO. 7485

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
90/014,651	01/12/2021 RULE	348	3992	2638-19.08

APPLICANTS

INVENTORS

10129590, Residence Not Provided;
MAXELL LTD (PATENT OWNER), KYOTO, JAPAN;
APPLE INC. (3RD. PTY. REQ.), CUPERTINO, CA;
ERISE IP, P.A. (GENERAL), OVERLAND PARK, KS

**** CONTINUING DATA ***************************

This application is a REX of 15/208,886 07/13/2016 PAT 10129590 *
which is a CON of 12/260,410 10/29/2008 PAT 9420212
(*)Data provided by applicant is not consistent with PTO records.

**** FOREIGN APPLICATIONS ***************************

JAPAN 2007-306750 11/28/2007

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ****

Foreign Priority claimed ❑ Yes ❑ No 35 USC 119(a-d) conditions met ❑ Yes ❑ No Verified and Acknowledged _____ Examiner's Signature	❑ Met after Allowance _____ Initials	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
				19	4

ADDRESS

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WASHINGTON, DC 20005-4051
UNITED STATES

TITLE

DISPLAY APPARATUS AND VIDEO PROCESSING APPARATUS

FILING FEE RECEIVED		
12600	FEES: Authority has been given in Paper No._____ to charge/credit DEPOSIT ACCOUNT No._____ for following:	❑ All Fees ❑ 1.16 Fees (Filing) ❑ 1.17 Fees (Processing Ext. of time) ❑ 1.18 Fees (Issue) ❑ Other _____ ❑ Credit

BIB (Rev. 05/07).

PTO/AIA/81B (07-13)
Approved for use through 03/31/2021. OMB 0651-0035
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

REEXAMINATION OR SUPPLEMENTAL EXAMINATION – PATENT OWNER POWER OF ATTORNEY OR REVOCATION OF POWER OF ATTORNEY WITH A NEW POWER OF ATTORNEY AND CHANGE OF CORRESPONDENCE ADDRESS FOR REEXAMINATION OR SUPPLEMENTAL EXAMINATION AND PATENT		
	Control Number(s)	90/014,651
	Filing Date(s)	January 12, 2021
	First Named Inventor	Toshiyuki Kurita
	Title	DISPLAY APPARATUS AND VIDEO PROCESSING APPARATUS
	Patent Number	10,129,590
	Examiner Name	My Trang Ton
	Attorney Docket No(s)	009379.00009

I. Power of Attorney. This form may be used to change the Power of Attorney in a reexamination or supplemental examination proceeding (or multiple proceedings where merged). This form may also be used to change the Power of Attorney in the patent file; in such a case, a copy of this form will be placed in both the patent file and the reexamination or supplemental examination proceeding.

A. Revocation of Previous Power of Attorney. I hereby revoke all previous patent owner powers of attorney, if any, given:

☒ in the above-identified reexamination or supplemental examination proceeding control number(s) (more than one may be changed only if the proceedings are merged).

☐ in the file of the above-identified patent.

(check BOTH boxes if change in BOTH the patent file and the reexamination or supplemental examination proceeding is requested).

B. Designation of Power of Attorney.

☐ A Power of Attorney is submitted herewith.

OR

☒ I hereby appoint Practitioner(s) associated with the Customer Number identified in the box at right as my/our attorney(s) or agent(s) to prosecute the proceeding(s)/patent identified above and selected in section I(A), and to transact all business in the United States Patent and Trademark Office connected therewith:

177632

OR

☐ I hereby appoint Practitioner(s) named below as my/our attorney(s) or agent(s) to prosecute the proceeding(s) identified above, and to transact all business in the United States Patent and Trademark Office connected therewith:

Practitioner(s) Name	Registration Number

Authorization for the Power of Attorney is provided by the signature on page 2 of this form.

This collection of information is required by 37 CFR 1.31, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public, which is to update (and by the USPTO to process) the file of a patent or reexamination proceeding. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 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: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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II. Change of Correspondence Address

Please recognize or change the correspondence address for the above-identified reexamination or supplemental examination proceeding control number(s) (more than one may be changed **only** if they are merged proceedings) **and for the file of the above-identified patent** to be:

☒ The address associated with the above-identified Customer Number.
OR
☐ The address associated with the Customer Number identified in the box at right: ☐
OR

☐ Firm or Individual Name					
Address					
City		State		Zip	
Country					
Telephone		Email			

NOTE: THE CORRESPONDENCE ADDRESS FOR THE REEXAMINATION OR SUPPLEMENTAL EXAMINATION PROCEEDING CONTROL NUMBER(S) MUST BE THE SAME AS THAT FOR THE PATENT. SEE 37 CFR 1.33.

III. Authorization for Power of Attorney and (if selected) Change of Correspondence Address

I am the:
☐ Inventor, having ownership of the patent being reexamined.
OR
☒ Patent owner.
Statement under 37 CFR 3.73(c) (Form PTO/AIA/96) submitted herewith or filed on _____.

Signature of Inventor or Patent Owner		Date	February 17, 2021
Name	Tatsuya Yamamoto	Telephone	
Title and Company	General Manager, Maxell, Ltd.		

NOTE: Signatures of all the inventors or patent owners of the entire interest or their representative(s) are required. If more than one signature is required, submit multiple forms, check the box below, and identify the total number of forms submitted in the blank below.

☒ A total of 2 forms are submitted. *If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*

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.

Electronic Acknowledgement Receipt

EFS ID:	41961768
Application Number:	90014651
International Application Number:	
Confirmation Number:	7485
Title of Invention:	DISPLAY APPARATUS AND VIDEO PROCESSING APPARATUS
First Named Inventor/Applicant Name:	10129590
Customer Number:	24956
Filer:	Scott M Kelly/Brooklyn Grossbard
Filer Authorized By:	Scott M Kelly
Attorney Docket Number:	2638-19.08
Receipt Date:	18-FEB-2021
Filing Date:	12-JAN-2021
Time Stamp:	18:06:09
Application Type:	Reexam (Patent Owner)

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	Assignee showing of ownership per 37 CFR 3.73	90014651_-_Rule_373_Statement_-_00937900009_PTO_AIA_96_20991474.PDF	122270 23e6df8c2129a305e5a8ec80d0feeea400fe5d76	no	3

Warnings:

Information:					
2	Power of Attorney	Executed_-_90014651_-_POA_-_00937900009_PTO_AIA_81B_21050956.PDF	514193 5c6b4e1bdde26d0dabb75cd190289eb57ff431ff	no	3
Warnings:					
Information:					
			Total Files Size (in bytes):	636463	

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.

PTO/AIA/96 (08-12)
Approved for use through 01/31/2013. OMB 0651-0031
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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.

STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: Maxell, Ltd.

Application No./Patent No.: 10129590 Filed/Issue Date: November 13, 2018

Titled: DISPLAY APPARATUS AND VIDEO PROCESSING APPARATUS

Maxell, Ltd., a Corporation

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. ☑ The assignee of the entire right, title, and interest.

2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):

   ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.

   ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (*e.g.*, bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.

B. ☑ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: TOSHIYUKI KURITA et al. To: HITACHI, LTD.,

   The document was recorded in the United States Patent and Trademark Office at

   Reel 021756, Frame 0400, or for which a copy thereof is attached.

2. From: HITACHI, LTD. To: HITACHI CONSUMER ELECTRONICS CO., LTD.

   The document was recorded in the United States Patent and Trademark Office at

   Reel 030622, Frame 0001, or for which a copy thereof is attached.

This collection of information is required by 37 CFR 3.73(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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PTO/AIA/96 (08-12)
Approved for use through 01/31/2013. 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 displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)

3. From: HITACHI CONSUMER ELECTRONICS CO., LTD. To: HITACHI MAXELL, LTD.

The document was recorded in the United States Patent and Trademark Office at
Reel 033685, Frame 0883, or for which a copy thereof is attached.

4. From: HITACHI MAXELL, LTD. To: MAXELL, LTD.

The document was recorded in the United States Patent and Trademark Office at
Reel 045142, Frame 0208, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☐ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Scott M Kelly/	February 18, 2021
Signature	Date
Scott M. Kelly	65,121
Printed or Typed Name	Title or Registration Number

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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UNITED STATES DEPARTMENT OF COMMERCE
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
90/014,651	01/12/2021	10129590	2638-19.08	7485

24956 7590 02/10/2021

MATTINGLY & MALUR, PC
1800 DIAGONAL ROAD
SUITE 210
ALEXANDRIA, VA 22314

EXAMINER	
TON, MY TRANG	

ART UNIT	PAPER NUMBER
3992	

MAIL DATE	DELIVERY MODE
02/10/2021	PAPER

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.

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
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(THIRD PARTY REQUESTER'S CORRESPONDENCE ADDRESS)

ERISE IP, P.A. (GENERAL)
7015 COLLEGE BLVD.,
SUITE 700
OVERLAND PARK, KS 66211

EX PARTE REEXAMINATION COMMUNICATION TRANSMITTAL FORM

REEXAMINATION CONTROL NO. *90/014,651* .

PATENT UNDER REEXAMINATION *10129590* .

ART UNIT *3992* .

Enclosed is a copy of the latest communication from the United States Patent and Trademark Office in the above identified *ex parte* reexamination proceeding (37 CFR 1.550(f)).

Where this copy is supplied after the reply by requester, 37 CFR 1.535, or the time for filing a reply has passed, no submission on behalf of the *ex parte* reexamination requester will be acknowledged or considered (37 CFR 1.550(g)).

Order Granting Request For Ex Parte Reexamination	Control No. 90/014,651	Patent Under Reexamination 10129590	
	Examiner MY TRANG TON	Art Unit 3992	AIA (FITF) Status No

--The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

The request for *ex parte* reexamination filed 01/12/2021 has been considered and a determination has been made. An identification of the claims, the references relied upon, and the rationale supporting the determination are attached.

Attachments: a)☐ PTO-892, b)☑ PTO/SB/08, c)☐ Other: ____

1. ☑ The request for *ex parte* reexamination is GRANTED.

RESPONSE TIMES ARE SET AS FOLLOWS:

For Patent Owner's Statement (Optional): TWO MONTHS from the mailing date of this communication (37 CFR 1.530 (b)). **EXTENSIONS OF TIME ARE GOVERNED BY 37 CFR 1.550(c).**

For Requester's Reply (optional): TWO MONTHS from the **date of service** of any timely filed Patent Owner's Statement (37 CFR 1.535). **NO EXTENSION OF THIS TIME PERIOD IS PERMITTED.** If Patent Owner does not file a timely statement under 37 CFR 1.530(b), then no reply by requester is permitted.

cc:Requester (if third party requester)

ORDER GRANTING *EX PARTE* REEXAMINATION

Ex parte reexamination has been requested for Claims 1-10 of United States Patent No. 10,129,590, entitled "DISPLAY APARATUS AND VIDEO PROCESSING APPARATUS" (hereinafter the "**590 Patent**"). Substantial new questions of patentability (SNQs) affecting claims 1-10 of the '590 Patent are raised by the request for *ex parte* reexamination filed January 12, 2021 (hereinafter the "**Request**"). Accordingly, reexamination is **GRANTED**.

REFERENCES/DOCUMENTS CITED HEREIN

In the request for reexamination, the Third Party Requester alleges that the '590 Patent claims 1-10 are rendered obvious under 35 U.S.C §103 in light of the following prior art references:

1. U.S Patent Application Pub. No. 2006/0203758 to Tee et al (hereinafter "**Tee**").
2. U.S. Patent Application Pub. No. 2006/0135076 to Honkanen et al (hereinafter "**Honkanen**").

The above cited references have been asserted in the Request as providing disclosures and/or teachings relevant to the claims of the '590 Patent. The Request and all of its accompanying documents and evidence have been fully considered in the Examiners' determinations and findings discussed below. These references were not of record in the prosecution of U.S Application Number

15/208,886 (hereinafter "**886 Application**"), later issuing as the '590 Patent for which reexamination is requested.

PRIORITY

After careful review of the prosecution history of the '590 Patent, Examiner finds that the '590 Patent was filed on July 13, 2016 as the '886 Application, and a continuation of application No. 12/260,410, filed on October 29, 2008, now Patent No. 9,420,212, which claims priority to Japanese Patent Application No. 2007-306750, filed on November 28, 2007.

LITIGATION

After reviewing the Request, performing a litigation search and reviewing the file history of the '590 Patent, Examiner is aware of the following related pending proceedings or litigation:

Status	Docket	Description
OPEN	6:20cv846	Maxell, Ltd. V. Apple Inc.

RELEVANT PROSECUTION HISTORY

The following are the Examiners' findings of fact related to the prosecution history of the '590 Patent, as evidenced in the documents of record in the prosecution history of the '886 Application:

07/13/2016 Patent Owner filed the '886 Application. The '886 Application was filed with 8 claims (hereinafter "**prosecuted**

claims"). Of the prosecuted claims, claims 1 and 5 were independent apparatus claims.

12/11/2017 The original Examiner issued a non-final Office action (hereinafter "**December 2017 NF**") that rejected prosecuted claims 5-6 and 8 as being anticipated by U.S. Pub. No. 2007/0091835 to Jo et al; rejected prosecuted claim 7 as being unpatentable over Jo et al; and rejected claims 1-4 as being unpatentable over Jo in view of U.S. Pub. No. 2007/0072642 to Kangas et al.

03/09/2018 Patent Owner filed an amendment (hereinafter "**March 2018 Amendment**") in response to the December 2017 NF. Therein, Patent Owner amended prosecuted claims 1-8 and added new method claims 9-10. Applicant argued the patentability of independent prosecuted claims 1 and 5 over the cited prior arts (Jo et al and Kangas et al) on the basis of the amended into the claims. Specifically, Applicant argued that Jo et al failed to teach: "*Jo fails to teach or suggest each and every element of the display apparatus disclosed in independent claim 5 including, at least, "...* ***wherein the controller controls each of the first and second radio communication circuits, so that the first radio communication circuit receives video information and the second radio communication circuit connects to the internet or the home network simultaneously...***".

Applicant further argued that Jo et al in combination with Kangas et al failed to teach: "*Independent claim 1 recites, inter alia,*".. ***wherein the controller controls each of the first and second radio communication circuit, so that the first radio communication circuit transmits video information and the second radio communication circuit connects to the internet or the home network simultaneously***..." *No such configuration and/or technique is disclosed or suggested by Jo or Kangas, taken alone or in any combination.*

...

Kangas fails to cure the deficiencies of Jo. Kangas discloses a method for initiating communication in a mobile terminal capable of providing at least a first mode of communication and a second mode of communication, the mobile terminal comprising a communication initiation element. See, Abstract, The method as taught by Kangas involves the steps of detecting a user actuation of the communication initiation element, discriminating between at least a first and a second type of the user actuation, and generating a control signal for initiating communication using the first mode of communication or the second mode of communication, depending on whether the user actuation is of the first type or the second type. See, Id.

*Kangas fails to teach or suggest the video processing apparatus of claim 1 which includes, at least, "wherein the controller controls each of the first and second radio communication circuit, so that the first radio communication circuit transmits video information and the second radio communication circuit connects to the internet or the home network simultaneously..." as recited in independent claim 1. Accordingly, Jo and Kangas, taken alone or in combination, do not disclose or suggest a video processing apparatus including, at least, "**wherein the controller controls each of the first and second radio communication circuit, so that the first radio communication circuit transmits video information and the second radio communication circuit connects to the internet or the home network simultaneously...**" as recited in claim 1, and thus claim 1 is allowable over Jo and Kangas for at least this reason."*

07/13/2018 The original Examiner issued a Notice of Allowance. Claims 1-10 were allowed. The Notice of Allowance included the following indication of allowable subject matter: "*In the prior art, U.S. Pub. No. 2008/0139118 to Sanguinetti teaches a first and a second communication device, where one device using Bluetooth receives data simultaneously as the WLAN device connects to the internet, see paragraph 70. However, Sanguinetti does not teach that the one device transmits data simultaneously as the other*

device connects to the internet and rather suggests against it in paragraph 71. Further in the prior art, U.S. Pub. No. 2005/0034169 to Maeda et al. teaches an apparatus, a base station 2, with a first and a second communication device, where the first device transmits data to display devices 3 via antenna 202 while the second communication device connects to the internet 1, See Figure 11. However, Maeda is silent on whether the first and second communication devices performs these functions simultaneously and gives examples of alternating one communication device with the other in the case that one is not functioning. U.S. Pub. No. 2004/0193647 to Ueda et al. also teaches two communications devices simultaneously connecting generally, see paragraph 116. The prior art does not teach all of the claimed limitations of the currently presented invention."

11/13/2018 The '886 Application issued as the '590 Patent. The prosecuted claims of the '886 Application were numbered as claims 1-10 of the '590 Patent (hereinafter the "**Patent Claims**").

SUBSTANTIAL NEW QUESTIONS OF PATENTABILITY

The presence or absence of a "substantial new question of patentability" determines whether or not reexamination is ordered.

For a substantial new question of patentability (SNQ) to be present, it is only necessary that:

(A) the prior art patents and/or printed publications raise a substantial question of patentability regarding at least one claim, i.e., the teaching of the (prior art) patents and printed publications is such that a reasonable examiner would consider the teaching to be important in deciding whether or not the claim is patentable; and

(B) the same question of patentability as to the claim has not been decided by the Office in a previous examination or pending reexamination of the patent or in a final holding of invalidity by the Federal Courts in a decision on the merits involving the claim. See MPEP §2242. Furthermore, "[i]t must first be demonstrated that a patent or printed publication that is relied upon in a proposed rejection presents a new, non-cumulative technological teaching that was not previously considered and discussed on the record during the prosecution of the application that resulted in the patent for which reexamination is requested, and during the prosecution of any other prior proceeding involving the patent for which reexamination is requested. See MPEP §2216.

Based on the forgoing summary of the prosecution history of the claims requested for reexamination, Examiner make the following findings:

1/ Examiner finds that the original Examiner provided art based rejections of prosecuted claims 1-8 as provided in the December 2017 NF. Specifically, the December 2017 NF rejected prosecuted claims 1-8 over Jo et al or Jo in combination with Kangas et al.

2/ Examiner finds that in response to the December 2017 NF, Patent Owner amended prosecuted claims 1-8 in the March 2018 Amendment, specifically amended prosecuted claim 1 to recite "*wherein the controller controls each of the first and second radio communication circuit, so that the first radio communication circuit transmits video information and the second radio communication circuit connects to the internet or the home network simultaneously*"; amended prosecuted claim 5 to recite "*wherein the controller controls each of the first and second radio communication circuits, so that the first radio communication circuit receives video information and the second radio communication circuit connects to the internet or the home network simultaneously*"; added new method claim 9 to recite "*wherein the transmitting and connecting is controlled so that the first radio communication circuit is configured to transmit video information and the second radio communication circuit is configured to connect to the internet or the home network simultaneously*"; and added new method claim 10 to recite "*wherein the receiving and connecting is controlled so that the first radio communication circuit is configured to receive video information and the second radio communication circuit is configured to connect to the internet or the home network simultaneously*".

3/ Examiner finds that Patent Owner specifically argued the patentability of prosecuted claims 1, 5 on the basis of the above

limitations. The method claims 9 and 10 recited similarly limitations as the prosecuted claims 1 and 5.

4/ Examiner finds prosecuted claims 1, 5 and new added claims 9, 10 were indicated as allowable on the basis of the above limitations (i.e., simultaneously connection).

Based on the above findings, Examiner determines that the limitation that overcame the prior arts cited during the prosecution of the '886 Application that became the '590 Patent were those limitations of amended into prosecuted claims 1 and 5 (and newly added method claims 9-10), specifically related to "*wherein the controller controls each of the first and second radio communication circuit, so that the first radio communication circuit transmits video information and the second radio communication circuit connects to the internet or the home network simultaneously*"; or "*wherein the controller controls each of the first and second radio communication circuits, so that the first radio communication circuit receives video information and the second radio communication circuit connects to the internet or the home network simultaneously*". For that reason, Examiner concludes that the limitation would be important to an examiner because these limitations provided the basis for allowance of the claims and the issuance of the '590 Patent.

Accordingly, Examiner determines that if the Request presents a new reference or combination of references that discloses or teaches the limitations of

[1] "*wherein the controller controls each of the first and second radio communication circuit, so that the first radio communication circuit transmits video information and the second radio communication circuit connects to the internet or the home network simultaneously* " as recited in Patent Claim 1 and those Patent Claims depending therefrom,

[2] "*wherein the controller controls each of the first and second radio communication circuits, so that the first radio communication circuit receives video information and the second radio communication circuit connects to the internet or the home network simultaneously*" as recited in Patent Claim 5 and those Patent Claims dependent therefrom,

[3] "*wherein the transmitting and connecting is controlled so that the first radio communication circuit is configured to transmit video information and the second radio communication circuit is configured to connect to the internet or the home network simultaneously*" as recited in Patent Claim 9,

[4] "*wherein the receiving and connecting is controlled so that the first radio communication circuit is configured to receive video information and the second radio communication circuit is configured to connect to the internet or the home network simultaneously*" as recited in Patent Claim 10,

then that new reference or combination of references would be important to an examiner because such teachings would be directed to those limitations for which the claims were allowed and/or overcame the applied prior art. Thus, the new reference or combination of references disclosing limitations

either [1], [2], [3] or [4] would raise a substantial new questions (SNQs) of patentability for the respective claims.

PROPOSED SNQs

The Request proposes combinations of references to raise SNQs for Patent Claims 1-10 of the '590 Patent:

Issue 1 – The Request submits that Tee in view of the knowledge of a person having ordinary skill the art (PHOSITA) raise SNQs for Patent claims 1 and 4-10. Support for the position in the Request is provided in the Request at pages 8-36.

Issue 2 – The Request submits that Tee in view of Honkanen raise SNQs for Patent claims 2-3. Support for the position in the Request is provided in the Request at pages 36-47.

DISCUSSION OF PROPOSED SNQS

Issue 1: The request indicates that the Requester considers that claims 1 and 4-10 are obvious over Tee in view of the knowledge of the PHOSITA.

It is agreed that the consideration of Tee in view of the knowledge of the PHOSITA raises a substantial new question of patentability to claims 1 and 4-

10 of the '590 patent. As presented in the detailed explanation in pages 8-36 offered by the Requester, a reasonable examiner would consider Tee in view of the knowledge of the PHOSITA important in making a decision as to the patentability of claims 1 and 4-10 of the '590 patent.

Consider, for example, the following limitations from independent claim 1 which is representative: Tee in view of the knowledge of the PHOSITA appear to teach in Fig. 2 a video processing apparatus [0019], [0033], a first radio communication circuit (PAN transceiver 203), a second radio communication circuit (WLAN transceiver 202), an imaging circuit (mobile terminal 110), an accumulation circuit (memory 215), a controller (control processor 210), where the first radio communication circuit (PAN transceiver 203) can transmit video information (video/multimedia file 280) accumulated in the accumulation circuit to an external device by radio ([0033], [0037], [0038]), the controller controls (the control processor 210) assignment of connection for each of the first and second radio communication circuit (PAN transceiver 203 and WLAN transceiver 202) in response to receiving an indication from a user ([0026], [0027], [0037], [0038], Fig. 3), **wherein the controller controls each of the first and second radio communication circuit, so that the first radio communication circuit transmits video information and the second radio communication circuit connects to the internet or the home network simultaneously** ([0031], Tee appears to describes a video is downloaded from base station 120 using the WLAN transceiver (second radio

communication circuit) and the same video is streamed to a remote display device using the PAN (Bluetooth) transceiver (first radio communication circuit) such that both connections are simultaneously active; and the PHOSITA appears implied that relaying a video stream to a remote display device would have involved actively receiving the video stream over the WLAN connection (i.e., receiving the stream) while simultaneously transmitting the video to a remote display device (i.e., relaying the video stream)). Since this teaching is directly related to subject matter considered as the basis for allowability of the patent claim, a reasonable examiner would consider this teaching important in determining the patentability of the base claims patent.

Fig. 2 of Tee is reproduced:

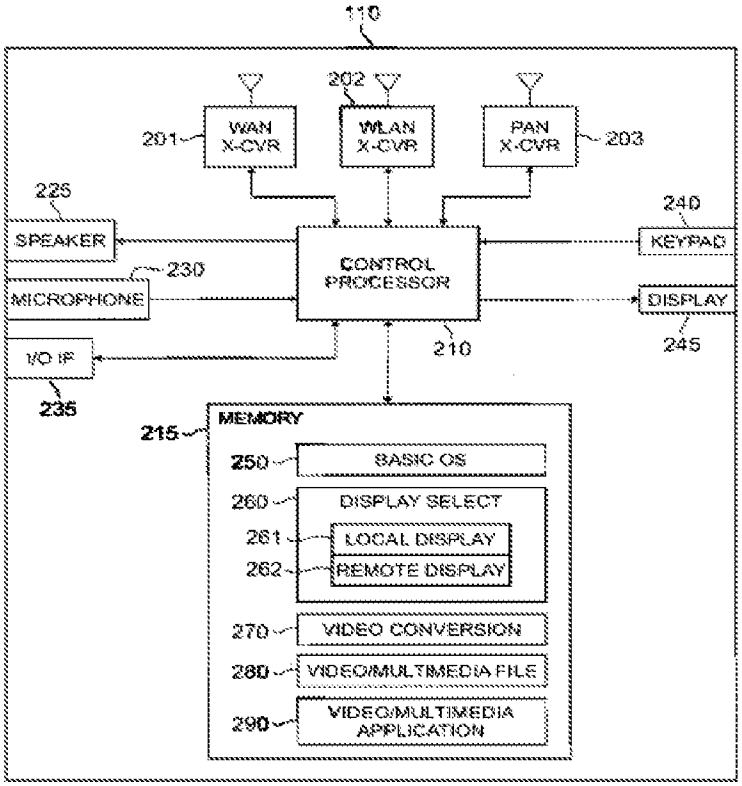


FIG. 2

Insofar as dependent Patent claim 4 is within the chain of dependency stemming from independent Patent claim 1, and thus inherently possesses all of the limitations of the independent Patent claim 1, the same substantial new question of patentability raised for Patent claim 1 is also raise for dependent Patent claim 4.

Patent claim 5 (and its dependent claims 6-8), Patent claims 9 and 10 are similarly as claim 1. Thus, Tee in view of the knowledge of the PHOSITA also raise a SNQs for these claims.

More particularly, the detail matching offered by Requester, pages 8-36 is deemed plausible to the degree that further consideration is warranted.

Examiner finds the teachings of Tee in view of the knowledge of the PHOSITA as discussed herein are not cumulative to any written discussion on the record of the teachings of the prior art, were not previously considered nor addressed in this manner during a prior examination, and the same questions were not the subject of a final holding of invalidity in the Federal Courts, and a reasonable examiner would consider the teachings to be important in deciding whether or not to allow the aforesaid claims.

Accordingly, Examiner concludes herein Tee in view of the knowledge of the PHOSITA raises the substantial new question regarding claims 1 and 4-10 of the '590 Patent.

Issue 2: The request indicates that the Requester considers that claims 2-3 are obvious over Tee in view of Honkanen.

Regarding the proposed rejection based on Tee in view of Honkanen: it is noted that, Tee raises an SNQ, thus, any plausible combination of valid prior art reference including Tee also raises an SNQ. Furthermore, insofar as dependent Patent claims 2-3 are within the chain of dependency stemming from independent Patent claim 1, and thus inherently possesses all of the limitations of the independent Patent claim 1, the same substantial new

question of patentability raised for Patent claim 1 is also raise for dependent Patent claims 2-3.

Honkanen also appears to teach a method for controlling a number of simultaneous radio connections in a communication device (abstract).

Examiner further finds the teachings of Tee in view of Honkanen as discussed herein are not cumulative to any written discussion on the record of the teachings of the prior art, were not previously considered nor addressed in this manner during a prior examination, and the same questions were not the subject of a final holding of invalidity in the Federal Courts. Accordingly, Examiner concludes herein Tee in view of Honkanen raises SNQs for Patent claims 2-3.

SCOPE OF REEXAMINATION

On the basis of the findings above, Examine agrees that Issues 1 and 2 raise SNQs for Patent Claims 1-10 of the '590 Patent. Accordingly, Patent Claims 1-10 of the '590 Patent will be reexamined as requested in this reexamination proceeding.

DUTY TO DISCLOSE

The Patent Owner is reminded of the continuing responsibility under 37 C.F.R. §1.565(a) to apprise the Office of any litigation activity, or other prior or concurrent proceeding, throughout the course of this reexamination proceeding involving the '590 Patent. The Third Party Requester is also reminded of the ability to similarly apprise the Office of any such activity or proceeding throughout the course of this reexamination proceeding. See MPEP §§2207, 2282 and 2286.

SERVICE OF PAPERS

After the filing of a request for reexamination by a Third Party Requester, any document filed by either the Patent Owner or the Third Party Requester must be served on the other party (or parties where two or more third party requester proceedings are merged) in the reexamination proceeding in the manner provided in 37 CFR 1.248 (See 37 CFR 1.550).

CONCLUSION

Reexamination of patent claims 1-10 is ordered herein.

Extensions of time under 37 C.F.R. §1.136(a) will not be permitted in these proceedings because the provisions of 37 C.F.R. §1.136 apply only to "an applicant" and not to parties in a reexamination proceeding. Additionally, 35 U.S.C. §305 requires that reexamination proceedings "will be conducted with

special dispatch" (37 C.F.R. §1.550(a)). Extension of time in reexamination proceedings are provided for in 37 C.F.R. §1.550(c). After the filing of a request for reexamination by the Third Party Requester, any document filed by either the Patent Owner or the Third Party Requester must be served on the other party (or parties where two or more third-party-requester proceedings are merged) in the reexamination proceeding in the manner provided in 37 C.F.R. §1.248. See 37 C.F.R. §1.550(f).

All correspondence relating to this ex parte reexamination proceeding should be directed as follows:

By U.S. Postal Service Mail to:
Mail Stop Ex Parte Reexam
ATTN: Central Reexamination Unit
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

By FAX to:
(571) 273-9900
Central Reexamination Unit

For EFS-Web transmissions, 37 CFR 1.8(a)(1)(i) (C) and (ii) states that correspondence (except for a request for reexamination and a corrected or replacement request for reexamination) will be considered timely filed if (a) it is transmitted via the Office's electronic filing system in accordance with 37 C.F.R. §1.6(a)(4), and (b) includes a certificate of transmission for each piece of correspondence stating the date of transmission, which is prior to the expiration of the set period of time in the Office action.

Any inquiry concerning this communication or earlier communications from the Reexamination Legal Advisor or Examiner, or as to the status of this proceeding, should be directed to the Central Reexamination Unit at telephone number (571) 272-7705.

Signed:

/MY TRANG TON/
Primary Examiner, Art Unit 3992

Conferees:

/KENNETH WHITTINGTON/
Primary Examiner, Art Unit 3992

/ANDREW J. FISCHER/
Supervisory Patent Reexamination Specialist, Art Unit 3992

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	90/014,651	10129590
	Examiner	Art Unit
	MY TRANG TON	3992

CPC - Searched*		
Symbol	Date	Examiner

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
Review of patented file's prosecution history	01/26/2021	mt
litigation review	01/26/2021	mt

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

Reexamination	Application/Control No.	Applicant(s)/Patent Under Reexamination
	90/014,651	10129590
	Certificate Date	Certificate Number

Requester Correspondence Address: ☐ Patent Owner ☑ Third Party
ERISE IP, P.A. (GENERAL) 7015 COLLEGE BLVD. , SUITE 700 OVERLAND PARK, KS 66211

LITIGATION REVIEW ☑	mt (examiner initials)	01 February 2021 (date)
Case Name		Director Initials
Maxell, Ltd, V. Apple Inc. (6:20cv646) (open)		

COPENDING OFFICE PROCEEDINGS	
TYPE OF PROCEEDING	NUMBER
N/a	

PTO/SB/08a (07-09)
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Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 2

Complete if Known	
Application Number	90/014,651
Filing Date	01/12/2021
First Named Inventor	Toshiyuki Kurita
Art Unit	3992
Examiner Name	TON
Attorney Docket Number	2638-19.08

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] *(if known)*	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
/M.T/	EX1005	US-2006/0203758 A1	09-14-2006	Tee, et al.	
	EX1006	US-2006/0135076 A1	06-22-2006	Honkanen, et al.	
	EX1007	US-9,420,212 B2	08-16-2016	Kurita, et al.	
	EX1012	US-2007/0109973 A1	05-17-2007	Trachewsky	
	EX1013	US-2006/0258289 A1	11-16-2006	Dua	
	EX1014	US-2005/0136949 A1	06-23-2005	Barnes, Jr.	
	EX1015	US-2008/0101446 A1	05-01-2008	Gautier, et al.	
	EX1017	US-2005/0215284 A1	09-29-2005	Su, et al.	
	EX1018	US-2007/0238482 A1	10-11-2007	Rayzman, et al.	
	EX1019	US-2007/0275746 A1	11-29-2007	Bitran	
	EX1020	US-2008/0081663 A1	04-03-2008	Kasslin, et al.	
	EX1021	US-2007/0165754 A1	07-19-2007	Kiukkonen, et al.	
	EX1022	US-2005/0190747 A1	09-01-2005	Sindhwani, et al.	
	EX1023	US-2005/0249245 A1	11-10-2005	Hazani, et al.	
	EX1024	US-8,625,547 B1	01-07-2014	Miller, II	
	EX1026	US-7,233,359 B2	06-19-2007	Suda	
	EX1031	US-2007/0091835 A1	04-06-2007	Jo, et al.	
	EX1032	US-2007/0072642 A1	03-29-2007	Kangas, et al.	
	EX1033	US-2008/0139118 A1	06-12-2008	Sanguinetti	
	EX1034	US-2005/0034169 A1	02-10-2005	Maeda, et al.	
/M.T/	EX1035	US-2004/0193647 A1	09-30-2004	Ueda, et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3] – Number[4] – Kind Code[5] *(if known)*	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T[6]
/M.T/	EX1016	WO/2005/060127 A1	06-30-2005	Nokia Corporation		

Examiner Signature	/MY TRANG TON/	Date Considered	02/01/2021

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5]Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

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 2 hours 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, 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 (1-800-786-9199) and select option 2.

PTO/SB/08b (07-09)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 2 of 2

Complete if Known	
Application Number	
Filing Date	
First Named Inventor	Toshiyuki Kurita
Art Unit	
Examiner Name	
Attorney Docket Number	2638-19.08

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	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, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
/M.T/	EX1002	Prosecution history for the '590 Patent ("'590 File History")	
	EX1008	Maxell, Ltd. v. Apple Inc., Complaint for Patent Infringement, US District Court, Western District of Texas 6:20-cv-00646, July 16, 2020	
	EX1009	Certain Mobile Electronic Devices And Laptop Computers, Complaint, July 16, 2020	
	EX1004	Certain Mobile Electronic Devices And Laptop Computers, Investigation No. 337-TA-1215, Commission Investigative Staff's Initial Markman Brief, January 5, 2020	
	EX1025	MALLICK, Martyn, "Mobile and Wireless Design Essentials," ISBN:0471214191, 2003	
	EX1027	APOSTOLOPOULOS, John G., et al., "Video Streaming: Concepts, Algorithms, and Systems," HP Laboratories Palo Alto, HPL-2002-260, September 18, 2002	
	EX1028	Newton's Telecom Dictionary 20th Update and Expanded Edition by Harry Newton, 2004	
	EX1029	RIBAS-CORBERA, Jordi, et al. "A Flexible Decoder Buffer Model For JVT Video Coding," IEEE ICIP, 2002	
/M.T/	EX1030	SHEU, Tsung-Ling, et al, "A Buffer Allocation Mechanism for VBR Video Playback" New Mexico State University, IEEE 0-7803-6394, 2000	

Examiner Signature	/MY TRANG TON/	Date Considered	02/01/2021

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

1 Applicant's unique citation designation number (optional). 2 Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 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 2 hours 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, 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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UNITED STATES PATENT AND TRADEMARK OFFICE

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United States Patent and Trademark Office
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P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
90/014,651	01/12/2021	10129590	2638-19.08	7485

24956 7590 01/26/2021

MATTINGLY & MALUR, PC
1800 DIAGONAL ROAD
SUITE 210
ALEXANDRIA, VA 22314

EXAMINER
TON, MY TRANG

ART UNIT	PAPER NUMBER
3992	

MAIL DATE	DELIVERY MODE
01/26/2021	PAPER

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.

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

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(THIRD PARTY REQUESTER'S CORRESPONDENCE ADDRESS)

ERISE IP, P.A.
7015 COLLEGE BOULEVARD
SUITE 700
OVERLAND PARK, KS 66211

EX PARTE REEXAMINATION COMMUNICATION TRANSMITTAL FORM

REEXAMINATION CONTROL NO. *90/014,651* .

PATENT UNDER REEXAMINATION *10129590* .

ART UNIT *3992* .

Enclosed is a copy of the latest communication from the United States Patent and Trademark Office in the above identified *ex parte* reexamination proceeding (37 CFR 1.550(f)).

Where this copy is supplied after the reply by requester, 37 CFR 1.535, or the time for filing a reply has passed, no submission on behalf of the *ex parte* reexamination requester will be acknowledged or considered (37 CFR 1.550(g)).

Ex Parte Reexamination Interview Summary – Pilot Program for Waiver of Patent Owner's Statement	Control No. 90/014,651	Patent Under Reexamination is Requested 10129590	
	Examiner MY TRANG TON	Art Unit 3992	AIA (FITF) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address. --

All participants (USPTO official and patent owner):

(1) SHANETTE BROWN (3) _____

(2) _____ (4) _____

Date of Telephonic Interview: 20 January 2021.

A. The USPTO official requested waiver of the patent owner's statement pursuant to the pilot program for waiver of patent owner's statement in *ex parte* reexamination proceedings.*

☐ The patent owner **agreed** to waive its right to file a patent owner's statement under 35 U.S.C. 304 in the event reexamination is ordered for the above-identified patent.

☐ The patent owner **did not agree** to waive its right to file a patent owner's statement under 35 U.S.C. 304 at this time.

☑ USPTO personnel were unable to reach the patent owner.**

B. The Patent Owner of record telephoned the Office and indicated they would like to participate in the pilot program for waiver of patent owner's statement in *ex parte* reexamination proceedings.*

☐ The Patent owner of record telephoned the Office and **agreed** to waive its right to file a patent owner's statement under 35 U.S.C. 304 in the event reexamination is ordered for the above-identified patent.

The patent owner is not required to file a written statement of this telephone communication under 37 CFR 1.560(b) or otherwise. However, any disagreement as to this interview summary must be brought to the immediate attention of the USPTO, and no later than one month from the mailing date of this interview summary. Extensions of time are governed by 37 CFR 1.550(c).

*For more information regarding this pilot program, see *Pilot Program for Waiver of Patent Owner's Statement in Ex Parte Reexamination Proceedings, 75 Fed. Reg.* 47269 (August 5, 2010), available on the USPTO Web site at http://www.uspto.gov/patents/law/notices/2010.jsp.

**The patent owner may contact the USPTO personnel at (571) 272-7705 or at the telephone number provided below if the patent owner decides to waive the right to file a patent owner's statement under 35 U.S.C. 304.

/SHANETTE BROWN/ (571)272-6632
Signature and telephone number of the USPTO official, who contacted, was contacted by, or attempted to contact the patent owner.

cc: Requester (if third party requester)

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

REEXAM CONTROL NUMBER	FILING OR 371 (c) DATE	PATENT NUMBER
90/014,651	01/12/2021	10129590

CONFIRMATION NO. 7485

ERISE IP, P.A. (GENERAL)
7015 COLLEGE BLVD. ,
SUITE 700
OVERLAND PARK, KS 66211

REEXAMINATION REQUEST NOTICE

OC000000122733850

Date Mailed: 01/19/2021

NOTICE OF REEXAMINATION REQUEST FILING DATE

(Third Party Requester)

Requester is hereby notified that the filing date of the request for reexamination is 01/12/2021, the date that the filing requirements of 37 CFR § 1.510 were received.

A decision on the request for reexamination will be mailed within three months from the filing date of the request for reexamination. (See 37 CFR 1.515(a)).

A copy of the Notice is being sent to the person identified by the requester as the patent owner. Further patent owner correspondence will be the latest attorney or agent of record in the patent file. (See 37 CFR 1.33). Any paper filed should include a reference to the present request for reexamination (by Reexamination Control Number).

cc: Patent Owner
24956
MATTINGLY & MALUR, PC
1800 DIAGONAL ROAD
SUITE 210
ALEXANDRIA, VA 22314

/pflewis/

Legal Instruments Examiner
Central Reexamination Unit 571-272-7705; FAX No. 571-273-9900

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

REEXAM CONTROL NUMBER	FILING OR 371 (c) DATE	PATENT NUMBER
90/014,651	01/12/2021	10129590

CONFIRMATION NO. 7485

REEXAM ASSIGNMENT NOTICE

24956
MATTINGLY & MALUR, PC
1800 DIAGONAL ROAD
SUITE 210
ALEXANDRIA, VA 22314

OC000000122733852

Date Mailed: 01/19/2021

NOTICE OF ASSIGNMENT OF REEXAMINATION REQUEST

The above-identified request for reexamination has been assigned to Art Unit 3992. All future correspondence to the proceeding should be identified by the control number listed above and directed to the assigned Art Unit.

A copy of this Notice is being sent to the latest attorney or agent of record in the patent file or to all owners of record. (See 37 CFR 1.33(c)). If the addressee is not, or does not represent, the current owner, he or she is required to forward all communications regarding this proceeding to the current owner(s). An attorney or agent receiving this communication who does not represent the current owner(s) may wish to seek to withdraw pursuant to 37 CFR 1.36 in order to avoid receiving future communications. If the address of the current owner(s) is unknown, this communication should be returned within the request to withdraw pursuant to Section 1.36.

NOTICE OF USPTO EX PARTE REEXAMINATION PATENT OWNER STATEMENT WAIVER PROGRAM

The USPTO has implemented a pilot program where, after a reexamination proceeding has been granted a filing date and before the examiner begins his or her review, the patent owner may orally waive the right to file a patent owner's statement. See *"Pilot Program for Waiver of Patent Owner's Statement in Ex Parte Reexamination Proceedings,"* 75 FR 47269 (August 5, 2010). One goal of the pilot program is to reduce the pendency of reexamination proceedings and improve the efficiency of the reexamination process.

Ordinarily when ex parte reexamination is ordered, the USPTO must wait until after the receipt of the patent owner's statement and the third party requester's reply, or after the expiration of the time period for filing the statement and reply (a period that can be as long as 5 to 6 months), before mailing a first determination of patentability. The USPTO's first determination of patentability is usually a first Office action on the merits or a Notice of Intent to Issue Reexamination Certificate (NIRC).

Under the pilot program, the patent owner's oral waiver allows the USPTO to act on the first determination of patentability immediately after determining that reexamination will be ordered, and in a suitable case issue the reexamination order and the first determination of patentability (which could be a NIRC if the claims under reexamination are confirmed) at the same time.

Benefits to the Patent Owner for participating in this pilot program include reduction in pendency.

To participate in this pilot program, Patent Owners may contact the USPTO's Central Reexamination Unit (CRU) at 571-272-7705. The USPTO will make the oral waiver of record in the reexamination file in an interview summary and a copy will be mailed to the patent owner and any third party requester.

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CONFIRMATION NO. 7485

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
90/014,651	01/12/2021 RULE	348	3992	2638-19.08

APPLICANTS

INVENTORS

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APPLE INC. (3RD. PTY. REQ.), CUPERTINO, CA;
ERISE IP, P.A. (GENERAL), OVERLAND PARK, KS

**** CONTINUING DATA ***************************

This application is a REX of 15/208,886 07/13/2016 PAT 10129590 *
which is a CON of 12/260,410 10/29/2008 PAT 9420212
(*)Data provided by applicant is not consistent with PTO records.

**** FOREIGN APPLICATIONS ***************************

JAPAN 2007-306750 11/28/2007

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ****

Foreign Priority claimed ❑ Yes ❑ No 35 USC 119(a-d) conditions met ❑ Yes ❑ No Verified and Acknowledged _____ Examiner's Signature	❑ Met after Allowance _____ Initials	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
				19	4

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ALEXANDRIA, VA 22314
UNITED STATES

TITLE

DISPLAY APPARATUS AND VIDEO PROCESSING APPARATUS

FILING FEE RECEIVED		
12600	FEES: Authority has been given in Paper No._____ to charge/credit DEPOSIT ACCOUNT No._____ for following:	❑ All Fees ❑ 1.16 Fees (Filing) ❑ 1.17 Fees (Processing Ext. of time) ❑ 1.18 Fees (Issue) ❑ Other _____ ❑ Credit

BIB (Rev. 05/07).

Patent Assignment Abstract of Title

Total Assignments: 1

Application #: 15208886 **Filing Dt:** 07/13/2016 Patent #: 10126886 **Issue Dt:** 11/13/2018

PCT #: NONE **Intl Reg #:** Publication #: US20160334635 **Pub Dt:** 11/03/2016

Inventors: Hitoaki Owashi, Toshiyuki Kurita

Title: DISPLAY APPARATUS AND VIDEO PROCESSING APPARATUS

Assignment: 1

Reel/Frame: 045142 / 0208 **Received:** 01/25/2018 **Recorded:** 01/25/2018 **Mailed:** 03/09/2018 **Pages:** 141

Conveyance: ASSIGNMENT OF ASSIGNORS INTEREST (SEE DOCUMENT FOR DETAILS).

Assignor: HITACHI MAXELL, LTD. **Exec Dt:** 10/01/2017

Assignee: MAXELL, LTD.
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Search Results as of: 01/15/2021 09:11 PM

If you have any comments or questions concerning the data displayed, contact PRD / Assignments at 571-272-3350. v.2.6
Web interface last modified: Jun 26, 2017 v.2.6

Litigation Search Report CRU 3999

Reexamination Control No. 90/014,651

To: EXAMINER	From: Shanette Brown
Location: CRU	Location: CRU 3999 / REM 4C75
Art Unit: 3999	Phone: (571) 272-6632
Date: 01/13/2021	E-mail: Shanett.brown@uspto.gov

Search Notes

U.S. Patent No. 10,129,590

1. Performed a KeyCite Search in Westlaw, which retrieves all history on the patent including any litigation.
2. Performed a search on the patent in Lexis CourtLink for any open dockets or closed cases.
3. Performed a search in Lexis in the Federal Courts and Administrative Materials databases for any cases found.
4. Performed a search in Lexis in the IP Journal and Periodicals database for any articles on the patent.
5. Performed a search in Lexis in the news databases for any articles about the patent or any articles about litigation on this patent.

Litigation: Found

Status	Docket	Description
OPEN	6:20cv646	Maxell, Ltd. V. Apple Inc.

Citing References (15)

Treatment	Title	Date	Type	Depth	Headnote(s)
Examined by	**1. Complaint and Demand for Jury Trial** MAXELL, LTD., Plaintiff, v. APPLE INC., Defendant. 2020 WL 4036869, *1+ , W.D.Tex. (Trial Pleading) , (NO. 6:20-CV-00646) ... by Apple's infringement of the '821 Patent COUNT 4 - INFRINGEMENT OF U.S. PATENT NO. 10,129,590 54. Maxell incorporates paragraphs 1-53 above by reference.55. U.S. Patent No. 10,129,590 (the '" 590 Patent ," attached hereto at Exhibit 4) duly issued on November 13, 2018 and is entitled Display Apparatus and Video Processing ...	July 16, 2020	Petition		—
Cited by	**2. Commission Notice** IN THE MATTER OF CERTAIN MOBILE ELECTRONIC DEVICES AND LAPTOP COMPUTERS NOTICE OF INSTITUTION OF INVESTIGATION USITC Inv. No. 337-TA-1215, 337-TA-1215+ , U.S.Intern.Trade Com'n , (NO. 337-TA-1215) Institution of Investigation Pursuant to 19 U.S.C. 1337 AGENCY: U.S. International Trade Commission ACTION: Notice SUMMARY: Notice is hereby given that a complaint was filed with... ... of certain claims of U.S. Patent No. 7,203,517 ("the '517 patent")U.S. Patent No. 8,982,086 ("the '086 patent")U.S. Patent No. 7,199,821 ("the '821 patent") U.S. Patent No. 10,129,590 ("the '590 patent "); and U.S. Patent No. 10,176,848 ("the '848 patent") The complaint further alleges that an industry in the United States ...	Aug. 19, 2020	Administrative Decision		—
Mentioned by	**3. Mobile communication terminal device** LitAlert P2020-29-112 ... 16/2020 Subsequent Action: 07/16/2020 Action Taken: CAUSE - 35 USC 271 - COMPLAINT FOR PATENT INFRINGEMENT Notes: none Other Patents: US 8982086 US 7199821 US 10129590 US 10176848 Other Trademarks: none See LitAlert No: none ...	July 16, 2020	Lit Alert		—
—	**4. VIDEO PROCESSING APPARATUS SUCH AS CAMERA, HAS CONTROL UNIT WHICH CONTROLS ASSIGNMENT OF CONNECTION FOR FIRST AND SECOND RADIO COMMUNICATION UNITS IN RESPONSE TO RECEIVING INDICATION FROM USER** DWPI 2016-68120H ... of the first and second radio communication units in response to receiving an indication from a user.First Derwent Appearance:2016.75 Publication No. (Derwent): US 10129590 B2 Original Title (English):DISPLAY APPARATUS AND VIDEO PROCESSING APPARATUS Publication Date:2018-11-13 Application No.:US 208886 Application Date:2016-07-13 ...	Nov. 28, 2007	DWPI	—	—

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Treatment	Title	Date	Type	Depth	Headnote(s)
—	**5. DISPLAY APPARATUS FOR VIDEO, HAS CONTROLLER THAT CONTROLS ASSIGNMENT BETWEEN FIRST RADIO COMMUNICATION CIRCUIT AND EXTERNAL VIDEO PROCESSING APPARATUS AND ASSIGNMENT BETWEEN SECOND RADIO COMMUNICATION CIRCUIT AND INTERNET OR HOME NETWORK** Out Of Plan DWPI 2018-46613K ... Date:2007-11-28 Related:Continuation of US patent number US 9420212 B Previously issued patent number US 2018167671 A Continuation of US patent number US 10129590 B Continuation of US patent number US 9420212 B No. of Countries:1 No. of Patents:2 First Derwent Appearance:2018.42 Latest Derwent ...	Nov. 28, 2007	DWPI	—	—
—	**6. METHOD FOR PROCESSING VIDEO INFORMATION, INVOLVES CONTROLLING EACH OF FIRST AND SECOND RADIO COMMUNICATORS SO THAT FIRST RADIO COMMUNICATOR TRANSMITS VIDEO INFORMATION AND SECOND RADIO COMMUNICATOR CONNECTS TO NETWORK SIMULTANEOUSLY** Out Of Plan DWPI 2019-49585W ... 2007-11-28 Related:Continuation of US patent number US 10244284 B Continuation of US patent number US 9420212 B Continuation of US patent number US 10129590 B No. of Countries:1 No. of Patents:1 First Derwent Appearance:2019.49 Latest Derwent Appearance:2019.49 Classification Information International Classes (IPC ...	Nov. 28, 2007	DWPI	—	—
—	**7. VIDEO PROCESSING APPARATUS, HAS CONTROLLER CONTROLLING FIRST/ SECOND COMMUNICATORS IN RESPONSE TO RECEIVING INDICATION FROM USER SUCH THAT SECOND COMMUNICATOR CONNECTS TO NETWORK, WHILE TRANSMITTING VIDEO INFORMATION FROM FIRST COMMUNICATOR** Out Of Plan DWPI 2019-49585X ... 2007-11-28 Related:Continuation of US patent number US 10244284 B Continuation of US patent number US 9420212 B Continuation of US patent number US 10129590 B No. of Countries:1 No. of Patents:1 First Derwent Appearance:2019.49 Latest Derwent Appearance:2019.49 Classification Information International Classes (IPC ...	Nov. 28, 2007	DWPI	—	—

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Treatment	Title	Date	Type	Depth	Headnote(s)
—	**8. DISPLAY APPARATUS FOR ESTABLISHING CONNECTIONS BETWEEN MULTIPLE APPARATUSES AND NETWORKS BY RADIO, COMPRISES A MEMORY (121), A PROCESSOR, A HIGH DEFINITION MULTIMEDIA INTERFACE, AN AUDIO OUTPUT DEVICE, A DISPLAY SCREEN AND A RADIO MODEM** Out Of Plan DWPI 2020-29875U ... 2007-11-28 Application priority Earliest Priority Date:2007-11-28 Related:Continuation of US patent number US 9420212 B Continuation of US patent number US 10129590 B Continuation of US patent number US 10244284 B No. of Countries:1 No. of Patents:1 First Derwent Appearance:2020.038 Latest Derwent ...	Nov. 28, 2007	DWPI	—	—
—	**9. INFORMATION PROCESSING APPARATUS E.G. DIGITAL CAMERA HAS PROCESSOR WHICH CONTROLS FIRST AND SECOND RADIO MODEM SO THAT FIRST RADIO MODEM TRANSMITS PICTURE INFORMATION TO EXTERNAL DEVICE WHILE SECOND RADIO MODEM IS CONNECTED TO INTERNET** Out Of Plan DWPI 2020-37389U ... 2007-11-28 Application priority Earliest Priority Date:2007-11-28 Related:Continuation of US patent number US 9420212 B Continuation of US patent number US 10129590 B Continuation of US patent number US 10244284 B No. of Countries:1 No. of Patents:1 First Derwent Appearance:2020.043 Latest Derwent ...	Nov. 28, 2007	DWPI	—	—
—	**10. Maxell, Ltd. v. Apple Inc.**	July 16, 2020	Docket Summaries	—	—
—	**11. DISPLAY APPARATUS AND VIDEO PROCESSING APPARATUS** Out Of Plan US PAT 10244284 , U.S. PTO Utility While presenting on a display apparatus videos of high picture quality obtained from portable video processing apparatuses such as a camera and a cellular, it is possible to... ... D Mekonnen D Dagnew 2664 Priority Information Related Information:This application is a Continuation of Application No. 15/208,886, filed on 2016/07/13, now Patent No. 10,129,590 US US which is a Continuation of Application No. 12/260,410, filed on 2008/10/29, now Patent No. 9,420,212, issued on 2016 ...	Mar. 26, 2019	Patents	—	—

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Treatment	Title	Date	Type	Depth	Headnote(s)
—	**12. INFORMATION PROCESSING APPARATUS AND INFORMATION PROCESSING METHOD** Out Of Plan US PAT APP 20200145718+ , U.S. PTO Application While presenting on a display apparatus videos of high picture quality obtained from portable video processing apparatuses such as a camera and a cellular, it is possible to... ... on 2018/02/07, now Patent No. 10,244,284 US US which is a Continuation of Application No. 15/208,886, filed on 2016/07/13, now Patent No. 10,129,590 US US which is a Continuation of Application No. 12/260,410, filed on 2008/10/29, now Patent No. 9,420,212 US US Priority ...	May 07, 2020	Patents	—	—
—	**13. DISPLAY APPARATUS AND VIDEO PROCESSING APPARATUS** Out Of Plan US PAT APP 20200120381+ , U.S. PTO Application While presenting on a display apparatus videos of high picture quality obtained from portable video processing apparatuses such as a camera and a cellular, it is possible to... ... on 2018/02/07, now Patent No. 10,244,284 US US which is a Continuation of Application No. 15/208,886, filed on 2016/07/13, now Patent No. 10,129,590 US US which is a Continuation of Application No. 12/260,410, filed on 2008/10/29, now Patent No. 9,420,212 US US Priority ...	Apr. 16, 2020	Patents	—	—
—	**14. DISPLAY APPARATUS AND VIDEO PROCESSING APPARATUS** Out Of Plan US PAT APP 20190174178+ , U.S. PTO Application While presenting on a display apparatus videos of high picture quality obtained from portable video processing apparatuses such as a camera and a cellular, it is possible to... ... on 2018/02/07, now Patent No. 10,244,284 US US which is a Continuation of Application No. 15/208,886, filed on 2016/07/13, now Patent No. 10,129,590 US US which is a Continuation of Application No. 12/260,410, filed on 2008/10/29, now Patent No. 9,420,212 US US Priority ...	June 06, 2019	Patents	—	—
—	**15. DISPLAY APPARATUS AND VIDEO PROCESSING APPARATUS** Out Of Plan US PAT APP 20190174179+ , U.S. PTO Application While presenting on a display apparatus videos of high picture quality obtained from portable video processing apparatuses such as a camera and a cellular, it is possible to... ... on 2018/02/07, now Patent No. 10,244,284 US US which is a Continuation of Application No. 15/208,886, filed on 2016/07/13, now Patent No. 10,129,590 US US which is a Continuation of Application No. 12/260,410, filed on 2008/10/29, now Patent No. 9,420,212 US US Priority ...	June 06, 2019	Patents	—	—

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Document: 6:20cv646, Maxell, Ltd. V. Apple Inc. Actions

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6:20cv646, Maxell, Ltd. V. Apple Inc.

US District Court Docket

US District Court for the Western District of Texas

(Waco)

This case was retrieved on 01/13/2021

Header

Case Number: 6:20cv646
Date Filed: 07/16/2020
Assigned To: Judge Alan D Albright
Nature of Suit: Patent (830)
Cause: Patent Infringement
Lead Docket: None
Other Docket: None
Jurisdiction: Federal Question

Class Code: Open
Statute: 35:271
Jury Demand: Plaintiff
Demand Amount: $0
NOS Description: Patent

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Proceedings

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	Availability	#	Date	Proceeding Text	Source
☐	Free	6	03/24/2020	STANDING ORDER from U.S. District Judge Alan D. Albright regarding scheduled civil hearings. Signed by Judge Alan D Albright. (Attachments: # 1 Supplemental Standing Order from Chief Judge Garcia re COVID19 Court Procedures)(mc5) (Entered: 07/22/2020)	
☐	Free	1	07/16/2020	COMPLAINT for Patent Infringement (Filing fee $ 400 receipt number 0542-13768209), filed by Maxell, Ltd.. (Attachments: # 1 Exhibit 1, # 2 Exhibit 2, # 3 Exhibit 3, # 4 Exhibit 4, # 5 Exhibit 5, # 6 Exhibit 6, # 7 Exhibit 7, # 8 Exhibit 8, # 9 Exhibit 9, # 10 Exhibit 10, # 11 Civil Cover Sheet)(Harrell, Robert) (Entered: 07/16/2020)	
☐	Online	2	07/16/2020	REQUEST FOR ISSUANCE OF SUMMONS by Maxell, Ltd.. (Harrell, Robert) (Entered: 07/16/2020)	
☐	Online	3	07/16/2020	Notice of Filing of Patent/Trademark Form (AO 120). AO 120 forwarded to the Director of the U.S. Patent and Trademark Office. (Harrell, Robert) (Entered: 07/16/2020)	
☐	Free	4	07/16/2020	RULE 7 DISCLOSURE STATEMENT filed by Maxell, Ltd.. (Harrell, Robert) (Entered: 07/16/2020)	
☐	Runner		07/16/2020	Case assigned to Judge Alan D Albright. CM WILL NOW REFLECT THE JUDGE INITIALS AS PART OF THE CASE NUMBER. PLEASE APPEND THESE JUDGE INITIALS TO THE CASE NUMBER ON EACH DOCUMENT THAT YOU FILE IN THIS CASE. (lad) (Entered: 07/16/2020)	
☐	Online	5	07/16/2020	Summons Issued as to Apple Inc. (lad) (Entered: 07/16/2020)	
☐	Free	7	07/29/2020	SUMMONS Returned Executed by Maxell, Ltd.. Apple Inc. served on 7/21/2020, answer due 8/11/2020. (Harrell, Robert) (Entered: 07/29/2020)	
☐	Free	8	08/10/2020	Unopposed MOTION for Extension of Time to File Answer by Apple Inc.. (Attachments: # 1 Proposed Order)(Guaragna, John) (Entered: 08/10/2020)	
☐	Runner		08/11/2020	Text Order GRANTING 8 Motion for Extension of Time to Answer entered by Judge Alan D Albright. Came on for consideration is Defendant's Motion. Noting that it is unopposed, the Court GRANTS the Motion. Defendant shall have up to and including September 10, 2020 to answer or otherwise respond to Plaintiff's Complaint. (This is a text-only entry generated by the court. There is no document associated with this entry.) (jy) (Entered: 08/11/2020)	
☐	Runner		08/11/2020	Reset Deadlines: Apple Inc. answer due 9/10/2020. (lad) (Entered: 08/11/2020)	
☐	Online	9	09/08/2020	Unopposed MOTION for Extension of Time to File Answer re 1 Complaint, or Otherwise Respond by Apple Inc.. (Attachments: # 1 Proposed Order)(Guaragna, John) (Entered: 09/08/2020)	
☐	Runner		09/08/2020	Text Order GRANTING 9 Unopposed Motion for Extension of Time to Answer entered by Judge Alan D Albright. Defendant has until up to and including September 24, 2020 to answer or otherwise respond to Plaintiff's complaint. (This is a text-only entry generated by the court. There is no document associated with this entry.) (as) (Entered: 09/08/2020)	
☐	Runner		09/08/2020	Reset Deadlines: Apple Inc. answer due 9/24/2020. (lad) (Entered: 09/09/2020)	
☐	Free	10	09/17/2020	MOTION to Stay Case Pursuant to 28 U.S.C. Sec. 1659 Pending Parallel ITC Action by Apple Inc.. (Attachments: # 1 Proposed Order)(Guaragna, John) (Entered: 09/17/2020)	
☐	Free	11	09/22/2020	RESPONSE to Motion, filed by Maxell, Ltd., re 10 MOTION to Stay Case Pursuant to 28 U.S.C. Sec. 1659 Pending Parallel ITC Action filed by Defendant Apple Inc. Maxell's Non-Opposition to Apple's Motion to Stay (Attachments: # 1 Proposed Order to Response-Non-Opposition to Apple's Motion to Stay)(Harrell, Robert) (Entered: 09/22/2020)	

	Availability	#	Date	Proceeding Text	Source
☐	Online	14	09/22/2020	Standing Order Regarding Notice of Readiness in Patent Cases (Entered: 10/05/2020)	
☐	Online	12	09/24/2020	Unopposed MOTION for Extension of Time to File Answer re 1 Complaint, or Otherwise Respond by Apple Inc.. (Attachments: # 1 Proposed Order)(Guaragna, John) (Entered: 09/24/2020)	
☐	Runner		09/24/2020	Text Order GRANTING 12 Motion for Extension of Time to Answer entered by Judge Alan D Albright. Before the Court is Apple's Unopposed Motion to Extend Time to Answer, Move, or Otherwise Respond to Plaintiffs Complaint. The Court GRANTS the motion. It is therefore ORDERED that Apple's deadline to answer, move, or otherwise respond to Maxells Complaint (Dkt. 1) is extended until October 26, 2020. (This is a text-only entry generated by the court. There is no document associated with this entry.) (jy) (Entered: 09/24/2020)	
☐	Runner		09/24/2020	Reset Deadlines: Apple Inc. answer due 10/26/2020. (lad) (Entered: 09/25/2020)	
☐	Free	13	09/28/2020	REPLY to Response to Motion, filed by Apple Inc., re 10 MOTION to Stay Case Pursuant to 28 U.S.C. Sec. 1659 Pending Parallel ITC Action filed by Defendant Apple Inc. (Attachments: # 1 Exhibit A)(Guaragna, John) (Entered: 09/28/2020)	
☐	Online	15	10/26/2020	Unopposed MOTION for Extension of Time to File Answer re 1 Complaint, or Otherwise Respond by Apple Inc. (Attachments: # 1 Proposed Order)(Guaragna, John) (Entered: 10/26/2020)	
☐	Runner		10/29/2020	Text Order GRANTING 15 Motion for Extension of Time to Answer entered by Judge Alan D Albright. This Court, having considered Defendant Apple Inc.s Unopposed Motion for Extensionof Time to Answer or Otherwise Respond, hereby GRANTS the Motion and ORDERS the following: Apples deadline to answer, move, or otherwise respond to Maxells Complaint (Dkt. 1) is extended until a decision has been made on Apples Motion to Stay Pursuant to 28 U.S.C. § 1659 Pending Parallel ITC Action (Dkt. 10).(This is a text-only entry generated by the court. There is no document associated with this entry.) (re) (Entered: 10/29/2020)	

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Patents

Number	Title	Issued	Class	Subclass
7,203,517	Mobile communication terminal device	04/10/2007	455	557
8,982,086	Information processing apparatus	03/17/2015	345	173
7,199,821	Imaging apparatus and method for controlling white balance	04/03/2007	348	223.1
10,129,580	Display apparatus and video processing apparatus	11/13/2018	1	1
10,176,848	Recording and reproducing apparatus and method thereof	01/08/2019	1	1

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US20200145718A1 - INFORMATION PROCESSING APPARATUS AND INFORMATION PROCESSING METHOD

Original

Bibliographic information & Images

Bibliographic information

Publication number and date
US20200145718A1
2020-05-07

Filed

Application number and date
US16738059 (/api/control?query=AN:("US16738059")&autosearch=true)
2020-01-09

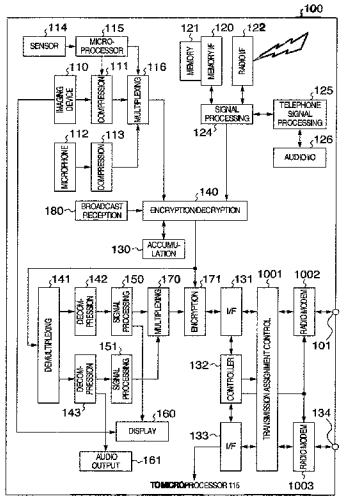
Priority number and date
JP2007306750 (/api/control?query=PRN:("JP2007306750")&autosearch=true)
2007-11-28

Original assignee
MAXELL, LTD. (/api/control?query=pa:("MAXELL%2C%20LTD.")&autosearch=true)

Current assignee
MAXELL, LTD. (/api/control?query=pacu:("MAXELL%2C%20LTD.")&autosearch=true)

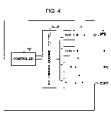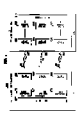
Inventor
Toshiyuki Kurita (/api/control?query=in:("Toshiyuki%20Kurita")&autosearch=true)

1/10 Clipped image










Abstract

While presenting on a display apparatus videos of high picture quality obtained from portable video processing apparatuses such as a camera and a cellular, it is possible to communicate with the Internet and/or a home network. A display apparatus includes a first radio communication unit capable of receiving video information by radio from an external video processing apparatus, a second radio communication unit capable of connecting by radio to a network, and a control unit for controlling assignment of connection by radio transmission for each of the first and second radio communication units. The control unit assigns connection of the first radio communication unit with higher priority and controls the assignment of the transmission rate such that the transmission rate between the first radio communication unit and the external video processing apparatus is more than that between the second radio communication unit and the network.

Original

Claims

1 . An information processing apparatus, comprising: an image sensing device having an optical system; a memory capable of storing picture information obtained by the image sensing device; a processor; a first radio modem, wherein the first radio modem implements a first transmission scheme to transmit or receive picture information; and a second radio modem, wherein the second radio modem implements a second transmission scheme and connects to an internet or a local area network to transmit and receive information, wherein the processor controls the first radio modem and second radio modem based on a user instruction, such that the first radio modem transmits picture information to an external device while the second radio modem is connected to the internet or the local area network for transmitting and receiving information.

2 . The information processing apparatus of claim 1 , further comprising: a third radio modem; and a fourth radio modem, wherein both of the third radio modem and the fourth radio modem are capable of transmitting information to an additional external device, and wherein the processor controls each of the first radio modem, second radio modem, third radio modem, and fourth radio modem based on one or more user instructions.

3 . The information processing apparatus of claim 1 , wherein the first transmission scheme transmits picture information using a first transmission frequency and the second transmission scheme transmits information using a second transmission frequency.

4 . The information processing apparatus of claim 2 , wherein the first radio modem, the second radio modem, the third radio modem, and fourth radio modem each use transmission frequencies that are different from each other.

5 . The information processing apparatus of claim 1 , wherein the first transmission scheme uses a first modulation scheme and the second transmission scheme uses a second modulation scheme.

6 . The information processing apparatus of claim 5 , wherein the first modulation scheme and the second modulation scheme include one or both of Quadrature Amplitude Modulation (QAM) and Quadrature Phase Shift Keying (QPSK).

7 . The information processing apparatus of claim 1 , wherein the memory stores an operating system of the information processing apparatus and the second radio modem receives a signal from the internet indicating that an update for the operating system is available, and wherein the processor executes an update process based on the signal, updates the operating system, and stores an updated operating system in the memory.

8 . The information processing apparatus of claim 1 , wherein the memory stores an application executed on the information processing apparatus and the second radio modem receives a signal from the internet indicating that an update for the application is available, and wherein the processor executes an update process based on the signal, updates the application, and stores an updated application in the memory.

9 . The information processing apparatus of claim 1 , wherein the first radio modem or the second radio modem receives picture information and control information, and wherein, during reproduction of the received picture information, the processor reads the control information to determine whether reproduction of the received picture information is allowed and reproduces the received picture information for display upon determining that reproduction is allowed.

10 . The information processing apparatus of claim 9 , wherein the processor does not reproduce the received picture information upon determining that reproduction is not allowed based on the read control information.

11 . The information processing apparatus of claim 9 , further comprising a decryptor, wherein the received picture information and the control information is encrypted, and wherein reading the control information and reproducing the received picture information includes using the decryptor to decrypt the received picture information and the control information.

12 . The information processing apparatus of claim 9 , wherein the received information includes error correction control bits and reproducing the received picture information includes processing the error correction control bits to correct any detected errors.

13 . The information processing apparatus of claim 1 , further comprising: an encoder for encoding the picture information obtained by the image sensing device, the picture information being encoded into a predetermined format; and an encryptor for encrypting the picture information.

14 . The information processing apparatus of claim 1 , further comprising: a display for displaying a screen requesting user input, wherein the displayed screen prompts the user for a user input that indicates whether the user allows a connection between the first radio modem and the external device to be established, wherein in response to receiving the user input indicating allowance of the connection, the first radio modem transmits the stored picture information to the external device.

15 . The information processing apparatus of claim 1 , wherein the first transmission scheme transmits picture information using a first transmission rate and the second transmission scheme transmits information using a second transmission rate.

16 . The information processing apparatus of claim 1 , wherein the processor assigns a first priority to the first radio modem and assigns a second priority to the second radio modem, and wherein the first priority is higher than the second priority.

17 . The information processing apparatus of claim 1 , wherein one of the first transmission scheme or second transmission scheme includes a Multiple-input and Multiple-output (MIMO) scheme.

18 . The information processing apparatus of claim 1 , wherein the first transmission scheme uses a first number of carriers and the second transmission scheme uses a second number of carriers.

19 . The information processing apparatus of claim 1 , wherein one of the first transmission scheme and the second transmission scheme includes Orthogonal Frequency Division Multiplexing (OFDM).

20 . The information processing apparatus of claim 1 , wherein the picture information transmitted to the external device is moving picture information or still picture information.

21 . The information processing apparatus of claim 20 , wherein the information processing apparatus transmits moving picture information according to at least one of Moving Picture Experts Group (MPEG) 2, MPEG4, or Advanced Video Coding (AVC)/H.264 standards.

22 . The information processing apparatus of claim 20 , wherein the information processing apparatus transmits still picture information according to the Joint Photographic Experts Group (JPEG) standard.

23 . The information processing apparatus of claim 1 , wherein the picture information transmitted to the external device includes the stored picture information.

24 . An information processing method, comprising: obtaining picture information using an image sensing device; storing picture information obtained by the image sensing device on a memory; receiving a user instruction; controlling a first radio modem and a second radio modem based on the user instruction, such that the first radio modem transmits picture information to an external device while the second radio modem is connected to an internet or a local area network for transmitting and receiving information, wherein the first radio modem implements a first transmission scheme to transmit or receive picture information, and wherein the second radio modem implements a second transmission scheme and connects to the internet or the local area network to transmit and receive information.

25 . The information processing method of claim 24 , further comprising: controlling a third radio modem and a fourth radio modem based on one or more user instructions, wherein both of the third radio modem and the fourth radio modem are capable of transmitting information to an additional external device.

26 . The information processing method of claim 24 , further comprising: storing an operating system on the memory; receiving a signal from the internet indicating that an update for the operating system is available; executing an update process based on the signal; updating the operating system; and storing an updated operating system on the memory.

27 . The information processing method of claim 24 , further comprising: storing an application on the memory; receiving a signal from the Internet indicating that an update for the application is available; executing an update process based on the signal; updating the application; and storing an updated application on the memory.

28 . The information processing method of claim 24 , further comprising: receiving picture information and control information; determining whether reproduction of the received picture information is allowed based on the control information; and reproducing the received picture information for display upon determining that reproduction is allowed.

29 . The information processing method of claim 24 , further comprising: assigning a first priority to the first radio modem; and assigning a second priority to the second radio modem, wherein the first priority is higher than the second priority.

30 . An information processing apparatus, comprising: an image sensing device having an optical system; a first memory capable of storing picture information obtained by the image sensing device; a second memory storing an operating system of the information processing apparatus; a processor; a display capable of displaying the stored picture information; a first radio modem, wherein the first radio modem implements a first transmission scheme to transmit or receive picture information; a second radio modem, wherein the second radio modem implements a second transmission scheme and connects to an internet or a local area network to transmit and receive information; a third radio modem capable of transmitting information from the information processing apparatus; and a fourth radio modem capable of transmitting information from the information processing apparatus, wherein the processor controls the first radio modem and the second radio modem based on a user instruction, such that the first radio modem transmits picture information to an external device while the second radio modem is connected to the internet or the local area network for transmitting and receiving information, wherein the second radio modem receives a signal from the Internet indicating that an update for the operating system is available, and the processor executes an update process based on the signal, updates the operating system, and stores an updated operating system on the second memory, wherein the first radio modem or the second radio modem receives picture information and control information, and, during reproduction of the received picture information, the processor reads the control information to determine whether reproduction of the received picture information is allowed and reproduces the received picture information for display upon determining that reproduction is allowed.

Original

Families

INPADOC

This section contains all family relations of this particular document. For more information about the different families please refer to the Manual (Glossary/Families).

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Extended (18)	Complete (18)	Main (18)	Domestic (1)	Application number	Publication	Title	Status
2007-11-**28** Priority claims CN200810175595 JP2007306750 US12260410 US15208886 US15891085 US16269662 US16269724	2007-11-**28** Priority claims CN200810175595 JP2007306750 US12260410 US15208886 US15891085 US16269662 US16269724	2007-11-**28** Priority claims CN200810175595 JP2007306750 US12260410 US15208886 US15891085 US16269662 US16269724	2007-11-**28**	16269724 US16269724	US20190174179A1	DISPLAY APPARATUS AND VIDEO PROCESSING APPARATUS	Filed
			2007-11-28	16269662 US16269662	US20190174178A1	DISPLAY APPARATUS AND VIDEO PROCESSING APPARATUS	Filed
			2007-11-28	15891085 US15891085	US10244284B2	Display apparatus and video processing apparatus	Granted
				15891085 US15891085	US20180167671A1	DISPLAY APPARATUS AND VIDEO PROCESSING APPARATUS	Granted

			2007-11-28	15208886 US15208886	US10129590B2	Display apparatus and video processing apparatus	Granted
				15208886 US15208886	US20160323635A1	DISPLAY APPARATUS AND VIDEO PROCESSING APPARATUS	Granted
			2007-11-28	201510969210 CN201510969210	CN105407104B	Display device and image device	Granted
				201510969210 CN201510969210	CN105407104A	Display Apparatus And Video Processing Apparatus	Granted
			2007-11-28	12260410 US12260410	US9420212B2	Display apparatus and video processing apparatus	Granted
				12260410 US12260410	US20090135307A1	Display Apparatus and Video Processing Apparatus	Granted
			2007-11-28	201410395041 CN201410395041	CN104540008B	Image apparatus	Granted
				201410395041 CN201410395041	CN104540008A	Display apparatus and video processing apparatus	Granted
			2007-11-28	2007306750 JP2007306750	JP5033598B2	The video device and display device	Granted
				2007306750 JP2007306750	JP2009130877A	DISPLAY DEVICE AND VIDEO EQUIPMENT	Granted
			2007-11-28	16738059 US16738059	US20200145718A1	INFORMATION PROCESSING APPARATUS AND INFORMATION...	Filed
			2007-11-28	16713182 US16713182	US20200120381A1	DISPLAY APPARATUS AND VIDEO PROCESSING APPARATUS	Filed
			2007-11-28	200810175595 CN200810175595	CN101447902B	Display apparatus and an Image apparatus	Granted
				200810175595 CN200810175595	CN101447902A	Display apparatus and image apparatus	Granted

Description

INCORPORATION BY REFERENCE

[0001] The present application is a continuation of U.S. patent application Ser. No. 16/269,662, filed Feb. 7, 2019, which is a continuation of U.S. patent application Ser. No. 15/891,085, filed on Feb. 7, 2018, (now, U.S. Pat. No. 10,244,284), which is a continuation of U.S. patent application Ser. No. 15/208,886, filed on Jul. 13, 2016 (now, U.S. Pat. No. 10,129,590), which is a continuation of U.S. patent application Ser. No. 12/260,410, filed on Oct. 29, 2008 (now, U.S. Pat. No. 9,420,212),

which claims priority to Japanese Patent Application No. 2007-306750, filed on Nov. 28, 2007, the contents of all of which are hereby incorporated by reference into this application.

BACKGROUND OF THE INVENTION

[0002] The present invention relates to a technique to establish connections between a plurality of apparatuses and networks by radio.

[0003] To connect a video processing apparatus to a video display apparatus as another video processing apparatus to view videos, there has been employed a method to establish analog connections therebetween to transmit video and audio signals. However, as digital apparatuses have been widely spread, there is employed, to prevent picture quality deterioration and to protect copyright of contents to be viewed, a method in which digital connections are established between the apparatuses and video and audio signals are encrypted to be transmitted therebetween.

[0004] High Definition Digital Multimedia Interface (HDMI) is known as an example of an interface for digital transmission. According to the HDMI, the base band signal and the audio signal of high definition are time-division multiplexed and the resultant signal is encrypted through HDCP for transmission thereof.

[0005] A conventional technique in which digitized video and audio signals are multiplexed for transmission as above is described in, for example, JP-A-2007-202115.

SUMMARY OF THE INVENTION

[0006] According to the HDMI, which is developed on assumption of uses for connections between apparatuses installed in a house of a family, consideration has not been given to connections with the internet and a network in the family or a home network while viewing high-quality videos. It is therefore an object of the present invention, devised to overcome the difficulty, to provide a technique wherein while presenting on a display apparatus videos of high picture quality obtained from portable video processing apparatuses such as a camera and a cellular phone, it is possible to communicate with the internet and/or a home network.

[0007] According to one aspect of the resent invention, there is provided a display apparatus including a first radio communication unit capable of receiving video information by radio from an external video processing apparatus, a second radio communication unit capable of connecting by radio to a network, and a connection assignment control unit for controlling assignment of connection by radio transmission for each of the first and second radio communication units. The control unit assigns connection of the first radio communication unit with higher priority and controls the assignment of the transmission rate, for example, such that the transmission rate between the first radio communication unit and the external video processing apparatus is more than the transmission rate between the second radio communication unit and the network.

[0008] According to another aspect of the present invention, there is provided a video processing apparatus including a first radio communication unit capable of transmitting video information by radio to an external display apparatus, a second radio communication unit capable of connecting by radio to a network, and a connection assignment control unit for controlling assignment of connection by radio transmission for each of the first and second radio communication units. The control unit assigns connection of the first radio communication unit with higher priority and controls the assignment of the transmission rate, for example, such that the transmission rate between the first radio communication unit and the external video display apparatus is more than the transmission rate between the second radio communication unit and the network.

[0009] In the display apparatus constructed as above, the first radio communication unit can communicate video information of high picture quality with an external video processing apparatus. The second radio communication unit can connect by radio to the internet and a home network. The controller controls the transmission rate of the radio transmitter module to be assigned to the first radio communication unit and can change the transmission rate of the radio transmitter module to be assigned to the second radio communication unit. It is possible for the controller to determine and to control the radio transmission rates to be assigned to the first and second radio communication units. The controller controls the operation such that the assignment to the first radio communication module to conduct transmission to receive video information from an external video processing apparatus is carried out with higher priority. Therefore, it is possible that video information of high picture quality is continuously fed from the video processing apparatus to the video information apparatus as well as information is transmitted from the internet and a home network. There can be hence provided a video display apparatus having high serviceability. According to the present invention, it is possible to communicate with a network while displaying videos of high picture quality obtained by a video processing apparatus.

[0010] Other objects, features and advantages of the invention will become apparent from the following description of the embodiments of the invention taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] FIG. 1 is a diagram showing an example of an embodiment of a video processing apparatus **100** according to the present invention;

[0012] FIG. 2 is a block diagram showing an example of an embodiment of a video display apparatus **200** according to the present invention;

[0013] FIG. 3 is a block diagram showing another example of an embodiment of a video display apparatus **200** according to the present invention;

[0014] FIG. 4 is a diagram showing an example of a radio modulator and demodulator or modem of the video processing apparatus **100**;

[0015] FIG. 5 is a block diagram showing an example of a system in which two video processing apparatuses are wirelessly connected to each other;

[0016] FIG. 6 is a block diagram showing another example of a system in which two video processing apparatuses are wirelessly connected to each other;

[0017] FIG. 7 is a diagram showing an example of structure of the HDMI;

[0018] FIG. 8 is a diagram showing an example of a radio modem of the video display apparatus;

[0019] FIG. 9 shows a diagram showing an example of transmission parameters of a radio modem in the embodiment;

[0020] FIG. 10 is a diagram showing connections between the video processing apparatus **100** and the video display apparatus **200** in the embodiment of the present invention; and

[0021] FIG. 11 is a diagram showing an example of assignment of bands in another example of a radio modem shown in FIGS. 4 and 8.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0022] Referring now to the drawings, description will be given of an embodiment according to the present invention.

First Embodiment

[0023] FIG. 10 shows an embodiment of the present invention. In this example, the system includes two video processing apparatuses, i.e., a video processing apparatus **100** which is, for example, a portable video processing apparatus capable of receiving a digital broadcast signal via a base station antenna for cellular phones or a broadcast transmission tower and a video display apparatus **200** such as a tuner capable of receiving a digital broadcast signal from a broadcast transmission tower. These apparatuses are connected, for example, via a bidirectional interface **10** to each other. Resultantly, a video signal of high picture quality and other information items and signals can be bidirectionally communicated therebetween. On the other hand, between a terminal **134** of the video processing apparatus **100** and a terminal **202** of the video display apparatus **200**, signals from the internet and a home network are communicated by radio. The frequency bands used for the transmission between the terminals **134** and **202** are limited to predetermined frequency bands. This increases the radio wave resource efficiency and prevents the problem of interference with other apparatuses.

[0024] In the embodiment, the portable video processing apparatus **100** is specifically, for example, a digital camera, a video camera, a cellular phone, a game machine, or a personal media player.

[0025] FIG. 1 shows a concrete example of the video processing apparatus **100** employed in the first embodiment of the present invention. This is a specific configuration of the apparatus **100** shown in FIG. 10. In FIG. 1, an imaging device **110** receives a moving or still picture supplied via an optical system to convert the picture into en electric signal. To transmit a moving picture, a compression circuit **111** employs a compression method, e.g., Moving Picture Experts Group 2 (MPEG2), MPEG4, or AVC/H.264. To transmit a still picture, the compression circuit **111** employs a compression method, e.g., Joint Photographic Experts Group (JPEG). The compression circuit **111** efficiently bit-compresses the received image.

[0026] A microphone **112** converts sound into an electric signal. A compression circuit **113** uses a compression method such as an MPEG audio to efficiently bit-compress the received audio signal.

[0027] A multiplexer circuit **116** receives the bit-compressed video and audio signals from the compression circuits **111** and **113** and various information items from a microprocessor **115**. By use of the information items, the multiplexer **116** multiplexes the signals according to a predetermined format. When a still picture is shot, the audio signal is not obtained in an ordinary case. However, it is also possible to multiplex an audio signal in synchronism with the still picture shooting operation.

[0028] The information items from the microprocessor **115** include, for example, positional information (horizontal positions, vertical positions on the right, and vertical positions on the left), date, and exposure information at shooting.

[0029] In FIG. 1, the multiplexed signal from the multiplexer **116** is fed via an encryption/decryption circuit **140** to be stored in a storage **130**. The storage **130** may be, for example, a hard disk device, an optical disk device, or a semiconductor memory device. The type of the storage **130** may be determined according to, for example, a storage capacity, a size of the storage **130**, easiness of removing a storage medium, and/or a price of the storage **130** according to necessity. It is also possible to store the multiplexed signal via a signal processing circuit **124** and a memory interface **120** in a memory **121**.

[0030] When information is shot by a particular person, copyright of the information belongs to the person. Hence, ordinarily, such information is not required to be encrypted for the storage thereof. However, the storage medium having stored information by the storage **130** may be lost. It will be more safe if the multiplexed signal from the multiplexer **116** is once encrypted by the encryption/decryption circuit **140** to be stored in the storage **130** or the memory **121**.

[0031] The video processing apparatus **100** may also support the use of a removable memory or include a cellular phone function or a radio Local Area Network (LAN) function. The memory interface **120** is an interface for a removable memory **121**. When video and audio contents of still and moving pictures are recorded by another apparatus in the memory **121** and the memory **121** is connected to the interface **120**, the contents can be recorded via the signal processing circuit **124** and the encryption/decryption circuit **140** into the storage **130**.

[0032] In this situation, the signal processing circuit **124** checks to determine whether or not the copyright of the contents recorded in the memory **121** is protected and whether or not the duplication thereof is prohibited. According to the detected condition, the encryption/decryption circuit **140** encrypts the contents and moves the encrypted contents in the storage **130**.

[0033] Similarly, audio and video contents of still and moving pictures are received as inputs by a radio interface **122**. The contents are stored via the signal processing circuit **124** and the encryption/decryption circuit **140** in the storage **130**. Also, according to conditions of the copyright protection and the replication restriction, the contents are encrypted by the encryption/decryption circuit **140**, as required.

[0034] When it is desired to reproduce a content stored in the storage **130** to view the reproduced content, the user selects the content by an input key or a remote control, not shown. The selected content is read from the storage **130** to be decoded by the encryption/decryption circuit **140** and is then separated by a demultiplexer circuit **141** into an audio signal and a video signal.

[0035] When a broadcast program is received by a broadcast receiver **180**, the encrypted signal encrypted for the broadcast is decrypted by the encryption/decryption circuit **140**. If encryption is required to store the signal, the signal is accordingly encrypted by the circuit **140** to be stored in the storage **130** and the memory **121**. To immediately view the received broadcast program in real time, the signal is separated by the demultiplexer **141** into a video signal and an audio signal.

[0036] The separated and compressed video signal is decompressed by a decompression circuit **142** to be fed to a signal processing circuit **150**. The circuit **150** conducts a scanning-line conversion for the video signal on the basis of the number of scanning lines of a display **160** to output the resultant video signal to the display **160**. The separated and compressed audio signal is decompressed by a decompression circuit **143** to be delivered to an audio output device **161**. Since the video processing apparatus **100** includes the display **160** and the audio output device **161**, it is possible to immediately view the broadcast program without externally connecting any video display apparatus. In a situation wherein the period of time required for the decompression varies between the video and audio signals and/or a time difference exists between the video display and the audio output due to presence or absence of the scanning-line conversion, if the audio signal is advanced in time relative to the video signal, the user particularly perceives an uncomfortable feeling. To overcome the difficulty, the audio signal is delayed, for example, in the decompression processing, namely, a lip-sync operation is carried out. This removes the uncomfortable feeling due to the difference in time between the video and audio signals.

[0037] Description will now be given of a situation wherein the video processing apparatus **100** is employed as a cellular phone. For example, a voice of a conversation is inputted to the audio input/output section **126** to produce an electric signal. For the signal, a telephone signal processing circuit **125** executes predetermined signal processing and modulation processing. The resultant signal is transmitted via an antenna, not shown, to a base station of the cellular phone. An audio signal sent from the base station is received by an antenna, not shown, to be fed to the telephone signal processing circuit **125**. For the signal,

the circuit **125** executes predetermined signal processing and demodulation processing. The resultant signal is fed to the audio I/O section **126** to be reproduced as a voice. The video processing apparatus **100** can also receive a content of a moving picture transmitted from the base station of the cellular phone. The content is received by an antenna, not shown, to be delivered via the telephone signal processing circuit **125** to the signal processing circuit **124**. The content is similarly processed as above by the encryption/decryption circuit **140**. The resultant signal of the content is fed to a display and an audio output unit incorporated in the video processing apparatus **100** to be viewed/listened by the user. The content thus processed may also be fed via a terminal **101**, a connection cable **10**, and a terminal **201** to an external video display apparatus **200** to be displayed on a large-sized screen. While viewing the content, it is possible to record the content in a recording medium incorporated in the video processing apparatus **100** or a recording medium, e.g., a memory **121** connected thereto, for example, to view the content later. The memory **121** may also be used as a recording medium to record a movie and the like.

[0038] Similarly, a program broadcast from a broadcast transmission tower is received by a broadcast receiver **180** of the video processing apparatus **100** to be viewed by the apparatus **100** or to be stored in a recording medium, not shown, incorporated in the apparatus **100** or a recording medium, e.g., the memory **121** connected thereto. Also, the content may be fed via the terminal **101**, the cable **10**, and the terminal **201** to the video display apparatus **200** to be viewed by the user.

[0039] In addition, by installing an imaging device **110** and a microphone **112** in the video processing apparatus **100**, still and moving pictures can be shot together with audios and can be stored in an incorporated recording medium, not shown, and/or the memory **121**. The videos and audios stored in the recording medium and/or the memory **121** may be fed via the terminal **101** to the video display apparatus **200** to be enjoyed by the user.

[0040] When the user views video and audio signals by use of the external video display apparatus **200**, the apparatus **200** confirms scanning lines which the apparatus **200** can support. If the scanning lines match those of the video signals to be displayed, the signals are immediately outputted in real time. Otherwise, the scanning lines of the video signals are converted by a signal processing circuit **150** into the required scanning lines to be fed to a multiplexer circuit **170**. In the circuit **170**, the video signals are multiplexed on the time axis, with the audio signals processed by a signal processing circuit **151**. The circuit **151** compresses the audio signals on the time axis during a period corresponding to the blanking period of the video signals and conducts a time adjusting operation to carry out the lip-sync operation according to the necessity. The video and audio signals multiplexed by the multiplexer circuit **170** are delivered to an encryption circuit **171**. For the signals, the circuit **171** carries out encryption for the transmission of the signals between the video processing apparatus **100** and the video display apparatus **200** and outputs the resultant signals via a video interface circuit **131**, a transmission rate assignment controller **1001**, and the terminal **101** to the video display apparatus **200**. On the other hand, the terminal **134** is connected to a network such as the internet as described above and is used to wirelessly communicate videos and other information items obtained from the network by use of a radio modem circuit **1003**. The information from the network is demodulated by the circuit **1003** to be fed via the transmission rate assignment controller **1001** to an interface circuit **133** and is delivered therefrom to a microprocessor **115**. The microprocessor **115** determines the type of the information from the network. If the information is, for example, a video stream compressed in a predetermined format, the microprocessor **115** feeds the video stream to the demultiplexer circuit **141** and the decompression circuit **143**. For the video stream, the circuits **141** and **143** conduct processing as described above. The resultant signals are presented on the display **160**. According to necessity, the audio information obtained from the network is reproduced by the audio output device **161**. If the information from the network is an update program of an application program or an Operating System (OS), the microprocessor **115** executes addition and storage processing for new software or executes update processing for the associated program. Although the processing of the network information is executed by the microprocessor **115** to process video information in the embodiment, it is also possible to arrange a microprocessor to dedicatedly process the network information.

[0041] The controller **132** controls the transmission rate assignment control circuit **1001** on the basis of time control information of the video signal to variably control the transmission rate of the radio modem circuit **1002**. At the same time, the controller **132** variably controls the transmission rate of the radio modem circuit **1003** for radio communication with a network such as the Internet. According to the embodiment, in the assignment of the transmission rate to the demodulation circuits **1002** and **1003**, the controller **132** gives preference to the demodulation circuit **1002**. In other words, the transmission rate of the demodulation circuit **1002** is more than that of the modem circuit **1003**. Hence, within the limited range of bands for the radio transmission, the modem **1002** can transmit video information without deteriorating the video quality of the video information having high picture quality. The band of radio signals from the terminal **101** and that of radio signals from the terminal **134** are fixed. Therefore, if the band of signals from the terminal **101** is expanded, that of signals from the terminal **134** narrows to slightly lower the communication speed of the network. However, this rarely influences the system operation since information regarding the network is less frequently exchanged as compared with video information sent from the video processing apparatus **100**.

[0042] When the signal from the terminal **101** is to be stored in the destination thereof, the compressed signal is transmitted without decompressing the signal. In the operation, the encryption/decryption circuit **140** delivers the compressed signal to the encryption circuit **171**. The circuit **171** conducts predetermined encryption for the signal and then outputs the resultant signal via the video interface circuit **131**, the transmission rate assignment controller **1001**, and the terminal **101**. Also in this situation, the control circuit **132** variably controls the transmission rate of the radio modem **1002** in association with the time control information of the video signal. As a result, the radio modem **1002** can send the video information without deteriorating the video quality of the video information having high picture quality.

[0043] In the description above, the video and audio signals obtained from the imaging device **110** and the microphone **112** and the contents inputted from the memory **121** and the radio interface **122** are once stored in the storage **130** to be thereafter reproduced. However, if the storing of the signals and the contents are not required or are immediately viewed, the signals and the contents are demultiplexed by the demultiplexer **141** without conducting the encryption and decryption for the storage by the encryption/decryption circuit **140**. Resultantly, the videos and audios can be enjoyed by use of the display **160** and the audio output device **161** of the video processing apparatus **100**. Also, it is possible to enjoy the videos and audios by a receiver externally connected via the wired interface circuit **131** to the apparatus **100**.

[0044] Description will now be specifically given of one technical aspect of the embodiment, namely, the transmission rate assignment control circuit **1001** and the radio demodulation circuits **1002** and **1003**. The modem circuits **1002** and **1003** conduct demodulation through Orthogonal Frequency Division Multiplexing (OFDM). In the example, the modem **1002** is a first radio communication unit which wirelessly sends video information and audio information to the external video display apparatus **200** and which receives data and information by radio therefrom. The modem **1002** is connected via the transmission rate assignment controller **1001** to the interface circuit **131** which communicates with the video display apparatus **200**. On the other hand, the modem **1003** is a second radio communication unit which connects to (accesses) a network, e.g., the Internet or a home network to wirelessly communicate various information including video signals, audio signals, and data therewith. The modem **1003** is connected via the transmission rate assignment controller **1001** to the interface circuit **133** for networks. The controller **1001** variably controls, according to a control signal from the controller **132**, the transmission rates respectively of the modems **1002** and **1003** by variably setting the modulation/demodulation methods, the frequency bands, and the number of carriers respectively for the modems **1002** and **1003**. In short, the controller **132** controls distribution of the radio transmission rate of each modem by controlling the transmission rate assignment controller **1001**. As a specific example of operation in which the transmission rate is controlled by changing parameters including the demodulation method and the frequency band, FIG. 9 shows the difference in the transmission rate between two schemes.

[0045] According to the embodiment, the controller **132** and the transmission rate assignment controller **1001** control the radio transmission assignment such that the radio transmission rate of the modem **1002** to send the video information of high picture quality by radio to the video display apparatus **200** takes precedence over the radio transmission rate of the modem **1003** to connect to a network for communication. That is, the radio transmission rate of the modem **1002** is more than that of the modem **1003**. For example, in a situation wherein the modem **1002** transmits video information to the display apparatus **200** and the modem **1003** simultaneously connects to the Internet to receive Internet information, the controller **132** controls the operation to continuously supply videos with high picture quality to the user, specifically, to set the transmission scheme of the modem **1002** to, for example, "scheme 1" shown in FIG. 9. For the radio modem **1003**, the controller **132** sets the transmission scheme thereof to "scheme 2" of FIG. 9. As can be seen from FIG. 9, the transmission capacity of scheme 1 is 17 Megabits per second (Mbps) which is more than three times that of scheme 2 (5 Mbps). As above, in the limited transmission capacity for radio transmission, a higher transmission rate is assigned to the communication with the display apparatus **200** in the embodiment. It is hence possible that the user continuously views videos with high picture quality on the display apparatus **100**. Naturally, the variable control of the transmission rate is not limited to the example shown in FIG. 9.

[0046] The controller **132** and the transmission rate assignment controller **1001** may variably control the radio transmission assignment to the modems **1002** and **1003** in response to an indication from the user. For example, in a situation wherein the user issues an indication to transmit video information by radio via the modem **1002** to the display apparatus **200** while acquiring information from the Internet according to scheme 1 of FIG. 9 by use of the modem **1003**, the controller **132** outputs a control signal to the assignment controller **1001** such that the transmission scheme of the modem **1003** is changed from scheme 1 to scheme 2 of FIG. 9 and that of the modem **1002** is set to scheme 1 of FIG. 9 conduct communications. The transmission rate of the modem **1002** may be variably changed according to fineness or precision of the video information sent from the modem **1002** to the display apparatus **200**. For example, if the fineness of the video information is altered from SD (640×480) to HD (1980×1080), the controller **132** instructs the assignment controller **1001** to heighten the transmission rate of the modem circuit **1002**. It is preferable in the operation that the transmission rate of the modem **1003** is lowered in association with the variable control of the transmission rate of the modem **1002**.

[0047] The transmission rates of the radio modems **1002** and **1003** may also be variably controlled by a communication technique using a plurality of antennas such as a Multi-Input Multi-Output (MIMO) scheme.

[0048] Referring next to FIG. 4, description will be given of other examples of the transmission rate assignment controller and the radio modem. FIG. 4 shows only part of the system associated with the transmission rate assignment control. In FIG. 4, the same functional constituent components as those of FIG. 1 are assigned with the same reference numerals.

[0049] In FIG. 4, radio modem circuits **5001** to **5004** are modems having respective fixed transmission capacity values and differ from each other only in the frequency band for transmission. The modems **5001** to **5004** respectively have bands A to D as shown in FIG. 11. Terminals **101** and **5005** to **5007** are input terminals to receive signals and are arranged respectively for radio modems **5001** to **5004**. In operation, the modems **5001** to **5004** may be appropriately combined with each other. For example, according to necessity, the modems **5001** and **5002** are employed to transmit video information and the modems **5003** and **5004** are utilized to communicate with the network such as the Internet. That is, while the interface circuit **131** wirelessly transmits video information and audio information via the modems **5001** and **5002** to the video display apparatus **200**, the interface circuit **133** conducts communication via the modems **5003** and **5004** with the network. In a situation wherein a wide band is required to transmit video information of high picture quality (e.g., video information of HD resolution), the modems **5001** to **5003** are assigned to send video information and only the modem **5004** is assigned to communicate with the network such as the Internet. Specifically, the interface circuit **131** transmits video and audio information by radio via the modems **5001** to **5003** to the display apparatus **200**, and the interface circuit **133** communicates with the network via the modem **5004**. As a result, video information of high picture quality can be continuously transmitted and it is also possible to communicate with the Internet. Particularly, the broadcast signal is required to be presented by synchronizing the time information sent from the broadcasting station with that on the receiver side. According to the present invention, the time information can be appropriately controlled without deteriorating the quality of the video information.

[0050] FIG. 2 shows a specific configuration of the video display apparatus **200** of FIG. 10. In FIGS. 2 and 10, the same constituent components are assigned with the same reference numerals and detailed description thereof will be avoided. Description will be given of a situation wherein an uncompressed baseband signal of a moving picture is inputted via the terminal **201**. The signal from the external video processing apparatus **100** thus received via the terminal **201** is demodulated by a radio modem circuit **2015** to be supplied via a transmission rate assignment controller **2017** and an input/output interface circuit **2011** to a decryption circuit **211**. In operation, a controller **2013** drives the assignment controller **2017** to vary the transmission rate of the modem **2015** according to that of the video information delivered from the video processing apparatus **100**. Resultantly, an input/output interface circuit **2011** can receive the video information of high picture quality at preset timing.

[0051] The decryption circuit **211** is associated with encryption by the encryption circuit **171** shown in FIG. 1 and decrypts a signal encrypted by the circuit **171**. The decrypted signal is fed to a demultiplexer circuit **250**, and then video and audio signals obtained from the demultiplexer **250** are inputted to signal processing circuits **251** and **252**, respectively. For the received video signal, the circuit **251** conducts a scanning-line conversion and a resolution conversion according to the number of pixels displayable by a display **260**. The circuit **252** decompresses on the time axis the audio signal which is compressed and multiplexed on the time axis by use of the blanking of the video signal. According to necessity, the circuit **252** carries out the lip-sync operation and the sound quality adjustment. Signals outputted respectively from the circuits **251** and **252** are inputted respectively to a display **260** and an audio input/output unit **270** to be viewed by the user.

[0052] Description will now be given of operation when a compressed moving-picture signal is received via the terminal **201**. This operation aims at storing the moving-picture signal in a storage **230** incorporated in the apparatus **200**.

[0053] The signal received from the terminal **201** is delivered via the wired input/output interface circuit **2011** to the decryption circuit **211**. The circuit **211** corresponds to the encryption circuit **171** shown in FIG. 2 and decrypts a signal encrypted by the circuit **171**. The decrypted signal is inputted to an encryption/decryption circuit **240**. The circuit **240** reads copy control information of the content to be stored and encrypts the content for the storage thereof according to the information. The encrypted signal is stored in the storage **230** in the compressed state.

[0054] In a situation wherein the user views the compressed signal received via the terminal **201** while storing the signal in the storage, a signal corresponding to a compressed signal decrypted by the encryption/decryption circuit **211** is fed from the encryption/decryption circuit **240** to a demultiplexer circuit **241**. In the circuit **241**, the signal is separated into a compressed video signal and a compressed audio signal. The separated video and audio signals are decompressed respectively by decompression circuits **242** and **243** to baseband signals to be respectively supplied to the signal processing circuits **251** and **252**. Signals outputted respectively therefrom are delivered respectively to the display and the audio output unit **270** to be viewed by the user.

[0055] When a content stored in the storage **230** is reproduced to be viewed by the user, information items such as titles of the contents stored in the storage **230** are presented on the display **260**. When the user selects one of the contents, a signal of the selected content is fed from the storage **230** to the encryption/decryption circuit **240**. The circuit **240** decrypts the encrypted signal of the content to input the resultant signal to the demultiplexer **241**. The signal of the content is thereafter similarly processed as described above to be viewed by the user.

[0056] It is possible to similarly reproduce contents stored in a memory **221**. As in the reproduction of contents stored in the storage **230**, the user selects one of the contents stored in a memory **221** to view the content. The selected content is transferred via a memory interface **220** and a signal processing circuit **224** to the encryption/decryption circuit **240**. Specifically, the circuit **224** executes processing necessary to read the content from the memory **221** to input compressed and multiplexed video and audio signals of the content to the circuit **240**. Subsequent signal processing is similar to the processing executed after the content is read from the storage **230**.

[0057] As in the operation to store a content in the storage **230**, it is possible to store the content in the memory **221**. Although detailed description of the associated processing will be avoided, the content encrypted by the encryption/decryption circuit **240** is stored via the signal processing circuit **224** and the memory interface **220** into the memory **221**.

[0058] To view or to store a content transmitted by radio, the system executes processing in a similar way. A compressed content received by radio is fed via a radio interface **222** and the signal processing circuit **224** to the encryption/decryption circuit **240**. The circuit **240** decrypts the signal encrypted for the radio transmission. Subsequent processing is similar to the processing executed at reproduction of the signal from the storage **230**.

[0059] When an uncompressed baseband signal is received from the terminal **201** or **202**, the content can be efficiently stored in the storage **230** and the memory **221**. Description will be given of operation in this situation.

[0060] The content inputted from the terminal **201** is transferred via the input/output interface **2011**, the decryption circuit **211** and the demultiplexer circuit **250** to be separated into a video signal and an audio signal. The video and audio signals thus separated are fed via a replication control circuit **280** to compression circuits **281** and **282**. The circuit **280** reads, from the content, multiplexed replication control information to determine whether or not replication of the content is allowed. As the control information, a bit may be assigned to a designated field. Or, by using electronic watermark, the information may be superimposed onto video or audio information. Information inputted from the network to the terminal **202** is also processed in a similar fashion as above.

[0061] The compression circuit **281** compresses the video signal by use of a compression scheme, e.g., MPEG2, MPEG4, or AVC/H.264. The compression circuit **282** compresses the audio signal according to a compression scheme, e.g., MPEG Audio. The compressed video and audio signals are inputted to a multiplexer circuit **283** to be multiplexed. The multiplexed signal is fed to the encryption/decryption circuit **240** to be thereafter similarly stored in the storage **230** and/or the memory **221**. As a result, the content can be efficiently recorded therein for a long period of time according to copyright information.

[0062] On the other hand, the signal from a network such as the Internet received via the terminal **202** is demodulated by a radio modem circuit **2016** to be supplied via a transmission rate assignment controller circuit **2017** and an input/output interface circuit **2012** to a microprocessor **279**. The type of information of the video information from the network is determined. If the information is, for example, a video stream compressed in a predetermined format, the system transfers the information to demultiplexer circuit **241** and the decompression circuits **242** and **243**. After the information is processed by these circuits in a similar way as described above, an image of the information is presented on the display **260**. According to necessity, audio information obtained from the network is reproduced by the audio output unit **261**. If the information from the network is an update program for an application program, an operating system OS, or the like, the microprocessor **279** adds and stores new software and/or updates an associated program. It is also possible that the function of the microprocessor **279** is installed in the controller **2013** to configure one unified module including the microprocessor **279** and the controller **2013**.

[0063] In the operation, the controller **2013** controls the transmission rate assignment controller **2017** to vary the transmission rate of the radio modem **2015** in association with the transmission rate of the video information received from the video processing apparatus **100**. Since the transmission rate of the radio modem **2015** to receive the video information from the apparatus **100** takes precedence over that of the modem **2016** in the transmission rate assignment, the transmission rate of the modem **2016** is lower than that of the modem **2015**. In the embodiment as described above, the transmission rate of the modem **2015** to receive the video information from the apparatus **100** is higher than that of the modem **2016** to communicate with the network. Therefore, within the limited range of bands for the radio transmission, it is possible to obtain the high-quality video information from the external video processing apparatus **100** without deteriorating the video quality. The band of radio signals received by the terminal **201** and that of radio signals inputted to the terminal **202** are fixed. Hence, if the band of signals from the terminal **201** is expanded, that of signals from the terminal **202** narrows. This slightly lowers the communication speed of the network. However, this rarely influences the system operation since information regarding the network is less frequently exchanged as compared with video information sent from the video processing apparatus **100**.

[0064] Next, description will be specifically given of one technical aspect of the embodiment, namely, the transmission rate assignment controller **2017** and the radio modems **2015** and **2016**. The modems **2015** and **2016** carry out OFDM modulation/demodulation. In the example, the modem **2015** is a first radio communication unit which wirelessly receives video information and audio information from the external video processing apparatus **100** and which sends data and information by radio to the apparatus **100**. The modem **2015** is connected via the transmission rate assignment controller **2017** to the interface circuit **2011** which communicates with the video display apparatus **200**. On the other hand, the modem **2016** is a second radio communication unit which connects to (accesses) a network, e.g., the Internet or a home network to wirelessly communicate various information including video signals, audio signals, and data with the network. The modem **2016** is connected via the transmission rate assignment controller **2017** to the interface circuit **2012** for networks. The controller **2017** variably controls, according to a control signal from the controller **2013**, the transmission rates respectively of the modems **2015** and **2016** by variably designating the modulation/demodulation methods, the frequency bands, and the number of carriers respectively for the modems **2015** and **2016**. In other words, the controller **2013** controls distribution of the radio transmission rate of each modem by controlling the transmission rate assignment controller **2017**. As a specific example of operation in which the transmission rate is controlled by changing parameters including the demodulation method and the frequency band, FIG. 9 shows the difference in the transmission rate between two schemes.

[0065] In the embodiment, the controller **2013** and the transmission rate assignment controller **2017** control the radio transmission rate assignment so that the radio transmission rate of the modem **2015** to receive the video information of high picture quality by radio from the external video processing apparatus **100** takes precedence over the radio transmission rate of the modem **2016** to connect to a network for communication. In short, the radio transmission rate of the modem **2015** is more than that of the modem **2016**. For example, in a situation wherein the modem **2015** receives video information from the video processing apparatus **100** and the modem **2016** simultaneously connects to the Internet to receive Internet information, the controller **2013** controls the operation to continuously provide videos with high picture quality to the user, specifically, to set the transmission scheme of the modem **2015** to, for example, "scheme 1" shown in FIG. 9. For the radio modem **2016**, the controller **2013** sets the transmission scheme thereof to "scheme 2" shown in FIG. 9. As can be seen from FIG. 9, the transmission capacity of scheme 1 is 17 Mbps which is more than three times that of scheme 2 (5 Mbps). Hence, in the limited transmission capacity for radio

transmission, a higher transmission rate is assigned to the communication with the video processing apparatus **100** in the embodiment. It is therefore possible that the user continuously watches videos with high picture quality on the display apparatus **100**. Naturally, the variable control of the transmission rate is not limited to the example shown in FIG. 9.

[0066] The controller **2013** and the transmission rate assignment controller **2017** may control the radio transmission assignment to the modems **2015** and **2016** in response to an indication from the user. For example, in a situation wherein the user issues an indication to receive video information by radio via the modem **2015** from the video processing apparatus **100** while acquiring information from the Internet according to scheme 1 of FIG. 9 by use of the modem **2016**, the controller **2013** outputs a control signal to the assignment controller **2017** such that the transmission scheme of the modem **2016** is changed from scheme 1 to scheme 2 of FIG. 9 and that of the modem **2015** is set to scheme 1 of FIG. 9. The transmission rate of the modem **2015** may be changed according to precision of the video information which is sent from the video processing apparatus **100** to be received by the modem **2015**. For example, the precision of the video information above is changed from SD (640×480) to HD (1980×1080), the controller **2013** instructs the assignment controller **2017** to heighten the transmission rate of the modem circuit **2015**. It is preferable in the operation that the transmission rate of the modem **2016** is lowered in association with the variable control of the transmission rate of the modem **2015**.

[0067] The transmission rates of the radio modems **2015** and **2016** may also be variably controlled by a communication technique using a plurality of antennas such as the MIMO scheme.

[0068] Referring next to FIG. 8, description will be given of other examples of the transmission rate assignment controller and the radio modem. FIG. 8 shows only part of the system associated with the transmission rate assignment control. In FIG. 8, the same functional constituent components as those of FIG. 1 are assigned with the same reference numerals. In FIG. 8, a transmission rate assignment controller **9005** operates in a similar way as the transmission rate assignment controller **1001** described above and assigns transmission rates respectively to radio modems **9010** to **9013** according to an instruction from the controller **2013**. The modem circuits **9010** to **9013** are modems having respective fixed transmission capacity values and differ from each other only in the frequency band for transmission. The modems **9010** to **9013** respectively have bands A to D as shown in FIG. 11. Terminals **9006** and **9007** are input terminals to receive signals and are arranged respectively for radio modems **9010** to **9013**. In operation, the modems **9010** to **9013** may be appropriately combined with each other. For example, under supervision of the assignment controller **9005**, the modems **9010** and **9011** are employed to transmit video information and the modems **9012** and **9013** are utilized for communication with the network such as the Internet depending on cases. That is, while the interface circuit **2011** transmits by radio video information and audio information via the modems **9010** and **9011** to the video display apparatus **200**, the interface circuit **2012** communicates via the modems **9012** and **9013** with the network. In a situation wherein a wide band is required to receive video information of high picture quality (e.g., video information of HD resolution) from the video processing apparatus **100**, the modems **9010** to **9012** are allocated to transmit video information and only the modem **9013** is allocated to communicate with the network such as the Internet. That is, the interface circuit **2011** transmits video and audio information by radio via the modems **9010** to **9012** to the video display apparatus **200**, and the interface circuit **2012** communicates with the network via the modem **9013**. Resultantly, video information of high picture quality can be continuously transmitted and it is also possible to communicate with the Internet. In particular, the broadcast signal is required to be presented by synchronizing the time information sent from the broadcasting station with that on the receiver side. According to the embodiment, the time information can be appropriately controlled without deteriorating the quality of the video information.

[0069] Description will now be given supplementally of the High Definition Digital Multimedia Interface (HDMI). FIG. 7 shows an example the HDMI configuration mainly including a transmission side and a reception side. The transmission side includes a transmitter section **1601** and a transmission controller section **1603** to control the transmitter section **1601**. The transmitter section **1601** encodes a video signal (Y, Pb, Pr) and an audio signal to output resultant signals to a receiver section **1604**. Also, the transmitter section **1601** includes a TMDS encoder circuit **1602** which converts the video signal (Y, Pb, Pr) and the audio signal respectively into serial video data and serial audio data. On the other hand, the reception side includes a receiver section **1604** and a reception controller section **1606** to control the receiver section **1604**. The receiver section **1604** receives the video data and the audio data from the transmitter section **1601** and conducts a TMDS decoding operation for the data by a TMDS decoder circuit **1605** to thereby reproduce baseband video data and baseband audio data. A CEC line **1607** is an apparatus control line to transmit a control signal for apparatuses. Display specification information known as "DDC" is transmitted via a DDC line **1608**. The reception side transmits to the transmission side a Hot Plug Detect (HPD) signal **1609** indicating that a connection is established between apparatuses of the transmission and reception sides.

[0070] To conduct transmission according to the HDMI standard, apparatuses mutually recognize in a procedure as follows. A physical address is obtained via the DDC line. The physical address is an identification number to discriminate an associated apparatus. By use of a CEC bus for bidirectional connection, a logical address is obtained for bidirectional communication of each apparatus. The logical address is identification information defining a category of each apparatus, e.g., a display or a recording apparatus.

[0071] FIG. 5 is a diagram to supplementally explain a radio interface **11** between the video processing apparatus **100** and the video display apparatus **200**. In FIG. 5, the apparatuses **100** and **200** are almost the same as those described in conjunction with, for example, FIG. 1. To simplify explanation, for the constituent components of the apparatus **100**, only the radio interface circuit **133** is shown in FIG. 8 and the other constituent components are not shown. For the constituent components of the display apparatus **200**, only the radio input/output interface circuit **2012** is shown and the other constituent components are not shown. The interface circuits **133** and **2012** are bidirectional interfaces.

[0072] In FIG. 5, a channel between antennas **81** and **84** and a channel between antennas **82** and **85** are channels to bidirectionally transmit a video signal, an audio signal, and control signals indicating copyright protection and a replication restriction condition of contents. On the other hand, a channel between antennas **83** and **86** is disposed to transmit an inter-apparatus control signal. Bit selection circuits **811** and **812** receive the video signal, the audio signal, the control signals indicating copyright protection and a replication restriction condition of contents, and the inter-apparatus control signal. In the demodulation, the QPSK demodulation scheme is more resistive against transmission errors as compared with the 64QAM demodulation scheme. For the transmission efficiency, the 64QAM demodulation scheme is superior to the QPSK demodulation scheme. Description will now be given of a situation wherein a video signal, an audio signal, and control signals indicating copyright protection and a replication restriction condition of contents are fed from the video processing apparatus **100** to the video display apparatus **200**. Assume in the operation that the transmission direction from the apparatus **100** to the apparatus **200** is an uplink direction and the transmission direction from the apparatus **200** to the apparatus **100** is an downlink direction.

[0073] To transmit information, the video processing apparatus **100** determines, by a carrier detector circuit, not shown, a state of an associated transmission path, i.e., whether or not the channel is reserved for another apparatus. In the carrier detection, a check is made to determine whether or not a carrier is detected in a predetermined frequency band for a predetermined period of time. If it is detected by the detector that the channel is occupied by another apparatus, the check is again carried out after a lapse of a predetermined period of time to determine whether or not an available channel is present. If such available channel is present, the condition is notified to the microprocessor **115** of the video processing apparatus **100**. The microprocessor **115** outputs from a QPSK modem circuit **803** a channel use request signal as an inter-apparatus control signal to secure the channel use right. Thereafter, the microprocessor **115** sends a transmission request signal to a bit selection circuit **811**. An error control circuit **843** adds an error control bit for error detection and correction to the transmission request signal and then transfers the signal to the QPSK modem **803**. The modem **803** conducts a QPSK modulation for the signal to resultantly

transmit a radio signal via the antenna **83** to the display apparatus **200**. The apparatus **200** then receives the radio signal by the antenna **86**, carries out a QPSK demodulation for the signal by a QPSK modem **806**, conducts error detection and correction control for the demodulated signal by an error control circuit **847** to produce an inter-apparatus control signal, and delivers the signal to the bit selection circuit **812**.

[0074] The microprocessor in the video display apparatus **200** decodes the inter-apparatus control signal and receives the transmission request signal from the video processing apparatus **100** together with apparatus category information regarding the apparatus **100** (information to identify a category indicating whether the associated apparatus is a display apparatus or a recording apparatus) and an apparatus identification number of the apparatus **100**. An image to urge the user to determine whether or not a connection is established to the video processing apparatus **100** is presented on a display screen of the display apparatus **200**. In response thereto, the user indicates allowance for the connection by using an input device such as a remote controller of the display apparatus **200**. Thereafter, between the apparatuses **100** and **200**, the apparatus category information and the identification number to identify each of the apparatuses are communicated to exchange information to observe the copyright protection and the replication restriction condition of the content. If there does not exist any problem, it is allowed that the apparatuses **100** and **200** are connected to each other. In a situation wherein the connection is meaningless, for example, each of the apparatuses **100** and **200** is an input or output dedicated unit or the copyright protection or the replication restriction condition of the content is not observed, the connecting operation is interrupted and an indication of the condition is displayed on the apparatuses **100** and **200**. Description will now be given of a situation wherein the copyright protection and the replication restriction condition of the content are observed.

[0075] By using the video signal, the audio signal, and the control signal indicating the copyright protection and the replication restriction condition of the contents associated with the video and audio signals which are inputted to an interface circuit **172**, two bits are selected from the Most-Significant Byte (MSB) of the video signal so that error detection and correction control bits are added thereto by an error control circuit **841** and the resultant signal is fed to a QPSK modem circuit **801**. The modem circuit **801** conducts a QPSK modulation for the signal and then transmits an associated radio signal from the antenna **81**. To the remaining third to eighth bits, an error control circuit **842** adds error detection and correction control bits to send the resultant signal to a 64QAM modem circuit **802**. The modem **802** carries out a 64QAM modulation for the signal and resultantly transmits a radio signal from the antenna **82**.

[0076] In the video display apparatus **200**, a QPSK modem circuit **804** conducts a QPSK demodulation for the signal received via the antenna **84** and an error control circuit **845** carries out error control for the resultant signal to output two high-order bits of the video signal to the bit control circuit **812**. For the remaining signals received via the antenna **85**, a 64QAM modem circuit **805** conducts a 64QAM demodulation. For the resultant signal, an error control circuit **846** carries out error control to output the obtained signal to the bit control circuit **812**.

[0077] Description will now be given of the inter-apparatus control signal. When an inter-apparatus control signal is sent in a downlink direction, i.e., from the video display apparatus **200** to the video processing apparatus **100**, the signal is fed from the bit selection circuit **812** via the error control circuit **847** to the QPSK modem circuit **806** to be demodulated. The demodulated signal is delivered from the antenna **86**. The video processing apparatus **100** receives the signal by the antenna **83** to send the signal to the QPSK modem circuit **803**. For the signal, the circuit **803** conducts a QPSK demodulation. For the demodulated signal, an error detection and correction is carried out by the error control circuit **843** to feed the resultant signal to the bit selection circuit **811**. Conversely, when an inter-apparatus control signal is transmitted in an uplink direction, i.e., from the video processing apparatus **100** to the video display apparatus **200**, the signal is fed from the bit selection circuit **811** via the error control circuit **843** to the QPSK modem circuit **803** to be modulated. The modulated signal is outputted from the antenna **83**. The display apparatus **200** receives the signal by the antenna **86**. For the signal, the modem **806** conducts a QPSK demodulation. For the demodulated signal, the error control circuit **847** conducts an error detection and correction to send the resultant signal to the bit selection circuit **812**. By virtue of the operation, there is obtained an advantage that for the inter-apparatus control signal which is important to construct the system, an erroneous operation is less frequently occurs even in a noisy environment.

[0078] In the configuration of the embodiment, for two high-order bits of the digital signal, there can be conducted the transmission highly resistive against noise with a relatively low transmission rate. That is, by using the fact that higher order bits of a video signal more strongly affect the picture quality, two bits are taken out from the video signal in order of MSB and a transmission path using the QPSK modulation is allocated to the information of these two bits, to thereby preventing deterioration of the picture quality. In a system in which the audio information is more important than the video information, the transmission path using the QPSK modulation may be allocated to important bits, e.g., two high-order bits of the audio signal.

[0079] When a human perceives an image on a screen, a higher-frequency is less influential as compared with a lower-frequency component for the frequency component in the horizontal direction of the screen and that in the vertical direction thereof. For a moving object on the screen, it is likely that the human eyes cannot appropriately follow a high-speed movement of the object. By using these tendencies, it is also possible that in the horizontal direction of the screen, the signal is subdivided into a lower-frequency component and a higher-frequency component so that the QPSK modulation is used for the lower-frequency component and the 64QAM modulation is employed for the higher-frequency component. As a result, within the limited transmission bands, the noise resistivity can be increased for important information and the overall transmission capacity is secured. Similarly, it is possible that in the vertical direction of the screen, the signal is subdivided into a lower-frequency component and a higher-frequency component so that the QPSK modulation is used for the lower-frequency component and the 64QAM modulation is employed for the higher-frequency component. Resultantly, within the limited transmission bands, it is possible to heighten the noise resistivity for important information and the overall transmission capacity is secured. Additionally, by combining the operation for the frequency component in the horizontal direction of the screen with that for the frequency component in the vertical direction of the screen, the noise resistivity can be strengthened for desired important information.

[0080] In the description above, the error control circuits **841** to **843** add the error control information items to the bits inputted respectively thereto. However, it is also possible that the bits inputted to the circuits **841** to **843** are collectively treated as one word to add error control information to the word. This advantageously leads to a simplified configuration of the error control circuits.

[0081] Although detailed description has not been given of the encryption in the embodiment shown in FIG. 5, it is possible to execute the processing as shown in FIG. 6 by combining the encryption circuit **171** with the interface circuit **172**. FIG. 6 shows an example of the configuration to carry out the encryption in the system of FIG. 5. The system shown in FIG. 6 includes encryption/decryption circuits **821** to **826**, interface circuits **830** and **831** including encryption, and error control circuits **841** to **847**.

[0082] In the example of FIG. 6, the bit selection circuit **811** selects predetermined bits as in the example shown in FIG. 5. For the respective bits, the error control circuits **841** and **842** conduct error control. For the resultant signals, the encryption/decryption circuits **821** and **822** respectively carry out encryption. The obtained signals are inputted respectively to the QPSK modem circuit **801** and the 64QAM modem circuit **802** to be demodulated. The signals demodulated respectively by the circuits **801** and **802** are delivered to the encryption/decryption circuits **824** and **825** to be decrypted. The decrypted signals are fed to the bit selection circuit **812** and are therein bit-combined with each other. As a result, the signal processing can be executed according to importance of signals to possibly suppress errors in the processing of more important information. Hence, the signals of information can be efficiently transmitted without deteriorating the picture quality.

[0083] It is also possible to further increase transmission efficiency by combining lossless coding with the encryption/decryption circuits **821** to **826**. For example, in the example of FIG. 6, before executing the encryption processing in the encryption/decryption circuits **821** to **823**, the number of bits to be transmitted is reduced, for example, by use of reversible arithmetic codes based on a statistic property. In the video display apparatus **200**, the received signals are decrypted by the encryption/decryption circuits **824** to **826**. Thereafter, the reversible codes corresponding to the circuits **821** to **823** are decoded to be fed to the error control circuits **845** to **846** for the error detection and correction thereof. The obtained signals are fed to the bit selection circuit **812** to be bit-combined with each other. Since the transmission rate of the information to be transmitted can be lowered by combining the reversible codes as above, the signal can be more efficiently transmitted.

[0084] Description will be supplementally given of the encryption. By using AES128 bit encryption in all encryption circuits for the encryption, it is possible to conduct the encryption with high safety for the protection of contents. Moreover, if the AES128 bit encryption is employed for the content encryption circuit **821** and the Data Encryption Standard (DES) encryption is used for the other encryption circuits, there can be easily constructed a system in which the protection of important contents and the processing efficiency are appropriately achieved.

[0085] It is also possible to construct a system in which a changeover operation is conducted between the baseband signal transmission and the compressed signal transmission in response to an inter-apparatus control signal. With the configuration, to transmit a compressed signal according to, for example, a content protection request, the error resistivity is enhanced on the transmission path by transmitting the signal using the QPSK modulation. To transmit the baseband signal, the transmission efficiency is increased by using the 64QAM modulation.

[0086] The operations of the video processing apparatus **100** and the video display apparatus **200** in FIG. 6 are basically similar to those of the apparatuses **100** and **200** shown in FIG. 5. To transmit a signal, the video processing apparatus **100** determines the state of an associated transmission path, specifically, detects by a carrier detection circuit, not shown, whether or not the channel to be used is occupied by another apparatus. In the carrier detection, a check is made to determined whether or not a carrier is detected in a predetermined frequency band for a predetermined period of time. If it is detected by the detector that the channel is occupied by another apparatus, the check is again carried out after a lapse of a predetermined period of time to determine whether or not an available channel is present. If such available channel is present, the condition is notified to the microprocessor **115** of the video processing apparatus **100**. The microprocessor **115** outputs from the QPSK modem circuit **803** a channel use request signal as an inter-apparatus control signal to secure the channel use right. Thereafter, the microprocessor **115** sends a transmission request signal to a bit selection circuit **811**.

[0087] The error control circuit **843** adds error control bits for error detection and correction to the transmission request signal which is in turn encrypted by an encryption/decryption circuit **823** and then transferred to the QPSK modem **803**. The modem **803** conducts a QPSK modulation for the signal to resultantly transmit a radio signal via the antenna **83** to the display apparatus **200**. The apparatus **200** then receives the radio signal by the antenna **86**, carries out a QPSK demodulation for the signal by the modem **806**, and decrypts the signal by the encryption/decryption circuit **826**. For the demodulated signal, the error control circuit **847** conducts error detection and correction control to produce an inter-apparatus control signal and delivers the signal to the bit selection circuit **812**. The microprocessor in the video display apparatus **200** decodes the inter-apparatus control signal and receives the transmission request signal from the video processing apparatus **100** together with apparatus category information regarding the apparatus **100** (information to identify a category indicating whether the associated apparatus is a display apparatus or a recording apparatus) and an apparatus identification number of the apparatus **100**. An image to urge the user to determine whether or not a connection is established to the video processing apparatus **100** is presented on a display screen of the display apparatus **200**. In response thereto, the user indicates allowance for the connection by use of an input device such as a remote control of the display apparatus **200**. Thereafter, between the apparatuses **100** and **200**, the apparatus category information and the identification number to identify each of the apparatuses are communicated to exchange information to observe the copyright protection and the replication restriction condition of the content. If there does not exist any problem, it is allowed that the apparatuses **100** and **200** are connected to each other. In a situation wherein the connection is meaningless, for example, each of the apparatuses **100** and **200** is an input or output dedicated unit or the copyright protection or the replication restriction condition of the content is not observed, the connecting operation is interrupted and the status is displayed on the apparatuses **100** and **200**. As above, in a situation wherein the copyright protection and the replication restriction condition of the content are observed, the connection is established to transmit video and audio signals from the video processing apparatus **100** to the video display apparatus **200**.

Second Embodiment

[0088] FIG. 3 shows a second embodiment of the present invention and is another configuration of the video display apparatus **200** shown in FIG. 1. The configuration of FIG. 3 is partially equal to that of FIG. 2. The same constituent components are assigned with the same reference numerals, and detailed description thereof will be avoided. The apparatus **200** of FIG. 3 includes a decryption circuit **212**, encryption/decryption circuits **245** and **290**, compression/transcoding circuits **291** and **292**, and copy control circuit **293** which is a multiplexing circuit.

[0089] In the embodiment of FIG. 3, when a baseband signal is inputted via the terminal **201** or **202**, the system operates in almost the same way as for the embodiment shown in FIG. 2. Each of the compression/transcoding circuits **291** and **292** operates as a compression circuit for the baseband signal. When a compressed signal is inputted from the terminal **201** or **202**, the signal is fed via the input/output interface **210** to the encryption/decryption circuit **212** to be decrypted. The signal is then delivered to the demultiplexer circuit **250** to be separated into a compressed video signal and a compressed audio signal. These signals are inputted to the replication control circuit **290**, which determines allowance or rejection of replication of the signals based on information indicating a replication restriction condition. If the replication is allowed, the bit rates of the compressed video and audio signals are lowered by the compression/transcoding circuits **291** and **292** by using, for example, a compression method having high compression efficiency according to necessity. Output signals from the circuits **291** and **292** are multiplexed by the multiplexer circuit **293** to be inputted to the encryption/decryption circuit **245**. In this situation, if the replication is allowed by the replication control circuit **290**, the circuit **245** encrypts the input signal for the storage thereof to store the encrypted signals in the storage **230** and/or the memory **221**. To reproduce the stored signal, the circuit **245** decrypts the signal read from the storage **230** or the memory **221**, and the decrypted signal is separated by the demultiplexer circuit **241** into a video signal and an audio signal. Thereafter, these signals are processed in almost the same way as described above and the user resultantly enjoys the image and the sound. In a situation wherein the user enjoys the image and the sound while storing the signal in the storage **230** or the memory **221**, the signal from the multiplexer **293** is delivered via the encryption/decryption circuit **245** to the demultiplexer **241** to be processed almost in the same way as above. In this case, it is possible to confirm the picture quality of the transcoded signal. To enjoy the image and the sound without storing the signal, the signal is fed from the decryption circuit **212** via the circuit **245** to the demultiplexer **241** to be separated into a video signal and an audio signal. Thereafter, the signals are processed in substantially the same way as described above.

[0090] According to the embodiment of FIG. 3, also in a situation wherein a compressed signal is inputted thereto, by conducting the transcoding for the signal, the signal can be efficiently stored with a high compression ratio. Although the signal processing is carried out by use of circuits such as the compression circuits **111** and **113** in the embodiment, the circuits may be implemented by software means. In this situation, there can also be obtained similar advantages. According to the present invention, the signal processing may be accomplished in any appropriate fashion, that is, the present invention does not particularly limit how to implement the signal processing.

[0091] It should be further understood by those skilled in the art that although the foregoing description has been made on embodiments of the invention, the invention is not limited thereto and various changes and modifications may be made without departing from the spirit of the invention and the scope of the appended claims.

Original

Classifications

IPC	CPC
H04N21/4363	H04L69/14
H04L29/06	H04N5/44
H04N5/44	H04N21/4122
H04N21/41	H04N21/41407
H04N21/414	H04N21/43637
H04W16/14	H04N21/4367
H04W28/10	
H04W28/18	
H04W72/04	
H04W72/10	
H04W84/12	
H04W88/02	
H04W88/06	
H04W92/08	

Persons

Original Assignees

Original	Standardized	Normalized
MAXELL, LTD. (/api/control?query=pa:("MAXELL%2C%20LTD.")&autosearch=true) KYOTO, Japan, JP	MAXELL (/api/control?query=pas:("MAXELL")&autosearch=true)	

Current Assignees

Original	Standardized	Normalized
MAXELL, LTD. (/api/control?query=pacu:("MAXELL%2C%20LTD.")&autosearch=true) KYOTO JP	MAXELL (/api/control?query=pacus:("MAXELL")&autosearch=true)	

Inventor(s)

Original
Toshiyuki Kurita (/api/control?query=in:("Toshiyuki%20Kurita")&autosearch=true) Yokohama, Japan, JP
Hitoaki Owashi (/api/control?query=in:("Hitoaki%20Owashi")&autosearch=true) Yokohama, Japan, JP

Legal information

Status

Event	Date
Filed	2020-01-09

Ownership

Date from	Date to	Name	Standardized	Normalized
2007-11-28		MAXELL, LTD.	MAXELL	

Payment status

Date	Payment status	Description

Litigation

Date	Docket number	Comments	Judgement

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Results for: 10129590 OR 10,129,590

News

1. US Patent Issued to MAXELL on Nov. 13 for "Display apparatus and video processing apparatus" (Japanese Inventor)

   US Fed News | Nov 15, 2018 | 291

   ... *For further information, including images, charts and tables, please visit: http://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO2&Sect2=HITOFF&p=1&u=%2Fnetahtml%2FPTO%2Fsearch-bool.html&r=1&f=G&l=50&co1=AND&d=PTXT&s1=**10129590**&OS=**10129590**&RS=**10129590** For any query with respect to this article or any other ... ... Va. , Nov. 15 -- United States Patent no. **10,129,590** , issued on Nov. 13, was assigned to MAXELL LTD. (Kyoto, ...

2. Wednesday December 16, 2020 Abu Dhabi National Oil Company for Distribution (ADNOCDIST:AED3.74) adds AED875 million ($238 million) (1.9%) in MCap, top heavyweight rise in Retail/Wholesale sector

   News Bites - Middle East and North Africa: UAE | Dec 16, 2020 | 3433

   ... 12,622 702 Yield % 5.5 3,969 437 PV1000 (1Year) $* 1,474 **10,129 590** $* Change (1Year) % 35.0 11,383 609 * 1 year ago ...

3. Certain Mobile Electronic Devices and Laptop Computers; Institution of Investigation

   Government Publications & Documents | Aug 24, 2020 | REGULATORY DOCUMENTS | 925

   ... patent"); U.S. Patent No. 7,199,821 ("the '821 patent"); U.S. Patent No. **10,129,590** ("the '590 patent"); and U.S. Patent No. 10,176,848 ("the '848 patent"). ...

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5. INTERNATIONAL TRADE COMMISSION ISSUES NOTICE: CERTAIN MOBILE ELECTRONIC DEVICES AND LAPTOP COMPUTERS; INSTITUTION OF INVESTIGATION

   US Fed News | Aug 24, 2020 | 282

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8. U.S. International Trade Commission Investigating Whether Apple Infringed on Maxell Patents

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9. Sports Direct International Plc Transaction in -9-

London Stock Exchange Aggregated Regulatory News Service (ARNS) | Jun 07, 2017 | 1615

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Plus Patent News | Nov 13, 2018 | 231

... United States Patent and Trademark Office has granted patent no. **10,129,590** on November 13, 2018, to MAXELL, LTD. titled as "Display apparatus ...

11. CONF CALL: INSG - 11/6/19 05:00 PM (844-881-0135)

FlyOnTheWall - Events Feed | Nov 06, 2019 | 39

... in number: 844-881-0135 Call in code: Replay number: 412-317-0088 Replay code: **10129590** # Special comments: Conference Call to discuss earnings for the Q3. ...

12. Inseego Corp. Schedules Release of Third Quarter 2019 Financial Results

Wireless News(Close-up Media) | Oct 28, 2019 | 203

... in the United States may call 1-877-344-7529 and enter access code **10129590** followed by the # key. International parties may call 1-412-317-0088. In ...

13. Inseego Corp. Schedules Release of Third Quarter 2019 Financial Results

Manufacturing Close-Up | Oct 31, 2019 | 203

... in the United States may call 1-877-344-7529 and enter access code **10129590** followed by the # key. International parties may call 1-412-317-0088. In ...

14. Inseego Corp. Sets Release of Third Quarter 2019 Financial Results

Entertainment Close-Up (Close-up Media) | Oct 30, 2019 | 203

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15. Inseego Corp. to Report Third Quarter 2019 Financial Results on November 6, 2019

Business Wire | Oct 23, 2019 | 547

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16. Inseego Corp. to Report Third Quarter 2019 Financial Results on November 6, 2019

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PTO/SB/08a (07-09)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 2

Complete if Known	
Application Number	
Filing Date	
First Named Inventor	Toshiyuki Kurita
Art Unit	
Examiner Name	
Attorney Docket Number	2638-19.08

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] *(if known)*	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	EX1005	US-2006/0203758 A1	09-14-2006	Tee, et al.	
	EX1006	US-2006/0135076 A1	06-22-2006	Honkanen, et al.	
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Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3] -Number[4] -Kind Code[5] (*if known*)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T[6]
	EX1016	WO/2005/060127 A1	06-30-2005	Nokia Corporation		

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 2 of 2

Complete if Known	
Application Number	
Filing Date	
First Named Inventor	Toshiyuki Kurita
Art Unit	
Examiner Name	
Attorney Docket Number	2638-19.08

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	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, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
	EX1002	Prosecution history for the '590 Patent ("'590 File History")	
	EX1008	Maxell, Ltd. v. Apple Inc., Complaint for Patent Infringement, US District Court, Western District of Texas 6:20-cv-00646, July 16, 2020	
	EX1009	Certain Mobile Electronic Devices And Laptop Computers, Complaint, July 16, 2020	
	EX1004	Certain Mobile Electronic Devices And Laptop Computers, Investigation No. 337-TA-1215, Commission Investigative Staff's Initial Markman Brief, January 5, 2020	
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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.
Petitioner

v.

MAXELL, LTD.
Patent Owner

Case No. IPR2021-00400
U.S. Patent No. 10,159,590

DECLARATION OF DR. CHARLES D. CREUSERE

I, Charles D. Creusere, hereby declare under penalty of perjury:

I. BACKGROUND AND QUALIFICATIONS

1. My name is Charles D. Creusere, Ph.D and I am over 21 years of age and otherwise competent to make this Declaration. I make this Declaration based on facts and matters within my own knowledge and on information provided to me by others.

2. I have been retained as an expert in this matter by Counsel for Apple Inc. to provide my independent opinions on certain issues requested by Counsel for Petitioner relating to the accompanying petition for *Inter Partes* Review of U.S. Patent No. 10,129,590 ("the '590 Patent"). I understand that the Challenged Claims are claims 1-10. My opinions are limited to those Challenged Claims.

3. My compensation in this matter is not based on the substance of my opinions or the outcome of this matter. I have no financial interest in Petitioner. I am being compensated at an hourly rate of $350 for my analysis and testimony in this case.

4. In writing this declaration, I have considered my own knowledge and experience, including my work experience in the field of electrical and computer engineering; my experience in teaching this area; and my experience working with others involved in this field, including in both the design and analysis of multimedia-

focused communication systems and subsystems. In reaching my opinions in this matter, I have also reviewed the following references and materials:

- U.S. Patent 10,159,590 B2 to Kurita et al. (*'590 Patent*) (Ex. 1001)
- File History of U.S. Patent 10,159,590 B2 to Kurita et al. (*'590* Patent File History) (Ex. 1002)
- U.S. Patent Application Publication No. 2006/0203758 A1 to Tee et al. (*Tee*) (Ex. 1005)
- U.S. Patent Application Publication No. 2006/0135076 A1 to Honkanen et al. (*Honkanen et al.*) (Ex. 1006)
- U.S. Patent Application Publication No. 2007/0109973 A1 to Trachewsky (*Trachewsky)* (Ex. 1012)
- U.S. Patent Application Publication No. 2006/0258289 A1 to Dua (*Dua*) (Ex. 1013)
- U.S. Patent Application Publication No. 2005/0136949 A1 to Barnes Jr. (*Barnes*) (Ex. 1014)
- U.S. Patent Application Publication No. 2008/0101446 A1 to Gautier et al. (*Gautier et al.*) (Ex. 1015)
- International Publication No. WO 2005/060127 A1 to Sinivaara (*Sinivaara*) (Ex. 1016)
- U.S. Patent Application Publication No. 2005/0215284 A1 to Su et al. (*Su et al.*) (Ex. 1017)
- U.S. Patent Application Publication No. 2007/0238482 A1 to Rayzman et al. (*Rayzman et al.*) (Ex. 1018)
- U.S. Patent Application Publication No. 2007/0275746 A1 to Bitran (*Bitran*) (Ex. 1019)
- U.S. Patent Application Publication No. 2008/0081663 A1 to Kasslin et al. (*Kasslin et al.*) (Ex. 1020)
- U.S. Patent Application Publication No. 2007/0165754 A1 to Kiukkonen et al. (*Kiukkonen et al.)* (Ex. 1021)
- U.S. Patent Application Publication No. 2005/0190747 A1 to Sindwhani et al. (*Sindhwani et al.*) (Ex. 1022)
- U.S. Patent Application Publication No. 2005/0249245 A1 to Hazani et al. (*Hazani et al.*) (Ex. 1023)
- U.S. Patent No. 8,625,547 to Miller II (*Miller II*) (Ex. 1024)
- Mobile and Wireless Design Essentials by Martyn Mallick (Ex. 1025)
- U.S. Patent No. 7,233,359 to Yasuo Suda ("Suda") (Ex. 1026)

- Video Streaming: Concepts, Algorithms, and Systems by Apostolopoulos et al. (Ex. 1027)
- Newton's Telecom Dictionary 20th Update and Expanded Edition by Harry Newton (Ex. 1028)
- "A Flexible Decoder Buffer Model For JVT Video Decoding" by Ribas-Corbera et al., IEEE ICIP 2002 (Ex. 1029)
- "A Buffer Allocation Mechanism for VBR Video Playback" by Sheu et al., IEEE (Ex. 1030)

A. Educational Background

5. I received a Bachelor of Science degree in Electrical and Computer Engineering from the University of California at Davis in 1985. I received a Master's of Science degree in Electrical and Computer Engineering from the University of California at Santa Barbara in 1990, and I received my Ph.D. in Electrical and Computer Engineering, also from the University of California at Santa Barbara, in 1993.

B. Professional Experience

6. I am currently a Full Professor in the Klipsch School of Electrical & Computer Engineering at New Mexico State University, and I hold the Frank Carden Endowed Chair in Telemetering and Telecommunications. I was an Assistant Professor at New Mexico State from January 2000 until I became an Associate Professor in 2004. I have been a Full Professor since August 2010. My research and teaching at New Mexico State have focused on digital signal processing and communications.

7. I have extensive experience in the technical areas of the '590 Patent, including more than 30 years of experience with analog and digital systems and, in particular, with digital signal processing and its application to communication, storage, and retrieval systems.

8. After receiving my B.S. from U. C. Davis in 1985, I went to work for the Naval Weapons Center, China Lake as a civilian Department of Defense (DoD) employee. From 1985 until the program was handed off to the contractor in 1989, I was the lead designer for the guidance electronics of the Laser Guided Training Round. My work on this project included analog and digital circuit design, embedded software design, and front-end systems integration and testing. In 1989, I was awarded a fellowship from the DoD to pursue graduate degrees at the University of California, Santa Barbara. After returning to China Lake with my PhD in 1993, I continued to pursue practical engineering projects along with my more theoretical endeavors. The most encompassing of these projects involved developing efficient video compression and decompression algorithms for use with wireless communication channels. These algorithms were designed for real-time streaming in a manner that maximized bandwidth efficiency while ensuring that the quality of the most important information in the data stream was preserved. During my Masters program at UCSB I pursued a dual communications/digital signal processing coursework specialization and, as a result, took the following relevant

graduate classes: ECE242 (Digital Coding of Analog Signals), ECE278 (Image Processing), ECE258 Digital Signal Processing, ECE148 (Real-Time Digital Signal Processing), ECE277B (Pattern Recognition), ECE243 (Digital Communication), ECE594C (Error Control Codes), and ECE205A (Information Theory). All of these classes have relevance to the patent in suit, but ECE242 (which is focused on data compression) and ECE243 are particularly pertinent here given that video compression and digital communication are both critical parts of any system designed to receive, stream, or store video data. In addition to the above, as part of my minor area of specialization in computer engineering, I took classes in linear and nonlinear programming, optimization theory, neural networks, and computational linear algebra. My Ph.D. research was focused on multimedia data compression using multirate filter banks and wavelets, and I continued to do research in this area for the six years I spent working at the Naval Air Warfare Center in China Lake, CA after completing my dissertation. Some of the papers that I wrote which are relevant to the claimed invention of the '590 Patent and related art include:

- C.D. Creusere and A. Van Nevel, "ATR-directed image and video compression," *Journal of Aircraft,* Vol. 36, No. 4, pp. 626-31, July-August 1999.
- C.D. Creusere, "A new method of robust image compression based on the embedded zerotree wavelet algorithm," IEEE Trans. on Image Processing, Vol 6, No. 10, Oct. 1997, pp. 1436-1442.
- C.D. Creusere, "Fast embedded compression for video," IEEE Trans. on Image Processing, Vol. 8,

No. 12, pp. 1811-16, December 1999.

- C.D. Creusere, "Motion compensated video compression with reduced complexity encoding for
remote transmission," Signal Processing: Image Communications, Vol. 16,

pp. 627-42, April 2000.

9. Since joining the faculty of New Mexico State University in 2000, I have taught numerous classes at both the graduate and undergraduate levels. These include EE497 (Digital Communications), EE585 (Telemetering Systems), EE573 (Signal Compression), EE596 (Image Processing), and EE586 (Information Theory). In the course of teaching these various classes, I cover much of the signal processing that facilitates modern digital communication systems, including video transmission and processing.

10. A listing of the cases (including trials before the Patent Trial and Appeal Board) in which I have testified within the last four years is found following my CV in the attached Appendix A. I've also listed my publications and patents in Appendix A.

C. Other Relevant Qualifications

11. In addition to the experience and publications listed above, I have also received the following awards and distinctions that are relevant to the subject matter of this declaration. I am currently a Senior Area Editor for IEEE Transactions on Image Processing and have previously served as an Associate Editor for IEEE

Transactions on Image Processing from 2010 through 2014. I have also served in this capacity from 2002 through 2005. From 2008-2013, I served as an Associate Editor for IEEE Transactions on Multimedia.

12. In 2004, I served as the co-general chair for the IEEE Digital Signal Processing Workshop in Taos, New Mexico. In 2012 and 2014, I served as the co-technical chair for the Southwest Symposium on Image Analysis and Interpretation held in Santa Fe, New Mexico and San Diego, CA, respectively. In addition, I also served as the technical chair for the 2015 International Telemetering Conference held in Las Vegas, NV. I am also a member of the technical program committees for the IEEE International Conference on Image Processing, the IEEE International Conference on Acoustics, Speech, and Signal Processing, and the IEEE Data Compression Conference.

II. LEGAL FRAMEWORK

A. Obviousness

13. I am a technical expert and do not offer any legal opinions. However, counsel has informed me as to certain legal principles regarding patentability and related matters under United States patent law, which I have applied in performing my analysis and arriving at my technical opinions in this matter.

14. I have been informed that the Patent Trial and Appeal Board ("PTAB") now applies the claim construction standard applied by Article III courts (i.e., the

Phillips standard) regardless of whether a patent has expired. I have been informed that under the *Phillips* standard, claim terms are to be given the meaning they would have to a person having ordinary skill in the art at the time of the invention, taking into consideration the patent, its file history, and, secondarily, any applicable extrinsic evidence (e.g., dictionary definitions). I have reviewed the Claim Construction section in the petition for which this declaration is submitted in support, and I have applied those constructions in my analyses. For all claim language not addressed in this section of the petition, I have applied the plain and ordinary meaning pursuant to the *Phillips* standard.

15. I have also been informed that a person cannot obtain a patent on an invention if the differences between the invention and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art. I have been informed that a conclusion of obviousness may be founded upon more than a single item of prior art. I have been further informed that obviousness is determined by evaluating the following factors: (1) the scope and content of the prior art, (2) the differences between the prior art and the claim at issue, (3) the level of ordinary skill in the pertinent art, and (4) secondary considerations of non-obviousness. In addition, the obviousness inquiry should not be done in hindsight. Instead, the obviousness

inquiry should be done through the eyes of a person having ordinary skill in the relevant art at the time the patent was filed.

16. In considering whether certain prior art renders a particular patent claim obvious, counsel has informed me that I can consider the scope and content of the prior art, including the fact that one of skill in the art would regularly look to the disclosures in patents, trade publications, journal articles, industry standards, product literature and documentation, texts describing competitive technologies, requests for comment published by standard setting organizations, and materials from industry conferences, as examples. I have been informed that for a prior art reference to be proper for use in an obviousness analysis, the reference must be "analogous art" to the claimed invention. I have been informed that a reference is analogous art to the claimed invention if: (1) the reference is from the same field of endeavor as the claimed invention (even if it addresses a different problem); or (2) the reference is reasonably pertinent to the problem faced by the inventor (even if it is not in the same field of endeavor as the claimed invention). In order for a reference to be "reasonably pertinent" to the problem, it must logically have commended itself to an inventor's attention in considering his problem. In determining whether a reference is reasonably pertinent, one should consider the problem faced by the inventor, as reflected either explicitly or implicitly, in the specification. I believe that all of the references that my opinions in this IPR are based upon are well within the

range of references a person having ordinary skill in the art would consult to address the type of problems described in the Challenged Claims.

17. I have been informed that, in order to establish that a claimed invention was obvious based on a combination of prior art elements, a clear articulation of the reason(s) why a claimed invention would have been obvious must be provided. Specifically, I am informed that, under the U.S. Supreme Court's *KSR* decision, a combination of multiple items of prior art renders a patent claim obvious when there was an apparent reason for one of ordinary skill in the art, at the time of the invention, to combine the prior art, which can include, but is not limited to, any of the following rationales: (A) combining prior art methods according to known methods to yield predictable results; (B) substituting one known element for another to obtain predictable results; (C) using a known technique to improve a similar device in the same way; (D) applying a known technique to a known device ready for improvement to yield predictable results; (E) trying a finite number of identified, predictable potential solutions, with a reasonable expectation of success; (F) identifying that known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations are predictable to one of ordinary skill in the art; or (G) identifying an explicit teaching, suggestion, or motivation in the prior art that

would have led one of ordinary skill to modify the prior art reference or to combine the prior art references to arrive at the claimed invention.

18. I am informed that the existence of an explicit teaching, suggestion, or motivation to combine known elements of the prior art is a sufficient, but not a necessary, condition to a finding of obviousness. This so-called "teaching suggestion-motivation" test is not the exclusive test and is not to be applied rigidly in an obviousness analysis. In determining whether the subject matter of a patent claim is obvious, neither the particular motivation nor the avowed purpose of the patentee controls. Instead, the important consideration is the objective reach of the claim. In other words, if the claim extends to what is obvious, then the claim is invalid. I am further informed that the obviousness analysis often necessitates consideration of the interrelated teachings of multiple patents, the effects of demands known to the technological community or present in the marketplace, and the background knowledge possessed by a person having ordinary skill in the art. All of these issues may be considered to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent.

19. I also am informed that in conducting an obviousness analysis, a precise teaching directed to the specific subject matter of the challenged claim need not be sought out because it is appropriate to take account of the inferences and creative steps that a person of ordinary skill in the art would employ. The prior art considered

can be directed to any need or problem known in the field of endeavor at the time of invention and can provide a reason for combining the elements of the prior art in the manner claimed. In other words, the prior art need not be directed towards solving the same specific problem as the problem addressed by the patent. Further, the individual prior art references themselves need not all be directed towards solving the same problem. I am informed that, under the *KSR* obviousness standard, common sense is important and should be considered. Common sense teaches that familiar items may have obvious uses beyond their primary purposes.

20. I also am informed that the fact that a particular combination of prior art elements was "obvious to try" may indicate that the combination was obvious even if no one attempted the combination. If the combination was obvious to try (regardless of whether it was actually tried) or leads to anticipated success, then it is likely the result of ordinary skill and common sense rather than innovation. I am further informed that in many fields it may be that there is little discussion of obvious techniques or combinations, and it often may be the case that market demand, rather than scientific literature or knowledge, will drive the design of an invention. I am informed that an invention that is a combination of prior art must do more than yield predictable results to be non-obvious.

21. I am informed that for a patent claim to be obvious, the claim must be obvious to a person of ordinary skill in the art at the time of the invention. I am

informed that the factors to consider in determining the level of ordinary skill in the art include (1) the educational level and experience of people working in the field at the time the invention was made, (2) the types of problems faced in the art and the solutions found to those problems, and (3) the sophistication of the technology in the field.

22. I am informed that it is improper to combine references where the references teach away from their combination. I am informed that a reference may be said to teach away when a person of ordinary skill in the relevant art, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the patent applicant. In general, a reference will teach away if it suggests that the line of development flowing from the reference's disclosure is unlikely to be productive of the result sought by the patentee. I am informed that a reference teaches away, for example, if (1) the combination would produce a seemingly inoperative device, or (2) the references leave the impression that the product would not have the property sought by the patentee. I also am informed, however, that a reference does not teach away if it merely expresses a general preference for an alternative invention but does not criticize, discredit, or otherwise discourage investigation into the invention claimed.

23. I am informed that even if a *prima facie* case of obviousness is established, the final determination of obviousness must also consider "secondary considerations" if presented. In most instances, the patentee raises these secondary considerations of non-obviousness. In that context, the patentee argues an invention would not have been obvious in view of these considerations, which include: (a) commercial success of a product due to the merits of the claimed invention; (b) a long-felt, but unsatisfied need for the invention; (c) failure of others to find the solution provided by the claimed invention; (d) deliberate copying of the invention by others; (e) unexpected results achieved by the invention; (f) praise of the invention by others skilled in the art; (g) lack of independent simultaneous invention within a comparatively short space of time; (h) teaching away from the invention in the prior art.

24. I am further informed that secondary considerations evidence is only relevant if the offering party establishes a connection, or nexus, between the evidence and the claimed invention. The nexus cannot be based on prior art features. The establishment of a nexus is a question of fact. While I understand that the Patent Owner here has not offered any secondary considerations at this time, I will supplement my opinions in the event that the Patent Owner raises secondary considerations during the course of this proceeding.

III. OPINIONS

A. Level of Skill of a Person Having Ordinary Skill in the Art

25. I was asked to provide my opinion as to the level of skill of a person having ordinary skill in the art of the '590 Patent at the time of the claimed invention, which counsel has informed me to assume is November 28, 2007, the earliest-claimed priority date for the '590 Patent. In determining the characteristics of a hypothetical person of ordinary skill in the art of the '590 Patent at the time of the claimed invention, I was told to consider several factors, including the type of problems encountered in the art, the solutions to those problems, the rapidity with which innovations are made in the field, the sophistication of the technology, and the education level of active workers in the field. I also placed myself back in the time frame of the claimed invention and considered the colleagues with whom I had worked at that time.

26. In my opinion, a person of ordinary skill in the art as of the priority date of the '590 Patent would have been a person having a bachelor's degree in electrical engineering or equivalent with at least one year of experience in the field of wireless communications. Additional education or experience might substitute for the above requirements.

27. Based on my education, training, and professional experience in the field of the claimed invention, I am familiar with the level and abilities of a person

of ordinary skill in the art at the time of the claimed invention. Additionally, I met at least these minimum qualifications to be a person having ordinary skill in the art as of the time of the claimed invention of the '590 Patent.

B. Background of the Technology

28. The below provides a brief overview of the relevant state of the art at the time of the '590 Patent.

29. Various types of mobile wireless communication devices (WCDs) such as personal device assistants, personal media players (PMDs), cell phones, laptops, etc. were well-known and commercially available prior to November 28, 2007. *Trachewsky* at [0009]. WCDs at the time were capable of processing and communicating digital media content such as audio, video, or images to other devices. *Dua* at [0004]. Many WCDs could also capture new multimedia content using built-in digital cameras. *Dua* at [0061], [0085]; *see also Barnes* at [0116]–[0117].

30. WCDs at the time of the '590 Patent included multiple radio transceivers in a single unit that could establish connections with other devices or networks using different communication standards. These WCDs were otherwise known as multimode WCDs. *Gautier* at [0004]–[0005]; *Sinivaara* at 2:14–18; *Barnes* at [0008]; *Su* at [0007]; *Rayzman* at [0001]; *Dua* at [0014]. Known communication protocols deployed in these multimode WCDs included Bluetooth,

wireless local area network (WLAN), cellular networks, Worldwide interoperability for Microwave Access (WiMAX), and ultra-wideband (UWB) among others. *Bitran* at [0004]; *Kasslin* at [0004]–[0006].

31. Wireless local area networks (WLANs) were widely used in WCDs. *Kiukkonen* at [0016]; *see also Kim* at 1:25-27, *Sindwhani* at [0011]. Most commonly, IEEE 802.11 (frequently referred to as Wi-Fi) transceivers were used in these devices. *Bitran* at [0003]. WLANs provided WCDs with Internet access through access points (e.g., a modem) and could also create "peer-to-peer" or "point-to-point" connections between WCDs on the WLAN home or office network. *Bitran* at [0042]; *Kasslin.* at [0009]; *Sindwhani* at [0011]; *Hazani* at [0019]–[0020]; *Miller II* at 1:23-39. In addition to WLANs, wide area networks (WANs) allowed for radio communication across larger geographical areas. *Mobile and Wireless Design Essentials* at 40–41. Often implemented as cellular networks, well-known cellular communication standards at the time included GSM, CDMA, and EDGE. *Id.* at 70. Bluetooth was a third well-known wireless radio technology used in WCDs, which reliably covered a geographic area of about 10 meters. *Kasslin* at [0006].

C. Description of the Alleged Invention of the '590 Patent

32. The '590 Patent is generally directed to video display and video processing devices that are capable of supporting simultaneous wireless connections where at least one wireless connection supports communicating video. *'590 Patent*

at 1:53–2:15. Both described devices include multiple radio communication circuits to support these simultaneous connections as well as controllers for assigning the multiple radio connections. *Id.* at 6:58–64, 7:48–59, 12:11–37.

33. The video processing apparatus 100 could be a digital camera, video camera, cellular phone, or personal media player among other known types of portable video processing devices. *Id.* at 3:43–46. In particular, the video processing apparatus 100 includes hardware for capturing and storing video or still images. *Id.* at 3:50–52, 4:10–14. The display apparatus includes a display for viewing received videos. *Id.* at 9:63–10:3.

34. A controller assigns resources (e.g., wireless communication parameters) to the multiple wireless connections in order to support simultaneous communications. *Id.* at 7:61–8:6. In one example, unique "schemes" are assigned to each connection. As depicted in Fig. 9 below, scheme 1 utilizes a larger modulation constellation and a less robust error correction code to achieve higher throughput relative to scheme 2:

FIG. 9

SCHEME	SCHEME 1	SCHEME 2
BANDWIDTH	6MHz	6MHz
CARRIER MODULATION SCHEME	64QAM	QPSK
CONVOLUTION CODE	3/4	2/3
GUARD INTERVAL	1/8	1/8
TRANSMISSION CAPACITY	17Mbps	5Mbps

Id. at Fig. 9, *see also* 8:7–34 (describing the same). These distinct schemes can be used to prioritize one connection over another. For example, a high-quality, high data rate video connection can be maintained by assigning it scheme 1 while using scheme 2 for a lower priority, lower data rate Internet connection. *Id.* The '590 Patent also teaches that parameters for active connections can be reassigned in order to prioritize a new connection over a pre-existing connection. For example, an Internet connection using scheme 1 can be reassigned to scheme 2 in order to accommodate a request for a new video connection:

> [I]n a situation wherein **the user issues an indication to transmit video information by radio via the modem 1002** to the display apparatus 200 **while acquiring information from the Internet according to scheme 1** of FIG. 9 **by use of the modem 1003**, the controller 132 outputs a control signal to the assignment controller 1001 such that **the transmission scheme of the modem 1003 is changed from scheme 1 to scheme 2** of FIG. 9 and that of the modem 1002 is set to scheme 1 of FIG. 9 conduct communications.

Id. at 8:38–47 (emphasis added).

D. Opinions Regarding *Tee* (Ex. 1005)

35. *Tee* discloses a mobile terminal 110 capable of receiving multimedia information (e.g., video) over a first wireless connection and relaying the multimedia information to an external display using a second wireless connection. *Tee* at Abstract, *see also id.* at [0015] (describing the video relay process allows a user to view the received video on a bigger and better display than the mobile terminal's native display). The mobile terminal 110 may be "any type of mobile wireless device including a display, including a cellular phone, a PDA, a handheld computer . . . , or even a laptop." *Id.* at [0019]. The mobile terminal 110 includes a control processor 210, memory 215, and display 245 with which a user can view video/multimedia content. *Id.* at [0026], [0018] (noting that video data is relayed to the internal display for local viewing). Figure 2 below depicts the mobile terminal 110 and associated components:

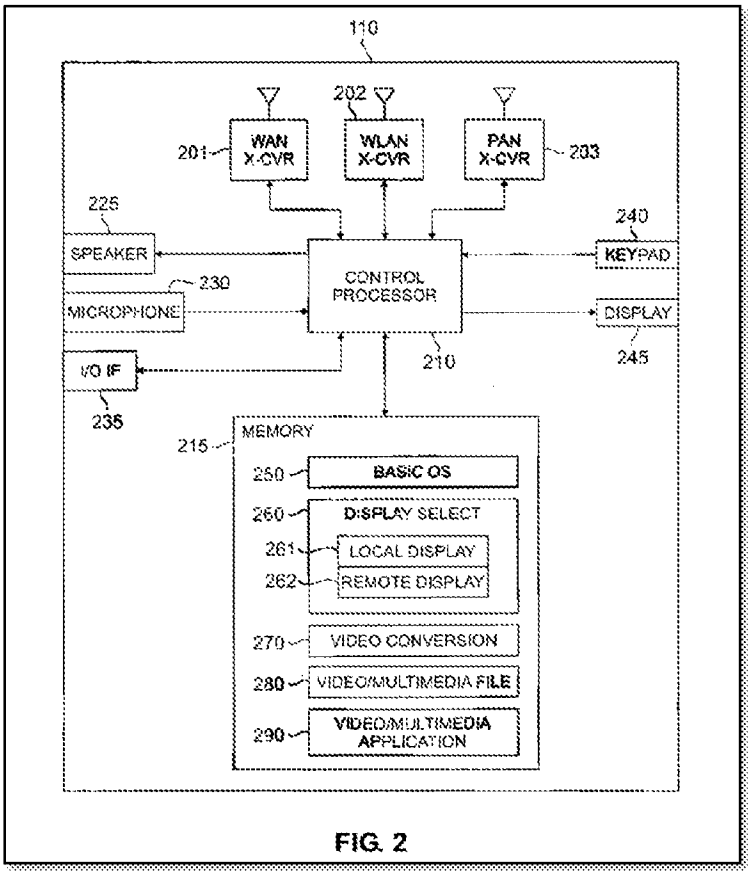


FIG. 2

Id. at Fig. 2, *see also* [0025] (describing the dame). The memory 115 stores video in the video/multimedia file 280 while also storing programming such as the video conversion program 260 for re-formatting incoming video. *Id.* at [0033], [0037].

36. As depicted above in Figure 2, mobile terminal 110 includes three distinct wireless transceivers—WAN transceiver 201, WLAN transceiver 202, and PAN transceiver 203. *Id.* at [0025]. The WAN transceiver 201 may support a wide variety of wide area network connections, such as GSM/GPRS/EDGE, CDMA, or IEEE-802.16. *Id.* at [0027]. A PHOSITA would have understood these are cellular communication standards and would have considered the WAN transceiver a device

that supports cellular-type communications. The WLAN transceiver 202 supports IEEE-802.11x connections (*id.*), which is commonly referred to as WiFi and is typically deployed in a home network to connect devices to each other and to connect those devices to the Internet through an access point. Finally, the PAN transceiver 203 provides the mobile terminal with shorter range device-to-device communications such as Bluetooth or IEEE-802.15.3. *Id.* All three transceivers are capable of receiving video, and the WLAN and PAN transceivers are capable of relaying the video to an external device. *Id.* at [0029]. The control processor 210 allocates resources to establish radio connections on the mobile terminal 110 using these transceivers. *Id.* at [0026] ("Control processor 210 executes basic OS program 250 in order to control, among other things, transceiver 201, 202, and 203.").

37. Figure 3 below illustrates a process by which video is received from the Internet and relayed to an external display device:

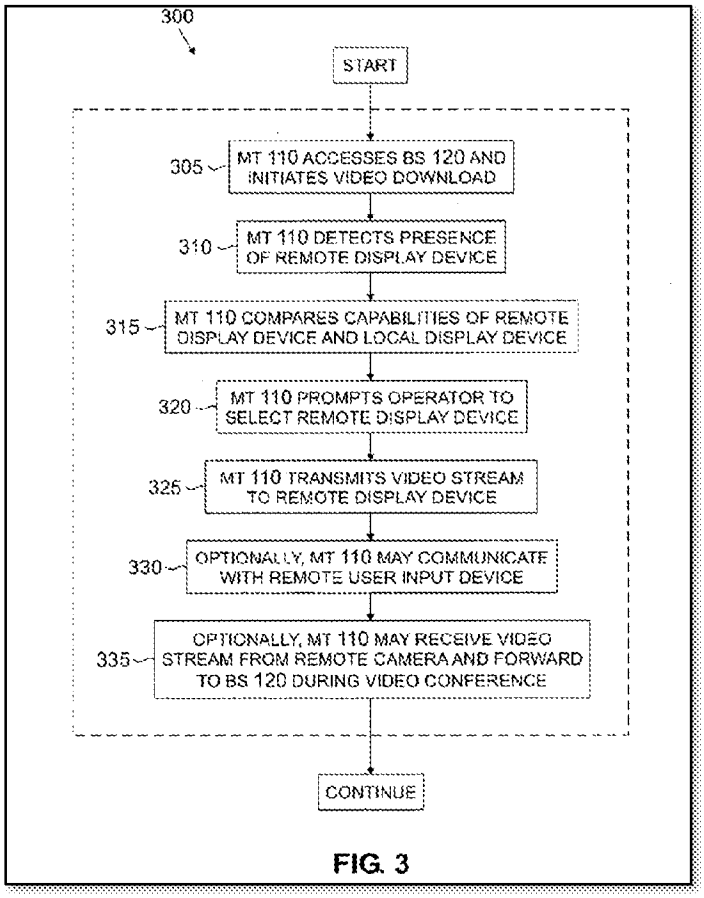


FIG. 3

Id. at Fig. 3, *see also* [0037–0038] (description of steps outlined in Figure 3). At step 305, the mobile terminal connects to a server (i.e., via an Internet connection) to download a video using either the WAN transceiver 201 or WLAN transceiver 202. *Id.* at [0037]. When an external display device such as a television is discovered nearby (step 310), the control processor compares the display quality parameters of the external device with the mobile terminal's native display (step 315), and prompts the user to select the remote device if it's a superior display (step 320). *Id.* at [0036–0038]. If the user chooses the remote device, the control processor relays the

downloaded video to the external display (step 325). *Id.* As also depicted in Fig. 3 above, the mobile terminal may also support video conferencing in which video is received from an external video source using the PAN transceiver and relays the video to the server (i.e., to the Internet). *Id.* at [0038], *see also id.* at [0017–0018] (describing the PAN transceiver as a "short-range wireless interface").

38. *Tee* and the '590 Patent are in the same field of endeavor—both disclose video devices capable of supporting simultaneous wireless connections. *Compare '590 Patent* at 1:47–51 (describing, as an object of the invention, "presenting on a display apparatus videos of high picture quality obtained from portable video processing apparatuses such as a camera" while communicating "with the internet and/or a home network") *with Tee* at [0032] ("… mobile terminal 201 may receive a video stream from… a video source device via PAN transceiver 203 and may relay the video stream" over the internet "via WLAN transceiver 202"). Accordingly, *Tee* is analogous art to the '590 Patent.

E. Opinions Regarding *Honkanen* (Ex. 1006)

39. *Honkanen* is directed to methods of controlling simultaneous radio connections in a wireless communication device. *Honkanen* at Abstract. Particularly, *Honkanen* describes a method of distributing radio resources between simultaneous radio connections to minimize interference. *Id.* The communication device includes

a control unit 104 for creating radio connections and for controlling multiple simultaneous radio connections. *Id.* at [0026].

40. When a radio connection is already established, a multi-radio controller 208 incorporated in the control unit 104 "establishes, controls, and terminates radio connections according to the connection requirements…" by determining whether the new connection would interfere with the existing connection. *Id.* at [0032], [0044]. The multi-radio controller 208 detects interference based on information about the used radio resources and available radio resources which resides in the controller's radio record block 302. *Id.* at [0045], *see also id.* at Fig. 3 (depicting the structure of the multi-radio controller). This information includes radio resources of existing radio connections, such as the modulation technique, power level, timing parameters, and data rates as well as radio resources used by each radio technology including frequency bands among other measured parameters. *Id.* at [0041–0042]. The multi-radio controller also includes a connection parameter manager for checking whether the new connection requires any of the same resources that are already used by an existing connection. *Id.* at [0045].

41. A specific method of controlling simultaneous radio connections in a wireless communication device is outlined in Figure 4 below:

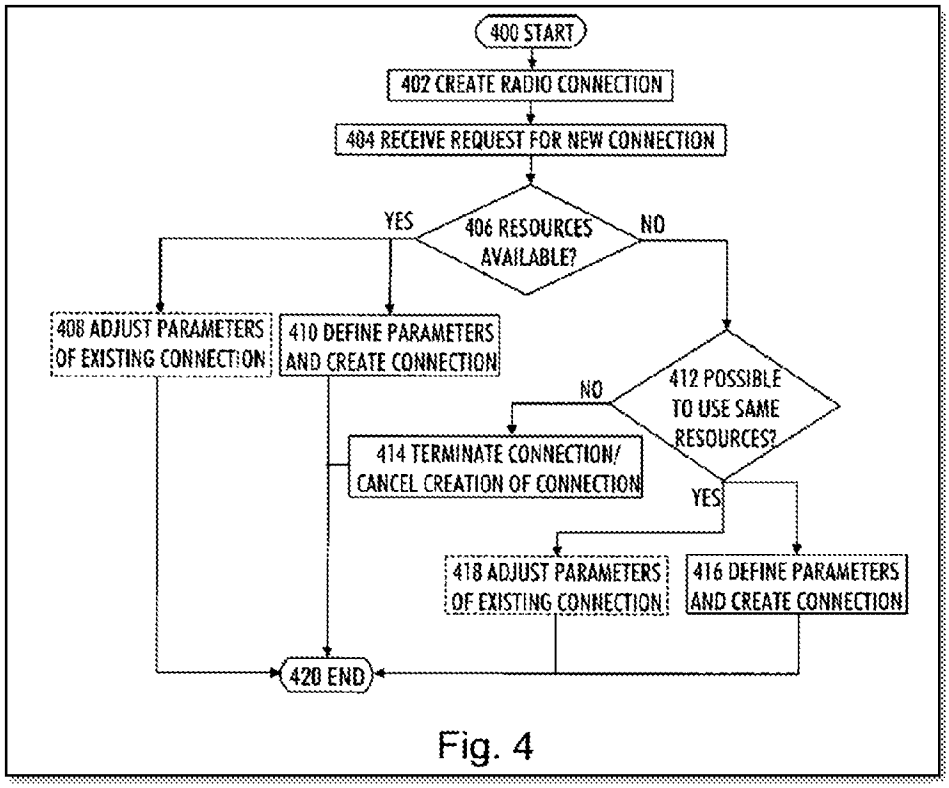


Fig. 4

Id. at Fig. 4, *see also id.* at [0060–0066]. An initial radio connection is created at step 402. *Id.* at [0060]. With that active radio connection established, a request to establish a new connection is received at step 404, and the available radio resources are checked at step 406. *Id.* at [0060–0061]. If the connection parameter manager finds the radio resources to be available, the new connection is established at step 410 with defined parameters. *Id.* at [0062]. Optionally, the connection parameters (i.e., radio resources) may be adjusted for the previously existing connection (step 408) to minimize interference. *Id.* If two connections require at least some overlapping resources, the connection parameter manager 308 determines whether the connections can support this overlap (step 412). *Id.* at [0063]. If it is possible,

the new connection is established at step 416 and the pre-existing connection may be adjusted at step 418. *Id.* at [0065]. Parameters, including modulation, coding, transmission power, and/or data rate, for both connections may be selected to minimize interference that may result from the shared resources. *Id.* at [0058], [0065].

42. Although *Honkanen* is not specifically directed to video transmission, a PHOSITA would have considered it in the same field of endeavor as the '590 Patent—both are directed to supporting simultaneous wireless connections. *Compare '590 Patent* at 13:58–14:3 (describing simultaneous video and Internet connections) *with Honkanen* at [0057] (describing simultaneous WLAN and Bluetooth connections). Further, *Honkanen* is reasonably pertinent to a problem the '590 Patent sought to address—supporting a new and higher priority connection by re-allocating resources of a pre-existing connection to support simultaneous communications). *Compare '590 Patent* at 8:7–57 (describing reallocating an existing Internet connection from scheme 1 to scheme 2 and allocating the higher throughput scheme 1 to a new video connection) *with Honkanen* at [0065] (describing allocating a new connection and then adjusting the parameters of a pre-existing connection to minimize interference due to simultaneous communications). Accordingly, *Honkanen* is analogous art to the '590 Patent.

F. Opinions Regarding the Claim Mappings of *Tee*

1. Claim 1(a): a first radio communication circuit capable of transmitting video information by radio or receiving information by radio;

43. *Tee* teaches that "[c]ontrol processor 210 may use PAN transceiver 203 to communicate in a personal area network environment, such as a Bluetooth or IEEE-802.15.3 communication link that may have a coverage of around 10-20 meters." *Tee* at [0027]. Further *Tee* explains that PAN transceiver 203 is "used to communicate in a personal area network (PAN)." *Id.* As explained above in ¶¶ 30–31, Bluetooth was one of the several known radio communication protocols included in multimode WCDs and used to establish radio connections within the WCD. In other words, *Tee* expressly teaches that PAN transceiver 203 is circuitry used for radio communications. Accordingly, a PHOSITA would have understood that *Tee's* PAN transceiver 203 is a radio communication circuit.

2. Claim 1(b): a second radio communication circuit capable of connecting by radio to an internet or a home network to transmit and receive information;

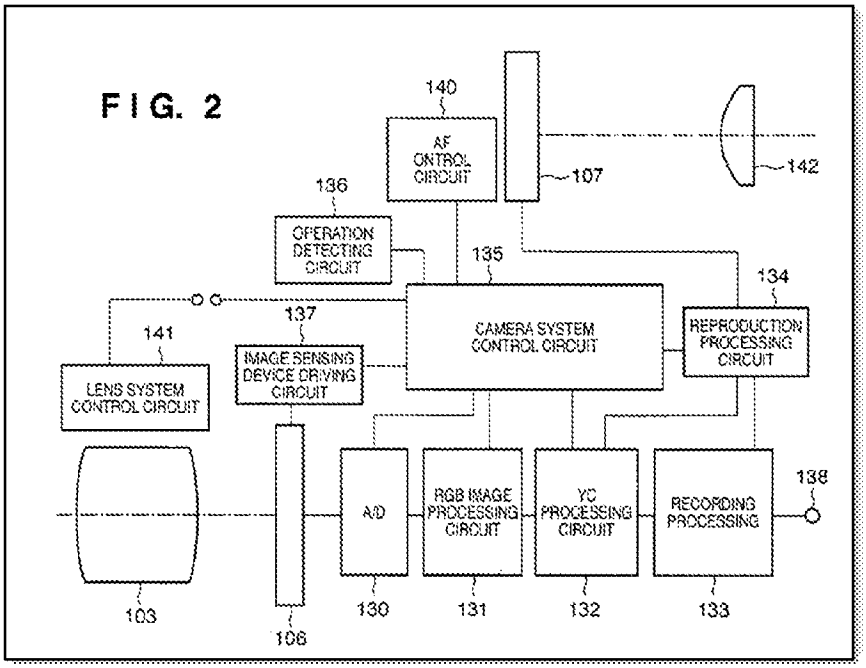
44. *Tee* teaches that control processor 210, within mobile terminal 110, includes a WLAN transceiver 202 that can connect to an internet or home network to transmit and receive information. *Tee* at [0026–0027]. As I explained above in ¶¶ 30–31, WLANs were a well-known radio communication technology implemented in WCDs. Accordingly, a PHOSITA would have understood that *Tee's* WLAN transceiver 202 is a radio communication circuit.

45. It was also well-known that WLANs at the time of the invention provided Internet access to through "access points." *Bitran* at [0042]; *Kasslin* at [0009]. More specifically, a WLAN (e.g., WiFi network) generally provides device-to-device connectivity within the home or office network and also provide those devices with Internet access through what's known as an access point. Generally, a modem is the device that serves as the access point and provides a home or office local network with access to the broader Internet. Consistent with this well-established understanding of WLAN implementation at the time, *Tee* expressly acknowledges that its described WLAN relies on access points to provide Internet access to the WCDs, noting that the mobile terminal may "receive a video stream from a base station or access point of a home or office WLAN via WLAN transceiver 2020," or with respect to a WLAN cellular transceiver, then the base station 120 provides mobile terminal 110 with access to data networks including the internet. *Tee* at [0020], [0031]. Thus, a PHOSITA would have understood that *Tee's* "access points" provided *Tee's* WLAN transceiver 202 with access to data networks such as the Internet.

3. Claim 1(c): an imaging circuit capable of receiving video information via an optical system

46. *Tee* teaches that its mobile terminal 110 may be a digital camera phone that can both capture video and then relay that video to an external display, allowing the camera phone to be used for video conferencing. *Tee* at [0018]. While *Tee* does

not describe its digital camera, a PHOSITA would have understood that an imaging circuit capable of receiving video information via an optical system is fundamental to digital cameras. Indeed, the fundamental operation of a digital camera is exposing an image sensing device, such as a CCD or CMOS image sensor, to the light generated by the subject of the image such that the image sensor can create a digital representation of the object. *See Suda* at 1:15–27. The light generated by the subject of an image is input to the image sensor through an optical system (e.g., one or more lenses) as depicted in the following block diagram:



Id. at Fig. 2, 7:7–37 (describing the same and noting "[t]he image sensing system is an optical processing system which forms an image on the image sensing plane of the image sensing device 106 through the imaging optical system 103"). Similar

CCD or CMOS and optical lens arrangements were also implemented in video devices of the type described by *Tee*. *Dua* at [0061] (describing digital camera components in a media player, including CCD or CMOS sensors and optics such as lenses and filters). Given this standard arrangement for digital imaging, a PHOSITA would have understood that *Tee's* digital camera phone would have included an imaging circuit capable of receiving video information via an optical system.

4. Claim 1(d): an accumulation circuit capable of accumulating video information received by the imaging circuit;

47. *Tee* teaches a memory 215 that stores, among other things, video/multimedia file 280. *Tee* at [0025]. And, as I discussed with reference to the preceding limitation, *Tee* teaches a videoconference embodiment in which its device may be a digital camera phone that "captures and transmits the local user images." A PHOSITA would have understood that the images captured by *Tee's* imaging circuit are stored memory 215—even if just temporarily (e.g., buffered) prior to relaying the images to a remote destination in support of the videoconference application. It was well understood that prior to transmitting video data over any wireless network for video streaming, it was necessary to store that video data in a buffer (e.g., a temporary storage location for information to be sent) prior to transmission in order to correctly format and compress the video for transmission. *Video Streaming: Concepts, Algorithms, and Systems* at 9; *Newton's Telecom Dictionary 20th Update and Expanded Edition* at 130. Confirming this well-

understood aspect of video streaming, *Tee* teaches that, prior to transmitting video data, control processor 210 executes a video conversion program 270 to re-format video data, when necessary, into a suitable format for retransmission over a specific wireless interface, such as WLAN transceiver 202 or PAN transceiver 203. *Tee* at [0033]. Even if a formal video format conversion is not required in a given scenario, a PHOSITA would have understood that video data would have been buffered in order to facilitate the communication process itself, e.g., populating the packet payloads from buffered video data. Accordingly, a PHOSITA would have understood that *Tee's* memory was capable of storing the video data captured by the internal camera module.

5. Claim 1(f): wherein the first radio communication circuit can transmit video information accumulated in the accumulation circuit to an external device by radio,

48. As I discussed above with respect to limitation 1(d), a PHOSITA would have understood that *Tee's* memory was capable of storing the video data captured by the internal camera module, even if temporarily (e.g., buffering) prior to relaying the captured video to an external destination. A PHOSITA would have understood that video obtained from any source would have similarly been stored at least temporarily in *Tee's* memory prior to relaying that video to an external destination. The fact that Tee explicitly states in [0035] that it may be necessary to convert the video into a compressed MPEG4 format prior to transmission to the external display

further supports the contention that Tee's memory is "accumulating" video since MPEG4, even in its simplest *I*-frame only operating mode, must store at least one frame of video (in more advanced modes when temporal prediction is used, it stores multiple reference frames). Furthermore, *Tee* also teaches that video downloaded from server 150, which is relayed to an external device via PAN transceiver 203 may be reformatted prior to transmission. *Tee* at [0033]. As above with respect to limitation 1(d), whether reformatted or not, such video would be stored at least temporarily in memory prior to transmission. *Tee* also expressly teaches that video stored in memory is relayed to an external source via a wireless transceiver. *Id.* ("[V]ideo/multimedia application program 290 may retrieve video/multimedia data from video/multimedia file 280 and transmit a video stream to a remote device via a wireless interface."). Accordingly, a PHOSITA would have understood that in each of the described embodiments in which *Tee's* PAN transceiver transmits video to an external display—whether the video was captured by an internal camera or received from an external source—the transmitted video information comes from memory (i.e., an accumulation circuit).

6. Claim 1(g): the controller controls assignment of connection for each of the first and second radio communication circuit in response to receiving an indication from a user;

49. *Tee* teaches that "control processor 210 executes basic OS program 250 in order to control, among other things, transceivers 201, 202, and 203." *Tee* at

[0026]. And as to PAN transceiver 203 and WLAN transceiver 202 specifically, *Tee* teaches that "control processor 210 may use PAN transceiver 203 to communicate in a personal area network (PAN) environment, such as Bluetooth," while "control processor 210 may use WLAN transceiver 202 to communicate in a wireless local area network (WLAN)." *Id.* at [0027]. Finally, *Tee* explains that mobile terminal 110 also "establishes a wireless link" with remote display devices prior to transmitting any video to the remote display. *Id.* at [0037]. While *Tee* does not expressly disclose that control processor 210 assigns both the PAN transceiver and WLAN transceiver connections as part of these processes, a person of ordinary skill in the art would have understood that the control processor 210 would have done so.

50. As depicted in Figure 2 of *Tee* (reproduced below), the mobile terminal contains only one processor—control processor 210. Further, Figure 2 shows that each of WAN transceiver 201, WLAN transceiver 202, and PAN transceiver 203 are only directly connected to one other component—again control processor 210:

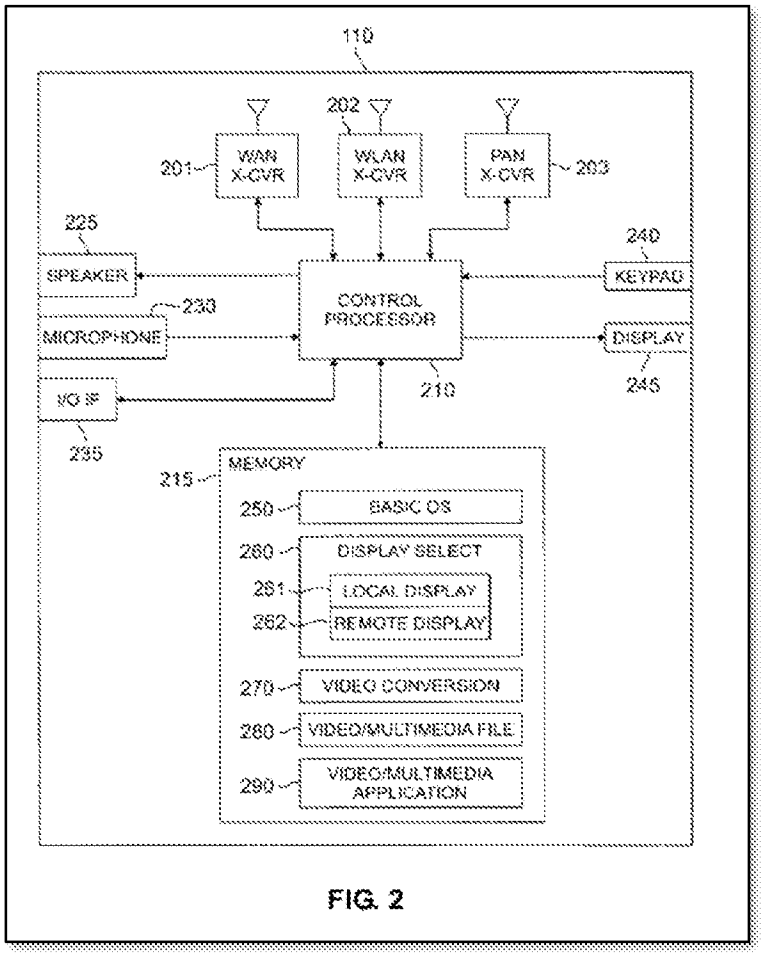


FIG. 2

Id. at Fig. 2. A person of ordinary skill in the art would have understood that because there is only a single processor and each of the transceivers has a direct connection only with that processor, control processor 210 is necessarily responsible for assigning both the PAN transceiver and WLAN transceiver connections.

51. A PHOSITA would also understand that control processor 210 would assign each of these connections in response to receiving an indication from a user. Figure 3 of *Tee* details the process in one embodiment of *Tee's* system in which both

the first connection and second connection are assigned in response to user requests/indications:

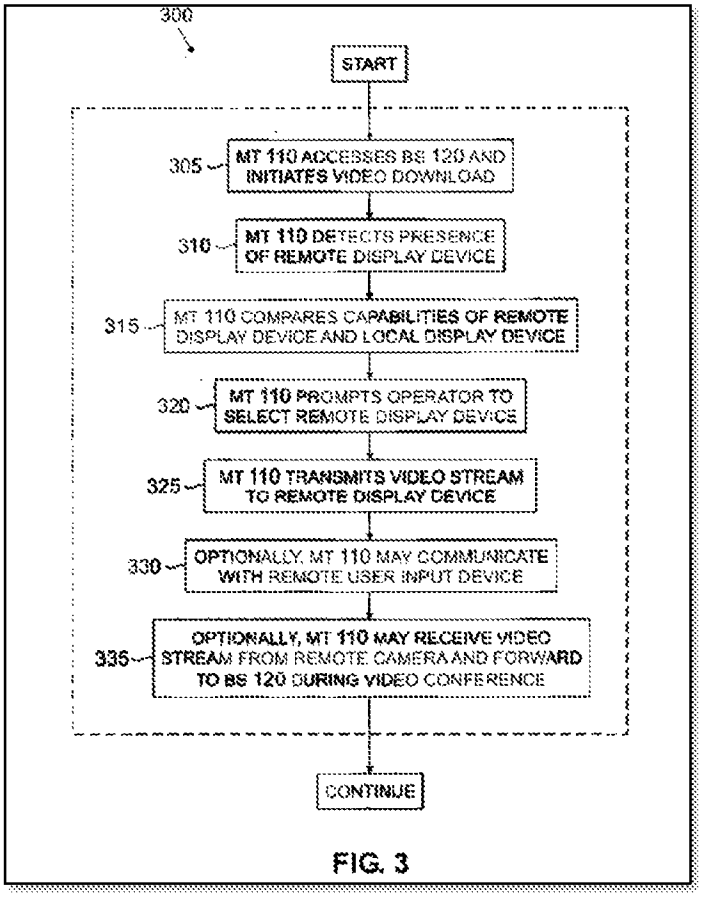


FIG. 3

Id. at Fig. 3. *Tee* explains, "[i]nitially, mobile terminal 110 accesses base station 120 via an air interface (e.g., transceiver 201 or 202) and initiates a video/multimedia download from server 150 (process step 305)." *Id.* at [0037]. A PHOSITA would have understood that the connection used to download a video from server 150 is assigned in response to a user request. Indeed, it would make little sense for the device to request and download such a video independent of the user. Because the

connection must be assigned prior to downloading the video in response to the user's request, a PHOSITA would have understood the second radio connection for downloading a video from server 150 using the WLAN transceiver is assigned in response to receiving an indication from the user.

52. Regarding the first radio connection, Figure 3 of *Tee* also illustrates the process for locating a local display device and connecting to that device using PAN transceiver 203 such that video can be streamed to the display device in response to a user's indication. Specifically, *Tee* teaches that the mobile terminal detects the remote display, either by PAN transceiver detecting a pilot signal sent by the display, by PAN transceiver broadcasting its own signal to find a display, or by having the user manually identify the display. *Id.* at [0034]. Once selected, the mobile terminal obtains the display capabilities of the remote display and compares them to the capabilities of the mobile terminal's display. *Id.* at [0037–0038]. The user is then prompted to select the remote display and, assuming it is selected, the mobile terminal forwards, relays, or retransmits the video stream to the display device. *Id.* A PHOSITA would have understood that, after the above-described interrogation occurs, separate resources would be assigned to the PAN connection in order to support streaming the video to the remote display selected by the user. At the time of the invention, video transmission was well-understood to be a high bandwidth communication. *Newton's Telecom Dictionary 20th Update and Expanded Edition*

at 676 (defining "quality of service" and noting multimedia streams, such as for videoconferencing, are extremely bandwidth sensitive). In stark contrast, interrogating a display for its capabilities would have required minimal bandwidth. Given the significantly different requirements between the interrogation phase and the video streaming phase (i.e., after a user chooses to stream video to an external display), a PHOSITA would have understood that a first set of resources would have been assigned the PAN connection to interrogate and a second (and distinct) set of resources would be assigned the PAN connection to support video streaming after the user chooses to stream video.

7. Claim 1(h): wherein the controller controls each of the first and second radio communication circuit, so that the first radio communication circuit transmits video information and the second radio communication circuit connects to the internet or the home network simultaneously.

53. *Tee* explains that its PAN transceiver "relays" video it has received through the WLAN transceiver. More specifically, *Tee* notes that "mobile terminal 201 may receive a video stream from a base station or access point of a home or office WLAN via WLAN transceiver 202 and may relay the video stream over a short distance to a remote display device via PAN transceiver 203." *Tee* at [0031]. *Tee* also makes clear that the process of relaying a video stream to an external device is an alternative to watching the stream on the mobile terminal itself. *Id.* at [0022–0023]. Video "streaming" was well understood in the art at the time of the invention, referring to real-time viewing of a communicated video "stream." *Video Streaming:*

Concepts, Algorithms, and Systems at 9. Because *Tee's* use of "streaming" is consistent with this well-understood meaning, a PHOSITA would have understood that "relaying" the described "video stream" would have involved simultaneously (1) receiving a video "stream" via the WLAN connection and (2) transmitting the video "stream" to a remote display device via the PAN connection. This interpretation gives meaning to both the "relaying" and "stream" terms used by *Tee* and is consistent with *Tee's* express purpose of utilizing an external display as alternative to the native screen. Indeed, were the video not being viewed while it is being actively received via the WLAN connection, it would not be a video "stream."

8. Claim 4(b): wherein the accumulation circuit accumulates the video information received via the radio interface

54. In addition to the WLAN and PAN communications I discuss above, *Tee* teaches that video files may be obtained via the WAN transceiver 201. In one example, *Tee* teaches the mobile terminal "may receive a video stream from BS 120 via WAN transceiver 201 and may relay the video stream to a remote display decide via . . . PAN transceiver 203." *Tee* at [0030]. In another example, *Tee* teaches that video files may be *downloaded* via the WAN transceiver 201. *Id.* at [0037]. Downloading is a well-understood term that connotes both receiving and storing information. Accordingly, a PHOSITA would have understood that downloading video from a server necessarily involves storing that video at the receiving device. As discussed above, even where *Tee* describes receiving video and relaying that

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video to an external display, the video is stored in memory, even if just temporarily, e.g., buffering the video in order to properly format the video data for a given wireless transmission scheme and a given remote display. Accordingly, whether video is received and relayed or "downloaded" via the WAN transceiver, that video is stored in memory.

9. Claim 5(c): a display capable of displaying the information received by the first radio communication circuit or the second radio communication circuit;

55. One of the fundamental aspects *Tee's* disclosure is that the mobile terminal can play back video on its native display or, if an available external display has better capabilities, can stream the video wirelessly to improve playback:

> **Control processor 210 executes display select program 260** in order **to determine whether the quality of the display of the remote device** (e.g., television 131) **is superior to the quality of display 245** in mobile terminal 110.
>
> . . .
>
> **control processor 210** compares the parameters in remote display parameters file 262 to the parameters in local display parameters file 261 and **selects the display best suited to video/multimedia application program 290. If the display of the external device is selected, control processor 210 transfers the video**/multimedia data to the appropriate one of transceivers 202 and 203.

Id. at [0034–0036] (emphasis added). While many of *Tee's* expressly described scenarios involve receiving video via one wireless interface and relaying that video

to an external display via a second wireless interface, a PHOSITA would have understood that the wirelessly received video could instead be displayed on the local display 245. Indeed, this is the default arrangement in *Tee's* device—the native display is used *unless* there is a better external display available that the user selects. Accordingly, a PHOSITA would have understood that *Tee's* native display 245 is capable of displaying video received via any of the three wireless transceivers.

10. Claim 5(e): wherein the controller controls assignment of connection for each of the first and second radio communication circuits in response to receiving an indication from a user

56. As I discussed above with reference to limitation [1(g)], in the *Tee*-described scenario in which video is received via the WLAN connection and relayed to an external display via the PAN connection, a PHOSITA would have understood that control processor 210 assigns both the PAN transceiver and WLAN transceiver connections in response to user indications. *Tee* teaches a separate scenario in which the device receives a video stream via the PAN transceiver and relays the video stream to an external device using the WLAN transceiver. *Tee* at [0029], [0032], [0038] (describing this scenario in the context of a videoconference application in which the video is received using the PAN connection from a local video camera and relayed to the videoconference application over the Internet using, for example, the WLAN transceiver). For the same reasons I set forth with respect to limitation [1(g)], where video is received via the PAN connection and transmitted via the

WLAN connection, control processor 210 assigns both the PAN transceiver and WLAN transceiver connections in response to user indications. Namely, in response to a user selecting the external camera to supply a video input for the videoconference, control processor 210 would have assigned resources using PAN transceiver to support that connection. Similarly, in response to a user choosing to supply the locally captured video to base station 120 in support of the videoconference application, control processor 210 would have assigned resources using WLAN transceiver to support that connection.

11. Claim 5(f): wherein the controller controls each of the first and second radio communication circuits, so that the first radio communication circuit receives video information and the second radio communication circuit connects to the internet or the home network simultaneously.

57. As described in the preceding paragraph, *Tee* teaches receiving a video stream via the PAN transceiver and relaying the video stream to an external device using the WLAN transceiver. *Tee* at [0029]. As I explained with respect to limitation 1(h), a PHOSITA would have understood that "relaying" a video "stream" involves actively receiving the video data over a first connection while simultaneously relaying the video data over a second connection. Further, as discussed with reference to limitation [1(b)], WLAN transceiver is a WiFi transceiver, which a PHOSITA would have understood is most commonly used to connect devices to each other within a home/office environment and to connect those devices to the Internet through an "access point." In this scenario in which the WLAN transceiver

is used to relay a video stream to a local display, a PHOSITA would have understood that the mobile terminal and display device would be connected using a "home network" as claimed (i.e., the home WiFi network).

58. *Tee* also teaches a video conferencing scenario in which video is received from a local camera via the PAN transceiver and is transmitted to base station 120 using, for example, the WLAN transceiver:

> [I]f video/multimedia application program 290 is a video conferencing application, **mobile terminal 110 receives via the short-range air interface video**/multimedia data **from a remote video camera and relays the camera video data to base station 120**[.]

Tee at [0038] (emphasis added); *see also id.* at [0017] (explaining its use of "short-range" is a reference to connections using the PAN transceiver), [0037] (explaining that "mobile terminal 110 accesses base station 120 via [WLAN] transceiver . . . 202"). As I explained with respect to limitation 1(h), a PHOSITA would have understood that relaying the camera video data via the Internet to support the video conferencing application would have necessarily involved actively receiving the video data over a first connection while simultaneously relaying the video data. Indeed, the purpose of video conferencing is to allow users in remote locations to see other user's live video streams, which is only possible if the video data captured by the local camera is relayed to the Internet-based video conferencing application in real-time, i.e., simultaneously as it is captured. Additionally, in this video

conference scenario, because the WLAN transceiver connects the device to base station 120, the WLAN transceiver not only provides a connection to the home network, but also to the Internet. *Id.* at [0020] (explaining that "[b]ase station 120 provides mobile terminal 110 with access to . . . the Internet").

12. Claim 6: The display apparatus according to claim 5, wherein, upon receiving an indication to receive video information from an external device via the first radio communication circuit, the controller assigns connection of the first radio communication circuit prior to connection of the second radio communication circuit.

59. The premise of the video conferencing application in *Tee* is that a video stream is received from a local camera via the PAN connection before being relayed to the videoconference application via the WLAN connection. *Tee* at [0038]. In this scenario, a PHOSITA would have recognized that the PAN connection should be assigned before assigning resources for the WLAN connection. The reason is simple—there must be video data received via the PAN connection in order to relay said video via the WLAN connection. Thus, a PHOSITA would have been motivated to establish the PAN connection (and confirm the video stream confirmed operational) before establishing the WLAN connection to the video conferencing application.

G. Opinions Regarding the Claim Mappings of *Tee* and *Honkanen*

60. As set forth with respect to Claim 1, *Tee* teaches a scenario in which a video stream is received via WiFi and is simultaneously relayed via Bluetooth. It

was well-known, however, that simultaneous WiFi and Bluetooth connections could lead to interference because these wireless technologies rely on overlapping frequencies. *See, e.g., Bitran* at [0006]. Indeed, *Honkanen* itself expressly identifies Bluetooth and WLAN as two wireless technologies that are subject to potentially severe interference. *Honkanen* at [0004]. Accordingly, a PHOSITA would have recognized that some form of interference mitigation should be used to ensure both connections have sufficient fidelity to support the described video streaming.

61. *Honkanen* describes one specific solution to minimize interference between simultaneous Bluetooth and WLAN connections. Namely, *Honkanen* teaches that if a Bluetooth connection is requested when a WLAN connection already exists, interference can be minimized by limiting the operational frequencies of the Bluetooth connection to "prevent the Bluetooth connection from hopping to the frequencies the WLAN connection is using." *Honkanen* at [0049]. Although *Honkanen* does not address the detrimental impact of this solution on the Bluetooth connection, there were findings in the field suggesting that restricting the operational frequencies of a Bluetooth connection may result in a significant throughput reduction. *See Kiukkonen* at [0021] (finding such restrictions resulted in an unacceptable loss to capacity of up to 13%).

62. A PHOSITA would have understood the importance of maintaining high throughput for the Bluetooth connection, in particular, in *Tee's* described

scenario. Indeed, video streaming, in general, demands high bandwidth and stable connections. Instability due to interference can cause serious performance issues, quickly rendering video streams unwatchable. In the described scenario, the mobile terminal controls video reception over the WiFi connection and video transmission over the Bluetooth connection, but *Tee* does not contemplate the mobile terminal exerting control over the (1) entity that transmits the video stream to the mobile terminal or (2) the external display that receives the video stream from the mobile terminal. Accordingly, if fidelity issues are experienced on the WiFi connection, the mobile terminal can make adjustments to ensure all video data is received properly (before it is relayed to the external display). One such adjustment—increasing the reception buffer—is explained in detail below. But, if fidelity issues are experienced on the Bluetooth connection, the mobile terminal likely has no ability to make adjustments at the external display to ensure the video is properly rendered since the processors in such displays have very limited capabilities and the software controlling them is thus inflexible. Given the lack of control over the video reception at the external display, a PHOSITA would have been motivated to ensure that the Bluetooth connection between the mobile terminal and external display retains the maximum throughput with high stability. Because *Honkanen's* express solution to minimize interference between simultaneous Bluetooth and WiFi connections would

artificially limit the throughput of the Bluetooth connection, a PHOSITA would have looked for alternative solutions.

63. In addition to *Honkanen's* solution that limits the operating frequencies of a Bluetooth connection, *Honkaken* teaches that the same resources may be used (i.e., WiFi and Bluetooth may use all their operating frequencies, even those that overlap) and that one or more operating parameters (e.g., transmission power) may be adjusted to minimize interference between the simultaneous connections:

> **If it is possible in 412 to create another connection using the same radio resources** as used for an existing connection or connections, the process proceeds to 416 and 418 (optional). **The new connection** with parameters that allow the connection to sustain interference to some degree **is created** in 416. **The parameters of an existing connection or connections are adjusted accordingly**, when necessary.

Honkanen at [0065] (emphasis added), Fig. 4 (illustrating the same), [0058] (listing spreading code, channel code, modulation technique, power level, and/or timing parameters as adjustable parameters).

64. As noted above, a PHOSITA would have been motivated to minimize interference when establishing a Bluetooth (PAN) connection for simultaneous communications with the existing WiFi connection (WLAN) and would further have been motivated to ensure the Bluetooth connection takes priority such that the video stream relayed to the external monitor via the PAN/Bluetooth connection experiences sufficiently high fidelity. *Honkanen's* solution excerpted above—where

the operating parameters of an existing connection are adjusted to minimize interference with a new connection—provides an intuitive solution to accomplish both goals. Namely, a PHOSITA would have recognized that the new Bluetooth connection should be established with parameters that support high throughput and stability, including the ability to utilize all its operating frequencies. A PHOSITA would have further recognized that one or more operating parameters of the existing WiFi connection should be adjusted (i.e., re-allocated) in order to minimize interference with the new Bluetooth connection.

65. Of the listed operating parameters, the transmission power level of the WiFi connection is the most straightforward to adjust in order to minimize interference. Indeed, where the WiFi connection is strong and communications over the channel are being conducted above the necessary signal-to-noise ratio (SNR), the transmission power level can be lowered without negatively impacting the fidelity of the channel. Even in situations in which lowering the WiFi transmission power level does negatively impact the connection, it was well known at the time that the reception buffer at the mobile terminal could be increased in order to ensure all video data is properly collected before relaying that video data via the Bluetooth connection. *A Flexible Decoder Buffer Model for JVT Video Coding* at 493 (noting that "video streaming through the Internet" often experiences a variable "bit rate . . according to the network path and also fluctuates in time according to network

conditions" and proposing a variable buffer to accommodate such instability); *A Buffer Allocation Mechanism for VBR Video Playback* at 1641 (explaining that video streaming requires received video to be accumulated in a buffer such that the video can be relayed to the display, noting that buffer requirements vary based on network conditions, and proposing a variable buffer to accommodate such non-ideal network conditions). In other words, a larger reception buffer provides the device flexibility to correct for errors (e.g., retransmit missing packets) and to account for delays in the video data reception, ensuring that a consistent video stream is relayed to the external display over the Bluetooth/PAN connection. To be sure, increasing the reception buffer at the mobile terminal (such that more video is collected before relaying to the external display) minimally increases the delay between receiving a video stream from the server and relaying the video stream to the external display. But a PHOSITA would have understood the tradeoff and would have preferred to obtain a consistent video stream to the external display (i.e., smooth video without frozen or missing frames) in exchange for a small time differential between the two video streams.

66. Furthermore, as mentioned above, *Honkanen* also contemplates other potential modifications to the WLAN transmission parameters beyond simply adjusting its transmission power. Specifically, *Honkanen* also cites the "channel code" as a parameter that can be altered. *Honkanen* at [0041], [0053], [0058]. Given

that channel codes are designed to protect data streams from transmission errors, it was well known to a PHOSITA at this time that by appropriately altering the channel code at the same time as the transmission power was reduced, one could maintain the channels transmission error rate at a constant level. While such alteration of the channel code might incur higher computational costs on both ends of the WLAN communications link, the devices supporting this link are both likely far more capable than the remote display and thus more able to support the added computational burden.

67. Accordingly, a PHOSITA would have been motivated to minimize interference when establishing a Bluetooth (PAN) connection for simultaneous communications with the existing WiFi connection (WLAN) and would have accomplished this goal by adjusting the operating parameters of the WiFi connection (e.g., lowering transmission power or using a more sophisticated channel code) pursuant to the teachings of *Honkanen*. Doing so would have prioritized the Bluetooth connection, ensuring that a consistent and high-quality video stream is relayed to the external display.

68. Such a modification to *Tee* would have been straightforward, requiring only minor changes such as reprogramming *Tee's* system to permit parameter adjustments on the WiFi connection, possibly with increased buffer size or enhanced channel coding as necessary to retain adequate WiFi reception. As I have already

explained with respect to *Tee* and Ground 1, because *Tee* expressly contemplates the use of simultaneous Bluetooth and WLAN connections, it includes the hardware infrastructure necessary to allocate resources in order to support both connections. Accordingly, a PHOSITA would have expected success in making the proposed modification of *Tee* pursuant to *Honkanen*.

IV. Conclusion

69. I declare that all statements made herein of my knowledge are true, and that all statements made on information and belief are believed to be true, and that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Dated: January 9, 2021

By: _____

Dr. Charles D. Creusere

Appendix A

VITA

CHARLES D. CREUSERE

Klipsch School of Electrical & Computer Engineering
Mailing Address:
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DISSERTATION TITLE

"Perfect Reconstruction Modulated Polyphase Filter Banks Using Reverse-Time Subfilters."

ACADEMIC TRAINING

1980-1985: University of California at Davis, B.S. in Electrical and Computer Engineering.

1989-1990: University of California at Santa Barbara, M.S. in Electrical and Computer Engineering.

1990-1993: University of California at Santa Barbara, Ph.D. in Electrical and Computer Engineering.

PROFESSIONAL EXPERIENCE

2010-Present Holder of the Frank Carden Endowed Chair in Telemetering & Telemcommunications and Full Professor. Current research interests include compressive sensing/sparse reconstruction for LIDAR and streaming sensor data as well as EEG brain analysis for audiovisual perceptual quality assessment and modeling.

October 2008 Selected for the International Foundation for Telemetering Endowed Professorship.

Jan. 2000-2008 Associate professor in the Klipsch School of Electrical & Computer Engineering. My teaching areas include digital signal processing, image processing, pattern classification, and source coding (signal compression). I have done past research in areas of image, video, and audio compression as well as feature vector extraction for pattern classification. Currently, my research interests include distributed compression, polarmetric image processing for scene analysis, and EEG waveform analysis and interpretation.

1993-1999: Researcher & Team Leader, Naval Air Warfare Center, China Lake. My research efforts have focused on high speed image and video compression technologies which offer unique capabilities such as robustness to transmission errors and regional localization. My team (2 other people) and I have implemented a real-time (3 to 15 frames/second with 240x512 frames)

320C80-based system which uses a wavelet transform along with embedded coding techniques to compress a video input and stream it through the Internet via TCP/IP protocols. Our recent research focus has been to add more intelligence to the encoder so that the space-frequency information in the image that is most useful for image analysis is received with the highest fidelity. While most of my recent research has been in the area of embedded compression, I am still very much interested in other applications of time/space-frequency decompositions and of multirate digital signal processing concepts in general.

1999, Spring Quarter: Instructor at the University of California at Santa Barbara. Taught graduate class in Multirate Digital Signal Processing, ECE 258B.

1990-1993: Research Assistant, Department of Electrical and Computer Engineering, University of California, Santa Barbara. Worked under Prof. S.K. Mitra on subband coding and multirate filter bank theory. Also implemented real-time filter banks on a Motorola 56001 digital signal processor.

1992: Summer Employee, AT&T Bell labs, Murray Hill, NJ. Developed and simulated new methods of extremely low bit rate video coding for video telephone applications.

1985-1989: Design Engineer, Naval Weapons Center, China Lake. Designed, built, and tested the guidance electronics for the Laser Guided Training Round. This project included mixed analog and digital circuit design as well as the programming of an embedded DSP. Also developed software for an advanced video processor and studied ground target tracking.

FUNDED RESEARCH

• (2000) Office of Naval Research, *Compression of Digital Elevation Maps Using Non-linear Wavelets*, 2000-2003, $94K

• (2001) Sandia National Labs, *Intelligent Compression for Remote Sensing*, 2001-2003, $70K.

• (2002) National Science Foundation (Early Career Grant), *Efficient Audio Compression with Perceptually Embedded Scalability*, 2002-2007, $350K.

• (2004) National Geospatial-Intelligence Agency, *Passive Polarimetric Imagery Classification Study*, 2004-2006, $160K (joint with Dr. David Voelz).

• (2005) Los Alamos National Laboratories, *Signal Detection via Adapted Filter Banks and Geometric Dimensionality Reduction*, 2005-2006, $15K (unburdened).

• (2006) Los Alamos National Laboratories, *Signal Detection via Adapted Filter Banks and Geometric Dimensionality Reduction*, 2006-2007, $50K (unburdened).

• (2006) National Geospatial-Intelligence Agency, *Exploiting Polarization in Imaging Systems*, 2006-2009, $304K (joint with Dr. David Voelz).

• (2006) Army Research Office, *Distributed Source Coding Using Bitstream-based Detection and Classification*, 2006-2009, $326K.

• (2006) DARPA (Subcontract from LANL), *ADAM Project*, 2006-2007, $104K (joint with Dr. Joe Lakey and Dr. Jaime Ramirez)

• (2009) NMSU IRG, *Perceptual audio quality evaluation by direct measurement of human brain responses*, 2009-2010, $39K (joint with Dr. Jim Kroger, Psychology)

• (2011) National Science Foundation, *CIF:Medium:Assessment and modeling of temporal variation in perceived audio and video quality using direct brainwave measurement*, 2011-2015, $917K (lead PI with Dr. Jim Kroger and Dr. Joerg Kliewer as co-PIs)

• (2011) NASA EPSCOR, *Proximity Operations for Near Earth Asteroid Exploration,* 2011-2014, $750K (co-PI, with Dr. Eric Butcher (lead), others)

• (2012) National Geospatial Intelligence Agency (NGA), *Pulse Complexity Based LIDAR Scene Modeling for Sparse Reconstruction and Super-Resolution*, 2012-2013 (plus 3 1 year options), $150K ($75K/option year), co-PI Dr. David Voelz.

• (2018) Airforce Research Lab (AFRL), Software Radio Design in LabView FPGA, 2018-2019, $140K.

OTHER DISTINCTIONS

• Awarded the International Foundation for Telemetering Professorship, October 2008.

• Received an educational fellowship from the Department of Defense, 1989-1992.

• Certificate of Merit for the outstanding technical paper awarded at the AIAA Missile Sciences Conference for the paper "Automatic target recognition directed image compression," Nov. 1998.

• Patent (classified) titled, "Microcontroller-Based Laser Pulse Decoder," awarded 1991.

• Patent titled "Parallel digital image compression system which exploits zerotree redundancies in wavelet coefficients," Patent Number 6,148,111.

• Patent titled "Efficient embedded image and video compression using lifted wavelets," Number: 6,466,698, granted October 15, 2002.

• Associate editor for IEEE Trans. on Image Processing, 2002-2005, 2010-2014

• Associate editor for IEEE Trans. on Multimedia , 2008-2013.

• Guest Editor, "Issue on Advances in Hyperspectral Data Processing and Analysis", IEEE Journal of Selected Topics in Signal Processing, Vol. 5, Numbers: 5 & 6, August-September 2015,

• Co-general chair, IEEE Digital Signal Processing Workshop, August 2004, Taos, NM.

• Co-technical chair for the 2012 and 2014 Southwest Symposium on Image Analysis and Interpretation.

• Student Paper Contest Chair, 40th Asilomar Conf. on Signals, Systems, and Computers, October 2006.

• Organized special session entitled "Applications of Multirate DSP" at the 40th Asilomar Conf. on Signals, Systems, and Computers, October 2006.

- Member of technical program committees for the IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP), the IEEE International Conference on Image Processing (ICIP), and the IEEE Data Compression Conference (DCC).
- Senior Area Editor, IEEE Transactions on Image Processing, March 2016 to present.

CONSULTING ACTIVITIES

- Video compression systems (technology consultant), Abba Tech, Albuquerque, NM, 2000.

- Expert witness in laser rangefinding technology, Asia Optical Inc. (through NY law firm of Osterlenk, Faber, Gerb & Soffen), Case: LTI versus Nikon/AOI, July 2001-2003. Case went to trial/ testified in court.

- Technical expert for defense (Evaluated expired PD patent and wrote Dec. demonstrating Dell could not have infringed, case was dropped); Case: Princeton Digital v. Dell, 2014-2015, case dismissed June 2015, no deposition.
- Technical expert for defense; Noninfrigement & IPR (6,597,812), Real-time v. SAP, 1/2016-6/2016, 2 depositions (IPR).
- Technical expert for defense; IPRs (7,378,992 & 7,415,530), Real-time v. Riverbed, 2/2016-present, 1 deposition.
- Technical expert for defense; IPRs (8,643,513, 7,378,992, 7,161,506, & 9,054,728), Real-time v.
- Dell, 2/2016-7/2018, 2 depositions.
- Technical expert for defense; Noninfringement, Real-time v. HP Enterprises, 4/2016-10/2018, not deposed.
- Technical expert for defense, IPR (7,358,867, 7,161,506, & 9,054,728), Real-time v. Teradata
- 11/2016-8/2018, 1 deposition.
- Technical expert for defense; IPRs (8,643,513 & 7,378,992), Real-time v. Veritas 12/2016-2018, no additional deposition
- Technical expert for defense; IPRs (7,151,916; 7,075,917; 6,304,612) , Uniloc LLC v. Apple, 2018-2019, not deposed.
- Technical expert for defense; Noninfringement, Realtime Adaptive Systems v. YouTube/Google, 2018-present, 1 deposition.
- Technical expert for defense; IPR (7,558,730) , AVRS v. Apple, 2019-2020, 2 depositions.
- Technical expert for defense: IPR (10,129,590) , Maxell v. Apple, 2019-2020, Oct. 2020-present.
- Nokia Techs. Oy v. Lenovo (Shanghai) Elects. Tech. Co. Ltd. et al., No. 5:19-cv-427 (E.D.N.C.)
- In re Certain Electronic Devices, Including Computers, Tablet Computers, and Components and Modules Thereof, Inv. No. 337-TA-1208 (U.S.I.T.C.)

JOURNAL PUBLICATIONS

1. **C.D. Creusere and S.K. Mitra**, "A simple method for designing high-quality prototype filters for M-band pseudo-QMF banks," *IEEE Trans. on Signal Processing*, Vol. 43, No. 4, April 1995, pp. 1005-1007.

2. **C.D. Creusere and S.K. Mitra**, "Efficient audio coding using perfect reconstruction noncausal IIR filter banks," *IEEE Trans. on Speech and Audio Processing,* Vol. 4, No. 2, March 1996, pp. 115-123.

3. **C.D. Creusere and S.K. Mitra**, "Image coding using wavelets based on perfect reconstruction IIR filter banks," *IEEE Trans. on Circuits and Systems for Video Technology,* Vol. 6, No. 5, Oct. 1996, pp. 447-458.

4. **C.D. Creusere**, "A new method of robust image compression based on the embedded zerotree wavelet algorithm," *IEEE Trans. on Image Processing*, Vol 6, No. 10, Oct. 1997, pp. 1436-1442.

5. **C.D. Creusere and A. Van Nevel**, "ATR-directed image and video compression," *Journal of Aircraft,* Vol. 36, No. 4, pp. 626-31, July-August 1999.

6. **C.D. Creusere**, "Fast embedded compression for video," *IEEE Trans. on Image Processing*, Vol. 8, No. 12, pp. 1811-16, December 1999.

7. **C.D. Creusere**, "Motion compensated video compression with reduced complexity encoding for remote transmission," *Signal Processing: Image Communications,* Vol. 16, pp. 627-42, April 2000.

8. **C.D. Creusere**, "Understanding perceptual distortion in MPEG scalable audio coding," *IEEE Trans. on Speech and Audio Processing,* Vol. 13, No. 3, pp. 422-431, May 2005.

9. **L. E. Boucheron and C.D. Creusere**, "Lossless wavelet-based compression of digital elevation maps for fast and efficient search and retrieval," *IEEE Trans. on Geoscience and Remote Sensing,* Vol. 43, No. 5, pp. 1210-1214, May 2005.

10. **V. Thilak, D. Voelz, and C.D. Creusere**, "Polarization-based index of refraction and reflection angle estimation for remote sensing applications," *Applied Optics*, Vol. 46, Bo. 30, pp. 7427-7536, Oct. 2007.

11. **C.D. Creusere, K. Kallakuri, and R. Vanam**, "An Objective Metric of Human Subjective Audio Quality Optimized for a Wide Range of Audio Fidelities," *Audio, Speech, and Language Processing, IEEE Transactions on [see also Speech and Audio Processing, IEEE Transactions on]* , vol.16, no.1, pp.129-136, Jan. 2008

12. **S. Kandadai and C.D. Creusere**, "Scalable Audio Compression at Low Bitrates," *Audio, Speech, and Language Processing, IEEE Transactions on [see also Speech and Audio Processing, IEEE Transactions on]* , vol.16, no.5, pp.969-979, July 2008

13. **S. Kandadai and C.D. Creusere**, "Reverse engineering and repartitioning vector quantizers using training set synthesis," *Signal Processing,* August 2008.

14. **V. Thilak, C.D. Creusere, and D. Voelz**, "Passive Polarimetric Imagery-Based Material Classification Robust to Illumination Source Position and Viewpoint," *Image Processing, IEEE Transactions on* , vol.20, no.1, pp.288-292, Jan. 2011.

15. **C.D. Creusere and J. Hardin**, "Assessing the Quality of Audio Containing Temporally Varying Distortions," *Audio, Speech, and Language Processing, IEEE Transactions on* , vol.19, no.4, pp.711-720, May 2011.

16. **Castorena, J.; Creusere, C.D.**, "The Restricted Isometry Property for Banded Random Matrices," *Signal Processing, IEEE Transactions on* , vol.62, no.19, pp.5073-5084, Oct.1, 2014 doi: 10.1109/TSP.2014.2345350.

17. **Castorena, J.; Creusere, C.D.**, "Sampling of Time-Resolved Full-Waveform LIDAR Signals at Sub-Nyquist Rates," *Geoscience and Remote Sensing, IEEE Transactions on* , vol.53, no.7, pp.3791-3802, July 2015. doi: 10.1109/TGRS.2014.2383839.

REFEREED CONFERENCE PUBLICATIONS

1. **H. Babic, S.K. Mitra, C.D. Creusere, and A. Das**, "Perfect reconstruction recursive QMF banks for image subband coding," *Proc. Asilomar Conf. Signals, Systems, and Computers*, Pacific Grove, CA, Nov. 1991, pp. 746-750.

2. **S.K. Mitra, C.D. Creusere, and H. Babic**, "A novel implementation of perfect reconstruction QMF banks using IIR filters," *Proc. IEEE Int. Symposium on Circuits and Systems*, San Diego, CA, May 1992, pp. 2312-2315.

3. **S.K. Mitra, C.D. Creusere, and H. Babic**, "Design of transmultiplexers using IIR filter banks," *Signal*

Processing VI: Theories and Applications, Elsevier Science Publishers, 1992, pp. 223-226.

4. **C.D. Creusere and S.K. Mitra**, "Efficient image scrambling using polyphase filter banks," *Proc. International Conference on Image Processing*, Austin, TX, Nov. 1994, pp. 81-85.

5. **C.D. Creusere and G. Hewer**, "Wavelet-based nearest neighbor pattern classification using scale sequential matching," *Proc. Asilomar Conf. Signals, Systems and Computers*, Pacific Grove, CA, Nov. 1994, pp. 1123-1127.

6. **C.D. Creusere**, "Embedded zerotree image coding using low complexity IIR filter banks," *Proc. Int. Conf. on Acoustics, Speech, and Signal Processing*, Detroit, MI, May 1995, pp. 2213-16.

7 **C.D. Creusere and Gary Hewer**, "Digital video compression for weapons control and bomb damage indication," *AGARD Conference Proceedings 576*, Chapter 16, Sept. 1995.

8. **C.D. Creusere**, "Image coding using parallel implementations of the embedded zerotree wavelet algorithm," *Proc. of the Digital Video Compression Conference (Algorithms and Technologies 1996)*, San Jose, CA, Jan. 28-Feb. 2, 1996, pp. 82-93.

9. **C.D. Creusere**, "A family of image compression algorithms which are robust to transmission errors," *Proceedings of the SPIE*, Vol. 2825, Denver, CO, August, 1996, pp. 890-900.

10. **C.D. Creusere**, "Perfect reconstruction time-varying IIR filter banks," *Conf. Rec. Asilomar Conf. Signals, Systems, and Computers*, Pacific Grove, CA, Nov. 1996, pp. 1319-23.

11. **C.D. Creusere**, "Out-of-loop motion compensation for reduced complexity video encoding," *Proc. of the Data Compression Conf.* (pp. 428) *& Data Compression Industry Workshop* (pp.28-37), March 1997, Snowbird, UT.

12. **C.D. Creusere**, "Periodic pan compensation for reduced complexity video compression," *Proc. Int. Conf. on Acoustics, Speech, and Signal Processing,* Vol IV, pp. 2889-92, April 1997, Munich, Germany.

13. **C.D. Creusere**, "A new approach to global motion compensation which reduces video encoding complexity," *Proc. Int. Conf. on Image Processing*, Vol. III, pp. 634-7, October 1997, Santa Barbara, CA.

14. **C.D. Creusere**, "Spatially partitioned lossless image compression in an embedded framework," *Conf. Rec. 31st Asilomar Conf. on Signals, Systems, and Computers*, Nov. 1997, Pacific Grove, CA.

15. **C.D. Creusere**, "Adaptive embedding for reduced complexity image and video compression," *Proc. of the SPIE*, Vol 3309 (Visual Communications and Image Processing), pp. 48-57, Jan. 1998, San Jose, CA.

16. **C.D. Creusere**, "Successive coefficient refinement for embedded lossless image compression," *Proc. of the Data Compression Conf.*, pp. 539, March 1998, Snowbird, UT.

17. **C.D. Creusere**, "Subband coding of speech and audio," *Proc. of the European Signal Processing Conf.* (invited paper), Sept. 1998, Isle of Rhodes, Greece.

18 **C.D. Creusere**, "Fast embedded video compression using cache-based processing," *Proc. of the European Signal Processing Conf.*, Sept. 1998, Isle of Rhodes, Greece.

19. **C.D. Creusere**, "Successive coefficient refinement for embedded lossless image compression," *Proc. Int. Conf. on Image Processing*, Oct. 1998, Chicago, IL.

20. **C.D. Creusere** and A. Van Nevel, "Autonomous target recognition directed image compression," *Proc. of the AIAA*, Nov. 1998.

21. **C.D. Creusere**," Improved successive refinement for wavelet-based embedded image compression," *Proc. of the SPIE*, Denver, CO, July 1999.

22. A. Van Nevel and **C.D. Creusere**, "Intelligent Bandwidth Compression," *Proc. of the SPIE*, Denver, CO, July 1999.

23. **C.D. Creusere,** "Optimal refinement/significance map tradeoffs in SPIHT-based image compression," *Conf. Rec., 34th Asilomar Conf. on Signals, Systems, & Computers, pp. 1026-30, Oct. 2000.*

24. **C.D. Creusere,** "Compression of digital elevation maps using nonlinear wavelets," *Proc. Int. Conf. on Image Processing*, pp. 824-7, October 2001.

25. **C.D. Creusere and G. Dahman**, "Object detection and localization in compressed video," *Conf. Rec. 35th Asilomar Conf. on Signals, Systems, and Computers*, Nov. 2001, Pacific Grove, CA.

26. **C.D. Creusere**, "An analysis of perceptual artifacts in MPEG scalable audio coding," *Proceedings of the Data Compression Conference*, pp. 152-161, April 2002, Snowbird, UT.

27. **C.D. Creusere and N. Tolk**, "Combining wavelets and GLICBAWLS to achieve resolution-progressive lossless compression," *Proc. of the International Conference on Image Processing*, pp. III-229-32, October 2002.

28. **L. Boucheron and C.D. Creusere**, "Compression of digital elevation maps for fast and efficient search and retrieval," *Proc. of the International Conference on Image Processing*, pp. 629-32, September 2003.

29. **S. Kandadai and C.D. Creusere**, "An experimental study of object detection in the wavelet domain," *Conf. Rec. 37th Asilomar Conf. on Signals, Systems, and Computers*, pp. 1620-4, Nov. 2003, Pacific Grove, CA.

30. **C.D. Creusere**, "Quantifying perceptual distortion in scalably compressed MPEG audio," *Conf. Rec. 37th Asilomar Conf. on Signals, Systems, and Computers*, pp. 265-9, Nov. 2003, Pacific Grove, CA.

31. **C.D. Creusere and L. Zhou**, "Spatial object detection and classification in JPEG bitstreams ," *Proceedings 11th Digital Signal Processing Workshop*, pp. 115-9, August 2004, Taos Ski Valley, NM,

32. **L. Zhou and C.D. Creusere**, "Spatial object detection in JPEG bitstreams," *Proceedings European Conference on Signal Processing*, pp. 949-52, September 2004, Vienna, Austria.

33. **V. Thilak and C.D. Creusere**, "Tracking of extended size targets in H.264 compressed video using the probabilistic data association filter," *Proceedings European Conference on Signal Processing*, pp. 281-4, September 2004, Vienna, Austria.

34. **S. Kandadai and C.D. Creusere**, Reverse engineering vector quantizers by training set synthesis," *Proceedings European Conference on Signal Processing*, pp. 789-92, September 2004, Vienna, Austria.

35. **V. Thilak, J. Saini, D. G. Voelz, C. D. Creusere** , "Pattern recognition for passive polarimetric data using nonparametric classifiers," *Proc. of the SPIE Vol. 5888*, p. 337-344, Polarization Science and Remote Sensing II; Joseph A. Shaw, J. Scott Tyo; Eds.

36. **R. Vanam and C.D. Creusere**, "Evaluating low bitrate scalable audio quality using advanced version of PEAQ and energy equalization approach ," *Proc. IEEE Int. Conf. on Acoustics, Speech, and Signal Processing*, Vol. III, pp. 189-92, March 2005.

37. **S. Kandadai and C.D. Creusere**, "Reverse engineering vector quantizers for repartitioned signal spaces," *Proc. 39th Asilomar Conference on Signals, Systems, and Computers*, pp. 1208-12, Pacific Grove, CA, Nov. 2005.

38. **R. Vanam and C.D. Creusere,** "Scalable perceptual metric for evaluating audio quality," *Proc. 39th Asilomar Conference on Signals, Systems, and Computers*, pp. 319-23, Pacific Grove, CA, Nov. 2005.

39. **S. Kandadai and C.D. Creusere**, "Perceptually-weighted audio coding that scales to extremely low bitrates," *Proc. IEEE Data Compression Conference*, pp. 382-391, Snowbird, UT, March 2006.

40. **V. Thilak, D. Voelz, C. Creusere, S. Damarla,** "Estimating the refractive index and reflected zenith angle of a target using multiple polarization measurements," Proc. SPIE Vol. 6240, 624004, Polarization: Measurement, Analysis, and Remote Sensing VII; Dennis H. Goldstein, David B. Chenault; Eds., May 2006.

41. **V.M. Prasad and C.D. Creusere**, "Analyzing reversible lapped transformations using Reng

probing," *Proc. 40th Asilomar Conference on Signals, Systems, and Computers*, pp. 873-877, Oct. 2006.

42. **N. Balachandran and C.D. Creusere**, "Chirp classification using hidden Markov models," *Proc. 40th Asilomar Conference on Signals, Systems, and Computers*, pp. 545-549, Oct. 2006.

43. **V. Thilak and C.D. Creusere**, "Estimating the complex index of refraction and view angle of an object using multiple polarization measurements," *Proc. 40th Asilomar Conference on Signals, Systems, and Computers*, pp. 1067-1071, Oct. 2006.

44. **V. Thilak, C.D. Creusere, and D.G. Voelz**, "Material classification using passive polarmetric imagery," Proc. IEEE Int. Conf. on Image Proc., Vol. 4, pp. IV-121-124, Sept., 2007.

45. **A. Pamba, V. Thilak, D. G. Voelz, C. D. Creusere** "Estimation of incidence and reflection angles from passive polarimetric imagery: extension to out-of-plane scattering," Proc. SPIE Vol 6682, 66820O, Polarization Science and Remote Sensing III, Joseph A. Shaw; J. Scott Tyo, Editors, September 2007.

46. **V. Thilak, D. G. Voelz, C. D. Creusere**, "Image segmentation from multi-look passive polarimetric imagery, Proc. SPIE 6682, 668206, Polarization Science and Remote Sensing III, Joseph A. Shaw; J. Scott Tyo, Editors, October 2007.

47. **S. Kandadai and C.D. Creusere**, "Optimal Bit Layering for Scalable Audio Compression Using Objective Audio Quality Metrics," *Signals, Systems and Computers, 2007. ACSSC 2007. Conference Record of the Forty-First Asilomar Conference on* , pp.560-564, 4-7 Nov. 2007.

48. **C.D. Creusere and I. Mecimore**, "Bitstream-based overlap analysis for multi-view distributed video coding," *Proc. IEEE Southwest Symposium on Image Analysis and Interpretation*, pp. 93-96, March 2008.

49. **V. Thilak, C.D. Creusere, and D.G. Voelz**, "Passive Polarimetric Imagery Based Material Classification For Remote Sensing Applications," *Proc. IEEE Southwest Symposium on Image Analysis and Interpretation*, pp. 153-156 March 2008.

50. **V. Thilak, Q. Wang, D. G. Voelz, C. D. Creusere**, "Estimation of target geometry from Mueller matrix imagery," *Proc. SPIE 6972*, March 2008.

51. **C.D. Creusere and I. Mecimore**, "Bitstream-based correlation detector for multi-view distributed video coding applications," *Proc. Int. Conf. on Accoustics, Speech, and Signal Processing*, pp. 1001-1004, April 2008, Las Vegas, NV.

52. **S. Kandadai, J. Hardin, and C.D. Creusere**, "Audio quality assessment using the mean structural similarity measure," *Proc. Int. Conf. on Accoustics, Speech, and Signal Processing*, pp. 221-224, April 2008, Las Vegas, NV.

53. **S. Matta and C.D. Creusere**, "Efficient correlation extraction for distributed audio coding," *Signals, Systems and Computers, 2008 42nd Asilomar Conference on* , vol., no., pp.1272-1276, 26-29 Oct. 2008 .

54. **J.C. Hardin and C.D. Creusere**, "Objective analysis of temporally varying audio quality metrics," *Signals, Systems and Computers, 2008 42nd Asilomar Conference on* , vol., no., pp.1245-1249, 26-29 Oct. 2008 .

55. **S. Matta and C.D. Creusere**, "Distributed audio coding with efficient source correlation extraction," *Proceedings 13th Digital Signal Processing Workshop*, pp. 16-20, January 2009, Marco Island, FL.

56. **I. Mecimore and C.D. Creusere**, "Unsupervised bitstream based segmentation of images," *Proceedings 13th Digital Signal Processing Workshop*, pp. 642-647, January 2009, Marco Island, FL.

57. **Q. Wang, C.D. Creusere, V. Thilak, and D.G. Voeltz**, "Active polarimetric imaging for estimation of scene geometry," *Proceedings 13th Digital Signal Processing Workshop*, pp. 659-663, January 2009, Marco Island, FL.

58. **J.C. Hardin and C.D. Creusere**, "A temporally varying objective audio quality metric," *Proceedings 13th Digital Signal Processing Workshop*, pp. 21-25, January 2009, Marco Island, FL.

59. **I. Mecimore, W. Fahrenkrog, and C.D. Creusere**, "On bitstream based edge detection techniques," ITEA Conference, January 2009, El Paso, TX (best graduate student paper award).

60. **Mecimore, Ivan; Creusere, Charles D.**; , "Low complexity multi-view distributed video coding based on JPEG," *Image Analysis & Interpretation (SSIAI), 2010 IEEE Southwest Symposium on* , vol., no., pp.165-168, 23-25 May 2010.

61. **Creusere, C.D.; Mehta, K.; Voelz, D.G.**; , "Model-based estimation of surface geometry using passive polarimetric imaging," *Geoscience and Remote Sensing Symposium (IGARSS), 2010 IEEE International* , vol., no., pp.4557-4560, 25-30 July 2010.

62. **Castorena, J.; Creusere, C.D.; Voelz, D.**; , "Modeling lidar scene sparsity using compressive sensing," *Geoscience and Remote Sensing Symposium (IGARSS), 2010 IEEE International* , vol., no., pp.2186-2189, 25-30 July 2010.

63. **Castorena, J.; Creusere, C.D.; Voelz, D.**; , "Using finite moment rate of innovation for LIDAR waveform complexity estimation," *Signals, Systems and Computers (ASILOMAR), 2010 Conference Record of the Forty Fourth Asilomar Conference on* , vol., no., pp.608-612, 7-10 Nov. 2010

64. **Creusere, C.D.; Siddenki, S.; Hardin, J; Kroger, J**; , "Early investigations into subjective audio quality assessment using brainwave responses," *Signals, Systems and Computers (ASILOMAR), 2011 Conference Record of the Forty Fifth Asilomar Conference on* , vol., no., pp., Nov. 2011.

65. **Castorena, J.E.; Creusere, C;**, "Remote-sensed LIDAR using random sampling and sparse reconstruction," *Proc. International Telemetering Conference*, Las Vegas, NV, October 2011.

66. **Davis, P; Creusere, C.**; "Quantifying the gains of compressive sensing for telemetering application," *Proc. International Telemetering Conference*, Las Vegas, NV, October 2011.

67. **Creusere, C.D.; Kroger, J.; Siddenki, S.R.; Davis, P.; Hardin, J.**; , "Assessment of subjective audio quality from EEG brain responses using time-space-frequency analysis," *Signal Processing Conference (EUSIPCO), 2012 Proceedings of the 20th European* , vol., no., pp.2704-2708, 27-31 Aug. 2012.

68. **Castorena, J.; Creusere, C.D.;** , "Compressive sampling of LIDAR: Full-waveforms as signals of finite rate of innovation," *Signal Processing Conference (EUSIPCO), 2012 Proceedings of the 20th European* , vol., no., pp.984-988, 27-31 Aug. 2012.

69. **Castorena, J.; Creusere, C.D.;** "Random impulsive scan for LIDAR sampling," Proc. IEEE Int. Conf. on Image Proc., October 2012.

70. **Creusere, C. ,Nelson, E., Critz, T., Butcher, E.**; "Analysis of communication interconnectedness in the proximity of near-earth asteroids," *Proc. International Telemetering Conference*, San Diego, CA, October 2012.

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(54) MOBILE TERMINAL FOR RELAYING MULTIMEDIA DATA TO AN EXTERNAL DISPLAY DEVICE

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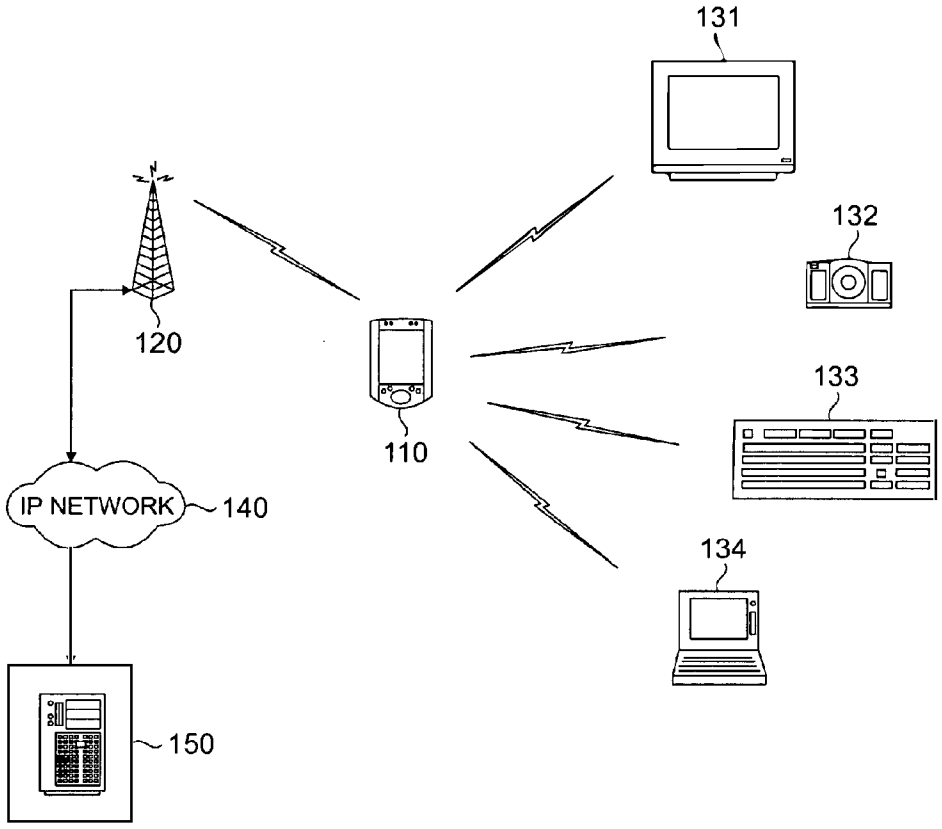
(51) **Int. Cl.**

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H04J 1/10	(2006.01)

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(57) **ABSTRACT**

A mobile terminal comprising a local display for displaying multimedia data. The mobile terminal receives multimedia data via a first wireless interface and transmits the received multimedia data to an external display via a second wireless interface. The mobile terminal transmits the received multimedia data to the external display if the mobile terminal determines the quality of the external display is superior to the quality of the local display.



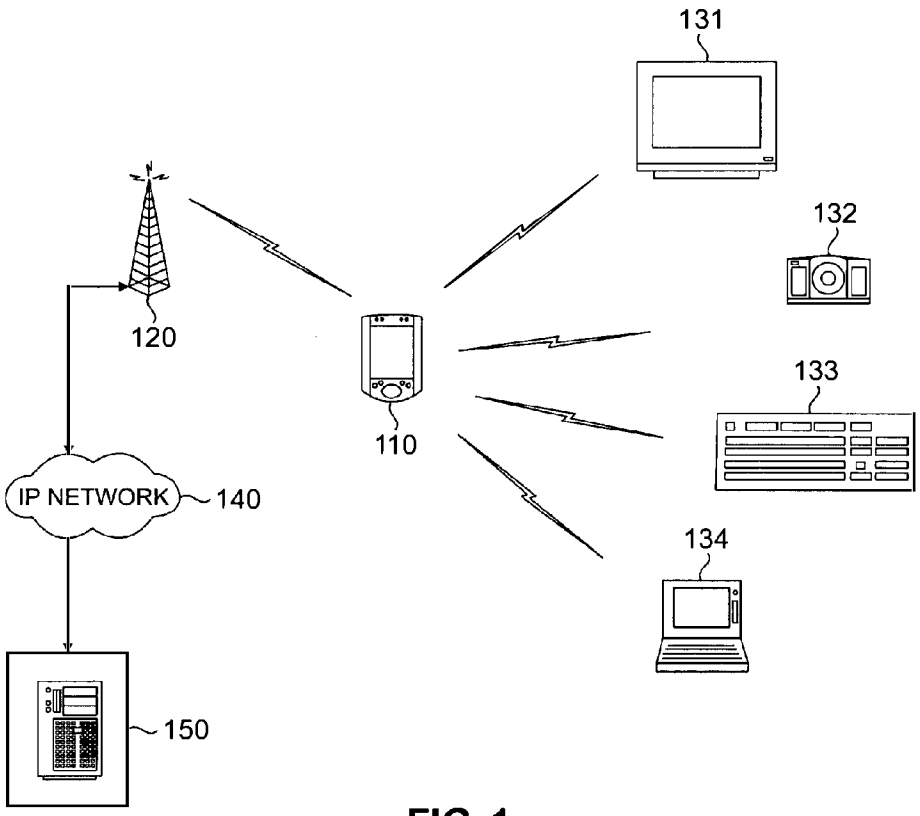


FIG. 1

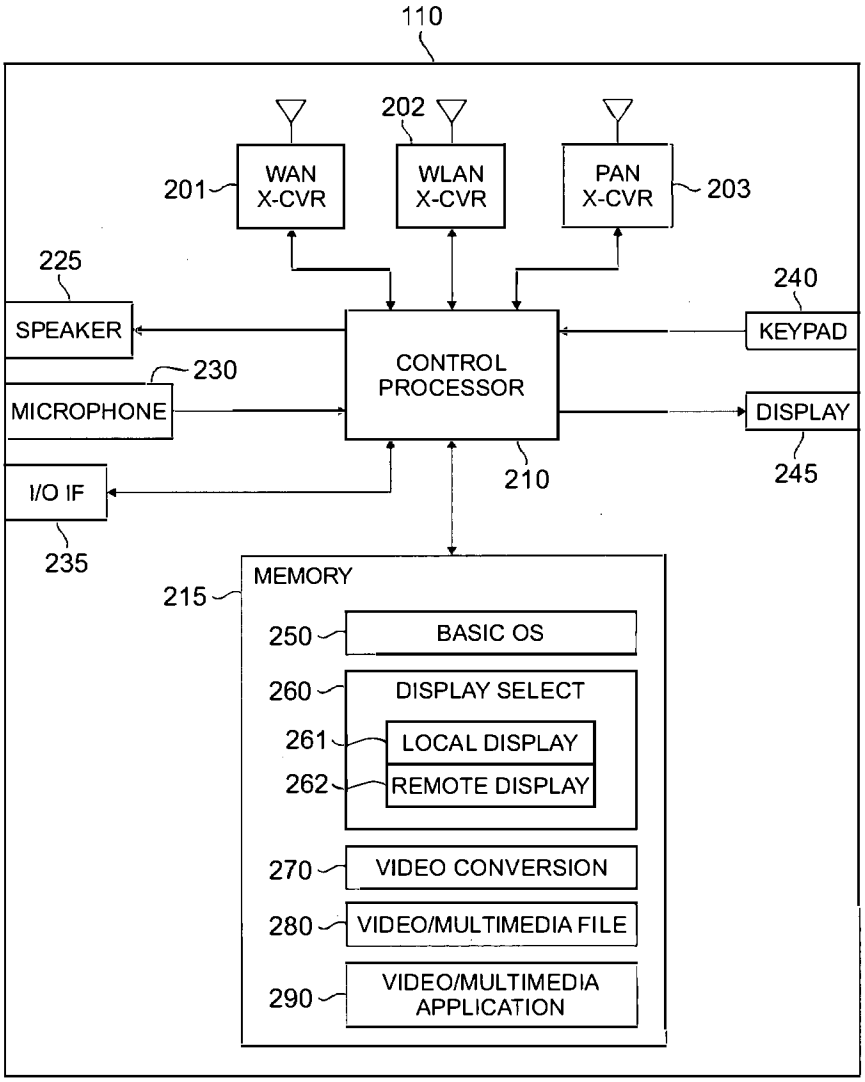

110
202
201
WAN X-CVR
WLAN X-CVR
PAN X-CVR
203
225
240
SPEAKER
CONTROL PROCESSOR
KEYPAD
230
MICROPHONE
DISPLAY
245
210
I/O IF
235
MEMORY
215
250
BASIC OS
260
DISPLAY SELECT
261
LOCAL DISPLAY
262
REMOTE DISPLAY
270
VIDEO CONVERSION
280
VIDEO/MULTIMEDIA FILE
290
VIDEO/MULTIMEDIA APPLICATION

FIG. 2

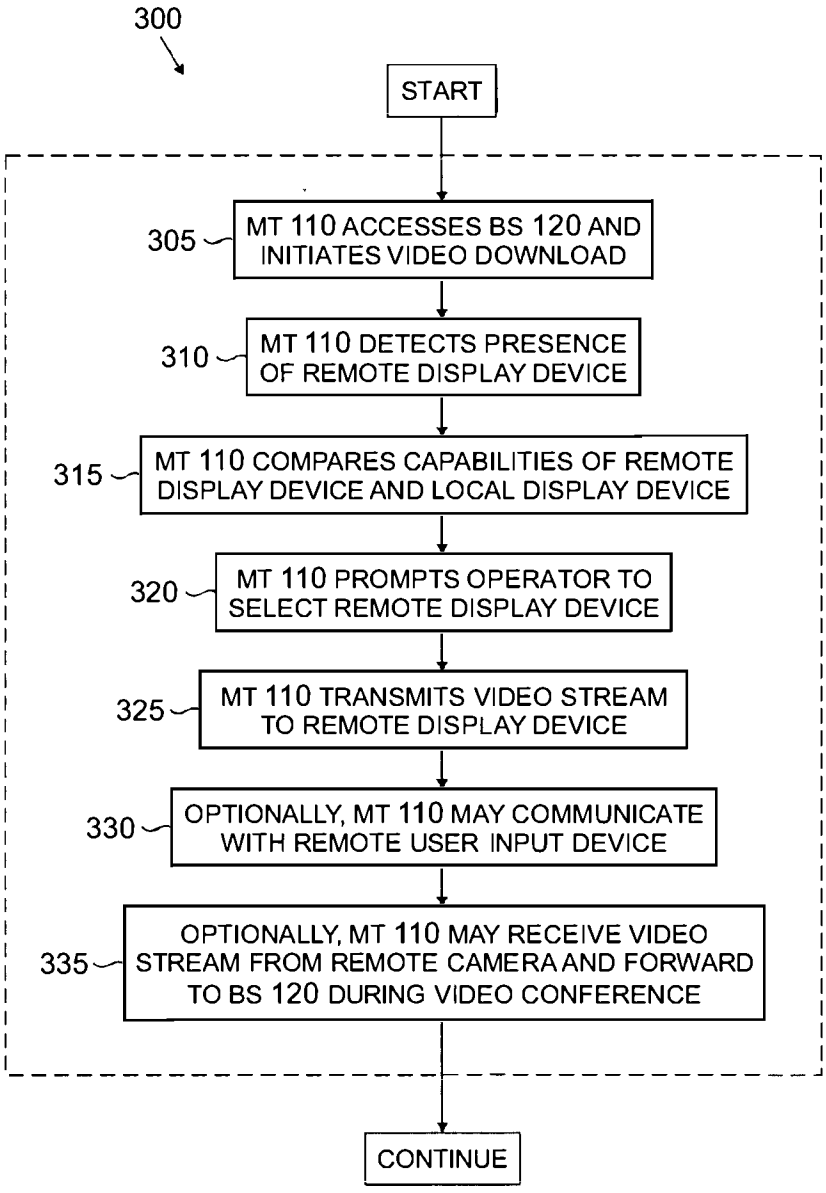

300
START
305
MT 110 ACCESSES BS 120 AND INITIATES VIDEO DOWNLOAD
310
MT 110 DETECTS PRESENCE OF REMOTE DISPLAY DEVICE
315
MT 110 COMPARES CAPABILITIES OF REMOTE DISPLAY DEVICE AND LOCAL DISPLAY DEVICE
320
MT 110 PROMPTS OPERATOR TO SELECT REMOTE DISPLAY DEVICE
325
MT 110 TRANSMITS VIDEO STREAM TO REMOTE DISPLAY DEVICE
330
OPTIONALLY, MT 110 MAY COMMUNICATE WITH REMOTE USER INPUT DEVICE
335
OPTIONALLY, MT 110 MAY RECEIVE VIDEO STREAM FROM REMOTE CAMERA AND FORWARD TO BS 120 DURING VIDEO CONFERENCE
CONTINUE

FIG. 3

MOBILE TERMINAL FOR RELAYING MULTIMEDIA DATA TO AN EXTERNAL DISPLAY DEVICE

CROSS-REFERENCE TO RELATED APPLICATION AND CLAIM OF PRIORITY

[0001] The present application is related to U.S. Provisional Patent No. 60/661,267, filed Mar. 11, 2005, entitled "Mobile Device For Downloading, Relaying And Distributing Multimedia Applications". U.S. Provisional Patent No. 60/661,267 is assigned to the assignee of the present application and is hereby incorporated by reference into the present disclosure as if fully set forth herein. The present application hereby claims priority under 35 U.S.C. §119(e) to U.S. Provisional Patent No. 60/661,267.

TECHNICAL FIELD OF THE INVENTION

[0002] The present application relates generally to wireless communications and, more specifically, to a wireless mobile terminal that relays video and other data to peripheral devices.

BACKGROUND OF THE INVENTION

[0003] Wireless mobile terminals are being used in an ever-increasing variety of applications. This is particularly true of hand-held devices, such as cell phones, personal digital assistant (PDA) devices with wireless capability, and wireless hand-held (or palm top) computers. More and more, these applications include video and/or audio applications or multimedia applications that rely heavily on graphics. Previous generations of hand-held mobile terminals were capable of supporting multimedia and video/audio applications, but this capability was diminished by the relatively low data rates that conventional wireless networks could achieve. This problem is being addressed by new wireless communications standards and equipment that provide much higher data rates.

[0004] However, even if network bottlenecks are removed, the usefulness of small mobile terminals may be limited nonetheless by the human interface problems associated with handheld devices. The small display screens of wireless mobile terminals diminish the capabilities of some applications, particularly video applications. For example, the small screens of hand-held mobile terminals are a well-known hindrance to the display of website information in Internet browser applications. As a practical matter, the display of a mobile terminal (e.g., a cell phone or PDA) typically has size limitations imposed by form-factor, power consumption and cost. Thus, handheld mobile terminals may not be an attractive device for some video and multimedia applications.

[0005] Therefore, there is a need in the art for small mobile terminals that are better suited to video applications and to multimedia applications. In particular, there is a need for a mobile terminal that can overcome the limitations of a small display screen to provide improved viewing of video and multimedia applications.

SUMMARY OF THE INVENTION

[0006] A mobile terminal is provided. According to an advantageous embodiment, the mobile terminal comprises a local display capable of displaying multimedia data, a controller capable of transmitting the multimedia data to the local display, and a first transceiver capable of communicating with a remote display device. The controller is capable of comparing display parameter information associated with the external display device to display parameter information associated with the local display and, in response to the comparison, transmitting the multimedia data to the external display device via the first transceiver.

[0007] A method of operating a remote terminal is also provided. The method comprises transmitting multimedia data to a local display of the remote terminal, detecting the presence of a remote display device, establishing a wireless communication link with the remote display device, comparing display parameter information associated with the remote display device to display parameter information associated with the local display, and, in response to the comparison, transmitting the multimedia data to the remote display device.

[0008] Another mobile terminal is provided comprising a local display capable of displaying multimedia data. The mobile terminal is capable of receiving multimedia data via a first wireless interface and transmitting the received multimedia data to an external display via a second wireless interface. The mobile terminal transmits the received multimedia data to the external display if the mobile terminal de the quality of the external display is superior to the quality of the local display.

[0009] Before undertaking the DETAILED DESCRIPTION OF THE INVENTION below, it may be advantageous to set forth definitions of certain words and phrases used throughout this patent document: the terms "include" and "comprise," as well as derivatives thereof, mean inclusion without limitation; the term "or," is inclusive, meaning and/or; the phrases "associated with" and "associated therewith," as well as derivatives thereof, may mean to include, be included within, interconnect with, contain, be contained within, connect to or with, couple to or with, be communicable with, cooperate with, interleave, juxtapose, be proximate to, be bound to or with, have, have a property of, or the like; and the term "controller" means any device, system or part thereof that controls at least one operation, such a device may be implemented in hardware, firmware or software, or some combination of at least two of the same. It should be noted that the functionality associated with any particular controller may be centralized or distributed, whether locally or remotely. Definitions for certain words and phrases are provided throughout this patent document, those of ordinary skill in the art should understand that in many, if not most instances, such definitions apply to prior, as well as future uses of such defined words and phrases.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] For a more complete understanding of the present disclosure and its advantages, reference is now made to the following description taken in conjunction with the accompanying drawings, in which like reference numerals represent like parts:

[0011] **FIG. 1** illustrates an exemplary mobile terminal operating in a network environment according to one embodiment of the disclosure;

[0012] **FIG. 2** illustrates the exemplary mobile terminal in **FIG. 1** in greater detail according to one embodiment of the disclosure; and

[0013] **FIG. 3** is a flow diagram illustrating the operation of the exemplary mobile terminal and a remote display device according to one embodiment of the disclosure.

DETAILED DESCRIPTION OF THE INVENTION

[0014] **FIGS. 1 through 3**, discussed below, and the exemplary embodiments described in the disclosure are by way of illustration only and should not be construed in any way to limit the scope of the disclosure. Those skilled in the art will understand that the principles of the present disclosure may be implemented in any suitably arranged wireless mobile terminal.

[0015] The mobile terminal disclosed herein overcomes the limitations of a small display screen by receiving video data (i.e., display data) over a first wireless interface and transmitting (or relaying) the video data over a second wireless interface to an external (or remote) device having a better (bigger) display, such as a television, a computer monitor, a laptop computer, the dashboard display of a car, a video projection device, and the like. For the purposes of this disclosure and the claims herein, the video data, which may also be referred to as multimedia data, is defined to include not only the video data itself, but may also include the audio data, text data, and control data that may accompany the video data.

[0016] In some instances, the determination of whether the remote device has a better display may depend on the requirements of the video application executed by the mobile terminal. For many applications, it may be assumed that displays that are larger and have higher resolutions are better displays. The mobile terminal user may also make the decision as to which display to use.

[0017] Generally, the first wireless interface supports mobile wireless communications, including, but not limited to IS-2000, 1xEV-DO, 1xEV-DV, GSM/GPRS/EDGE, 3GPP UTRAN, HSDPA/HSUPA, 3GPP EUTRAN, TD-CDMA, WiBro, WiMAX, IEEE-802.16x, IEEE-802.20, and IEEE-802.11x (e.g., WiFi) in a hotspot environment. The second wireless interface typically supports shorter range wireless communications, including, but not limited to IEEE-802.15.3x, MB-OFDM, UWB, Wireless USB, IEEE-802.11x (or WiFi), and a Bluetooth standard that supports high throughput applications.

[0018] An exemplary mobile terminal may be used for mobile communications and as a gateway for a short-range wireless network, also called a personal area network (PAN). The mobile terminal may support a variety of mobile applications, including voice, multimedia (i.e., video, graphics, text, and audio downloads), video conferencing, web browsing, file download, VPN and Internet gaming. Advantageously, when the mobile terminal is near a higher quality display (e.g., a TV screen), the mobile terminal relays its video data to the external display device as well as to its internal display. This enables the operator of the mobile terminal to view the information on the higher quality display device, and to share the displayed information with other people at the same location, e.g., in a video conference call, or watching the latest broadcasting and streaming of News or events of common interests. Note that in the latter example, the source of information could be a remote Internet web server instead of a conventional TV broadcasting station. A remote Internet web server does not have the same geographical coverage limit as a conventional TV broadcasting station. In the case of group video conferencing using, for example, a digital camera phone, it would be more practical and ergonomically correct to have the received video data displayed on an external screen, while the phone camera captures and transmits the local user images.

[0019] **FIG. 1** illustrates exemplary mobile terminal **110** operating in a network environment according to an exemplary embodiment of the disclosure. Mobile terminal **110** is depicted in **FIG. 1** as a PDA type device. However, this depiction is by way of illustration only and should not be construed so as to limit the scope of the present disclosure. In fact, mobile terminal (MT) **110** may be any type of mobile wireless device that uses a display, including a cellular phone, a PDA, a handheld computer (e.g., Pocket PC™), and even a laptop computer. As an alternative, this mobile terminal may not need to have a high resolution, high quality display, as it could make use of external display device.

[0020] Mobile terminal **110** is capable of communicating with one or more types of wireless wide-area networks (WANs), including conventional cellular networks and wireless local area networks (WLANs). By way of example, mobile terminal **110** may communicate with base station (BS) **120**, which may be associated with a CDMA2000/1xEV-DO/1xEV-DV network, a GSM/GPRS/EDGE network, an IEEE-802.16x network, or the like. In other embodiments, base station **120** may communicate according to such wireless interface standards, or their evolutions, as 1xEV-DO, 1xEV-DV, GSM/GPRS/EDGE, 3GPP UTRAN, HSDPA/HSUPA, 3GPP EUTRAN, TD-CDMA, WiBro, WiMAX, IEEE-802.20, or IEEE-802.11x, among others. Base station **120** provides mobile terminal **110** with access to voice networks, such as the public switched telephone network (PSTN), and to data networks, including, for example, the Internet or proprietary Internet protocol (IP) networks. In the illustrated embodiment, BS **120** provides mobile terminal **110** with access to server **150** via IP network **140**.

[0021] Mobile terminal **110** is also capable of communicating with one or more types of external (or remote) devices via a short-range wireless interface standard, such as IEEE-802.11x, ultra-wideband (UWB), IEEE-802.15.3x, MB-OFDM, Wireless USB, or a Bluetooth standard that supports high throughput applications, among others. It is assumed for the purposes of this disclosure that any such remote device comprises a wireless transceiver that can communicate with mobile terminal **110** in order to establish a personal area network (PAN) connection. By way of example, mobile terminal **110** may communicate with television **131** (or computer monitor **131**), projector **132**, keyboard **133**, and laptop (or handheld) personal computer (PC) **134**. If the remote device is capable of displaying video (e.g., television **131**), it is assumed that the wireless transceiver of the remote device supports a relatively high data rate that is suitable for video applications and/or multimedia applications.

[0022] According to an advantageous embodiment, mobile terminal **110** may relay a video stream to a remote device in order to allow the operator of mobile terminal **110** to view the video on a better display. By way of example,

mobile terminal **110** may be receiving streaming video data from server **150** via IP network **140** and base station **120**. The streaming video is displayed on the display of mobile terminal **110**. At some point, mobile terminal **110** may be located near to television **131** and establish a wireless communication link via the short-range wireless protocol (e.g., IEEE-802.11x/802.15.3x) with television **131**. Mobile terminal **110** may then request information from television **131** regarding the capabilities of the display screen of television **131**.

[0023] Assuming television **131** is a more desirable display than mobile terminal **110**, mobile terminal **110** may relay the streaming video signal to television **131** via the short-range (or PAN) wireless communication link. This may be done automatically, or mobile terminal **110** may prompt the operator of mobile terminal **110** to select television **131** before relaying the video signal. Similarly, mobile terminal **110** may transmit a video signal over the short-range PAN connection to computer **134**, projector **132**, or any other remote device that has a display screen.

[0024] It is not required that mobile terminal **110** receive an incoming video stream from base station **120**. In an alternate scenario, mobile terminal **110** may execute a video application and/or a multimedia application that plays back a video file and/or multimedia file stored in memory in mobile terminal **110**. Mobile terminal **110** then transmits the video (or multimedia) stream from the stored file to television **131** (or another device) for viewing. Advantageously, mobile terminal **110** is also capable of establishing a communication link with keyboard **133** (or another input device such as an electronic notepad) via the short-range PAN connection in order to allow the operator of mobile terminal **110** to use keyboard **133** (or the other input device) in lieu of the keyboard or other control buttons on mobile terminal **110**. By way of example, mobile terminal **110** may establish a Bluetooth connection to keyboard **133** in order to allow the operator to use keyboard **133** to control mobile terminal **110**. In this scenario, the external keyboard, external display and the mobile terminal are connected in the form of a conventional computer, with air interface **1** connecting the computer (with the MT playing the role of the computing unit) to the Internet, and air interface **2** or **3** connecting the computer to the external keyboard and display. If air interface **2** can support both connections between the MT and keyboard or display simultaneously, it is not necessary to have air interface **3**.

[0025] **FIG. 2** illustrates exemplary mobile terminal **110** in greater detail according to an exemplary embodiment of the disclosure. Mobile terminal **110** comprises wide-area network (WAN) transceiver (X-CVR) **201**, wireless local area network (WLAN) transceiver (X-CVR) **202**, and personal area network (PAN) transceiver (X-CVR) **203**. In an embodiment, only one of WLAN transceiver **202** and PAN transceiver **203** may be employed. Mobile terminal **110** also comprises control processor **210**, memory **215**, speaker **225**, microphone **230**, input/output interface (I/O IF) **235**, keypad **240** and display **245**. Memory **215** stores basic operating system (OS) program **250**, display select program **260**, video conversion program **270**, video/multimedia file **280**, and one or more video application programs **290**. Display select program **260** comprises local display parameters file **261** and remote display parameters file **262**.

[0026] Control processor **210** and memory **215** function as a controller that controls the overall operation of mobile terminal **110**. Control processor **210** executes basic OS program **250** in order to control, among other things, transceivers **201**, **202** and **203**. Control processor **210** receives operator inputs from keypad **240** or another user input device (not shown) and displays data on display **245**. If mobile terminal **110** is, for example, a cell phone, control processor **210** can receive a voice signal from microphone **230** and can send voice signals to speaker **225**. I/O interface **235** allows control processor **210** to be coupled to, and communicate with, another device, including, for example, a docking station, a data cord, an operator input device, or the like.

[0027] In the exemplary embodiment, control processor **210** uses WAN transceiver **201** to communicate over a wide area network. For example, WAN transceiver **201** may be a GSM/GPRS/EDGE transceiver, a CDMA2000/1xEV-DO transceiver, or an IEEE-802.16x transceiver that communicates with base station **120** of a wide-area network. Control processor **210** may use WLAN transceiver **202** to communicate in a wireless local area network (WLAN) environment, such as an office WLAN that may have a coverage area or range of several hundred feet. By way of example, WLAN transceiver **202** may be an IEEE-802.11x transceiver. Control processor **210** may use PAN transceiver **203** to communicate in a personal area network (PAN) environment, such as a Bluetooth or IEEE-802.15.3 communication link that may have a coverage area or range around 10-20 meters.

[0028] In the illustrated embodiment in **FIG. 2**, three distinct transceivers are shown. However, this is by way of example only. In an alternate embodiment, mobile terminal **110** may communicate with BS **120** via a first air interface (or wireless interface) and with an external device that has a display screen via a second air interface (or wireless interface). Thus, mobile terminal **110** may comprise only two transceivers. Advantageously, one or more of transceivers **201-203** may be based on software-defined radio (SDR) technology and therefore may be capable of communicating according to more than one wireless interface standard.

[0029] Additionally, depending on the distances involved, mobile terminal **110** may receive an incoming video and/or multimedia stream from any one of WAN transceiver **201**, WLAN transceiver **202**, and PAN transceiver **203** and may relay the video and/or multimedia stream to an external device using, for example, WLAN transceiver **202** or PAN transceiver **203**. Essentially, this air interface functions similarly to I/O interface **235**, but over the wireless link.

[0030] In one example, mobile terminal **201** may receive a video stream from BS **120** via WAN transceiver **201** and may relay the video stream over a short distance to a remote display device via WLAN transceiver **202** or PAN transceiver **203**. This may occur when mobile terminal **201** communicates with BS **120** in a cellular network and the remote display communicates with mobile terminal **110** using, for example, an IEEE-802.11x transceiver (i.e., communicates with WLAN transceiver **202**) or a Bluetooth or IEEE-802.15.3x transceiver (i.e., communicates with PAN transceiver **203**).

[0031] In another example, mobile terminal **201** may receive a video stream from a base station or access point of

a home or office WLAN via WLAN transceiver **202** and may relay the video stream over a short distance to a remote display device via PAN transceiver **203**. This may occur when the base station or access point in the office WLAN communicates with mobile terminal **110** using, for example, an IEEE-802.11x transceiver and the remote display communicates with mobile terminal **110** using, for example, a high data rate Bluetooth transceiver that is capable of supporting the required video data throughput.

[0032] In a third example, mobile terminal **201** may receive a video stream from a base station, an access point, or a video source device via PAN transceiver **203** and may relay the video stream over a short distance to a remote display device via WLAN transceiver **202**. This may occur if the video source with wireless capability transmits a video stream to mobile terminal **110** using, for example, a high data rate Bluetooth transceiver and the remote display communicates with mobile terminal **110** using, for example, an IEEE-802.11x transceiver.

[0033] Control processor **210** executes video/multimedia application program **290** in order to display video data on display **245**. Control processor **210** executes video conversion program **270** in order to re-format (if necessary) the video data downloaded from server **150** through the one wireless interface (e.g., WAN transceiver **201**) to a suitable format for re-transmission via another wireless interface (e.g., WLAN transceiver **202** or PAN transceiver **203**). Additionally, video/multimedia application program **290** may retrieve video/multimedia data from video/multimedia file **280** and transmit a video stream to a remote device via a wireless interface. Advantageously, the wireless interface may have more than one connection at the same time. For example, PAN transceiver **203** may transmit video to television **131** while simultaneously communicating with wireless keyboard **240**.

[0034] Control processor **210** executes display select program **260** in order to determine whether the quality of the display of the remote device (e.g., television **131**) is superior to the quality of display **245** in mobile terminal **110**. Control processor **210** may execute display select program **260** automatically in response to detection of wireless signals transmitted by the remote device. For example, PAN transceiver **203** may detect a pilot (or similar beacon) signal transmitted by the wireless transceiver associated with television **131** and may send a notification signal to control processor **210**. The pilot/beacon signal may be a signal broadcast by a device, such as television **131**, for example, to provide notification of the presence and capabilities of the device and the services provided by the device. Upon receipt of the notification signal, control processor **210** may launch display select application program **260**. In another embodiment, PAN transceiver **203** broadcasts a signal to discover and interrogate neighboring nodes that may have the ability to display the information. As an example, the wireless transceiver associated with television **131** may acquire the transmission from PAN transceiver **203** and may transmit a signal in response to the inquiry, using the protocol supported by the air interface standard. Alternatively, control processor **210** may execute display select program **260** in response to manual inputs entered by the operator of mobile terminal **110**.

[0035] Under control of display select program **260**, control processor **210** is capable of querying the remote device (e.g., television **131**) to determine the quality of the display associated with the remote device, for example, by requesting the remote device to transmit parameters or attributes describing the capabilities of the remote device. If the attributes of the external display device are available, the data can be formatted accordingly before transmission through the second interface to the display device. However, it is not always necessary for the remote device to have the capability to respond to such an inquiry. Any standard protocol that is supported by the air interface would be sufficient for the mobile terminal to transmit the video data, and the similar air interface of the display device to receive, demodulate and decode the data. Nevertheless, it is assumed that the external display device has the capability to decode the received data and convert it to a signal/pixel format that is supported by the display mechanism, e.g., a MPEG4 decoder, and/or a Digital-to-Analog converter. Control processor **210** receives the display parameters associated with the remote device and stores these parameters in remote display parameters file **262**. The parameters associated with display **245** are stored in local display parameters file **261**. The parameter data may include, for example, display size, display type (CRT, LED, etc.), pixel size, refresh rate, and the like.

[0036] Under control of display select program **260**, control processor **210** compares the parameters in remote display parameters file **262** to the parameters in local display parameters file **261** and selects the display best suited to video/multimedia application program **290**. If the display of the external device is selected, control processor **210** transfers the video/multimedia data to the appropriate one of transceivers **202** and **203**. Control processor **210** may prompt the operator of mobile terminal **110** for permission to transmit video/multimedia data to the remote display device. Control processor **210** may also continue to send video/multimedia data to display **245** for simultaneous display. In an alternate embodiment, it may be assumed that the remote display is better than display **245**. In such an embodiment, control processor **210** may select the remote display (with or without operator permission) without comparing parameters associated with display **245** and the remote display.

[0037] **FIG. 3** depicts flow diagram **300**, which illustrates the operation of exemplary mobile terminal **110** and a remote display device according to one embodiment of the disclosure. Initially, mobile terminal **110** accesses base station **120** via an air interface (e.g., transceiver **201** or **202**) and initiates a video/multimedia download from server **150** (process step **305**). Alternatively, mobile terminal **110** may play back video/multimedia data stored in video/multimedia file **280**. At some point, mobile terminal **110** detects the presence of a remote display device (e.g., television **131**) via another air interface (e.g., transceiver **202** or **203**) and establishes a wireless link with the remote display device (process step **310**), with the authorization of the mobile terminal user.

[0038] Mobile terminal **110** then requests the capabilities of the remote display device and compares the capabilities of the remote display device and local display **245** (process step **315**). Mobile terminal **110** may prompt the operator to select the remote display device (process step **320**). Assuming the remote display device is selected, mobile terminal **110** then forwards (or relays or re-transmits) the video

stream from base station **120** (or video/multimedia file **280**) to the remote display device (process step **325**). Optionally, mobile terminal **110** may wirelessly communicate with a remote user input device, such as keyboard **133** process step **330**). Optionally, if video/multimedia application program **290** is a video conferencing application, mobile terminal **110** receives via the short-range air interface video/multimedia data from a remote video camera and relays the camera video data to base station **120** (process step **335**).

[**0039**] Although the present disclosure has been described with one or more exemplary embodiments, various changes and modifications may be suggested to one skilled in the art. It is intended that the present disclosure encompass such changes and modifications as fall within the scope of the appended claims.

What is claimed is:

1. A mobile terminal comprising:

a local display capable of displaying multimedia data;

a controller capable of transmitting the multimedia data to the local display; and

a first transceiver capable of communicating with a remote display device,

wherein the controller is capable of comparing display parameter information associated with the remote display device to display parameter information associated with the local display and, in response to the comparison, transmitting the multimedia data to the remote display device via the first transceiver.

2. The mobile terminal as set forth in claim 1, wherein the controller retrieves the multimedia data from a multimedia file stored in a memory associated with the controller.

3. The mobile terminal as set forth in claim 1, wherein the controller compares the display parameter information associated with the remote display device to the display parameter information associated with the local display in order to determine which of the remote display device and the local display is better suited to a multimedia application executed by the mobile terminal.

4. The mobile terminal as set forth in claim 3, wherein the controller is capable of communicating with a remote user input device via the first transceiver.

5. The mobile terminal as set forth in claim 4, wherein the remote user input device comprises a wireless keyboard.

6. The mobile terminal as set forth in claim 4, wherein the controller is capable of prompting an operator of the mobile terminal for permission to transmit the multimedia data to the remote display device via the first transceiver.

7. The mobile terminal as set forth in claim 4, wherein the first transceiver comprises a personal area network transceiver.

8. The mobile terminal as set forth in claim 4, wherein the personal area network transceiver comprises one of: an IEEE-802.15.3x transceiver, an MB-OFDM transceiver, a UWB transceiver, a wireless USB transceiver, an IEEE-802.11x transceiver, and a Bluetooth transceiver.

9. The mobile terminal as set forth in claim 1, further comprising a second transceiver capable of communicating with a wireless network.

10. The mobile terminal as set forth in claim 9, wherein the controller retrieves the multimedia data from a server via the second transceiver and the wireless network.

11. The mobile terminal as set forth in claim 9, wherein the controller compares the display parameter information associated with the remote display device to the display parameter information associated with the local display in order to determine which of the remote display device and the local display is better suited to a multimedia application executed by the mobile terminal.

12. The mobile terminal as set forth in claim 11, wherein the controller is capable of communicating with a remote user input device via the first transceiver.

13. The mobile terminal as set forth in claim 12, wherein the remote user input device comprises a wireless keyboard.

14. The mobile terminal as set forth in claim 12, wherein the controller is capable of prompting an operator of the mobile terminal for permission to transmit the multimedia data to the remote display device via the first transceiver.

15. The mobile terminal as set forth in claim 9, wherein the first transceiver comprises a personal area network transceiver.

16. The mobile terminal as set forth in claim 15, wherein the personal area network transceiver comprises one of: an IEEE-802.15.3x transceiver, an MB-OFDM transceiver, a UWB transceiver, a wireless USB transceiver, an IEEE-802.11x transceiver, and a Bluetooth transceiver.

17. The mobile terminal as set forth in claim 9, wherein the second transceiver comprises one of an IS-2000 transceiver, a 1xEV-DO transceiver, a 1xEV-DV transceiver, a GSM/GPRS/EDGE transceiver, a 3GPP UTRAN transceiver, an HSDPA/HSUPA transceiver, a 3GPP EUTRAN transceiver, a TD-CDMA transceiver, a WiBro transceiver, a WiMAX transceiver, an IEEE-802.16x transceiver, an IEEE-802.20 transceiver, and an IEEE-802.11x transceiver.

18. A method of operating a remote terminal comprising the steps of:

transmitting multimedia data to a local display of the remote terminal;

detecting the presence of a remote display device;

establishing a wireless communication link with the remote display device;

comparing display parameter information associated with the remote display device to display parameter information associated with the local display; and

in response to the comparison, transmitting the multimedia data to the remote display device.

19. The method as set forth in claim 18, further comprising the step of prompting an operator of the mobile terminal for permission to transmit the multimedia data to the remote display device.

20. The method as set forth in claim 18, further comprising the step of retrieving the multimedia data from one of: 1) a memory associated with the mobile terminal; and 2) a wireless network with which the mobile terminal is capable of communicating.

21. A mobile terminal comprising a local display capable of displaying multimedia data, wherein the mobile terminal is capable of receiving multimedia via a first wireless interface and transmitting the received multimedia to an external display via a second wireless interface.

22. The mobile terminal as set forth in claim 21, wherein the mobile terminal is further capable of determining if the quality of the external display is superior to the quality of the local display.

23. The mobile terminal as set forth in claim 22, wherein the mobile terminal transmits the received multimedia to the external display via the second wireless interface in response to a determination that the quality of the external display is superior to the quality of the local display.

24. The mobile terminal as set forth in claim 23, wherein the second wireless interface comprises one of: an IEEE-802.15.3x interface, an MB-OFDM interface, a UWB interface, a wireless USB interface, an IEEE-802.11x interface, and a Bluetooth interface.

25. The mobile terminal as set forth in claim 24, wherein the first wireless interface comprises one of: an IS-2000 interface, a 1xEV-DO interface, a 1xEV-DV interface, a GSM/GPRS/EDGE interface, a 3GPP UTRAN interface, an HSDPA/HSUPA interface, a 3GPP EUTRAN interface, a TD-CDMA interface, a WiBro interface, a WiMAX interface, an IEEE-802.16x interface, an IEEE-802.20 interface, and an IEEE-802.11x interface.

* * * * *

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(54) METHOD AND DEVICE FOR CONTROLLING RADIO ACCESS

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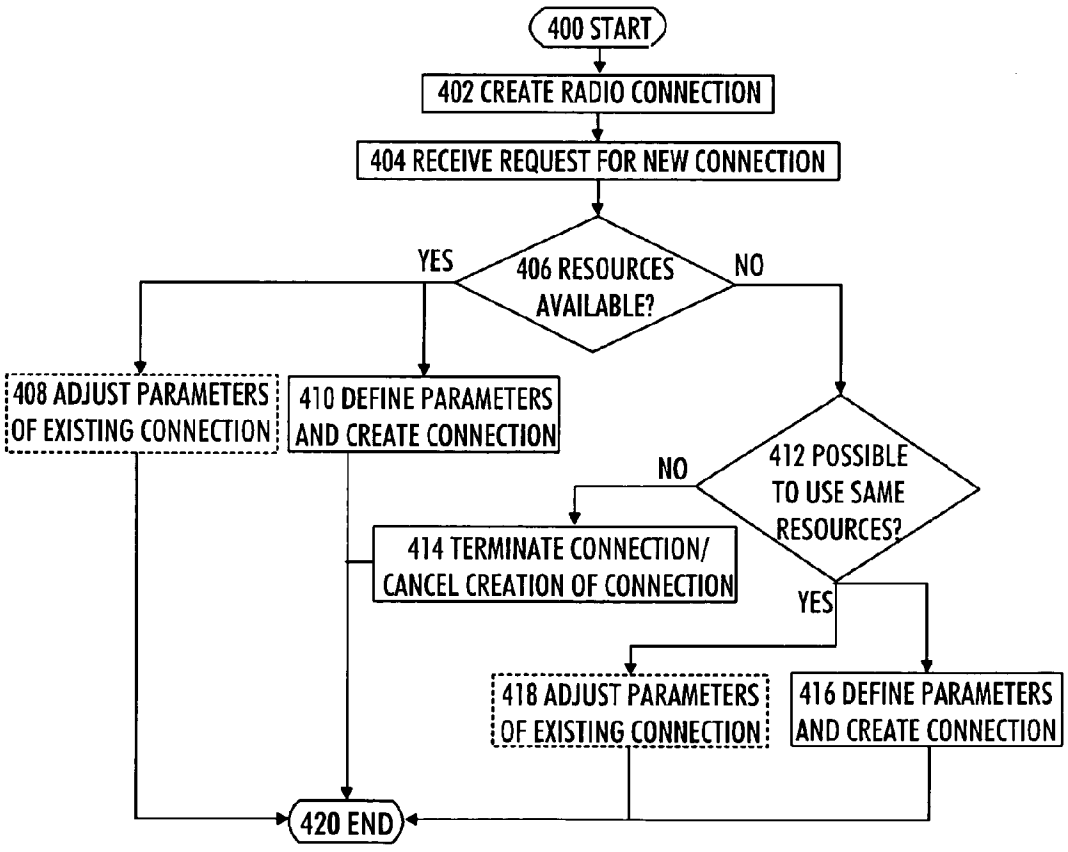
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(57) **ABSTRACT**

A method for controlling a number of simultaneous radio connections in a communication device is presented. The control of a number of simultaneous radio connections is carried out in the communication device. Parameters of the radio connections are controlled such that interference between the radio connections is minimized.



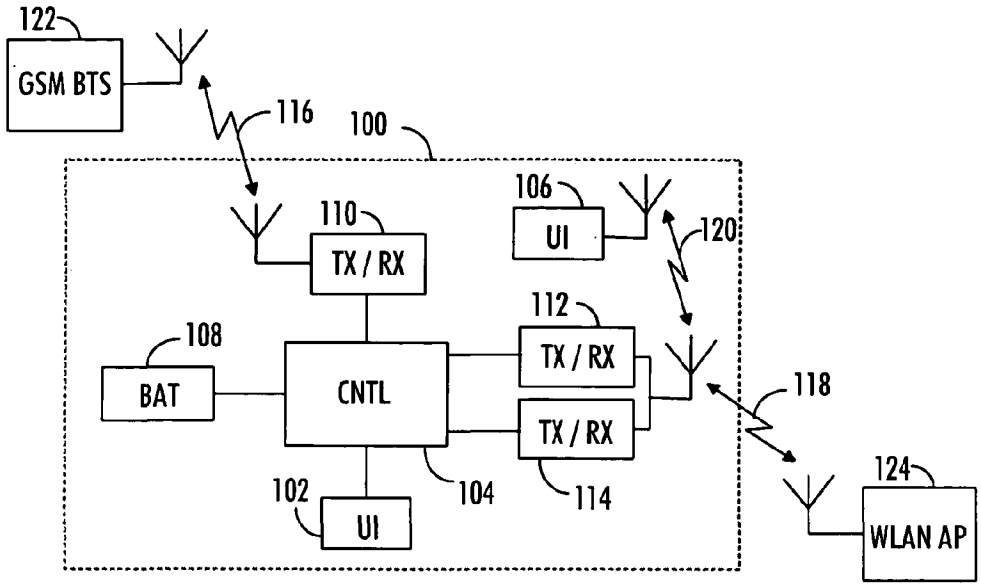

122
GSM BTS
116
100
106
UI
120
110
TX / RX
112
108
BAT
CNTL
TX / RX
118
TX / RX
124
102
UI
104
114
WLAN AP

Fig. 1

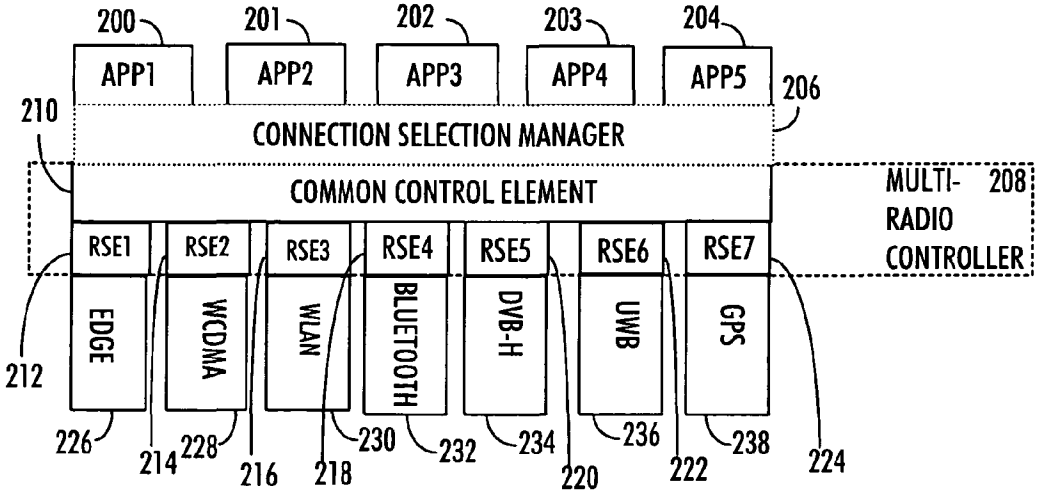

200
201
202
203
204
APP1
APP2
APP3
APP4
APP5
206
210
CONNECTION SELECTION MANAGER
COMMON CONTROL ELEMENT
MULTI-RADIO CONTROLLER
208
RSE1
RSE2
RSE3
RSE4
RSE5
RSE6
RSE7
EDGE
WCDMA
WLAN
BLUETOOTH
DVB-H
UWB
GPS
212
226
214
228
216
218
230
232
234
220
236
222
238
224

Fig. 2

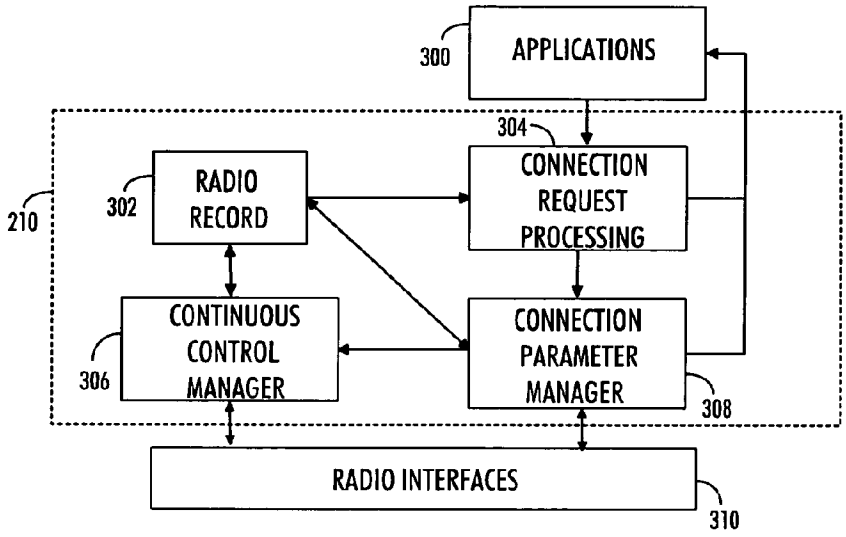

300
APPLICATIONS
304
CONNECTION REQUEST PROCESSING
210
302
RADIO RECORD
306
CONTINUOUS CONTROL MANAGER
CONNECTION PARAMETER MANAGER
308
RADIO INTERFACES
310

Fig. 3

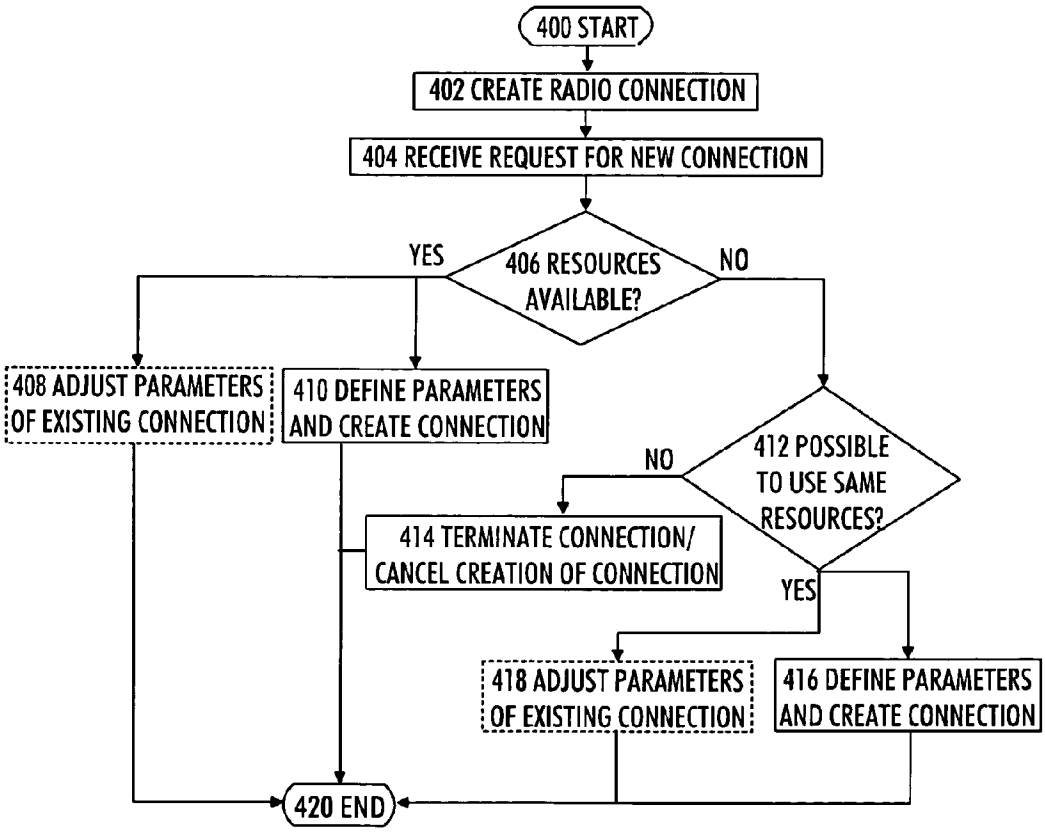

400 START
402 CREATE RADIO CONNECTION
404 RECEIVE REQUEST FOR NEW CONNECTION
406 RESOURCES AVAILABLE?
YES
NO
408 ADJUST PARAMETERS OF EXISTING CONNECTION
410 DEFINE PARAMETERS AND CREATE CONNECTION
412 POSSIBLE TO USE SAME RESOURCES?
NO
414 TERMINATE CONNECTION/ CANCEL CREATION OF CONNECTION
YES
418 ADJUST PARAMETERS OF EXISTING CONNECTION
416 DEFINE PARAMETERS AND CREATE CONNECTION
420 END

Fig. 4

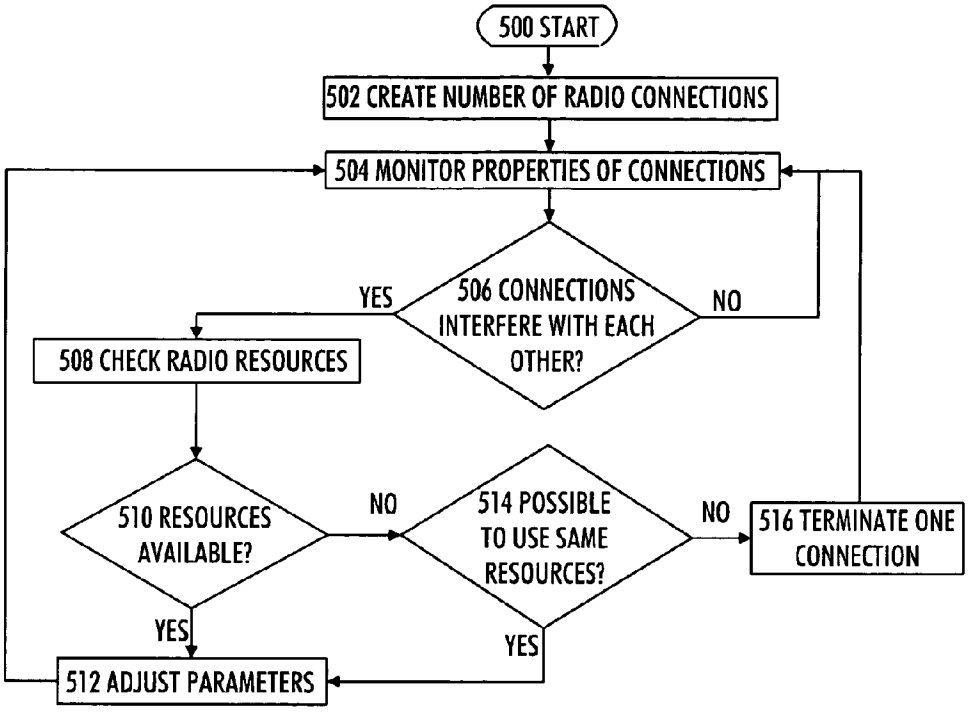

500 START
502 CREATE NUMBER OF RADIO CONNECTIONS
504 MONITOR PROPERTIES OF CONNECTIONS
506 CONNECTIONS INTERFERE WITH EACH OTHER?
YES
NO
508 CHECK RADIO RESOURCES
510 RESOURCES AVAILABLE?
NO
514 POSSIBLE TO USE SAME RESOURCES?
NO
516 TERMINATE ONE CONNECTION
YES
YES
512 ADJUST PARAMETERS

Fig. 5

METHOD AND DEVICE FOR CONTROLLING RADIO ACCESS

[0001] The invention relates to controlling a number of simultaneous radio connections in a communication device.

BACKGROUND

[0002] The number of different radios in mobile communication devices is steadily increasing to facilitate more flexible connectivity and a broader range of services. Cellular access alone is no longer sufficient, but new wireless technologies are integrated to communication devices now and especially in the future to enable novel connectivity solutions. Integration of multiple radios into a single terminal, however, introduces a serious integration challenge that is becoming more pronounced as the number of radios increases. One element of the integration challenge is the appropriate handling of simultaneous operation of radios. It is quite evident that users are willing to use different radios at the same time, like using a headset employing wireless Bluetooth® technology during a GSM phone call, and using a wireless local area network (WLAN) connection for Internet surfing, for example.

[0003] If there are two or more operational radio connections from one communication device, the connections may very well interfere with one another. Even if the connections are not operating on the same frequency band, they may still interfere with each other due to the non-idealities in the components of the communication device. The components may introduce spectral leakage, and the selectivity of receivers may not be ideal, meaning that they may also receive signal components belonging to a signal other than the desired one.

[0004] If there is a number of connections simultaneously operating on the same band, interference they cause to one another is much more severe than if they were operating on separate bands. Especially on the 2.4 GHz unlicensed Industrial, Scientific and Medical (ISM) band there may be several connections, for example Bluetooth® and wireless local area network (WLAN) connections, operating on the same band simultaneously. These connections cause intersystem interference to one another, which may result in a degraded quality of service. If there are two active connections on the same band operating from the same communication device, these two connections may very well interfere with each other severely, or the connections may even block each other's usage totally. This may happen because both of the connections operate from the same communication device, and thus the radio transceivers may be located within a few centimeters from each other. They may also be using the same radio components, like an antenna, for instance.

BRIEF DESCRIPTION OF THE INVENTION

[0005] An object of the invention is to provide a solution for controlling a number of simultaneous radio connections in a communication device.

[0006] According to an aspect of the invention, there is provided a method for creating a new radio connection in a communication device with at least one existing radio connection. The method comprises determining whether or not an existing radio connection and a new radio connection interfere with one another and creating the new radio connection with parameters that minimize interference between the existing radio connection and the new radio connection if the existing radio connection and the new radio connection interfere with one another.

[0007] According to another aspect of the invention, there is provided a method for controlling a number of simultaneously operating radio connections in a communication device. The method comprises monitoring properties of the radio connections in order to detect interference between at least two radio connections and adjusting parameters of at least one radio connection so that interference between the radio connections is minimized if interference between the at least two radio connections is detected.

[0008] According to another aspect of the invention, there is provided a communication device comprising at least one communication interface to provide at least one radio connection and a control unit which is configured to create at least one radio connection, process a request to create a new radio connection, determine whether or not an existing radio connection and the new radio connection interfere with one another and create the new radio connection with parameters that minimize interference between an existing radio connection and the new radio connection if the existing radio connection and the new radio connection interfere with one another.

[0009] According to another aspect of the invention, there is provided a communication device comprising at least one communication interface to provide a radio connection and a control unit configured to monitor properties of the radio connections in order to detect interference between at least two radio connections and adjust parameters of at least one radio connection so that the interference between the radio connections is minimized, if interference between the at least two radio connections is detected.

[0010] According to yet another aspect of the invention, there is provided a computer program product embodied on a computer readable medium, the computer program product encoding a computer program of instructions for executing a computer process for creating a new radio connection in a communication device with at least one existing radio connection. The process comprises determining whether or not the existing radio connection and the new radio connection interfere with one another and creating the new radio connection with parameters that minimize interference between the existing radio connection and the new radio connection if the existing radio connection and the new radio connection interfere with one another.

[0011] According to yet another aspect of the invention, there is provided a computer program distribution medium readable by a computer and encoding a computer program of instructions for executing a computer process for creating a new radio connection in a communication device with at least one existing radio connection. The process comprises determining whether or not the existing radio connection and the new radio connection interfere with one another and creating the new radio connection with parameters that minimize interference between the existing radio connection and the new radio connection if the existing radio connection and the new radio connection interfere with one another.

[0012] According to yet another aspect of the invention, there is provided a computer program product embodied on

a computer readable medium, the computer program product encoding a computer program of instructions for executing a computer process for controlling a number of simultaneously operating radio connections in a communication device. The process comprises monitoring properties of the radio connections in order to detect interference between at least two radio connections and adjusting parameters of at least one radio connection so that the interference between the radio connections is minimized if interference between the at least two radio connections is detected.

[0013] According to yet another aspect of the invention, there is provided a computer program distribution medium readable by a computer and encoding a computer program of instructions for executing a computer process for controlling a number of simultaneously operating radio connections in a communication device. The process comprises monitoring properties of the radio connections in order to detect interference between at least two radio connections and adjusting parameters of at least one radio connection so that the interference between the radio connections is minimized if interference between the at least two radio connections is detected.

[0014] The invention provides several advantages. The invention enables simultaneous operation of several radio connections from one communication device, even though the connections used the same radio resources, such as a frequency band. The invention is also able to control different radio connections regardless of the radio access technologies.

LIST OF DRAWINGS

[0015] In the following, the invention will be described in greater detail with reference to the embodiments and the accompanying drawings, in which

[0016] **FIG. 1** shows a block diagram of a communication device employing a number of radio connections,

[0017] **FIG. 2** illustrates an example of an architecture of a communication device,

[0018] **FIG. 3** illustrates an example of a structure of a multiradio controller,

[0019] **FIG. 4** is a flow diagram illustrating a process of creating a new connection in a communication device while operational connections exist, and

[0020] **FIG. 5** is a flow diagram illustrating a process of controlling a number of simultaneous connections in a communication device.

DESCRIPTION OF EMBODIMENTS

[0021] Next, a structure of a communication device employing a number of simultaneous radio connections will be described with reference to **FIG. 1**. The communication device **100** may be for example a personal communication device such as a mobile communication device, a computer, a laptop, or a PDA (Personal Digital Assistant). The communication device **100** may also be a combination of two electronic devices, such as a computer with a mobile communication device connected to the computer. An example of a combination of a PDA and a mobile communication device is the Nokia Communicator®.

[0022] The communication device **100** comprises a number of communication interfaces **110** to **114** to provide a wireless radio connection. The communication interfaces **110** to **114** may be configured to provide connections employing different radio access technologies. In our example, the communication interface **110** provides a communication link **116** with a GSM (Global System for Mobile Communications)-system through a serving GSM base transceiver station **122**. The communication interface **114** provides a WLAN (Wireless Local Area Network) connection **118** with a serving WLAN access point **124**.

[0023] A communication interface **112** provides another wireless connection **120**, using Bluetooth®-technology, with a user interface component **106**. The user interface component **106** may be for example a headset of a mobile telephone, comprising a microphone, a loudspeaker, and a communication interface for a Bluetooth® connection with the mobile telephone. The user interface component **106** may also be a keyboard or a mouse operating with a computer through a Bluetooth® link.

[0024] The communication interfaces **110** to **114** described above may be using partially the same components of the communication device **100** during the operation of radio connections **116** to **120**. The communication interfaces **110** to **114** may be using for example the same antenna or antennas, radio frequency amplifier, and/or radio frequency filter. Each communication interface **110** to **114** may naturally have its own components or only some of the communication interfaces **110** to **114** may be using the same components.

[0025] In the example of **FIG. 1** three communication interfaces **110** to **114** are provided in the communication device, these interfaces **110** to **114** providing the Bluetooth® connection **122**, the GSM connection **116**, and the WLAN connection **118**, respectively. It should, however, be appreciated that the communication device according to the invention is limited neither to the number of communication interfaces in the communication device nor to the wireless communication technology the communication interfaces provide. Thus, the communication device may comprise several communication interfaces providing connections based on, for example, the following technologies: GSM, WLAN, Bluetooth®, WCDMA (Wideband Code Division Multiple Access), GPRS (General Packet Radio Service), EDGE (Enhanced Data Rates for GSM Evolution), DVB-H (Digital Video Broadcasting for Handheld devices), UWB (Ultra Wideband), GPS (Global Positioning System), CDMA2000. Other wireless communication technologies are also possible to be implemented in the communication device according to the invention.

[0026] The communication device **100** further comprises a control unit **104** to control functions of the device **100**. The control unit **104** comprises means for creating radio connections between the communication device **100** and other communication devices or networks. The control unit **104** also comprises means for controlling a number of simultaneous radio connections in the communication device **100**. The control unit **104** may be implemented with a digital signal processor with suitable software or with separate logic circuits, for example with ASIC (Application Specific Integrated Circuit). The control unit **104** may also be a combination of these two implementations, such as a processor with suitable software embedded within an ASIC.

[0027] The communication device **100** further comprises a user interface **102** connected to the controlling unit. The user interface **102** may comprise a keyboard, a microphone, a loudspeaker, a display, and/or a camera.

[0028] The communication device **100** usually comprises a voltage source **108** to provide current for the operation of the device **100**. The voltage source may be for example a rechargeable battery.

[0029] **FIG. 2** illustrates an example of an architecture of the communication device **100**. The architecture is depicted in a layered form, like an OSI (Open Systems Interconnection) model of ISO (International Organization for Standardization), with lower layers providing services to higher layers.

[0030] On the highest layer are provided applications **200** to **204** that may need a radio connection. The application **200** to **204** may be for example an application handling a voice call, a web or WAP (Wireless Application Protocol) browser, an e-mail client, a GPS navigation application, a gaming application, or a media player application. The communication device **100** may also comprise other applications. Whenever an application **200** to **204** needs a radio connection to another communication device or network, the application sends a request to a lower layer to establish the connection. During the operation of the connection, the application sends data related to the application to lower layers for transmission over the connection to the other communication device. Similarly, the application receives data related to the application from the other communication device via the connection through the lower layers. When a need no longer exists to maintain the connection, the application sends a request to a lower layer to terminate the connection.

[0031] On the lower layer, services may be provided to the applications **200** to **204** by a connection selection manager **206**. The connection selection manager **206** may select an appropriate connection for an application based on a set of connection profiles stored in its database. A user or an operator, for example, may define the connection profiles, and the profiles may be based on optimization of some criterion, for example throughput, bit error rate or cost-efficiency of the connection. The connection selection manager **206** is an optional layer in the architecture of the communication device **100**, since the applications **200** to **204** may be designed to define the suitable connections by themselves.

[0032] The next lower layer is a multiradio controller **208**. The multiradio controller **208** establishes, controls, and terminates radio connections according to the connection requirements from the higher layers. The multiradio controller **208** is also responsible for taking care of the simultaneous operation of multiple radio connections.

[0033] The multiradio controller **208** may be a two-fold entity. First of all, there is a common control element **210**, which communicates with the higher layers. It receives requests for creating and terminating a radio connection from the applications **200** to **204** or, if applied, the connection selection manager **206**. The common control element **210** may also check the availability of the radio connection requested from a higher layer, and either start a process for creating a radio connection or inform higher layers that the requested radio connection is not currently available. The common control element **210** is also responsible for controlling the simultaneous operation of multiple radio connections by adjusting the parameters of an existing connection whenever a new radio connection which would interfere with an existing radio connection is created, or whenever the common control element **210** detects a sufficient change in the properties of an existing connection.

[0034] The multiradio controller **208** also comprises radio-specific entities **212** to **224**. Each radio-specific entity can be seen as an interface between the common control element **210** of the multiradio controller **208** and the specific radio interface. A radio-specific entity takes care of controlling one radio connection according to the parameters received from the common control element **210**. A radio-specific entity is close to the physical layer of the connection, which enables rapid adaptation to the changing environment and fast control of the connection. The functionality of each radio-specific entity is radio-system-specific, which means that the parameters from the common control element **210** are applied to the standard specifications of the radio system. A radio-specific entity may also supply the common control element **210** with the measured properties of the connection it controls. The measured properties of the connection may comprise the bit error rate (BER), block error rate, or the frame error rate (FER) of the connection. The measured properties may also comprise received energy per chip divided by the noise power density in the band (Ec/No), interference signal code power (ISCP), received signal code power (RSCP), received signal strength indicator (RSSI), signal-to-interference-power ratio (SIR).

[0035] In an embodiment of the multiradio controller radio-specific entities are not included in the multiradio controller. Instead, the multiradio controller may have an interface to an external entity providing the interface to each radio.

[0036] Below the radio-specific entities **212** to **224** in **FIG. 2** are provided the communication interfaces **226** to **238**. Each communication interface takes care of encoding and decoding data into suitable electrical waveforms for transmission and reception on the specific physical media used. This process is carried out according to each radio-access-specific standard. The architecture of **FIG. 2** employs physical layers of EDGE, WCDMA, WLAN, Bluetooth®, DVB-H, UWB and GPS radio access technologies, but the operation of the multiradio controller is not limited to these technologies as it can be configured to control also other wireless radio access technologies.

[0037] Next, the operation of the multiradio controller **208** in the communication device will be described in more detail with reference to **FIG. 3** comprising the structure of the common control element **210** of the multiradio controller **208**. In addition to the common control element **210**, **FIG. 3** comprises applications **300** and radio interfaces **310** to clarify the operation of the common control element **210**.

[0038] A block **300** comprises applications, which may need a radio connection. The operation of the applications **300** is the same as described above. The block **300** may also comprise a connection selection manager, if a connection selection manager is applied in the communication device.

[0039] A connection request processing block **304** processes requests for a radio connection coming from an

application or from the connection selection manager. The connection request processing block **304** checks at least the validity of a request and the availability of radio resources related to the request. Checking the validity of a request comprises checking, whether or not the requested radio connection is available in the communication device. Checking the availability of the radio resources comprises checking which and how many radio connections are in operation, and whether it is possible to establish another radio connection without deteriorating or even collapsing the operation of an existing connection. If the requested connection is available and if it is possible to establish it, the connection request processing block **304** sends a command message to create the connection to a connection parameter manager **308**. If the creation of the connection is not possible, the connection request processing block **304** informs the application, or the connection selection manager, that requested the connection that the requested connection is not currently available.

[**0040**] A radio record block **302** comprises information on the status, parameters and properties of the radio connections applied to the communication device. The status of a connection describes whether the connection is in operation, available, or disabled. When a connection is in operation, a communication link has been established using the communication interface related to that specific connection, and data is being transported through that link. When a connection is available, no communication link related to that specific connection has been established but radio resources are available for the establishment of the connection. When a connection is disabled, the connection is not available due to lack of radio resources, for example. There may also be two descriptions for the status of a radio connection. For example, if it is possible to establish a number of connections using a single communication interface, the status of the connection in the radio record block **302** may be both 'in operation' and 'available'.

[**0041**] The parameters of the connections that are held in the radio record block **302** may comprise the center frequency of the connection as well as a spreading code, channel code, modulation technique, power level, timing parameters, data rate, packet type, link type, automatic repeat request (ARQ) scheme etc. The properties of the connections that are held in the radio record block **302** may comprise the BER or FER of the connection as well as other measured or detected properties of the connection.

[**0042**] The radio record block **302** may also comprise information on all possible parameters specific to each radio access technology employed in the communication device and not just the ones that are currently being used. This information may comprise all the possible frequency bands, modulation and coding schemes, waveforms, etc. of each radio access technology. The radio record block **302** may also comprise information on the measured or detected non-idealities of the connections, such as spectral leakage or spurious emissions of radio signals. This information may then be used when controlling a number of simultaneously operating radio connections.

[**0043**] The radio record block **302** provides information on the status, parameters, and properties of the connections to the connection request processing block **304**, to the connection parameter manager **308**, and to the continuous control manager **306**. The radio record block **302** receives updates to the status, parameters, and properties from the connection parameter manager and from the continuous control manager. The radio record block **302** is included in the common control element **210** of **FIG. 2**.

[**0044**] A connection parameter manager **308** determines the operational parameters of each connection. When receiving a command from the connection request processing block **304** to create a new connection, the connection parameter manager **308** checks which connections are operational, and the parameters of the operational connections. If the connection parameter manager **308** detects that there is an active connection which might interfere with the operation of the new connection (or vice versa), the connection parameter manager **308** defines the parameters of the new connection so that interference between the two connections is as minimal as possible.

[**0045**] The detection of possible interference between connections is based on the information on the used radio resources, available radio resources, and on the parameters of existing connections. This information is contained in the radio record block **302**. The connection parameter manager **308** may first check, whether or not an existing, operational connection exists that uses the same radio resources as the newly requested connection would use. These radio resources comprise a frequency band, time domain, and space domain. The space domain is a possible radio resource in communication devices which comprise multiple antennas and an ability to control the direction of a radio beam from the antenna or antenna array. It is possible that two simultaneous radio connections are operating on the same frequency band and transmitting/receiving data at the same time, only in/from different directions.

[**0046**] If no radio connections using the same radio resources exist, the creation of a new connection is simple, since the connection parameter manager **308** does not have to arrange several connections to share the same radio resources. The connection parameter manager **308** simply defines the parameters for the connection and sends a command to the corresponding radio-specific entity to create the connection.

[**0047**] If an operational radio connection exists that uses the same radio resource(s) as the requested new connection, the connection parameter manager **308** may define the parameters for the new connection so that interference between the two connections is minimized. The connection parameter manager **308** may also adjust the parameters of the existing connection in order to minimize the interference between the two connections using the same radio resource(s).

[**0048**] Next, a number of examples of defining/adjusting the parameters of a radio connection in creation and/or the existing radio connection(s) will be described. The radio connection in creation may employ different radio access technology than an existing radio connection or radio connections use. Equivalently, the radio connection in creation may employ the same radio access technology than an existing radio connection or radio connections use. It should be appreciated that the operation of the connection parameter manager **308** and the multiradio controller **208** is not limited to the examples described below, but other procedures for defining/adjusting the parameters of the radio connections are also possible.

[0049] When creating a new radio connection, the connection parameter manager **308** may first check, whether existing connections exist that use the same frequency band as the requested new connection in creation would use. If an existing connection on the same frequency band exists, the connection manager may (if possible) define the frequency parameters of the connection in creation so that the frequency bands of two connections do not overlap. For example, a Bluetooth® connection and a WLAN connection operate partially on the same 2.4 Gigahertz ISM-band. Let us assume that the connection in creation is a Bluetooth® connection, and a WLAN connection in operation exists. The Bluetooth® connection is a frequency hopping spread spectrum connection. Thus, the connection parameter manager **308** may prevent the Bluetooth® connection from hopping to the frequencies the WLAN connection is using. The limitation of frequency hops of the Bluetooth® connection is naturally possible also when a Bluetooth® connection exists and the connection in creation is a WLAN connection. The frequency overlapping is naturally also possible between connections other than just Bluetooth® and WLAN ones, and the frequency parameters of these other connections may be adjusted accordingly.

[0050] In some cases the frequency bands of two connections may overlap too much to enable the connections to be enabled to operate on the same frequency band. If the connection parameter manager **308** detects that a new connection cannot be created without using the same band as that used by an existing connection, the connection parameter manager **308** may next check whether it is possible to schedule the two connections so that the connection will not be transporting data at the same time. If applicable, the scheduling of two connections may be carried out by the multiradio controller **208** in the communication device. In many communication systems, however, very strictly defined time slots exist for data transport allocated for a connection. In such a case the connection parameter manager **308** may delay the establishment of a new connection so that the time slots allocated for the connections using the same band do not overlap.

[0051] It is also possible in some communication systems for the communication device to control the transmission or reception timing, either directly or indirectly. For example, in a GPS system a GPS receiver may decide the timing of reception. In packet switched systems, a receiver may choose not to receive packet switched data when another connection is using the same radio resource. If the receiver misses the reception of a transmitted data packet during that time, the transmitter does not receive a 'packet received' indication from the receiver, and retransmits the packet. This is a standard feature in most packet switched systems.

[0052] Space as a radio resource can be divided between connections in the same way as the frequency band and time described above. If a connection exists that uses the same frequency band, and/or the allocated time slots are all in use, but there is no connection transporting data to the same direction as in which the connection in creation would be transporting, the new connection may be established to transport data on the same frequency band in the same time slots, only in a different direction. This, however, requires an ability to control the direction of the connections from the communication device. The communication device should also comprise multiple directional antennas or an antenna array.

[0053] In some cases no alternative exists for two connections (an existing connection and the connection in creation) but to use at least partly but even totally the same radio resources. In this case, the connection parameter manager **308** may determine, whether the new connection may be allocated with at least partly the same radio resources as the existing connection with a tolerable level of interference between the new connection and the existing connection. The tolerable level of interference between the connections may be such interference level that the connections do not block each other even though the effective data rate of the connections would be reduced. The connection parameter manager **308** may check the radio record **302** for knowledge of which radio connections may share at least partly the same radio resources and check the parameters of the connections for such case. The two connections then interfere with one another and, in the worst case, may block each other's operation totally. In such a case, other parameters of the connections could be adjusted so that the connections would tolerate as much interference as possible. Such parameters include modulation, coding (spreading code and/or channel code), interleaving, transmission power, and data rate. Other parameters of the connection may also be adjusted. An existing radio connection may even be put on a standby state or even terminated in order to create a new connection if the new connection has a higher priority than the existing connection, and it is not possible for the two connections to operate simultaneously. An alternative is that the creation of the new connection is terminated. In such a case, the connection parameter manager **308** informs the application/connection manager which requested the creation of the connection that the requested connection is currently unavailable.

[0054] After the connection parameter manager **308** has decided the proper parameters for the connection in creation, and possibly the adjustable parameters for an existing connection, it sends command messages to respective radio-specific entities to create a connection with the defined parameters, or to adjust the parameters of an existing connection. It updates the status and stores the parameters of the new connection in the radio record **302**. The connection parameter manager **308** also sends the parameter of the new connection as well as a command to the continuous control manager **306** to start the monitoring and control of the new connection. Functions of the continuous control manager **306** will be described below.

[0055] Above, the functionality of the connection parameter manager **308** was described in the scenario where one connection is in creation and parameters of one existing connection are checked and possibly adjusted. The procedure is similar in a case where several connections exist, whose parameters need to be checked and/or adjusted in order to create a new connection. The operation of the connection parameter manager **308** is not restricted to the number of existing connections.

[0056] The continuous control manager **306** monitors the properties of operational radio connections, and adjusts their parameters according to the performance of the connections or to the information on the connections. The function of the

continuous control manager **306** is to rapidly adapt the operating radio connections to the possibly changing radio environment. When a new connection is created, the continuous control manager **306** receives the parameters related to the connection and a command to start the monitoring and control of the new connection from the connection parameter manager **308**. The continuous control manager **306** then starts monitoring the properties of the connection. The properties of the connection may be measured in the communication device or by the serving network system and delivered to the continuous control manager **306** through the corresponding radio-specific entity.

[**0057**] The continuous control manager **306** may monitor for example performance measures of operational connections. Such performance measures may be BER or FER. If the continuous control manager **306** detects too poor performance measures related to a connection, it may check whether the poor performance is associated with the use of a certain radio resource. For example when related to a Bluetooth® connection, a momentarily high bit error rate may be associated with a certain frequency hop. This may occur when an operational WLAN connection exists partially on the same band as a Bluetooth® connection, and the frequency hops to the band where WLAN is operating may produce poorer performance. If the poor performance is related to a use of a certain radio resource (or a portion of the radio resource), the continuous control manager **306** may adjust the parameters of a connection or connections so that the radio resource is not used by several connections. For instance, the parameters of a Bluetooth® connection may be adjusted so that the frequency hopping of the connection is limited to a narrower band, where no other operating connection exists. Controlling the use of time (or space) domain radio resources is carried out in a similar way, of course taking into account restrictions given by for example the radio systems (such as the time slots allocated for each connection in a GSM system).

[**0058**] If no alternative exists but to use the same radio resources for two (or more) connections, the continuous control manager **306** may adjust the parameters of one or more connections whose performance is too poor. The adjusted parameters may comprise a spreading code, channel code, modulation technique, power level, and/or timing parameters. If the performance of a connection or connections is still unsatisfactory, the continuous control manager **306** may temporarily shut down a connection or even terminate either the connection performing poorly or the connection interfering with the poorly performing connection.

[**0059**] The continuous control manager **306** may also have a pre-information on the possible combinations of connections, which may interfere with one another. For example, if the continuous control manager detects a poor performance in a Bluetooth® connection, it may automatically check, whether an operational WLAN connection (or vice versa) exists, because it has information that these connections may interfere with one another. If the continuous control manager **306** detects an operational WLAN connection, it may adjust the parameters of one or both connections. The continuous control manager **306** may take care of scheduling the transmission of packets, and changing parameters of packets to be transmitted. Possible parameters that may be changed comprise packet length, amount of data in the packet, modulation scheme, channel coding scheme, transmission frequency/rate of packets, and/or format of the packet (preamble, header, payload, etc.). The continuous control manager **306** may predict possible collisions of data packets of a number of connections and adapt the scheduling accordingly. Thus, the continuous control manager **306** may have information on the possible coincidences between connections, and also a defined set of rules as to how to rapidly adapt to these situations.

[**0060**] **FIG. 4** illustrates a method for creating a radio connection in a communication device, and arranging simultaneous operation of several radio connections. The process starts in **400** with no operational connections in the communication device. In **402** a first radio connection is created according to a prior art procedure. A request to create a new radio connection is received in **404**. The request may come from an application in the communication device or from an external instance, for example from a radio network.

[**0061**] Available radio resources are checked in **406**. This comprises checking the radio resources specified for the connection in creation. Available radio resources mean that there is at least a portion of one radio resource (frequency band, time slots, space) available. Although the frequency band the new connection is specified to use were in use, it may be possible to arrange the two (or more) connections to operate so that they do not transport data at the same time (or in the same direction).

[**0062**] If radio resources are available so that a new connection can be created without using the same radio resources as used for an existing connection, the process proceeds to **408** (optional) and **410**. **408** is carried out, if the parameters of an existing radio connection have to be adjusted in order to create a new connection without the connections interfering with each other. A new connection with parameters that do not interfere with another connection is created in **410**.

[**0063**] If no radio resources are available in **406**, the process moves to **412**, where it is checked whether or not it is possible to create another connection using at least partially all the same radio resources as used for an existing connection or connections. This means that at least two connections would be operating at least partially at the same frequency, transporting data at least partially at the same time and at least partially in the same direction.

[**0064**] If it is impossible to create another connection (even with adjusting the parameters of existing connection or connections) without blocking the usage of another radio connection, the process moves to **414**, where one radio connection is either put on a standby state or even terminated. The radio connection put on a standby state or terminated may be an existing connection, but also the creation procedure of the new radio connection may be cancelled.

[**0065**] If it is possible in **412** to create another connection using the same radio resources as used for an existing connection or connections, the process proceeds to **416** and **418** (optional). The new connection with parameters that allow the connection to sustain interference to some degree is created in **416**. The parameters of an existing connection or connections are adjusted accordingly, when necessary.

[0066] The process ends in **420**.

[0067] **FIG. 5** illustrates a procedure for controlling a number of simultaneous radio connections in a communication device.

[0068] The process starts in **500**. A number of radio connections is created according to the procedure of **FIG. 4** in **502**. Properties of the radio connections are monitored in **504**. The properties being monitored may comprise properties describing the performance of the connection, such as BER or FER. It is checked in **506** whether two connections interfere with each other. Detection of two connections interfering with each other may be based on sudden degradation in performance of at least one connection combined to the information that there is another connection or connections using the same radio resources.

[0069] If two connections do not interfere with each other in **506**, the process returns to **504** and continues the monitoring of the properties of the connections. If two connections are detected to interfere with each other in **506**, the process moves to **508**, where the radio resources are checked. This comprises checking the radio resources of both connections that interfere with each other. If there are radio resources available so that the two connections can operate without interfering with each other, the process moves from **510** to **512**, where the parameters of at least one connection are adjusted so that the two connections do not interfere with one another. Adjusting the parameters of one connection may suffice in some cases, but a need may exist to adjust the parameters of both connections interfering with each other. Parameters of another connection or other connections that were not involved in the interference in **506** may also need to be adjusted in some cases. This may be the case in situations where the adjustment of parameters of one connection results in interference between the adjusted connection and another connection. A precaution would be to also adjust the parameters of that other connection at the same time so that interference between these two connections would be avoided.

[0070] The process returns from **512** to **504**, and the monitoring of the properties of the operational radio connections in the communication device is continued.

[0071] If no other option exists for the two connections but to use the same radio resources, the process moves from **510** to **514**, where it is checked whether or not it is possible for the two connections to operate using at least partially all the same radio resources. This means that at least two connections would be operating at least partially at the same frequency, transporting data at least partially at the same time and at least partially in the same direction.

[0072] If it is possible for the two connections to operate using the same radio resources in **514**, the process proceeds to **512**, where the parameters of one connection or both connections are adjusted so that they sustain interference to some degree, thus enabling the operation of two connections using the same radio resources. The process returns from **512** to **504**, and the monitoring of the properties of the operational radio connections in the communication device is continued.

[0073] If it is impossible for the two connections to operate using the same radio resources in **514**, the process moves to **516**, and one of the connections is either put on a standby state or even terminated. A decision about which connection is put on a standby state or terminated is based on some criterion, such as priority or performance of the connections. A connection with a lower priority or poorer performance is terminated. The process returns from **516** to **504**, and the monitoring of the properties of the operational radio connections in the communication device is continued.

[0074] The communication device **100** of the type described above may be used for implementing the methods, but also other types of communication devices may be suitable for the implementation. In an embodiment, a computer program product encodes a computer program of instructions for executing a computer process of the above-described method for creating a new radio connection in a communication device with at least one existing radio connection. In another embodiment, a computer program product encodes a computer program of instructions for controlling a number of simultaneously operating radio connections in a communication device. The computer program product may be implemented on a computer program distribution medium. The computer program distribution medium includes all manners known in the art for distributing software, such as a computer readable medium, a program storage medium, a record medium, a computer readable memory, a computer readable software distribution package, a computer readable signal, a computer readable telecommunication signal, and a computer readable compressed software package.

[0075] Even though the invention has been described above with reference to an example according to the accompanying drawings, it is clear that the invention is not restricted thereto but it can be modified in several ways within the scope of the appended claims.

1. A method for creating a new radio connection in a communication device with at least one existing radio connection, the method comprising:

determining whether or not the existing radio connection and the new radio connection interfere with one another; and

creating the new radio connection with parameters that minimize interference between the existing radio connection and the new radio connection if the existing radio connection and the new radio connection interfere with one another.

2. The method of claim 1, wherein the existing radio connection and the new radio connection employ at least two different radio access technologies.

3. The method of claim 1, further comprising:

defining the parameters of the new connection such that the new radio connection does not use the same radio resources as the existing radio connection.

4. The method of claim 3, wherein the parameters of the new connection are defined such that the new radio connection does not transmit or receive data at a same time as the existing radio connection.

5. The method of claim 3, wherein the parameters of the new connection are defined such that the new radio connection does not transmit or receive data at a same frequency band as the existing radio connection.

6. The method of claim 1, further comprising:

determining, whether the new connection may be allocated with at least partly the same radio resources as the existing connection with a tolerable level of interference between the new connection and the existing connection;

defining the parameters of the new connection such that the new radio connection uses at least partly the same radio resources as the existing radio connection, if it has been determined that the new connection and the existing connection may be allocated with at least partly the same radio resources.

7. The method of claim 1, wherein the existing radio connection and the new radio connection employ the same radio access technology.

8. The method of claim 1, further comprising:

adjusting the parameters of the existing radio connection in order to minimize interference between the new radio connection and the existing radio connection.

9. The method of claim 1, wherein the determining of whether or not the existing radio connection and the new radio connection interfere with one another is based on pre-information on properties of the existing radio connection and the new radio connection.

10. The method of claim 1, wherein the determining of whether or not the existing radio connection and the new radio connection interfere with one another is based on detected or measured properties of the existing radio connection.

11. A method for controlling a number of simultaneously operating radio connections in a communication device, the method comprising:

monitoring properties of the radio connections in order to detect interference between at least two radio connections; and

adjusting parameters of at least one radio connection of the at least two radio connections so that interference between the at least two radio connections is minimized if interference between the at least two radio connections is detected.

12. The method of claim 11, further comprising:

monitoring the properties describing a performance of the radio connections in order to detect interference between the at least two radio connections.

13. The method of claim 11, further comprising:

adjusting the parameters of the at least one radio connection such that the at least two radio connections do not use the same radio resources.

14. The method of claim 11, further comprising:

adjusting parameters of the at least one radio connection such that the at least two radio connections interfering with one another use at least partially the same radio resources, if not enough radio resources are available for the at least two radio connections interfering with one another.

15. The method of claim 14, further comprising:

adjusting the parameters of the radio connections that use at least partially the same radio resources in order for the radio connections to sustain interference.

16. The method of claim 11, further comprising:

terminating or putting on a stand-by state the at least one radio connection if the at least two radio connections interfering with one another cannot be arranged to operate simultaneously.

17. A communication device, comprising:

at least one communication interface to provide at least one radio connection; and

a control unit configured to

create the at least one radio connection as an existing radio connection,

process a request to create a new radio connection,

determine whether or not the existing radio connection and the new radio connection interfere with one another, and

create the new radio connection with parameters that minimize interference between the existing radio connection and the new radio connection if the existing radio connection and the new radio connection interfere with one another.

18. The communication device of claim 17, wherein the control unit is further configured to create radio connections which employ at least two different radio access technologies.

19. The communication device of claim 17, wherein the control unit is further configured to define the parameters of the new radio connection such that the new radio connection does not use the same radio resources as the existing radio connection.

20. The communication device of claim 19, wherein the control unit is further configured to define the parameters of the new radio connection such that the new radio connection is not transmitting or receiving data at a same time as the existing radio connection.

21. The communication device of claim 19, wherein the control unit is further configured to define the parameters of the new radio connection such that the new radio connection does not transmit or receive data at a same frequency band as the existing radio connection.

22. The communication device of claim 17, wherein the control unit is further configured to determine, whether the new connection may be allocated with at least partly the same radio resources as the existing connection with a tolerable level of interference between the new connection and the existing connection, and to define the parameters of the new connection such that the new radio connection uses at least partly the same radio resources as the existing radio connection, if it has been determined that the new connection and the existing connection may be allocated with at least partly the same radio resources.

23. The communication device of claim 17, wherein the control unit is further configured to create radio connections which employ the same radio access technology.

24. The communication device of claim 17, wherein the control unit is further configured to adjust the parameters of the existing radio connection in order to minimize interference between the new radio connection and the existing radio connection.

25. The communication device of claim 17, wherein the control unit is further configured to determine, whether or not the existing radio connection and the new radio connec-

tion interfere with one another, based on pre-information on properties of the existing radio connection and the new radio connection.

26. The communication device of claim 17, wherein the control unit is further configured to determine, whether or not the existing radio connection and the new radio connection interfere with one another, based on detected or measured properties of the existing radio connection.

27. A communication device, comprising:

communication interfaces to provide radio connections; and

a control unit configured to

monitor properties of the radio connections in order to detect interference between at least two radio connections, and

adjust parameters of at least one radio connection so that the interference between the at least two radio connections is minimized, if interference between the at least two radio connections is detected.

28. The communication device of claim 27, wherein the control unit is further configured to monitor properties describing a performance of the radio connections in order to detect interference between the at least two radio connections.

29. The communication device of claim 27, wherein the control unit is further configured to adjust the parameters of at least one radio connection of the at least two radio connections in a way that the at least two radio connections do not use the same radio resources.

30. The communication device of claim 27, wherein the control unit is further configured to adjust the parameters of at least one radio connection of the at least two radio connections such that the at least two radio connections interfering with one another use at least partially the same radio resources, if there are not enough radio resources available for the at least two radio connections interfering one another.

31. The communication device of claim 30, wherein the control unit is further configured to adjust the parameters of the at least two radio connections using at least partially the same radio resources in order for the at least two radio connections to sustain interference.

32. The communication device of claim 27, wherein the control unit is further configured to terminate or put on a stand-by state at least one radio connection of the at least two radio connections if the at least two radio connections interfering with one another cannot be arranged to operate simultaneously.

33. A communication device, comprising:

communication means to provide a radio connection;

means for creating the radio connection as an existing radio connection;

means for processing a request to create a new radio connection;

means for determining whether or not the existing radio connection and the new radio connection interfere with one another; and

means for creating the new radio connection with parameters that minimize interference between the existing radio connection and the new radio connection if the existing radio connection and the new radio connection interfere with one another.

34. A communication device, comprising:

communication means to provide radio connections;

means for monitoring properties of the radio connections in order to detect interference between at least two radio connections; and

means for adjusting parameters of at least one radio connection of the at least two radio connections so that the interference between the at least two radio connections is minimized if interference between the at least two radio connections is detected.

35. A computer program product embodied on a computer readable medium, the computer program product encoding a computer program of instructions for executing a computer process for creating a new radio connection in a communication device with at least one existing radio connection, the process comprising:

determining whether or not the existing radio connection and the new radio connection interfere with one another; and

creating the new radio connection with parameters that minimize interference between the existing radio connection and the new radio connection if the existing radio connection and the new radio connection interfere with one another.

36. A computer program distribution medium readable by a computer and encoding a computer program of instructions for executing a computer process for creating a new radio connection in a communication device with at least one existing radio connection, the process comprising:

determining whether or not the existing radio connection and the new radio connection interfere with one another; and

creating the new radio connection with parameters that minimize interference between the existing radio connection and the new radio connection if the existing radio connection and the new radio connection interfere with one another.

37. The computer program distribution medium of claim 36, the distribution medium comprising at least one of a computer readable medium, a program storage medium, a record medium, a computer readable memory, a computer readable software distribution package, a computer readable signal, a computer readable telecommunications signal, and a computer readable compressed software package.

38. A computer program product embodied on a computer readable medium, the computer program product encoding a computer program of instructions for executing a computer process for controlling a number of simultaneously operating radio connections in a communication device, the process comprising:

monitoring properties of the radio connections in order to detect interference between at least two radio connections; and

adjusting parameters of at least one radio connection of the at least two radio connections so that interference

between the at least two radio connections is minimized if interference between the at least two radio connections is detected.

39. A computer program distribution medium readable by a computer and encoding a computer program of instructions for executing a computer process for controlling a number of simultaneously operating radio connections in a communication device, the process comprising:

monitoring properties of the radio connections in order to detect interference between at least two radio connections; and

adjusting parameters of at least one radio connection of the at least two radio connections so that interference between the at least two radio connections is minimized if interference between the at least two radio connections is detected.

40. The computer program distribution medium of claim 39, the distribution medium comprising at least one of a computer readable medium, a program storage medium, a record medium, a computer readable memory, a computer readable software distribution package, a computer readable signal, a computer readable telecommunications signal, and a computer readable compressed software package.

* * * * *

EXHIBIT 1007

US009420212B2

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Kurita et al.

(10) **Patent No.: US 9,420,212 B2**
(45) **Date of Patent: Aug. 16, 2016**

(54) **DISPLAY APPARATUS AND VIDEO PROCESSING APPARATUS**

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(73) Assignee: **HITACHI MAXELL, LTD.**, Osaka (JP)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 1245 days.

(21) Appl. No.: **12/260,410**

(22) Filed: **Oct. 29, 2008**

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(30) **Foreign Application Priority Data**

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(51) **Int. Cl.**

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H04N 21/4363	(2011.01)
H04L 29/06	(2006.01)
H04N 21/41	(2011.01)
H04N 21/414	(2011.01)
H04N 21/4367	(2011.01)

(52) **U.S. Cl.**

CPC ***H04N 5/44*** (2013.01); ***H04L 69/14*** (2013.01); ***H04N 21/4122*** (2013.01); ***H04N 21/41407*** (2013.01); ***H04N 21/43637*** (2013.01); *H04N 21/4367* (2013.01)

(58) **Field of Classification Search**

CPC H04L 69/14; H04N 21/4122; H04N 21/41407; H04N 21/43637; H04N 21/4367; H04N 5/44

USPC 348/729, 725

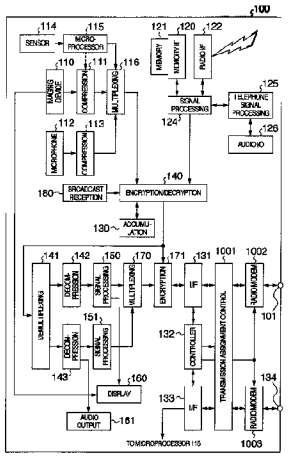
See application file for complete search history.

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FIG. 1

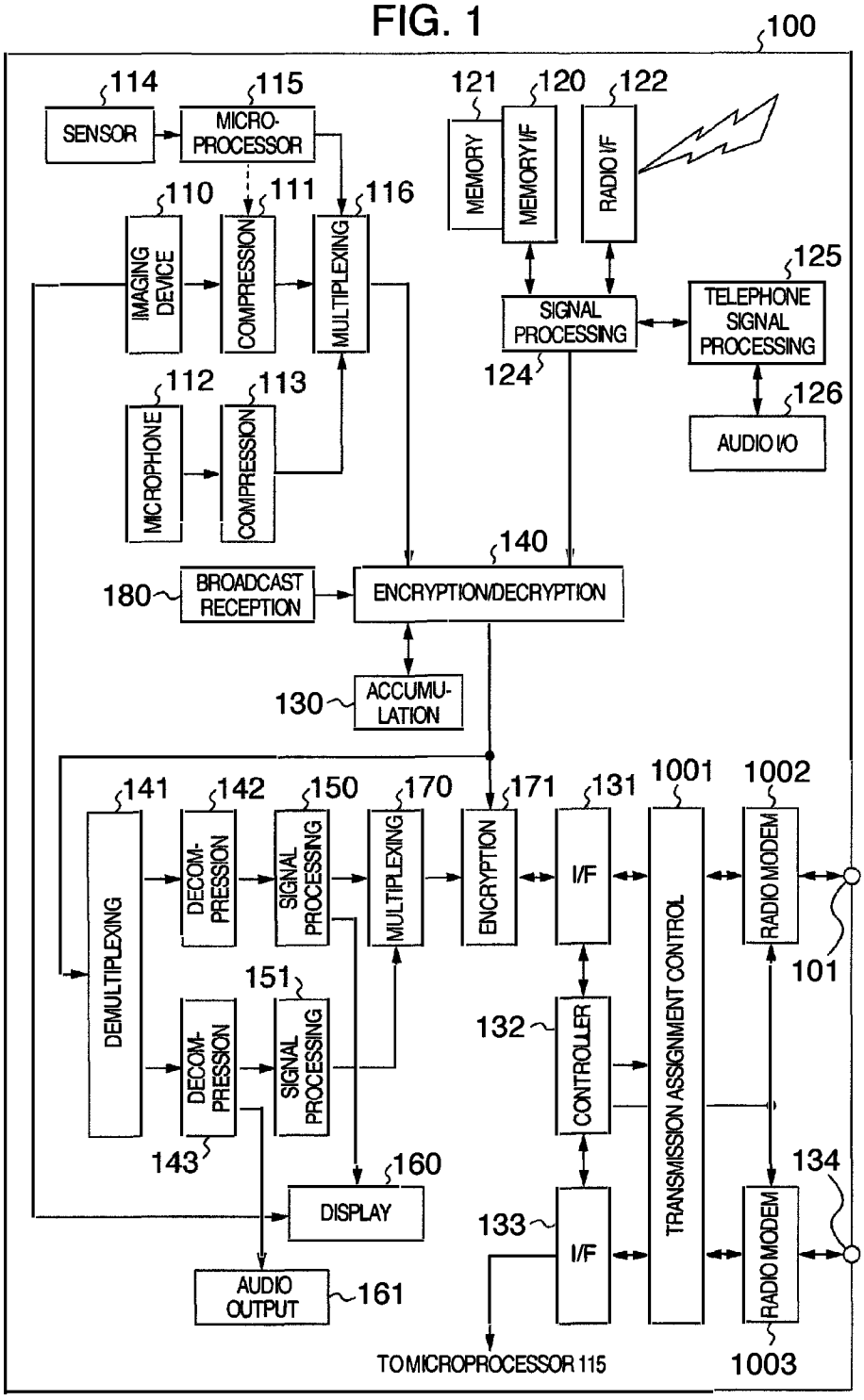

100
114
SENSOR
115
MICRO-PROCESSOR
121
MEMORY
120
MEMORY I/F
122
RADIO I/F
110
IMAGING DEVICE
111
COMPRESSION
116
MULTIPLEXING
125
TELEPHONE SIGNAL PROCESSING
SIGNAL PROCESSING
124
126
AUDIO I/O
112
MICROPHONE
113
COMPRESSION
140
180
BROADCAST RECEPTION
ENCRYPTION/DECRYPTION
130
ACCUMU-LATION
141
142
150
170
171
131
1001
1002
DEMULTIPLEXING
DECOM-PRESSION
SIGNAL PROCESSING
MULTIPLEXING
ENCRYPTION
I/F
TRANSMISSION ASSIGNMENT CONTROL
RADIO MODEM
101
151
DECOM-PRESSION
SIGNAL PROCESSING
132
CONTROLLER
143
160
134
DISPLAY
133
I/F
RADIO MODEM
AUDIO OUTPUT
161
TO MICROPROCESSOR 115
1003

FIG. 2

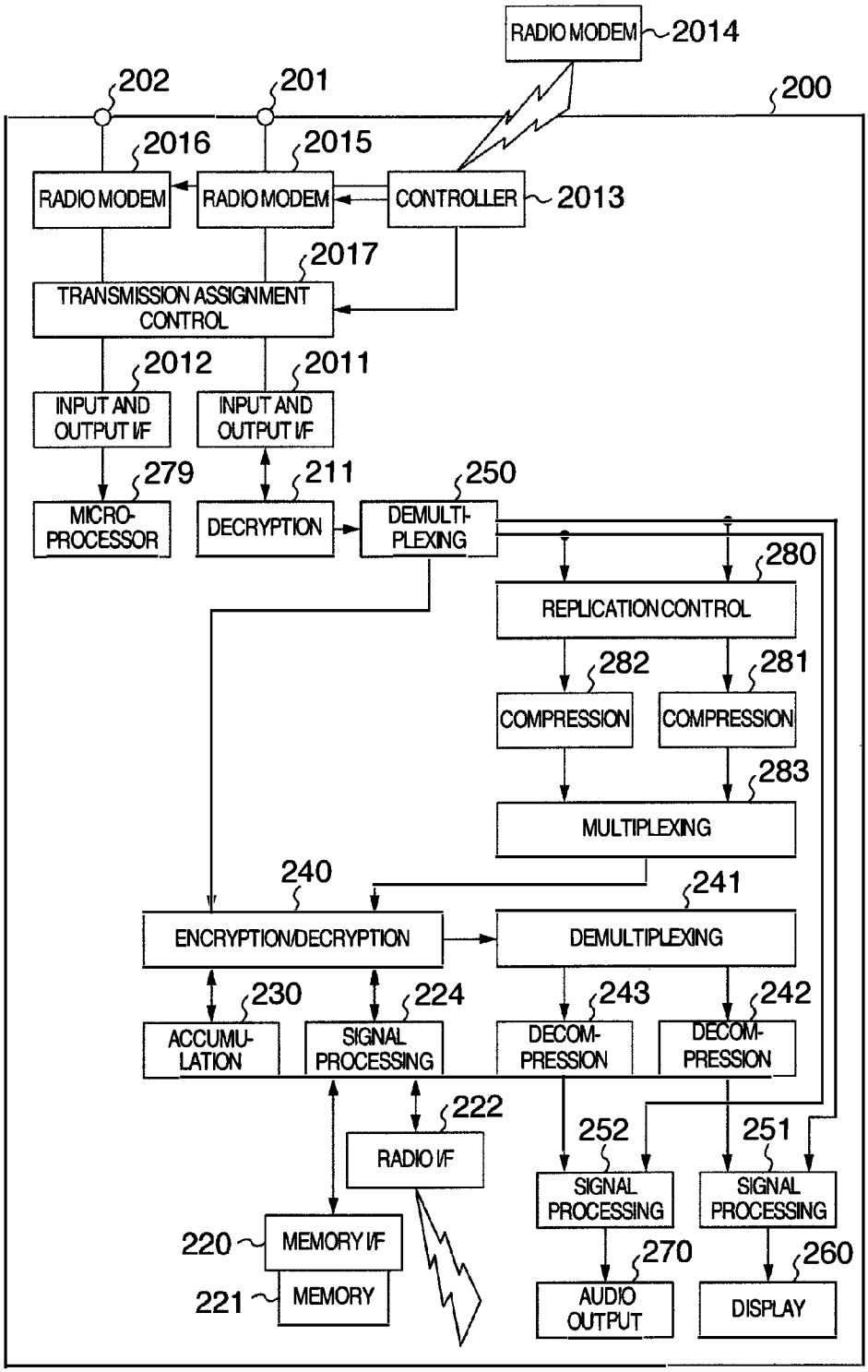

RADIO MODEM
2014
202
201
200
2016
2015
RADIO MODEM
RADIO MODEM
CONTROLLER
2013
2017
TRANSMISSION ASSIGNMENT CONTROL
2012
2011
INPUT AND OUTPUT I/F
INPUT AND OUTPUT I/F
279
211
250
MICRO-PROCESSOR
DECRYPTION
DEMULTI-PLEXING
280
REPLICATION CONTROL
282
281
COMPRESSION
COMPRESSION
283
MULTIPLEXING
240
241
ENCRYPTION/DECRYPTION
DEMULTIPLEXING
230
224
243
242
ACCUMU-LATION
SIGNAL PROCESSING
DECOM-PRESSION
DECOM-PRESSION
222
252
251
RADIO I/F
SIGNAL PROCESSING
SIGNAL PROCESSING
220
MEMORY I/F
270
260
221
MEMORY
AUDIO OUTPUT
DISPLAY

FIG. 3

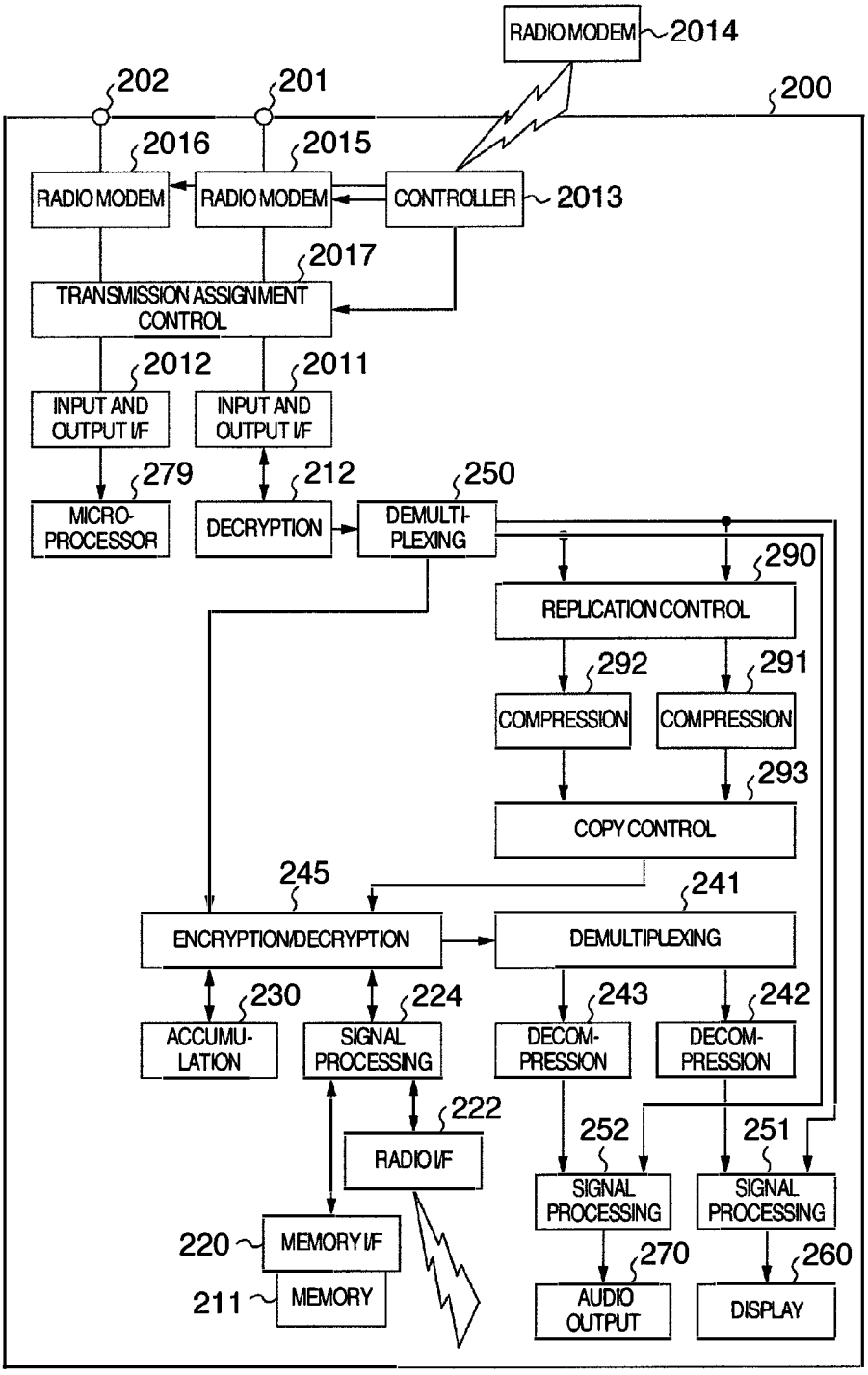
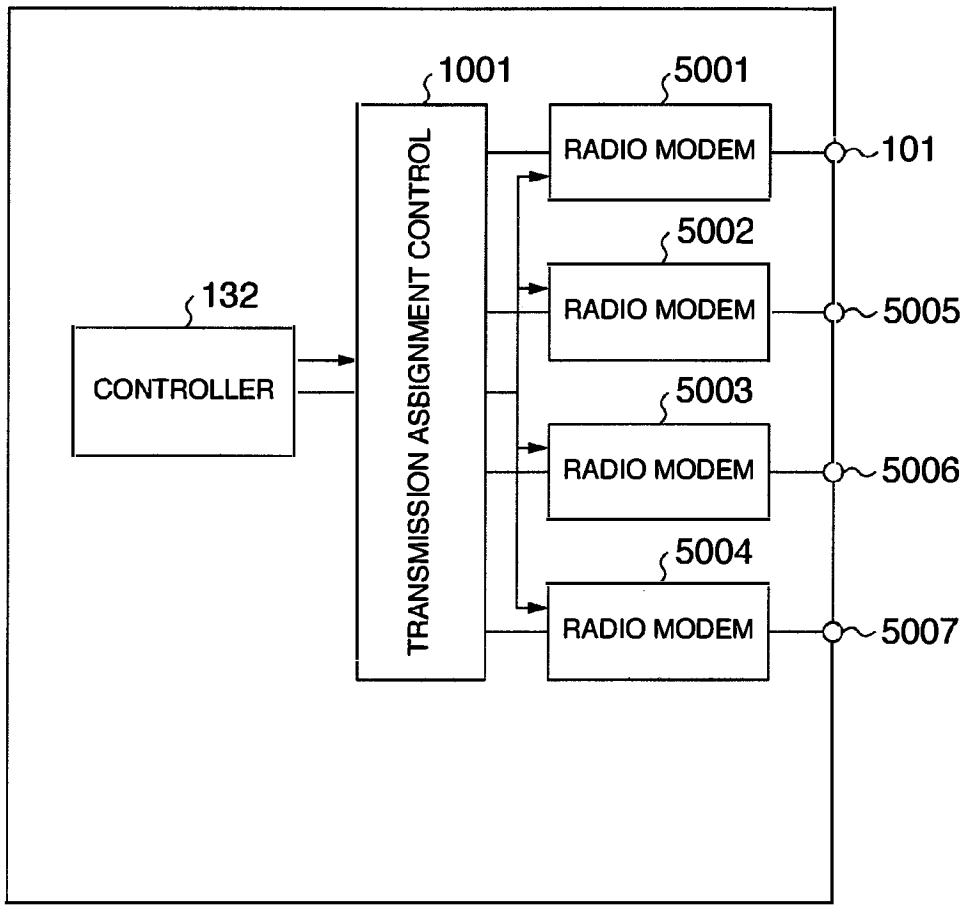

RADIO MODEM
2014
202
201
200
2016
2015
RADIO MODEM
RADIO MODEM
CONTROLLER
2013
2017
TRANSMISSION ASSIGNMENT CONTROL
2012
2011
INPUT AND OUTPUT I/F
INPUT AND OUTPUT I/F
279
212
250
MICRO-PROCESSOR
DECRYPTION
DEMULTI-PLEXING
290
REPLICATION CONTROL
292
291
COMPRESSION
COMPRESSION
293
COPY CONTROL
245
241
ENCRYPTION/DECRYPTION
DEMULTIPLEXING
230
224
243
242
ACCUMU-LATION
SIGNAL PROCESSING
DECOM-PRESSION
DECOM-PRESSION
222
252
251
RADIO I/F
SIGNAL PROCESSING
SIGNAL PROCESSING
220
MEMORY I/F
270
260
211
MEMORY
AUDIO OUTPUT
DISPLAY

FIG. 4


1001
5001
RADIO MODEM
101
5002
RADIO MODEM
5005
132
CONTROLLER
TRANSMISSION ASSIGNMENT CONTROL
5003
RADIO MODEM
5006
5004
RADIO MODEM
5007

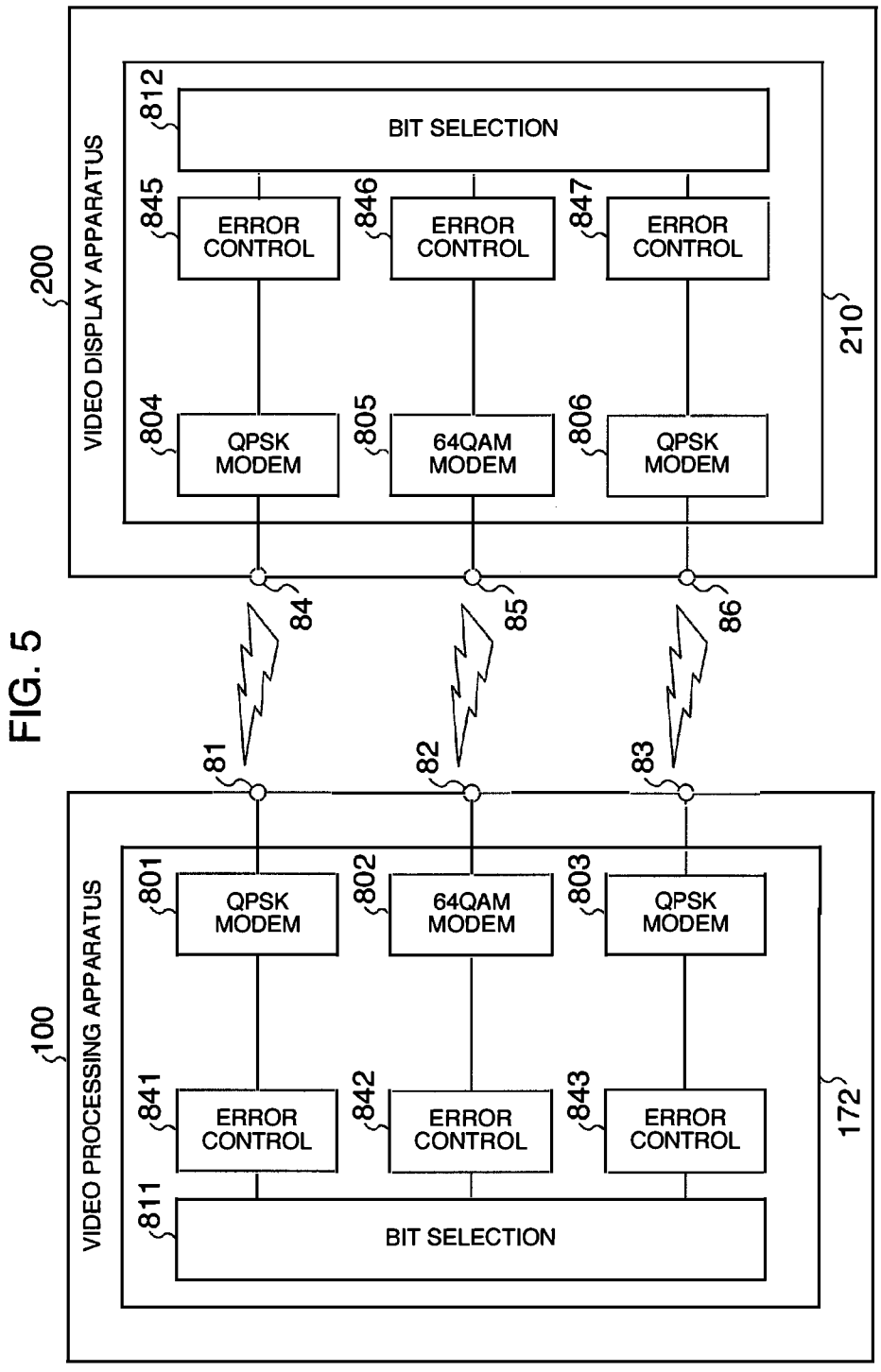

200
VIDEO DISPLAY APPARATUS
210
812
BIT SELECTION
845
ERROR CONTROL
846
ERROR CONTROL
847
ERROR CONTROL
804
QPSK MODEM
805
64QAM MODEM
806
QPSK MODEM
84
85
86
81
82
83
100
VIDEO PROCESSING APPARATUS
172
801
QPSK MODEM
802
64QAM MODEM
803
QPSK MODEM
841
ERROR CONTROL
842
ERROR CONTROL
843
ERROR CONTROL
811
BIT SELECTION

FIG. 5

FIG. 6

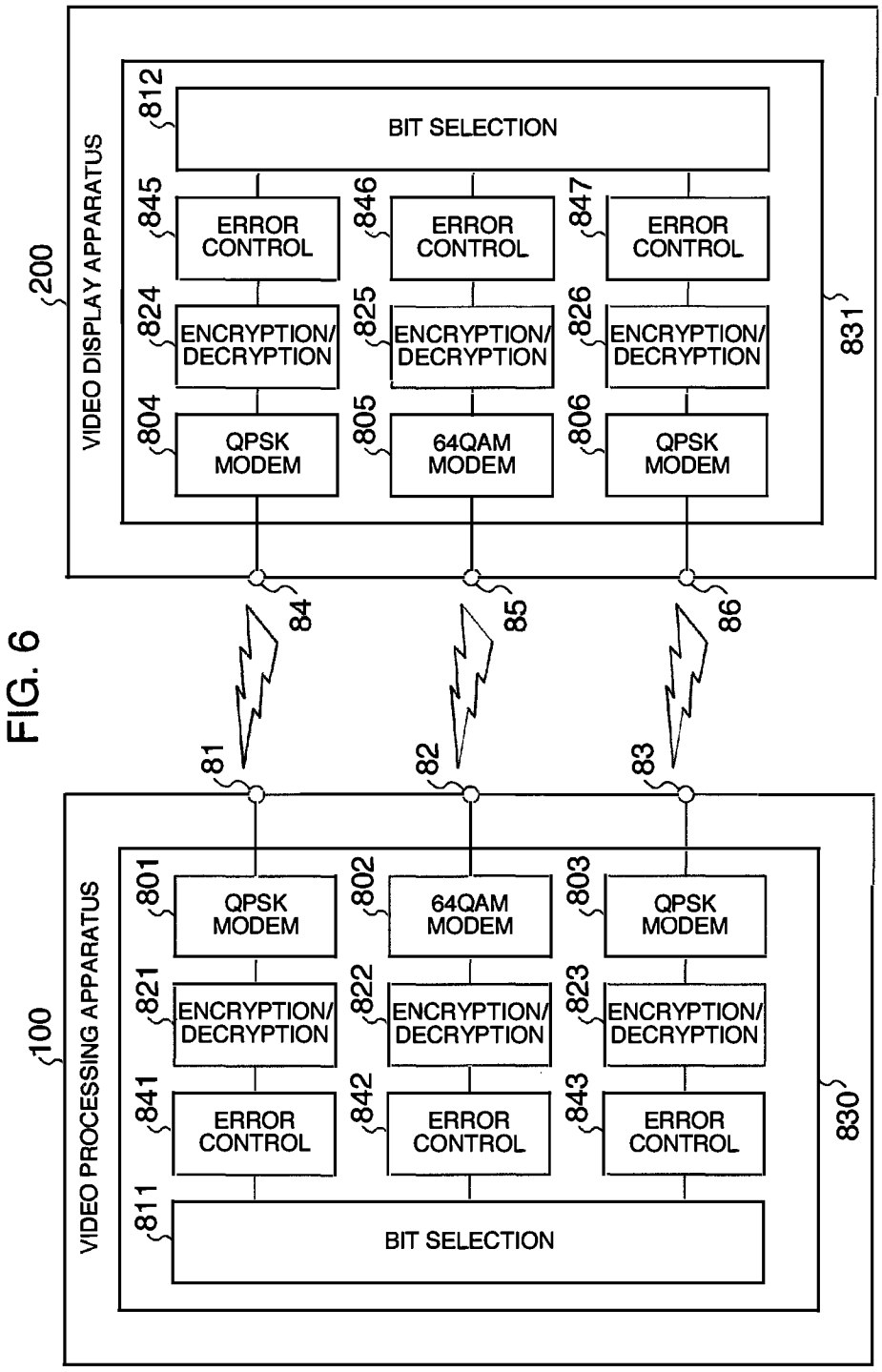

200
VIDEO DISPLAY APPARATUS
812
BIT SELECTION
845
ERROR CONTROL
846
ERROR CONTROL
847
ERROR CONTROL
824
ENCRYPTION/ DECRYPTION
825
ENCRYPTION/ DECRYPTION
826
ENCRYPTION/ DECRYPTION
804
QPSK MODEM
805
64QAM MODEM
806
QPSK MODEM
831
84
85
86
81
82
83
100
VIDEO PROCESSING APPARATUS
801
QPSK MODEM
802
64QAM MODEM
803
QPSK MODEM
821
ENCRYPTION/ DECRYPTION
822
ENCRYPTION/ DECRYPTION
823
ENCRYPTION/ DECRYPTION
841
ERROR CONTROL
842
ERROR CONTROL
843
ERROR CONTROL
811
BIT SELECTION
830

FIG. 7

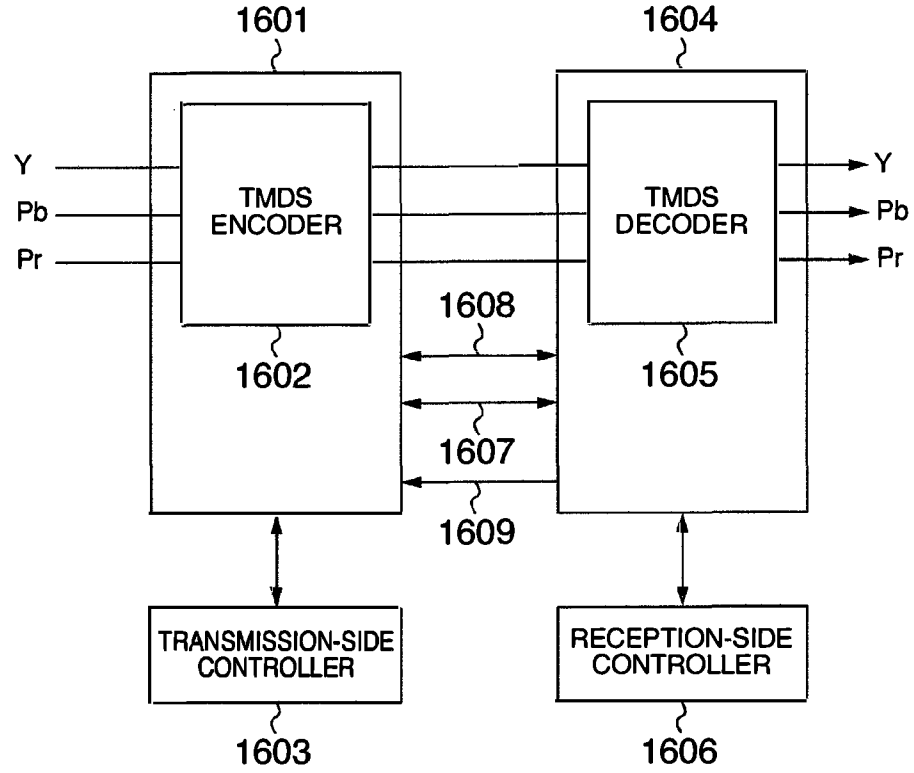

1601
1604
Y
Pb
Pr
TMDS ENCODER
TMDS DECODER
Y
Pb
Pr
1608
1602
1605
1607
1609
TRANSMISSION-SIDE CONTROLLER
RECEPTION-SIDE CONTROLLER
1603
1606

FIG. 8

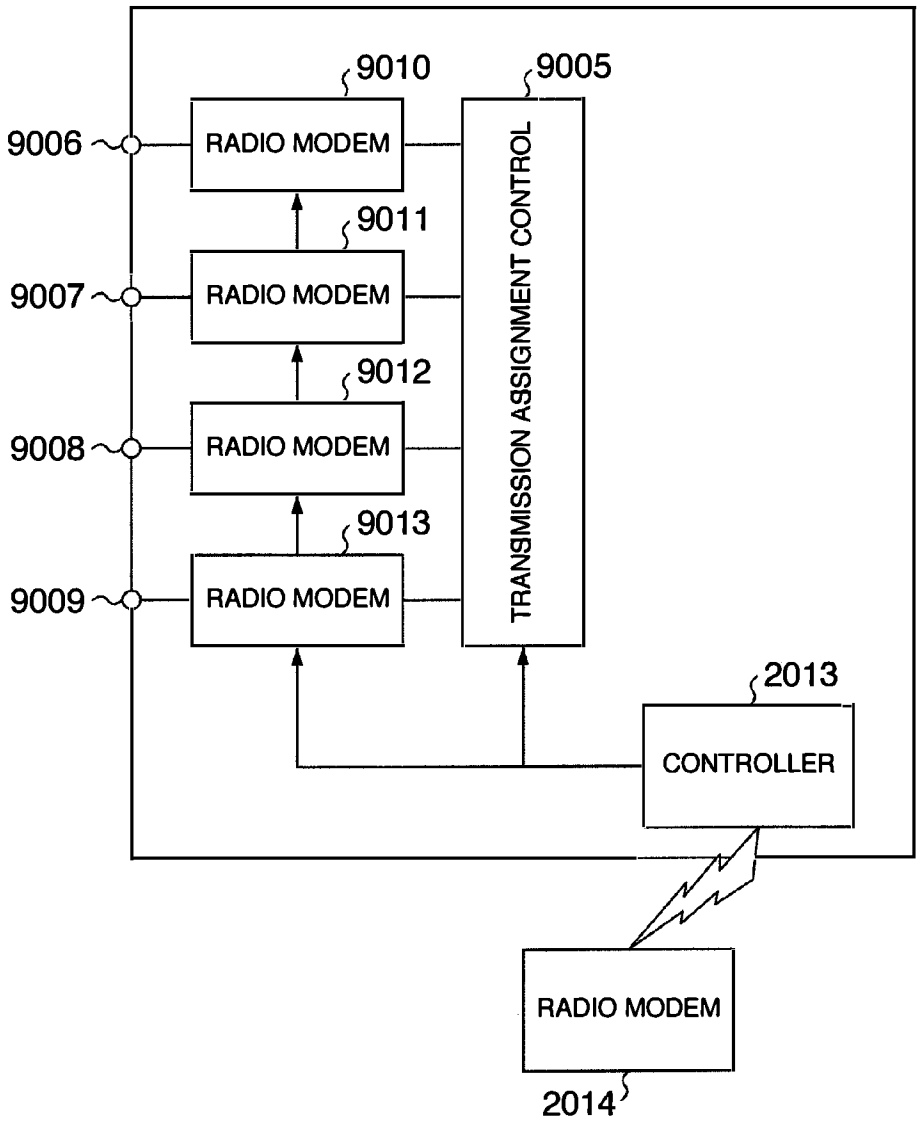

9010
9005
9006
RADIO MODEM
9011
9007
RADIO MODEM
9012
9008
RADIO MODEM
9013
9009
RADIO MODEM
TRANSMISSION ASSIGNMENT CONTROL
2013
CONTROLLER
RADIO MODEM
2014

FIG. 9

SCHEME	SCHEME 1	SCHEME 2
BANDWIDTH	6MHz	6MHz
CARRIER MODULATION SCHEME	64QAM	QPSK
CONVOLUTION CODE	3/4	2/3
GUARD INTERVAL	1/8	1/8
TRANSMISSION CAPACITY	17Mbps	5Mbps

FIG. 10

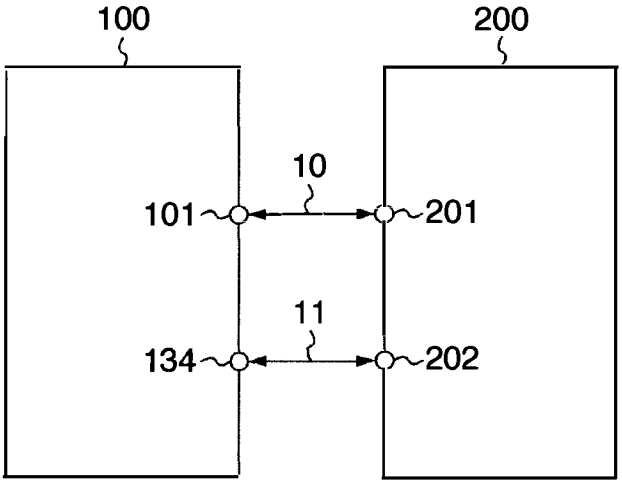
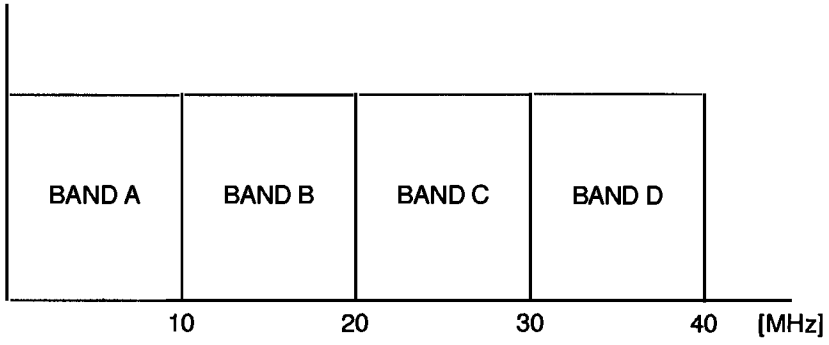


FIG. 11



DISPLAY APPARATUS AND VIDEO PROCESSING APPARATUS

INCORPORATION BY REFERENCE

The present application claims priority from Japanese application JP2007-306750 filed on Nov. 28, 2007, the content of which is hereby incorporated by reference into this application.

BACKGROUND OF THE INVENTION

The present invention relates to a technique to establish connections between a plurality of apparatuses and networks by radio.

To connect a video processing apparatus to a video display apparatus as another video processing apparatus to view videos, there has been employed a method to establish analog connections therebetween to transmit video and audio signals. However, as digital apparatuses have been widely spread, there is employed, to prevent picture quality deterioration and to protect copyright of contents to be viewed, a method in which digital connections are established between the apparatuses and video and audio signals are encrypted to be transmitted therebetween.

High Definition Digital Multimedia Interface (HDMI) is known as an example of an interface for digital transmission. According to the HDMI, the base band signal and the audio signal of high definition are time-division multiplexed and the resultant signal is encrypted through HDCP for transmission thereof.

A conventional technique in which digitized video and audio signals are multiplexed for transmission as above is described in, for example, JP-A-2007-202115.

SUMMARY OF THE INVENTION

According to the HDMI, which is developed on assumption of uses for connections between apparatuses installed in a house of a family, consideration has not been given to connections with the internet and a network in the family or a home network while viewing high-quality videos. It is therefore an object of the present invention, devised to overcome the difficulty, to provide a technique wherein while presenting on a display apparatus videos of high picture quality obtained from portable video processing apparatuses such as a camera and a cellular phone, it is possible to communicate with the internet and/or a home network.

According to one aspect of the resent invention, there is provided a display apparatus including a first radio communication unit capable of receiving video information by radio from an external video processing apparatus, a second radio communication unit capable of connecting by radio to a network, and a connection assignment control unit for controlling assignment of connection by radio transmission for each of the first and second radio communication units. The control unit assigns connection of the first radio communication unit with higher priority and controls the assignment of the transmission rate, for example, such that the transmission rate between the first radio communication unit and the external video processing apparatus is more than the transmission rate between the second radio communication unit and the network.

According to another aspect of the present invention, there is provided a video processing apparatus including a first radio communication unit capable of transmitting video information by radio to an external display apparatus, a second radio communication unit capable of connecting by radio to a network, and a connection assignment control unit for controlling assignment of connection by radio transmission for each of the first and second radio communication units. The control unit assigns connection of the first radio communication unit with higher priority and controls the assignment of the transmission rate, for example, such that the transmission rate between the first radio communication unit and the external video display apparatus is more than the transmission rate between the second radio communication unit and the network.

In the display apparatus constructed as above, the first radio communication unit can communicate video information of high picture quality with an external video processing apparatus. The second radio communication unit can connect by radio to the internet and a home network. The controller controls the transmission rate of the radio transmitter module to be assigned to the first radio communication unit and can change the transmission rate of the radio transmitter module to be assigned to the second radio communication unit. It is possible for the controller to determine and to control the radio transmission rates to be assigned to the first and second radio communication units. The controller controls the operation such that the assignment to the first radio communication module to conduct transmission to receive video information from an external video processing apparatus is carried out with higher priority. Therefore, it is possible that video information of high picture quality is continuously fed from the video processing apparatus to the video information apparatus as well as information is transmitted from the internet and a home network. There can be hence provided a video display apparatus having high serviceability.

According to the present invention, it is possible to communicate with a network while displaying videos of high picture quality obtained by a video processing apparatus.

Other objects, features and advantages of the invention will become apparent from the following description of the embodiments of the invention taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a diagram showing an example of an embodiment of a video processing apparatus **100** according to the present invention;

FIG. **2** is a block diagram showing an example of an embodiment of a video display apparatus **200** according to the present invention;

FIG. **3** is a block diagram showing another example of an embodiment of a video display apparatus **200** according to the present invention;

FIG. **4** is a diagram showing an example of a radio modulator and demodulator or modem of the video processing apparatus **100**;

FIG. **5** is a block diagram showing an example of a system in which two video processing apparatuses are wirelessly connected to each other;

FIG. **6** is a block diagram showing another example of a system in which two video processing apparatuses are wirelessly connected to each other;

FIG. **7** is a diagram showing an example of structure of the HDMI;

FIG. **8** is a diagram showing an example of a radio modem of the video display apparatus;

FIG. **9** shows a diagram showing an example of transmission parameters of a radio modem in the embodiment;

FIG. **10** is a diagram showing connections between the video processing apparatus **100** and the video display apparatus **200** in the embodiment of the present invention; and

FIG. **11** is a diagram showing an example of assignment of bands in another example of a radio modem shown in FIGS. **4** and **8**.

DETAILED DESCRIPTION OF THE EMBODIMENTS

Referring now to the drawings, description will be given of an embodiment according to the present invention.

First Embodiment

FIG. **10** shows an embodiment of the present invention. In this example, the system includes two video processing apparatuses, i.e., a video processing apparatus **100** which is, for example, a portable video processing apparatus capable of receiving a digital broadcast signal via a base station antenna for cellular phones or a broadcast transmission tower and a video display apparatus **200** such as a tuner capable of receiving a digital broadcast signal from a broadcast transmission tower. These apparatuses are connected, for example, via a bidirectional interface **10** to each other. Resultantly, a video signal of high picture quality and other information items and signals can be bidirectionally communicated therebetween. On the other hand, between a terminal **134** of the video processing apparatus **100** and a terminal **202** of the video display apparatus **200**, signals from the internet and a home network are communicated by radio. The frequency bands used for the transmission between the terminals **134** and **202** are limited to predetermined frequency bands. This increases the radio wave resource efficiency and prevents the problem of interference with other apparatuses.

In the embodiment, the portable video processing apparatus **100** is specifically, for example, a digital camera, a video camera, a cellular phone, a game machine, or a personal media player.

FIG. **1** shows a concrete example of the video processing apparatus **100** employed in the first embodiment of the present invention. This is a specific configuration of the apparatus **100** shown in FIG. **10**. In FIG. **1**, an imaging device **110** receives a moving or still picture supplied via an optical system to convert the picture into en electric signal. To transmit a moving picture, a compression circuit **111** employs a compression method, e.g., Moving Picture Experts Group 2 (MPEG2), MPEG4, or AVC/H.264. To transmit a still picture, the compression circuit **111** employs a compression method, e.g., Joint Photographic Experts Group (JPEG). The compression circuit **111** efficiently bit-compresses the received image.

A microphone **112** converts sound into an electric signal. A compression circuit **113** uses a compression method such as an MPEG audio to efficiently bit-compress the received audio signal.

A multiplexer circuit **116** receives the bit-compressed video and audio signals from the compression circuits **111** and **113** and various information items from a microprocessor **115**. By use of the information items, the multiplexer **116** multiplexes the signals according to a predetermined format. When a still picture is shot, the audio signal is not obtained in an ordinary case. However, it is also possible to multiplex an audio signal in synchronism with the still picture shooting operation.

The information items from the microprocessor **115** include, for example, positional information (horizontal positions, vertical positions on the right, and vertical positions on the left), date, and exposure information at shooting.

In FIG. **1**, the multiplexed signal from the multiplexer **116** is fed via an encryption/decryption circuit **140** to be stored in a storage **130**. The storage **130** may be, for example, a hard disk device, an optical disk device, or a semiconductor memory device. The type of the storage **130** may be determined according to, for example, a storage capacity, a size of the storage **130**, easiness of removing a storage medium, and/or a price of the storage **130** according to necessity. It is also possible to store the multiplexed signal via a signal processing circuit **124** and a memory interface **120** in a memory **121**.

When information is shot by a particular person, copyright of the information belongs to the person. Hence, ordinarily, such information is not required to be encrypted for the storage thereof. However, the storage medium having stored information by the storage **130** may be lost. It will be more safe if the multiplexed signal from the multiplexer **116** is once encrypted by the encryption/decryption circuit **140** to be stored in the storage **130** or the memory **121**.

The video processing apparatus **100** may also support the use of a removable memory or include a cellular phone function or a radio Local Area Network (LAN) function. The memory interface **120** is an interface for a removable memory **121**. When video and audio contents of still and moving pictures are recorded by another apparatus in the memory **121** and the memory **121** is connected to the interface **120**, the contents can be recorded via the signal processing circuit **124** and the encryption/decryption circuit **140** into the storage **130**.

In this situation, the signal processing circuit **124** checks to determine whether or not the copyright of the contents recorded in the memory **121** is protected and whether or not the duplication thereof is prohibited. According to the detected condition, the encryption/decryption circuit **140** encrypts the contents and moves the encrypted contents in the storage **130**.

Similarly, audio and video contents of still and moving pictures are received as inputs by a radio interface **122**. The contents are stored via the signal processing circuit **124** and the encryption/decryption circuit **140** in the storage **130**. Also, according to conditions of the copyright protection and the replication restriction, the contents are encrypted by the encryption/decryption circuit **140**, as required.

When it is desired to reproduce a content stored in the storage **130** to view the reproduced content, the user selects the content by an input key or a remote control, not shown. The selected content is read from the storage **130** to be decoded by the encryption/decryption circuit **140** and is then separated by a demultiplexer circuit **141** into an audio signal and a video signal.

When a broadcast program is received by a broadcast receiver **180**, the encrypted signal encrypted for the broadcast is decrypted by the encryption/decryption circuit **140**. If encryption is required to store the signal, the signal is accordingly encrypted by the circuit **140** to be stored in the storage **130** and the memory **121**. To immediately view the received broadcast program in real time, the signal is separated by the demultiplexer **141** into a video signal and an audio signal.

The separated and compressed video signal is decompressed by a decompression circuit **142** to be fed to a signal processing circuit **150**. The circuit **150** conducts a scanning-line conversion for the video signal on the basis of the number of scanning lines of a display **160** to output the resultant video signal to the display **160**. The separated and compressed audio signal is decompressed by a decompression circuit **143** to be delivered to an audio output device **161**. Since the video processing apparatus **100** includes the display **160** and the

audio output device **161**, it is possible to immediately view the broadcast program without externally connecting any video display apparatus. In a situation wherein the period of time required for the decompression varies between the video and audio signals and/or a time difference exists between the video display and the audio output due to presence or absence of the scanning-line conversion, if the audio signal is advanced in time relative to the video signal, the user particularly perceives an uncomfortable feeling. To overcome the difficulty, the audio signal is delayed, for example, in the decompression processing, namely, a lip-sync operation is carried out. This removes the uncomfortable feeling due to the difference in time between the video and audio signals.

Description will now be given of a situation wherein the video processing apparatus **100** is employed as a cellular phone. For example, a voice of a conversation is inputted to the audio input/output section **126** to produce an electric signal. For the signal, a telephone signal processing circuit **125** executes predetermined signal processing and modulation processing. The resultant signal is transmitted via an antenna, not shown, to a base station of the cellular phone. An audio signal sent from the base station is received by an antenna, not shown, to be fed to the telephone signal processing circuit **125**. For the signal, the circuit **125** executes predetermined signal processing and demodulation processing. The resultant signal is fed to the audio I/O section **126** to be reproduced as a voice. The video processing apparatus **100** can also receive a content of a moving picture transmitted from the base station of the cellular phone. The content is received by an antenna, not shown, to be delivered via the telephone signal processing circuit **125** to the signal processing circuit **124**. The content is similarly processed as above by the encryption/decryption circuit **140**. The resultant signal of the content is fed to a display and an audio output unit incorporated in the video processing apparatus **100** to be viewed/listened by the user. The content thus processed may also be fed via a terminal **101**, a connection cable **10**, and a terminal **201** to an external video display apparatus **200** to be displayed on a large-sized screen. While viewing the content, it is possible to record the content in a recording medium incorporated in the video processing apparatus **100** or a recording medium, e.g., a memory **121** connected thereto, for example, to view the content later. The memory **121** may also be used as a recording medium to record a movie and the like.

Similarly, a program broadcast from a broadcast transmission tower is received by a broadcast receiver **180** of the video processing apparatus **100** to be viewed by the apparatus **100** or to be stored in a recording medium, not shown, incorporated in the apparatus **100** or a recording medium, e.g., the memory **121** connected thereto. Also, the content may be fed via the terminal **101**, the cable **10**, and the terminal **201** to the video display apparatus **200** to be viewed by the user.

In addition, by installing an imaging device **110** and a microphone **112** in the video processing apparatus **100**, still and moving pictures can be shot together with audios and can be stored in an incorporated recording medium, not shown, and/or the memory **121**. The videos and audios stored in the recording medium and/or the memory **121** may be fed via the terminal **101** to the video display apparatus **200** to be enjoyed by the user.

When the user views video and audio signals by use of the external video display apparatus **200**, the apparatus **200** confirms scanning lines which the apparatus **200** can support. If the scanning lines match those of the video signals to be displayed, the signals are immediately outputted in real time. Otherwise, the scanning lines of the video signals are converted by a signal processing circuit **150** into the required scanning lines to be fed to a multiplexer circuit **170**. In the circuit **170**, the video signals are multiplexed on the time axis, with the audio signals processed by a signal processing circuit **151**. The circuit **151** compresses the audio signals on the time axis during a period corresponding to the blanking period of the video signals and conducts a time adjusting operation to carry out the lip-sync operation according to the necessity. The video and audio signals multiplexed by the multiplexer circuit **170** are delivered to an encryption circuit **171**. For the signals, the circuit **171** carries out encryption for the transmission of the signals between the video processing apparatus **100** and the video display apparatus **200** and outputs the resultant signals via a video interface circuit **131**, a transmission rate assignment controller **1001**, and the terminal **101** to the video display apparatus **200**. On the other hand, the terminal **134** is connected to a network such as the internet as described above and is used to wirelessly communicate videos and other information items obtained from the network by use of a radio modem circuit **1003**. The information from the network is demodulated by the circuit **1003** to be fed via the transmission rate assignment controller **1001** to an interface circuit **133** and is delivered therefrom to a microprocessor **115**. The microprocessor **115** determines the type of the information from the network. If the information is, for example, a video stream compressed in a predetermined format, the microprocessor **115** feeds the video stream to the demultiplexer circuit **141** and the decompression circuit **143**. For the video stream, the circuits **141** and **143** conduct processing as described above. The resultant signals are presented on the display **160**. According to necessity, the audio information obtained from the network is reproduced by the audio output device **161**. If the information from the network is an update program of an application program or an Operating System (OS), the microprocessor **115** executes addition and storage processing for new software or executes update processing for the associated program. Although the processing of the network information is executed by the microprocessor **115** to process video information in the embodiment, it is also possible to arrange a microprocessor to dedicatedly process the network information.

The controller **132** controls the transmission rate assignment control circuit **1001** on the basis of time control information of the video signal to variably control the transmission rate of the radio modem circuit **1002**. At the same time, the controller **132** variably controls the transmission rate of the radio modem circuit **1003** for radio communication with a network such as the Internet. According to the embodiment, in the assignment of the transmission rate to the demodulation circuits **1001** and **1002**, the controller **132** gives preference to the demodulation circuit **1001**. In other words, the transmission rate of the demodulation circuit **1001** is more than that of the modem circuit **1002**. Hence, within the limited range of bands for the radio transmission, the modem **1002** can transmit video information without deteriorating the video quality of the video information having high picture quality. The band of radio signals from the terminal **101** and that of radio signals from the terminal **134** are fixed. Therefore, if the band of signals from the terminal **101** is expanded, that of signals from the terminal **134** narrows to slightly lower the communication speed of the network. However, this rarely influences the system operation since information regarding the network is less frequently exchanged as compared with video information sent from the video processing apparatus **100**.

When the signal from the terminal **101** is to be stored in the destination thereof, the compressed signal is transmitted without decompressing the signal. In the operation, the encryption/decryption circuit **140** delivers the compressed

signal to the encryption circuit **171**. The circuit **171** conducts predetermined encryption for the signal and then outputs the resultant signal via the video interface circuit **131**, the transmission rate assignment controller **1001**, and the terminal **101**. Also in this situation, the control circuit **132** variably controls the transmission rate of the radio modem **1002** in association with the time control information of the video signal. As a result, the radio modem **1002** can send the video information without deteriorating the video quality of the video information having high picture quality.

In the description above, the video and audio signals obtained from the imaging device **110** and the microphone **112** and the contents inputted from the memory **121** and the radio interface **122** are once stored in the storage **130** to be thereafter reproduced. However, if the storing of the signals and the contents are not required or are immediately viewed, the signals and the contents are demultiplexed by the demultiplexer **141** without conducting the encryption and decryption for the storage by the encryption/decryption circuit **140**. Resultantly, the videos and audios can be enjoyed by use of the display **160** and the audio output device **161** of the video processing apparatus **100**. Also, it is possible to enjoy the videos and audios by a receiver externally connected via the wired interface circuit **131** to the apparatus **100**.

Description will now be specifically given of one technical aspect of the embodiment, namely, the transmission rate assignment control circuit **1001** and the radio demodulation circuits **1002** and **1003**. The modem circuits **1002** and **1003** conduct demodulation through Orthogonal Frequency Division Multiplexing (OFDM). In the example, the modem **1002** is a first radio communication unit which wirelessly sends video information and audio information to the external video display apparatus **200** and which receives data and information by radio therefrom. The modem **1002** is connected via the transmission rate assignment controller **1001** to the interface circuit **131** which communicates with the video display apparatus **200**. On the other hand, the modem **1003** is a second radio communication unit which connects to (accesses) a network, e.g., the Internet or a home network to wirelessly communicate various information including video signals, audio signals, and data therewith. The modem **1003** is connected via the transmission rate assignment controller **1001** to the interface circuit **133** for networks. The controller **1001** variably controls, according to a control signal from the controller **132**, the transmission rates respectively of the modems **1002** and **1003** by variably setting the modulation/demodulation methods, the frequency bands, and the number of carriers respectively for the modems **1002** and **1003**. In short, the controller **132** controls distribution of the radio transmission rate of each modem by controlling the transmission rate assignment controller **1001**. As a specific example of operation in which the transmission rate is controlled by changing parameters including the demodulation method and the frequency band, FIG. **9** shows the difference in the transmission rate between two schemes.

According to the embodiment, the controller **132** and the transmission rate assignment controller **1001** control the radio transmission assignment such that the radio transmission rate of the modem **1002** to send the video information of high picture quality by radio to the video display apparatus **200** takes precedence over the radio transmission rate of the modem **1003** to connect to a network for communication. That is, the radio transmission rate of the modem **1002** is more than that of the modem **1003**. For example, in a situation wherein the modem **1002** transmits video information to the display apparatus **200** and the modem **1003** simultaneously connects to the Internet to receive Internet information, the controller **132** controls the operation to continuously supply videos with high picture quality to the user, specifically, to set the transmission scheme of the modem **1002** to, for example, "scheme **1**" shown in FIG. **9**. For the radio modem **1003**, the controller **132** sets the transmission scheme thereof to "scheme **2**" of FIG. **9**. As can be seen from FIG. **9**, the transmission capacity of scheme **1** is 17 Megabits per second (Mbps) which is more than three times that of scheme **2** (5 Mbps). As above, in the limited transmission capacity for radio transmission, a higher transmission rate is assigned to the communication with the display apparatus **200** in the embodiment. It is hence possible that the user continuously views videos with high picture quality on the display apparatus **100**. Naturally, the variable control of the transmission rate is not limited to the example shown in FIG. **9**.

The controller **132** and the transmission rate assignment controller **1001** may variably control the radio transmission assignment to the modems **1002** and **1003** in response to an indication from the user. For example, in a situation wherein the user issues an indication to transmit video information by radio via the modem **1002** to the display apparatus **200** while acquiring information from the Internet according to scheme **1** of FIG. **9** by use of the modem **1003**, the controller **132** outputs a control signal to the assignment controller **1001** such that the transmission scheme of the modem **1003** is changed from scheme **1** to scheme **2** of FIG. **9** and that of the modem **1002** is set to scheme **1** of FIG. **9** conduct communications. The transmission rate of the modem **1002** may be variably changed according to fineness or precision of the video information sent from the modem **1002** to the display apparatus **200**. For example, if the fineness of the video information is altered from SD (640×480) to HD (1980×1080), the controller **132** instructs the assignment controller **1001** to heighten the transmission rate of the modem circuit **1002**. It is preferable in the operation that the transmission rate of the modem **1003** is lowered in association with the variable control of the transmission rate of the modem **1002**.

The transmission rates of the radio modems **1002** and **1003** may also be variably controlled by a communication technique using a plurality of antennas such as a Multi-Input Multi-Output (MIMO) scheme.

Referring next to FIG. **4**, description will be given of other examples of the transmission rate assignment controller and the radio modem. FIG. **4** shows only part of the system associated with the transmission rate assignment control. In FIG. **4**, the same functional constituent components as those of FIG. **1** are assigned with the same reference numerals.

In FIG. **4**, radio modem circuits **5001** to **5004** are modems having respective fixed transmission capacity values and differ from each other only in the frequency band for transmission. The modems **5001** to **5004** respectively have bands A to D as shown in FIG. **11**. Terminals **101** and **5005** to **5007** are input terminals to receive signals and are arranged respectively for radio modems **5001** to **5004**. In operation, the modems **5001** to **5004** may be appropriately combined with each other. For example, according to necessity, the modems **5001** and **5002** are employed to transmit video information and the modems **5003** and **5004** are utilized to communicate with the network such as the Internet. That is, while the interface circuit **131** wirelessly transmits video information and audio information via the modems **5001** and **5002** to the video display apparatus **200**, the interface circuit **133** conducts communication via the modems **5003** and **5004** with the network. In a situation wherein a wide band is required to transmit video information of high picture quality (e.g., video information of HD resolution), the modems **5001** to **5003** are assigned to send video information and only the modem **5004**

is assigned to communicate with the network such as the Internet. Specifically, the interface circuit **131** transmits video and audio information by radio via the modems **5001** to **5003** to the display apparatus **200**, and the interface circuit **133** communicates with the network via the modem **5004**. As a result, video information of high picture quality can be continuously transmitted and it is also possible to communicate with the Internet. Particularly, the broadcast signal is required to be presented by synchronizing the time information sent from the broadcasting station with that on the receiver side. According to the present invention, the time information can be appropriately controlled without deteriorating the quality of the video information.

FIG. **2** shows a specific configuration of the video display apparatus **200** of FIG. **10**. In FIGS. **2** and **10**, the same constituent components are assigned with the same reference numerals and detailed description thereof will be avoided. Description will be given of a situation wherein an uncompressed baseband signal of a moving picture is inputted via the terminal **201**. The signal from the external video processing apparatus **100** thus received via the terminal **201** is demodulated by a radio modem circuit **2015** to be supplied via a transmission rate assignment controller **2017** and an input/output interface circuit **2011** to a decryption circuit **211**. In operation, a controller **2013** drives the assignment controller **2017** to vary the transmission rate of the modem **2015** according to that of the video information delivered from the video processing apparatus **100**. Resultantly, an input/output interface circuit **2011** can receive the video information of high picture quality at preset timing.

The decryption circuit **211** is associated with encryption by the encryption circuit **171** shown in FIG. **1** and decrypts a signal encrypted by the circuit **171**. The decrypted signal is fed to a demultiplexer circuit **250**, and then video and audio signals obtained from the demultiplexer **250** are inputted to signal processing circuits **251** and **252**, respectively. For the received video signal, the circuit **251** conducts a scanning-line conversion and a resolution conversion according to the number of pixels displayable by a display **260**. The circuit **252** decompresses on the time axis the audio signal which is compressed and multiplexed on the time axis by use of the blanking of the video signal. According to necessity, the circuit **252** carries out the lip-sync operation and the sound quality adjustment. Signals outputted respectively from the circuits **251** and **252** are inputted respectively to a display **260** and an audio input/output unit **270** to be viewed by the user.

Description will now be given of operation when a compressed moving-picture signal is received via the terminal **201**. This operation aims at storing the moving-picture signal in a storage **230** incorporated in the apparatus **200**.

The signal received from the terminal **201** is delivered via the wired input/output interface circuit **2011** to the decryption circuit **211**. The circuit **211** corresponds to the encryption circuit **171** shown in FIG. **2** and decrypts a signal encrypted by the circuit **171**. The decrypted signal is inputted to an encryption/decryption circuit **240**. The circuit **240** reads copy control information of the content to be stored and encrypts the content for the storage thereof according to the information. The encrypted signal is stored in the storage **230** in the compressed state.

In a situation wherein the user views the compressed signal received via the terminal **201** while storing the signal in the storage, a signal corresponding to a compressed signal decrypted by the encryption/decryption circuit **211** is fed from the encryption/decryption circuit **240** to a demultiplexer circuit **241**. In the circuit **241**, the signal is separated into a compressed video signal and a compressed audio signal. The separated video and audio signals are decompressed respectively by decompression circuits **242** and **243** to baseband signals to be respectively supplied to the signal processing circuits **251** and **252**. Signals outputted respectively therefrom are delivered respectively to the display and the audio output unit **270** to be viewed by the user.

When a content stored in the storage **230** is reproduced to be viewed by the user, information items such as titles of the contents stored in the storage **230** are presented on the display **260**. When the user selects one of the contents, a signal of the selected content is fed from the storage **230** to the encryption/decryption circuit **240**. The circuit **240** decrypts the encrypted signal of the content to input the resultant signal to the demultiplexer **241**. The signal of the content is thereafter similarly processed as described above to be viewed by the user.

It is possible to similarly reproduce contents stored in a memory **221**. As in the reproduction of contents stored in the storage **230**, the user selects one of the contents stored in a memory **221** to view the content. The selected content is transferred via a memory interface **220** and a signal processing circuit **224** to the encryption/decryption circuit **240**. Specifically, the circuit **224** executes processing necessary to read the content from the memory **221** to input compressed and multiplexed video and audio signals of the content to the circuit **240**. Subsequent signal processing is similar to the processing executed after the content is read from the storage **230**.

As in the operation to store a content in the storage **230**, it is possible to store the content in the memory **221**. Although detailed description of the associated processing will be avoided, the content encrypted by the encryption/decryption circuit **240** is stored via the signal processing circuit **224** and the memory interface **220** into the memory **221**.

To view or to store a content transmitted by radio, the system executes processing in a similar way. A compressed content received by radio is fed via a radio interface **222** and the signal processing circuit **224** to the encryption/decryption circuit **240**. The circuit **240** decrypts the signal encrypted for the radio transmission. Subsequent processing is similar to the processing executed at reproduction of the signal from the storage **230**.

When an uncompressed baseband signal is received from the terminal **201** or **202**, the content can be efficiently stored in the storage **230** and the memory **221**. Description will be given of operation in this situation.

The content inputted from the terminal **201** is transferred via the input/output interface **2011**, the decryption circuit **211** and the demultiplexer circuit **250** to be separated into a video signal and an audio signal. The video and audio signals thus separated are fed via a replication control circuit **280** to compression circuits **281** and **282**. The circuit **280** reads, from the content, multiplexed replication control information to determine whether or not replication of the content is allowed. As the control information, a bit may be assigned to a designated field. Or, by using electronic watermark, the information may be superimposed onto video or audio information. Information inputted from the network to the terminal **202** is also processed in a similar fashion as above.

The compression circuit **281** compresses the video signal by use of a compression scheme, e.g., MPEG2, MPEG4, or AVC/H.264. The compression circuit **282** compresses the audio signal according to a compression scheme, e.g., MPEG Audio. The compressed video and audio signals are inputted to a multiplexer circuit **283** to be multiplexed. The multiplexed signal is fed to the encryption/decryption circuit **240** to be thereafter similarly stored in the storage **230** and/or the

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10

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Referring next to FIG. **8**, description will be given of other examples of the transmission rate assignment controller and the radio modem. FIG. **8** shows only part of the system associated with the transmission rate assignment control. In FIG. **8**, the same functional constituent components as those of FIG. **1** are assigned with the same reference numerals.

In FIG. **8**, a transmission rate assignment controller **9005** operates in a similar way as the transmission rate assignment controller **1001** described above and assigns transmission rates respectively to radio modems **9010** to **9013** according to an instruction from the controller **2013**. The modem circuits **9010** to **9013** are modems having respective fixed transmission capacity values and differ from each other only in the frequency band for transmission. The modems **9010** to **9013** respectively have bands A to D as shown in FIG. **11**. Terminals **9006** and **9007** are input terminals to receive signals and are arranged respectively for radio modems **9010** to **9013**. In operation, the modems **9010** to **9013** may be appropriately combined with each other. For example, under supervision of the assignment controller **9005**, the modems **9010** and **9011** are employed to transmit video information and the modems **9012** and **9013** are utilized for communication with the network such as the Internet depending on cases. That is, while the interface circuit **2011** transmits by radio video information and audio information via the modems **9010** and **9011** to the video display apparatus **200**, the interface circuit **2012** communicates via the modems **9012** and **9013** with the network. In a situation wherein a wide band is required to receive video information of high picture quality (e.g., video information of HD resolution) from the video processing apparatus **100**, the modems **9010** to **9012** are allocated to transmit video information and only the modem **9013** is allocated to communicate with the network such as the Internet. That is, the interface circuit **2011** transmits video and audio information by radio via the modems **9010** to **9012** to the video display apparatus **200**, and the interface circuit **2012** communicates with the network via the modem **9013**. Resultantly, video information of high picture quality can be continuously transmitted and it is also possible to communicate with the Internet. In particular, the broadcast signal is required to be presented by synchronizing the time information sent from the broadcasting station with that on the receiver side. According to the embodiment, the time information can be appropriately controlled without deteriorating the quality of the video information.

Description will now be given supplementally of the High Definition Digital Multimedia Interface (HDMI). FIG. **7** shows an example the HDMI configuration mainly including a transmission side and a reception side. The transmission side includes a transmitter section **1601** and a transmission controller section **1603** to control the transmitter section **1601**. The transmitter section **1601** encodes a video signal (Y, Pb, Pr) and an audio signal to output resultant signals to a receiver section **1604**. Also, the transmitter section **1601** includes a TMDS encoder circuit **1602** which converts the video signal (Y, Pb, Pr) and the audio signal respectively into serial video data and serial audio data. On the other hand, the reception side includes a receiver section **1604** and a reception controller section **1606** to control the receiver section **1604**. The receiver section **1604** receives the video data and the audio data from the transmitter section **1601** and conducts a TMDS decoding operation for the data by a TMDS decoder circuit **1605** to thereby reproduce baseband video data and baseband audio data. A CEC line **1607** is an apparatus control line to transmit a control signal for apparatuses. Display specification information known as "DDC" is transmitted via a DDC line **1608**. The reception side transmits to the transmission side a Hot Plug Detect (HPD) signal **1609** indicating that a connection is established between apparatuses of the transmission and reception sides.

To conduct transmission according to the HDMI standard, apparatuses mutually recognize in a procedure as follows. A physical address is obtained via the DDC line. The physical address is an identification number to discriminate an associated apparatus. By use of a CEC bus for bidirectional connection, a logical address is obtained for bidirectional communication of each apparatus. The logical address is identification information defining a category of each apparatus, e.g., a display or a recording apparatus.

FIG. **5** is a diagram to supplementally explain a radio interface **11** between the video processing apparatus **100** and the video display apparatus **200**. In FIG. **5**, the apparatuses **100** and **200** are almost the same as those described in conjunction with, for example, FIG. **1**. To simplify explanation, for the constituent components of the apparatus **100**, only the radio interface circuit **133** is shown in FIG. **8** and the other constituent components are not shown. For the constituent components of the display apparatus **200**, only the radio input/output interface circuit **2012** is shown and the other constituent components are not shown. The interface circuits **133** and **2012** are bidirectional interfaces.

In FIG. **5**, a channel between antennas **81** and **84** and a channel between antennas **82** and **85** are channels to bidirectionally transmit a video signal, an audio signal, and control signals indicating copyright protection and a replication restriction condition of contents. On the other hand, a channel between antennas **83** and **86** is disposed to transmit an inter-apparatus control signal. Bit selection circuits **811** and **812** receive the video signal, the audio signal, the control signals indicating copyright protection and a replication restriction condition of contents, and the inter-apparatus control signal. In the demodulation, the QPSK demodulation scheme is more resistive against transmission errors as compared with the 64QAM demodulation scheme. For the transmission efficiency, the 64QAM demodulation scheme is superior to the QPSK demodulation scheme. Description will now be given of a situation wherein a video signal, an audio signal, and control signals indicating copyright protection and a replication restriction condition of contents are fed from the video processing apparatus **100** to the video display apparatus **200**. Assume in the operation that the transmission direction from the apparatus **100** to the apparatus **200** is an uplink direction and the transmission direction from the apparatus **200** to the apparatus **100** is an downlink direction.

To transmit information, the video processing apparatus **100** determines, by a carrier detector circuit, not shown, a state of an associated transmission path, i.e., whether or not the channel is reserved for another apparatus. In the carrier detection, a check is made to determine whether or not a carrier is detected in a predetermined frequency band for a predetermined period of time. If it is detected by the detector that the channel is occupied by another apparatus, the check is again carried out after a lapse of a predetermined period of time to determine whether or not an available channel is present. If such available channel is present, the condition is notified to the microprocessor **115** of the video processing apparatus **100**. The microprocessor **115** outputs from a QPSK modem circuit **803** a channel use request signal as an inter-apparatus control signal to secure the channel use right. Thereafter, the microprocessor **115** sends a transmission request signal to a bit selection circuit **811**. An error control circuit **843** adds an error control bit for error detection and correction to the transmission request signal and then transfers the signal to the QPSK modem **803**. The modem **803**

conducts a QPSK modulation for the signal to resultantly transmit a radio signal via the antenna **83** to the display apparatus **200**. The apparatus **200** then receives the radio signal by the antenna **86**, carries out a QPSK demodulation for the signal by a QPSK modem **806**, conducts error detection and correction control for the demodulated signal by an error control circuit **847** to produce an inter-apparatus control signal, and delivers the signal to the bit selection circuit **812**.

The microprocessor in the video display apparatus **200** decodes the inter-apparatus control signal and receives the transmission request signal from the video processing apparatus **100** together with apparatus category information regarding the apparatus **100** (information to identify a category indicating whether the associated apparatus is a display apparatus or a recording apparatus) and an apparatus identification number of the apparatus **100**. An image to urge the user to determine whether or not a connection is established to the video processing apparatus **100** is presented on a display screen of the display apparatus **200**. In response thereto, the user indicates allowance for the connection by using an input device such as a remote controller of the display apparatus **200**. Thereafter, between the apparatuses **100** and **200**, the apparatus category information and the identification number to identify each of the apparatuses are communicated to exchange information to observe the copyright protection and the replication restriction condition of the content. If there does not exist any problem, it is allowed that the apparatuses **100** and **200** are connected to each other. In a situation wherein the connection is meaningless, for example, each of the apparatuses **100** and **200** is an input or output dedicated unit or the copyright protection or the replication restriction condition of the content is not observed, the connecting operation is interrupted and an indication of the condition is displayed on the apparatuses **100** and **200**. Description will now be given of a situation wherein the copyright protection and the replication restriction condition of the content are observed.

By using the video signal, the audio signal, and the control signal indicating the copyright protection and the replication restriction condition of the contents associated with the video and audio signals which are inputted to an interface circuit **172**, two bits are selected from the Most-Significant Byte (MSB) of the video signal so that error detection and correction control bits are added thereto by an error control circuit **841** and the resultant signal is fed to a QPSK modem circuit **801**. The modem circuit **801** conducts a QPSK modulation for the signal and then transmits an associated radio signal from the antenna **81**. To the remaining third to eighth bits, an error control circuit **842** adds error detection and correction control bits to send the resultant signal to a 64QAM modem circuit **802**. The modem **802** carries out a 64QAM modulation for the signal and resultantly transmits a radio signal from the antenna **82**.

In the video display apparatus **200**, a QPSK modem circuit **804** conducts a QPSK demodulation for the signal received via the antenna **84** and an error control circuit **845** carries out error control for the resultant signal to output two high-order bits of the video signal to the bit control circuit **812**. For the remaining signals received via the antenna **85**, a 64QAM modem circuit **805** conducts a 64QAM demodulation. For the resultant signal, an error control circuit **846** carries out error control to output the obtained signal to the bit control circuit **812**.

Description will now be given of the inter-apparatus control signal. When an inter-apparatus control signal is sent in a d the bit selection circuit **812** via the error control circuit **847** to the QPSK modem circuit **806** to be demodulated. The demodulated signal is delivered from the antenna **86**. The video processing apparatus **100** receives the signal by the antenna **83** to send the signal to the QPSK modem circuit **803**. For the signal, the circuit **803** conducts a QPSK demodulation. For the demodulated signal, an error detection and correction is carried out by the error control circuit **843** to feed the resultant signal to the bit selection circuit **811**. Conversely, when an inter-apparatus control signal is transmitted in an uplink direction, i.e., from the video processing apparatus **100** to the video display apparatus **200**, the signal is fed from the bit selection circuit **811** via the error control circuit **843** to the QPSK modem circuit **803** to be modulated. The modulated signal is outputted from the antenna **83**. The display apparatus **200** receives the signal by the antenna **86**. For the signal, the modem **806** conducts a QPSK demodulation. For the demodulated signal, the error control circuit **847** conducts an error detection and correction to send the resultant signal to the bit selection circuit **812**. By virtue of the operation, there is obtained an advantage that for the inter-apparatus control signal which is important to construct the system, an erroneous operation is less frequently occurs even in a noisy environment.

In the configuration of the embodiment, for two high-order bits of the digital signal, there can be conducted the transmission highly resistive against noise with a relatively low transmission rate. That is, by using the fact that higher order bits of a video signal more strongly affect the picture quality, two bits are taken out from the video signal in order of MSB and a transmission path using the QPSK modulation is allocated to the information of these two bits, to thereby preventing deterioration of the picture quality. In a system in which the audio information is more important than the video information, the transmission path using the QPSK modulation may be allocated to important bits, e.g., two high-order bits of the audio signal.

When a human perceives an image on a screen, a higher-frequency is less influential as compared with a lower-frequency component for the frequency component in the horizontal direction of the screen and that in the vertical direction thereof. For a moving object on the screen, it is likely that the human eyes cannot appropriately follow a high-speed movement of the object. By using these tendencies, it is also possible that in the horizontal direction of the screen, the signal is subdivided into a lower-frequency component and a higher-frequency component so that the QPSK modulation is used for the lower-frequency component and the 64QAM modulation is employed for the higher-frequency component. As a result, within the limited transmission bands, the noise resistivity can be increased for important information and the overall transmission capacity is secured. Similarly, it is possible that in the vertical direction of the screen, the signal is subdivided into a lower-frequency component and a higher-frequency component so that the QPSK modulation is used for the lower-frequency component and the 64QAM modulation is employed for the higher-frequency component. Resultantly, within the limited transmission bands, it is possible to heighten the noise resistivity for important information and the overall transmission capacity is secured. Additionally, by combining the operation for the frequency component in the horizontal direction of the screen with that for the frequency component in the vertical direction of the screen, the noise resistivity can be strengthened for desired