no connection to bridge 30 or controller 32, and to user terminal 13 via interconnection 43.

[0016] Similarly, user terminal 11 is interconnected to user terminal 12 via interconnection 52; and to user terminal 13 via interconnection 53, which is shown in a dashed line in part to indicate that there is no connection to bridge 30 or controller 32. User terminal 12 is connected to user terminal 13 via interconnection 63.

[0017] A preferred embodiment of the present invention includes each user terminal 10-14 negotiating with the other user terminals directly via session initiation protocol and the internet to determine what compatible codec the terminals have with one another.

[0018] As an example, user terminal 10 originates the conference call and includes two codecs 80 and 82 while user terminal 11 includes three codecs 81, 82 and 83. As a result, user terminals 10 and 11 will negotiate the use of a codec by each of the terminals via internet interconnection 41. User terminals 10 and 11 may have many or only one codec in common. This particular common codec is codec 82 and will be selected between terminals 10 and 11.

[0019] User terminal 10 then will negotiate with user terminal 12 via internet interconnection 42. User terminal 12 includes only one codec 82. Therefore, the compatible codec of the user terminals 10 and 12 will be selected so that communication may be established between user terminals 10 and 12. This compatible codec is codec 82. If a different codec other than 82 was common between user terminals 10 and 12 this would mean that user terminal 10 must renegotiate use of the codec with user terminal 11 so as to establish a new common codec.

[0020] Similarly, user terminal 10 will negotiate selection of a codec via interconnection 43 with user terminal 13. In this example, user terminal 13 has a successful negotiation with user terminal 13 to codec 82. User terminal will not have to renegotiate the selection of a codec with the other user terminals 11 and 12. Again in this example, selection of an appropriate compatible codec could mean renegotiating the codec interconnections between user terminal 10 and user terminals 11 and 12. In this embodiment, user terminals 10 through 13 negotiate codecs to a "least common denominator" (LCD) codec. That is, a codec which will support communications between any of the user terminals 10-13. In this example, codec 82 met the criteria for LCD codec selection.

[0021] In another embodiment, the conference bridge may be asked to convert, mix and revocode certain data packets transmitted among the conference callers. Those data packets would be limited to those for users which have different codecs than the other users in the conference call. Therefore, this embodiment would support an arrangement in which each user terminal could speak in its native bearer format (codec translation) with the other conference callers. All packets would not have to be converted, mixed and revocoded; only the packets with those special user terminals having nonhomogeneous bearer formats would be required to be thusly processed. This conversion and mixing may be done by one or more of the user terminals instead of the conference bridge.

[0022] The control of setting up the appropriate codecs for interfacing and negotiating to either a least common denominator codec or to codecs which are variable may be extended to add additional parties to the conference call. When each of the callers in the conference call has been suitably negotiated for a corresponding codec, the data flow is then established through the conventional conference bridge 30 to each of the data ports of the user terminals 10-13.

[0023] Referring to FIGs. 2 and 3, a call origination 100 conference call arrangement of FIG 1 is shown. Party A (user terminal 10) is to enter into a conference call, block 101. Party A originates a call via internet interconnection 41 to party B (user terminal 11), block 103. Next, block 105 determines a common bearer format (codec) between parties A and B. A call is then originated to user terminal 12 via internet interconnection 42, block 107.

[0024] Next, block 109 negotiates a bearer format between party A and party C (user terminal 12), block 109. An attempt is made to negotiate the same bearer format (codec) as was negotiated between parties A and C. Block 110 determines whether there are any other user terminals (parties) to be interconnected to the conference call. If there are other parties to be coupled, then block 110 transfers control to block 107 for repeating the processes of blocks 107 and 109 with a new party to be coupled to the conference call. If no other user terminals (parties) are to be coupled to the conference call, then block 110 transfers control to block 111 via the NO path.

[0025] Next, block 111 determines whether the user terminal support multiple interoperable bearer formats. If each of the user terminals supports multiple bearer formats, control is transferred from block 111 to block 121 via the YES path. Block 121 indicates to each of the user terminals that each of the user terminals will transmit and receive in their own native bearer format.

[0026] If each of the user terminals will not support multiple bearer formats, block 111 transfers control to block 113 via the NO path. Block 113 determines whether the bearer formats which were negotiated are homogeneous. If the formats are homogeneous, block 113 transfers control to block 123 via the YES path. This indicates that there is a LCD codec for use by each of the parties. If the negotiated formats are not homogeneous, block 113 transfers control to block 115 via the NO path.

[0027] Block 115 determines whether any common bearer format exists among each of the parties or users. If no common format exists, there is a failure and the conference call bridge may not be set up to all members, block 115 transfers control to block 117 via the NO path. The conference call bridge may continue to set up for a subset of the initial parties or cancel the setup completely, block 117. If a common bearer format exists, block

115 transfers control to block 119 via the YES path. Block 119 modifies A, B, C, etc. bearer formats to obtain a common bearer format between the parties in the conference call. Then block 119 transfers control to block 123.

[0028] Block 123 originates call to conference bridge 30 with all the parties or users being addressed. The conference bridge establishes the data path communications via conference bridge 30 and controller 32, block 125. The bridge for conference calling is then established, block 127.

[0029] In response to the call origination process 100, conference bridge executes, block 125, the following setup procedure, block 141.

[0030] For example, the conference bridge 30 receives the origination request from party A with a list of targets to connect to the conference call of parties B and C, block 143. Block 145 originates the data hook up to parties B and C.

[0031] Conference bridge 30 sends a message to parties A, B and C (user terminals 10, 11 and 12) via internet interconnections 44, 54 and 64 to use the conference bridge as an end point for the voice packet data transmissions, block 147. The conference bridge is then an established block 149 and procedure 140 is ended. The user terminals update their states to reflect that the conference bridge Is now the bearer endpoint, instead of the user terminals. The conference bridge is established and procedure 100 is also ended, block 127.

[0032] Turning now to FIG. 4, a flow chart of a "token" or control passing arrangement is shown. Once the conference bridge is established, control of speech is passed among the users via their user terminals. The real time protocol (RTP) is a protocol used for carrying the bearer traffic, and is associated with the session initiation protocol (SIP). SIP negotiates the kind of bearer/payloads to be transported in the RTP packets. There is a particular indicator in the header of the RTP voice packet which designates the voice packet as a packet with silence. This indicator is readily ascertainable without examining each bit of the voice sample in the packet.

[0033] While in a conference bridge arrangement block 201, the controller of the conference bridge detects if there is speech on any "leg" or input of the conference bridge, block 203. That is, the conference bridge detects the first user terminal to provide a speech or voice input. If no speech input is detected, block 203 transfers control again to make the detection by transferring control to itself via the NO path. Silence is the lack of speech. Silence may be detected by an indicator in the header of the voice packet or by sampling the data of the packet itself. When speech is detected, block 203 will transfer control to block 205 via the YES path.

[0034] Block 205 will disable the other inputs ("legs") of the conference bridge from providing any input to the conference bridge. That is, the first speaker will seize control of the conference and other speakers will be disabled from having their voice transferred to each of the users in the conference call. Only one speaker will speak at a given time.

[0035] The next block 207 initiates a "babble" timer. A babble timer is a timer set to prevent one speaker on the conference call from tying up and monopolizing the conference forever from ("babbling") or if a noisy background causes the user terminal to never generate the silence packets, thereby monopolizing the conference bridge. The intent of the babble timer is to force the passage of control or token passing of the right to speak to another caller in the conference call at a predetermined time. The term "babble" is to prevent one speaker from babbling on forever, to prevent the noisy environment from never allowing silence packets to be generated.

[0036] The next block 209 takes the input voice packet and replicates it for transmission to each of the legs or inputs of the conference call. That is, each caller in the conference call, including the speaker, receives back the voice packets input from the speaking party including the speaking party.

[0037] Next, a determination is made as to whether the "babble" timer has expired, block 211. This indicates that one speaker has monopolized the conference call and it is time to pass the control or token to another speaker in the conference call who may be initiating speech (trying to speak). If the babble timer has expired, block 211 transfers control to block 213 via the YES path. Block 213 enunciates a cut off tone or message to the present speaker so that the speaker will be aware that he is temporarily losing control of the token or control of the conference call. This means that the speaker is being forced to relinquish his ability to speak to the others in the conference call in an uninterrupted fashion.

[0038] Block 215 disables the present speaker's input leg temporarily. This is so that the other input legs may be examined for speech and a determination of passing control or the token to another speaker may be made. Block 215 then transfers control to block 203 which detects bearer speech on an input leg, except for the disabled past speaker's input. If speech is not detected after a predetermined number of times of checking by block 203, the past speaker's input will be re-enabled and he will again be able to seize the token or control of the conference call. The reader is reminded that speech is quite slow compared to today's real time processing capabilities and that the checks made by the conferencing bridge method 200 are done in fractions of a second so that the speaker who is disabled temporarily may not even know that he has been temporarily disabled from speaking. If block 203 detects speech of another speaker, the steps of blocks 205, 207, 209, 211 and 217 are then performed.

[0039] If the babble timer has not expired, block 211 transfers control to block 217 via the NO path. Block 217 detects silence. Silence in a real time protocol SIP configuration is indicated by a particular setting in the header of each packet of speech information. Also, silence may be detected by examining the actual input stream

which would be coded to indicate silence. The latter solution requires considerable real time processing power. If silence is detected, block 217 transfers control to block 203 via the NO path which indicates that the past speaker has relinquished the token and the conference bridge is waiting to detect a new speaker by block 203. When this happens, each of the above mentioned steps is again repeated. If silence is not detected, block 217 transfers control to block 209 which replicates the input packet to all the output legs (user terminals) of the conference call. This means that the present speaker has not relinquished control and the timer has not indicated to him to release control and he is continuing to talk with his voice packets of information being distributed to each of the conference callers including himself.

[0040] In the token or control passing arrangement 200, token control is simplified by examining the header of the real time protocol to determine a data packet of silence in the preferred embodiment. This greatly simplifies the processing capability required for the conference call and such conferencing circuitry may be employed in a user terminal or even in a mobile handset. In an alternate embodiment, each data packet may be examined for the voice coded silence (as well as moise detection to determine "babble" or a noisy environment). This embodiment requires considerably more real time processing power.

[0041] FIG. 5 depicts a block diagram of the conference bridge 30. Hardware 310 includes a processor 311 interconnected with memory 312 and internet protocol based interface 313. Memory 312 is also interconnected with IP based interface 313. IP based interface 313 provides the bearer traffic and control signaling inputs and outputs mentioned above.

[0042] The software 320 of the conference bridge includes SIP user agent server 321 which is interconnected to packet replicator 322. Packet replicator 322 is interconnected with the token passing control logic 323 which is shown in FIG. 4. The SIP user agent server software 321 is depicted in FIGs. 1-3 discussed above. Packet replicator 322 is believed well known in the art and will not be discussed further. Token passing control logic 323 was previously described in FIG. 4. These various functions interact as discussed above to provide the conference bridge arrangement of the present invention.

[0043] New wire line cable and DSL infrastructure is being positioned to support voice along with data. In addition, third generation mobile networks are currently being developed. Much of the new infrastructures use internet protocol technology which enables voice over internet protocol services to be supplied. The present invention leverages off of session initiation protocol applicable to such voice over internet protocol capabilities to provide a conference bridge in accordance with the above description. The present invention simplifies the way in which conference calling can work in a voice over internet protocol environment. The present conference bridge arrangement allows negotiation of codecs directly between each of the participants in a conference call. This negotiation occurs over the internet which allows each user to be found regardless of whether he is at his typical location or is in a mobile location. This eliminates the need for complex conversions and vocoding to occur at the central conference bridge. The conference bridge is greatly simplified to be a basically packet replicator and distributor. This greatly simplifies the requirements for conference bridges located within telephone operating companies or conference facilitator providers.

[0044] The conference bridge is removed from handling the set up of the conference call and handles just the transmission of bearer traffic between the conference call participants. Conventional conference arrangements require the conference bridge to include virtually every conceivable codec for information interchange among varied users. In addition, the conference bridge needs to include much processing power in the form of digital signal processors to implement conversion, mixing and revocoding functions required. The present invention eliminates all such functional requirements in the conference bridge by having the user terminals themselves negotiate a compatible codec (bearer format) with the other user terminals in the conference call. Suitably equipped user terminals including remote terminals may perform the conference bridge function directly.

[0045] The token control arrangement leverages off of the real time protocol (RTP) to quickly detect silence for passing the token to another caller in the conference. In addition, the token passing arrangement allows for cutting off the speaker who is monopolizing the conference call. The control for such token passing arrangements may reside even in the user terminal of one of the conference callers.

[0046] Although the preferred embodiment of the invention has been illustrated, and that form described in detail, it will be readily apparent to those skilled in the art that various modifications may be made therein without departing from the spirit of the present invention or from the scope of the appended claims.

Claims

1. A token control method for an internet conference call among a plurality of user terminals, the token control method comprising the steps of:

   detecting (203) bearer traffic from a first user terminal of the plurality of user terminals;
   detecting (217) silence from a real time protocol of data packets being transmitted by the first user terminal of the plurality of user terminals; and
   if the step of detecting silence is successful, detecting (203) bearer traffic from the real time

protocol of a second user terminal of the plurality of user terminals.

2. The token control method as claimed in claim 1, wherein there is further included a step of establishing (321) the internet conference call via a session initiation protocol over an internet.

3. The token control method as claimed in claim 1, wherein the step of detecting silence includes the step of detecting (217) an indication of silence from a header of at least one of the data packets in real time protocol.

4. The token control method as claimed in claim 3, wherein if the step of detecting silence is successful, there is further included the step of detecting (203) bearer traffic from the real time protocol of a second of the plurality of user terminals.

5. The token control method as claimed in claim 1, wherein the step of detecting silence includes the step of examining (323) data of the data packets for an indication of silence.

6. The token control method as claimed in claim 5, wherein if the step of detecting silence is successful, there is further included the step of detecting (323) bearer traffic from the real time protocol of a second of the plurality of user terminals.

7. The token control method as claimed in claim 1, wherein there is further included the step of disabling (205) an input of each of another of the plurality of user terminals when bearer traffic is detected from the first user terminal of the plurality of user terminals.

8. The token control method as claimed in claim 1, wherein there is further included the step of starting (207) a timer for the first user terminal to measure a length of time the first user terminal continuously speaks.

9. The token control method as claimed in claim 1, wherein there is further included the step of replicating (209, 322) the data packets of the first user terminal for transmission to each of the plurality of user terminals.

10. The token control method as claimed in claim 1, wherein there is further included the step of replicating (322) the data packets of the first user terminal for transmission to each of the plurality of user terminals, if silence is not detected.

11. The token control method as claimed in claim 8, wherein there is further included the step of examining (211) the timer for determining whether the length of time has exceeded a predetermined length of time for continuous speaking by the first user terminal.

12. The token control method as claimed in claim 11, wherein there is further included the step of annunciating (213) a cut-off tone to said first user terminal, if the timer exceeded its predetermined length of time.

13. The token control method as claimed in claim 11, wherein there is further included the step of temporarily disabling (215) an input of said first user terminal, if the timer exceeded its predetermined length of time.

14. The token control method as claimed in claim 13, wherein there is further included the steps of:

detecting (203) bearer traffic from the real time protocol of the second user terminal of the plurality of user terminals; and
enabling (205) the input of the first user terminal.

15. The token control method as claimed in claim 14, wherein there is further included the step of iterating the steps of: detecting (203) bearer traffic; detecting silence from a real time protocol of data packets; and if the step of detecting (217) silence is successful, detecting (203) bearer traffic for the second user terminal.

16. The token control method as claimed in claim 14, wherein there is further included the step of replicating (209) the data packets of the second user terminal for transmission to each of the plurality of user terminals.

17. In a mobile user terminal a token control method for an internet conference call among a plurality of user terminals, the token control method comprising the steps of:

detecting (203) bearer traffic transmitted by a first mobile user terminal of the plurality of user terminals;
detecting (217) silence from a real time protocol of data packets being transmitted by the first mobile user terminal; and
if the step of detecting silence is successful, detecting (203) bearer traffic from the real time protocol of a second mobile user terminal by the first mobile user terminal.

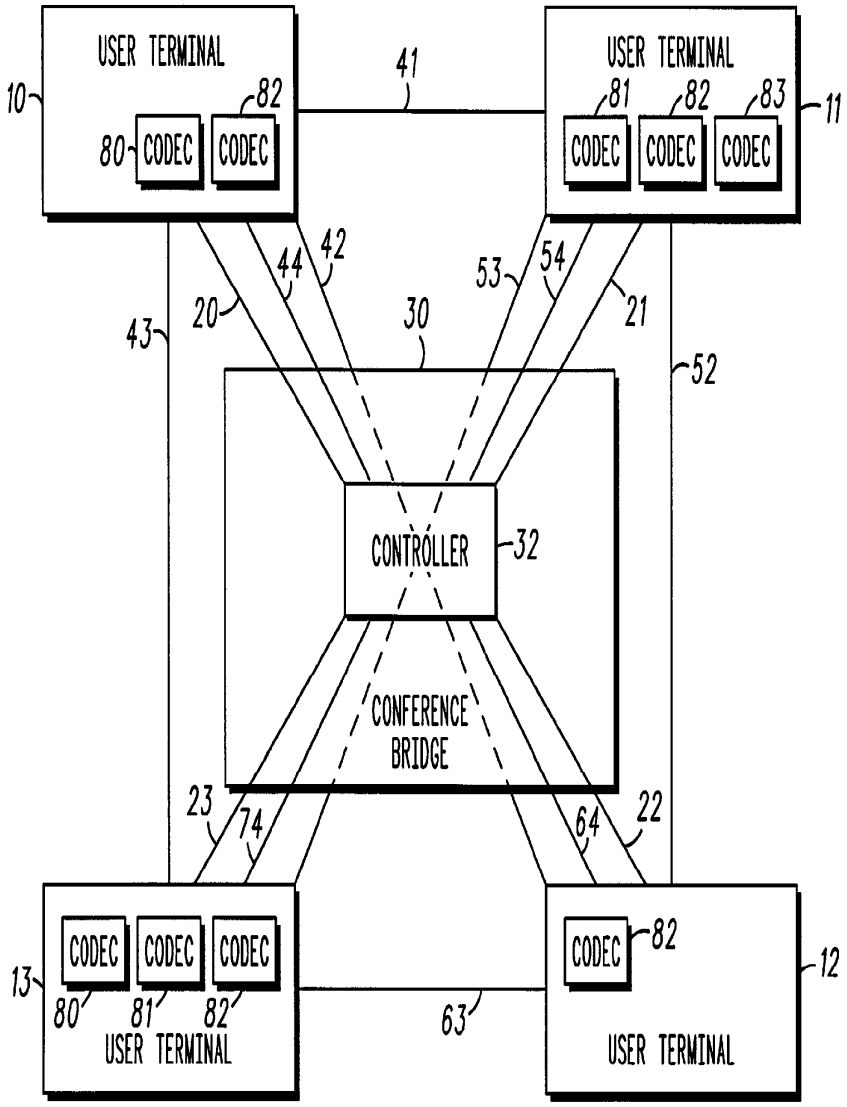
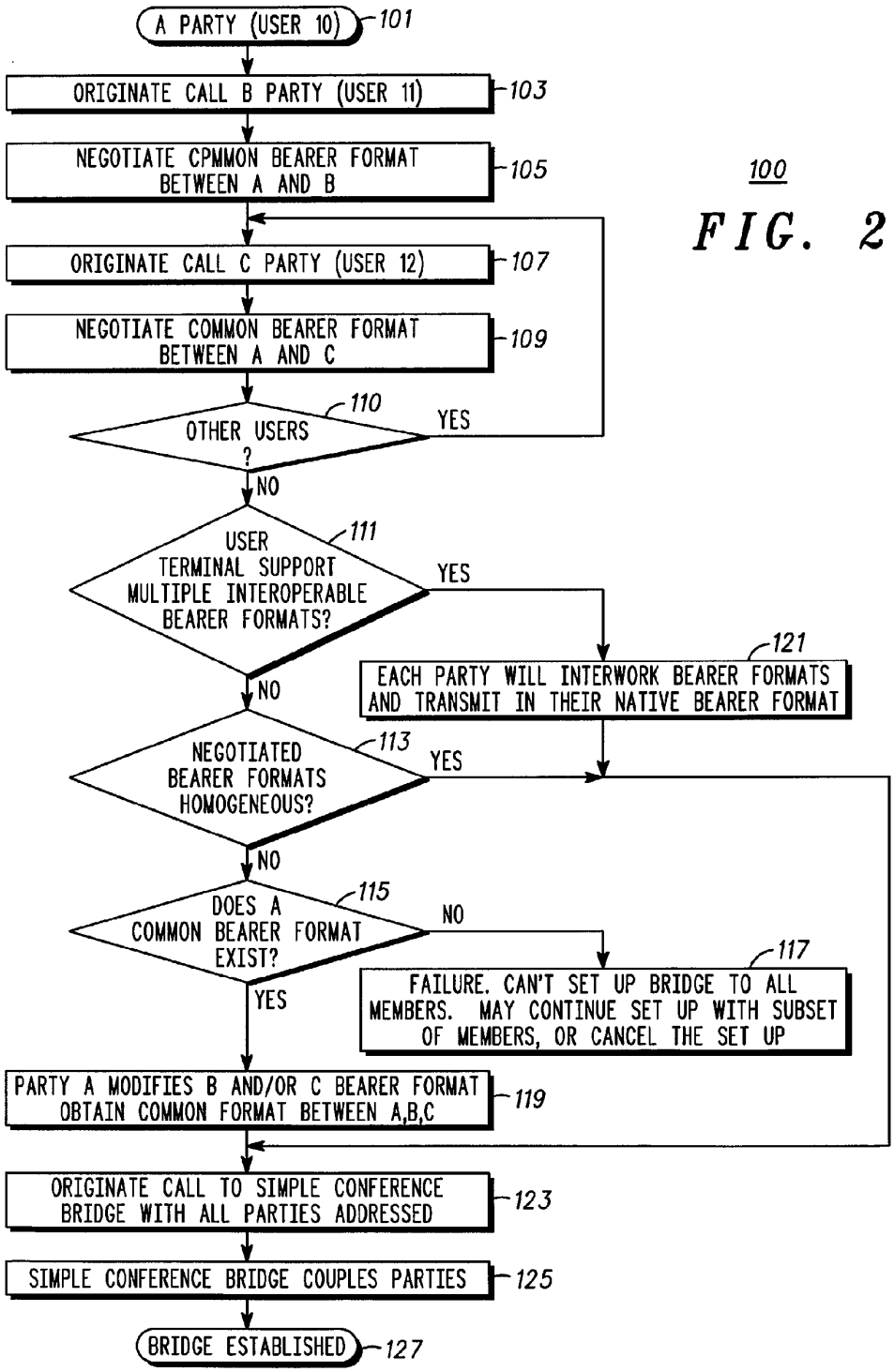

USER TERMINAL
10
80
CODEC
CODEC
82
41
USER TERMINAL
11
81
82
83
CODEC
CODEC
CODEC
42
44
53
54
20
21
30
43
52
CONTROLLER
32
CONFERENCE BRIDGE
23
74
64
22
CODEC
CODEC
CODEC
13
80
81
82
USER TERMINAL
63
CODEC
82
12
USER TERMINAL

FIG. 1


A PARTY (USER 10)
101
ORIGINATE CALL B PARTY (USER 11)
103
NEGOTIATE CPMMON BEARER FORMAT BETWEEN A AND B
105
ORIGINATE CALL C PARTY (USER 12)
107
NEGOTIATE COMMON BEARER FORMAT BETWEEN A AND C
109
OTHER USERS ?
110
YES
NO
USER TERMINAL SUPPORT MULTIPLE INTEROPERABLE BEARER FORMATS?
111
YES
NO
EACH PARTY WILL INTERWORK BEARER FORMATS AND TRANSMIT IN THEIR NATIVE BEARER FORMAT
121
NEGOTIATED BEARER FORMATS HOMOGENEOUS?
113
YES
NO
DOES A COMMON BEARER FORMAT EXIST?
115
NO
YES
FAILURE. CAN'T SET UP BRIDGE TO ALL MEMBERS. MAY CONTINUE SET UP WITH SUBSET OF MEMBERS, OR CANCEL THE SET UP
117
PARTY A MODIFIES B AND/OR C BEARER FORMAT OBTAIN COMMON FORMAT BETWEEN A,B,C
119
ORIGINATE CALL TO SIMPLE CONFERENCE BRIDGE WITH ALL PARTIES ADDRESSED
123
SIMPLE CONFERENCE BRIDGE COUPLES PARTIES
125
BRIDGE ESTABLISHED
127

100

FIG. 2

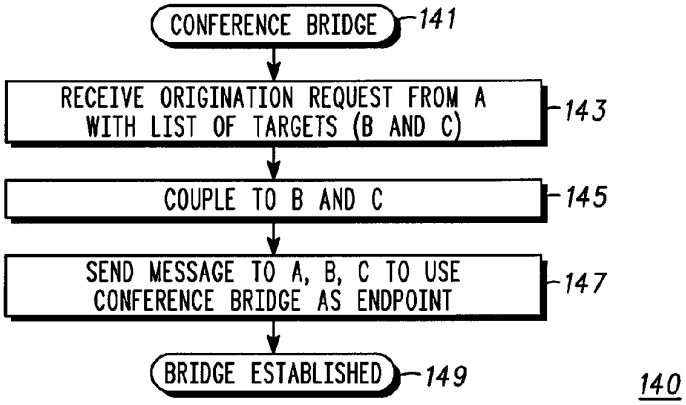

CONFERENCE BRIDGE
141
RECEIVE ORIGINATION REQUEST FROM A WITH LIST OF TARGETS (B AND C)
143
COUPLE TO B AND C
145
SEND MESSAGE TO A, B, C TO USE CONFERENCE BRIDGE AS ENDPOINT
147
BRIDGE ESTABLISHED
149
140

FIG. 3

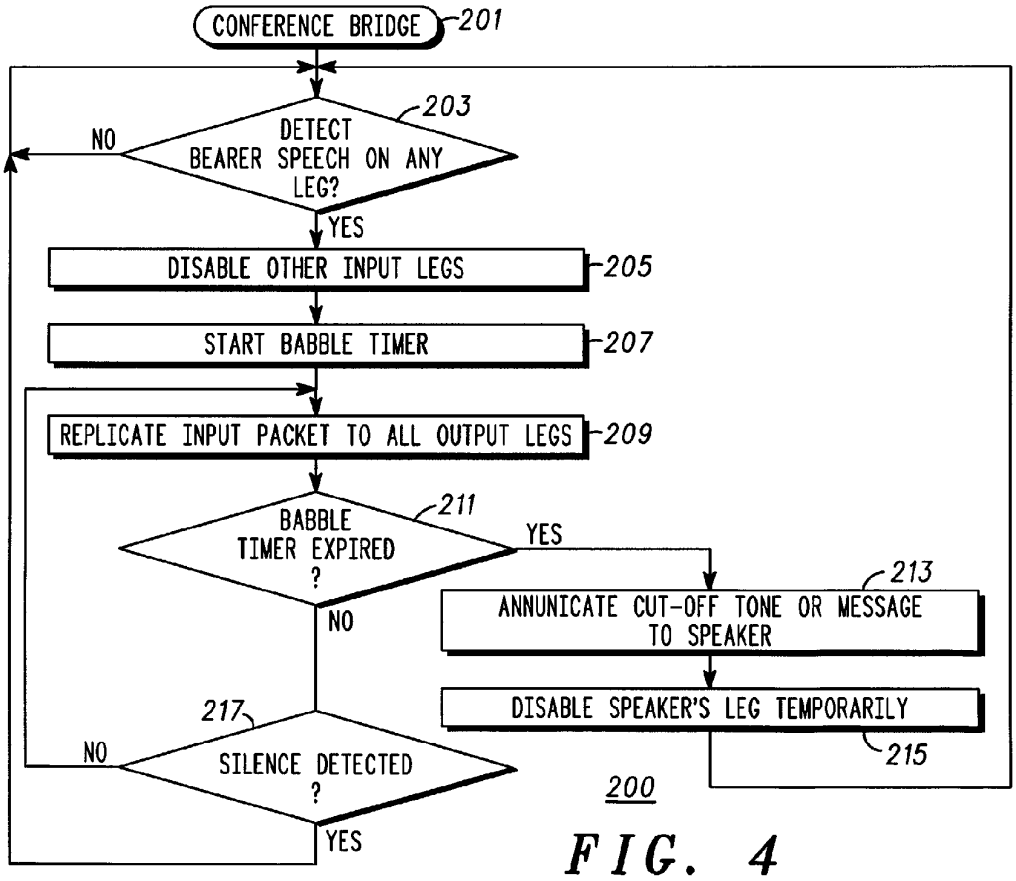

CONFERENCE BRIDGE
201
DETECT BEARER SPEECH ON ANY LEG?
203
NO
YES
DISABLE OTHER INPUT LEGS
205
START BABBLE TIMER
207
REPLICATE INPUT PACKET TO ALL OUTPUT LEGS
209
BABBLE TIMER EXPIRED ?
211
YES
NO
ANNUNICATE CUT-OFF TONE OR MESSAGE TO SPEAKER
213
DISABLE SPEAKER'S LEG TEMPORARILY
215
SILENCE DETECTED ?
217
NO
YES
200

FIG. 4

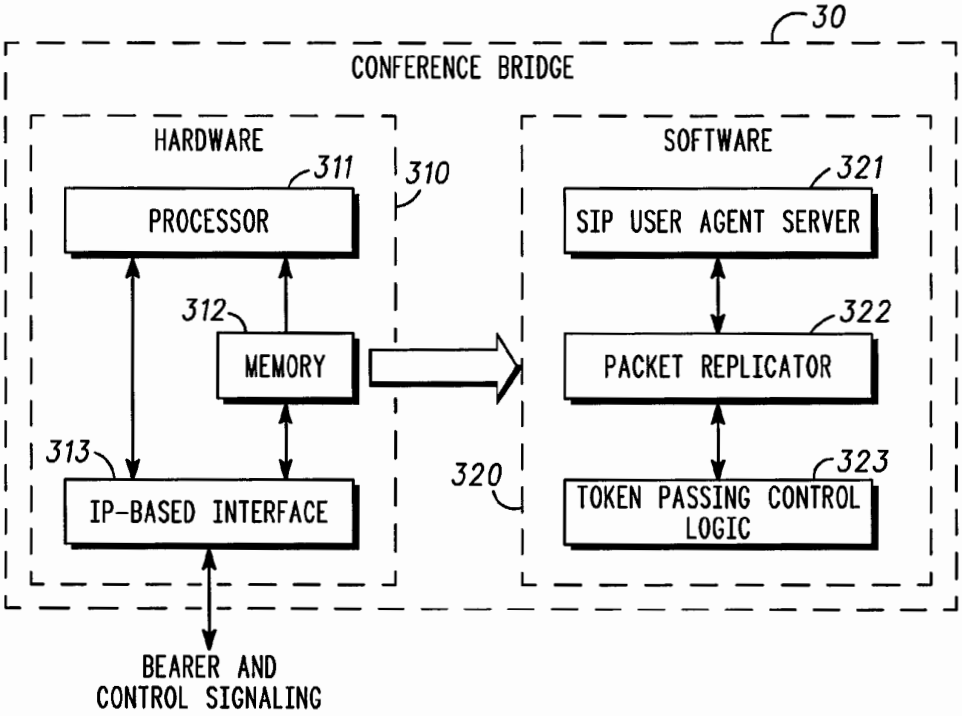

30
CONFERENCE BRIDGE
HARDWARE
311
310
PROCESSOR
312
MEMORY
313
IP-BASED INTERFACE
SOFTWARE
321
SIP USER AGENT SERVER
322
PACKET REPLICATOR
320
323
TOKEN PASSING CONTROL LOGIC
BEARER AND CONTROL SIGNALING

FIG. 5

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 02 00 2956

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	US 6 175 871 B1 (SIDHU IKHLAQ S ET AL) 16 January 2001 (2001-01-16) * abstract * * column 8, line 35 - line 50 * * column 9, line 14 - line 20 * * column 13, line 50 - line 59 *	1-7,9, 10,17	H04L12/18 H04L29/06 H04M3/56
Y		8,11-16	
X	EP 0 779 732 A (ONLIVEO TECHNOLOGIES INC) 18 June 1997 (1997-06-18) * abstract * * page 7, line 24 - line 29 * * page 8, line 25 - line 32 *	1-7,9, 10,17	
Y	US 6 009 469 A (HUTTON GLENN W ET AL) 28 December 1999 (1999-12-28) * abstract * * column 8, line 41 - line 50 *	8,11-16	

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

H04L
H04M

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
MUNICH	15 July 2002	Hilbig, S

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 02 00 2956

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

15-07-2002

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			US	6275490	B1	14-08-2001

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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Priority number(s): CN20061101814 20060711

Also published as: CN100466531 (C)

Abstract of CN101106469 (A)

A control system and the control method for the public presentation meeting are provided. The control system comprises a plurality of computers, a gateway, a projector, and presentation images are stored in the computers. The control method includes: the first computer is connected with the network by the gateway; a internet users list is downloaded through the gateway; and then the presentation consult signal is sent to the second computer in the users list; if the second computer permits the presentation consult, the first computer obtains the authorization to access the presentation images in the second computer, and transmits the presentation images to the projector through the gateway. The invention makes the the meeting more fluent and efficient.

[19] 中华人民共和国国家知识产权局

[51] Int. Cl.
H04L 12/18 (2006.01)
G06F 15/163 (2006.01)

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[71] 申请人 奇扬网科股份有限公司
地址 台湾省台北县
[72] 发明人 张国隆 郑博文 陈祥立
[74] 专利代理机构 北京三友知识产权代理有限公司
代理人 任默闻

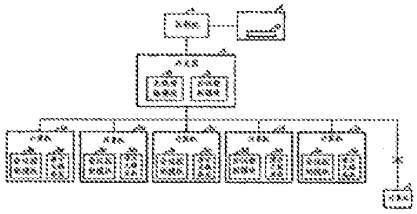
权利要求书 2 页 说明书 6 页 附图 4 页

[54] 发明名称

多方演示文稿会议的控制系统与方法

[57] 摘要

一种多方演示文稿会议的控制系统与方法，控制系统包括：多个计算机、一网关器以及一投影机，计算机中并储存有演示文稿画面，其控制方法包括：利用第一计算机与网关器进行网络连结；透过网关器下载网络使用者名单；之后再对使用者名单中的第二计算机发出演示文稿征询信号；若第二计算机同意演示文稿征询，第一计算机取得存取(access)第二计算机演示文稿画面的权限，并将演示文稿画面透过网关器传送至投影机。本发明使会议的进行更加流畅、效率更高。



1.一种多方演示文稿会议的控制系统，其特征在于，包括:

多个计算机，各计算机内部各自储存着一演示文稿画面;

一网关器，与多个计算机进行网络连接并进行数据传送；以及

一会议控制模块，控制一计算机的权限，使其它计算机对该计算机的演示文稿画面进行存取。

2.如权利要求 1 所述的控制系统，其特征在于，会议控制模块储存于网关器中，多个计算机中的任一个计算机与网关器进行网络连接时，会议控制模块被下载至该计算机中。

3.如权利要求 1 所述的控制系统，其特征在于，会议控制模块将计算机演示文稿画面透过网关器传送至网络的多个计算机中。

4.如权利要求 1 所述的控制系统，其特征在于，还包括一投影机，会议控制模块将计算机的演示文稿画面透过网关器传送至一投影机。

5.如权利要求 1 所述的控制系统，其特征在于，会议控制模块透过网关器取得一使用者名单显示计算机的使用状态，以及一权限同意名单显示计算机的权限设定状态。

6.一种多方演示文稿会议的控制方法，其特征在于，多方演示文稿内容分别储存在多个计算机中，并且多个计算机透过一网关器形成一网络连接，其步骤包括:

利用第一计算机与网关器进行网络连接;

自网关器下载网络使用者名单;

对使用者名单中的第二计算机发出演示文稿征询讯号；以及

若第二计算机同意演示文稿征询，第一计算机取得存取第二计算机的演示文稿画面的权限。

7.如权利要求 6 所述的控制方法，其特征在于，第一计算机将第二计算机

的演示文稿画面透过网关器传送至一投影机。

8.如权利要求 6 所述的控制方法，其特征在于，第一计算机将第二计算机的演示文稿画面透过网关器传送至网络的多个计算机中。

9.如权利要求 6 所述的控制方法，其特征在于，当第一计算机取得存取第二计算机的演示文稿画面的权限时，第一计算机先将第二计算机列入权限同意名单中，之后再决定是否要传送第二计算机的演示文稿画面。

10.如权利要求 6 所述的控制方法，其特征在于，第二计算机发出一权限取消信号，主动取消第一计算机对第二计算机存取其演示文稿画面的权限。

多方演示文稿会议的控制系统与方法

技术领域

本发明涉及一种利用计算机进行演示文稿会议的控制系统与方法，特别涉及于一种可进行多方演示文稿会议的控制系统与方法。

背景技术

会议的目的在于意见的沟通以及信息的表达，而为了使会议的进行能够更流畅，会议数据(或演示文稿画面)的管理更方便，计算机和投影机已是会议中不可或缺的主要配备。

会议的进行方式大致可以区分为单方演示文稿方式以及多方演示文稿方式，单方演示文稿方式进行会议时，通常只有一个主讲人并以单向方式将其演示文稿画面讲述给与会人员，因此会场中只需要一部计算机与一部投影机，而主讲人必须先将演示文稿画面储存于该计算机中，再透过投影机将演示文稿画面放映出来，若与会人员有任何意见时，只能透过口述方式表达，而无法透过计算机与投影机表达其意见与信息，使得此种会议失去双向沟通的机会。

多方演示文稿方式会议则强调双向沟通，通常有其主题需要与会者共同讨论，并透过多方讨论以寻求解决之道，此种会议常见于学术研讨会、跨部门讨论会以及会议教学等，与会者通常各自有准备想要在会议中讨论的演示文稿画面，这些演示文稿画面多储存在与会者自己的计算机中。若每一个与会者需要轮流讲述其演示文稿画面时，则必须轮流将其计算机连接至投影机，才能够将其演示文稿画面放映出来。

请参阅图 1 所示，目前尚有一种网关器 2 可提供无线网络连接功能，将该网关器 2 与投影机 4 连接之后，多方演示文稿会议的与会者只要透过其计算机 1 登入网关器 2 提供的网络，便可以将自己的演示文稿画面透过网关器 2 与投影

机4将演示文稿画面投影至布幕8上。

然而，与会者无论是透过计算机直接连到投影机，或是透过网关器的无线网络连到投影机，可以想见的是，在进行多方演示文稿会议时，演示文稿人员必须不断地进行连接线的插拔动作，或是无线网络的登入、注销动作，使得会议进行非常不顺畅甚至会影响会议的效率。

发明内容

本发明的主要目的在于提供一种多方演示文稿会议的控制系统，该系统可以使会议的进行更顺畅更有效率。

本发明的另一目的在于提供一种多方演示文稿会议的控制方法，该方法可以使会议的进行更顺畅更有效率。

为了达到上述目的，本发明所提供多方演示文稿会议的控制系统包括：多个计算机、一网关器、一会议控制模块以及一投影机。上述计算机内部各自储存着一演示文稿画面，并且可与该网关器形成网络连接并进行数据传递，该会议控制模块可控制一计算机权限，使其它计算机可以对该计算机的演示文稿画面进行存取，并将演示文稿画面透过该网关器传送至投影机或多个计算机中。

本发明所提供的多方演示文稿会议的控制方法，其步骤：包括首先利用第一计算机与该网关器进行网络连接，再从网关器下载网络上使用者名单，再对使用者名单中的第二计算机发出演示文稿征询信号，若该第二计算机同意演示文稿征询，该第一计算机取得存取(access)该第二计算机的演示文稿画面的权限，最后再将第二计算机的演示文稿画面透过该网关器传送至一投影机或网络的多个计算机中。

其中，当该第一计算机取得存取该第二计算机的演示文稿画面的权限时，可先将第二计算机列入权限同意名单中，之后再决定是否要传送该第二计算机的演示文稿画面，使用者名单与权限同意名单可利用一会议控制模块整合在一起，而该会议控制模块可储存于网关器中，并在计算机与网关器进行网络连接

时将其下载至计算机中，此外，第二计算机也可发出一权限取消信号，主动取消该第一计算机对该第二计算机存取其演示文稿画面的权限。

由以上说明可知，利用本发明所提供的控制系统与方法在进行多方演示文稿会议时，任何一台计算机的使用者只要取得其它台计算机的存取权限，就可以将其演示文稿画面透过网关器传送至投影机或其它台计算机，使会议的进行更加流畅、效率更高。

附图说明

图 1 为利用现有技术进行多方演示文稿会议的示意图;

图 2 为本发明的多方演示文稿会议的控制系统架构图;

图 3 为本发明的使用者名单以及权限同意名单的示意图;

图 4 为本发明的多方演示文稿会议的控制方法流程图。

主要组件符号说明:

计算机 1	网关器 2	无线传输模块 21	会议控制模块 3
投影机 4	演示文稿画面 5	使用者名单 61	权限同意名单 62
计算机 7	布幕 8	密码 81	

具体实施方式

以下结合附图，详细说明本发明实施例的实施过程:

请参阅图 2 所示，图 2 为本发明一实施例的多方演示文稿会议的控制系统架构图。图中包括多个计算机、一网关器 2、一会议控制模块 3 以及一投影机 4，其中该网关器 2 具有无线传输模块 21 可与计算机形成网络连接并进行存取，会议控制模块 3 则是内置于网关器 2 之中，而投影机 4 则是与网关器 2 连接并进行数据传输。

上述计算机为参加多方演示文稿会议者所配备的计算机，至少包括第一计算机 1a、第二计算机 1b 以及第三计算机 1c，各计算机内部各自储存着一份演示

文稿画面 5，该演示文稿画面 5 可以是任何计算机 1 可显示出来的画面。当上述计算机 1 进入网关器 2 的无线信号范围时，可与网关器 2 形成网络连接以便加入多方演示文稿会议并进行数据传递。

会议控制模块 3 具有执行多方演示文稿会议的功能，对于第一次参加多方演示文稿会议的计算机 1 而言，以第一计算机 1a 为例，其可以透过网络连接从网关器 2 下载会议控制模块 3，当第一计算机 1 执行会议控制模块 3a 时，网关器 2 便会主动下载一使用者计算机名单 61 至第一计算机 1a，并同时对网络中所有计算机 1 的使用者名单 61 进行更新(如图 3 所示)。

此外，第一计算机 1a 也可透过会议控制模块 3a 对其他计算机 1 发出演示文稿征询信号以获得存取其演示文稿画面 5 的权限，当其它计算机 1 同意(granted)第一计算机 1a 的演示文稿征询信号时，会议控制模块 3a 便会建立一权限同意名单 62(如图 3 所示)，该权限同意名单 62 可以和使用者名单 61 整合在一起。第一计算机 1a 可随时透过会议控制模块 3a，对权限同意名单 62 中的任一计算机 1 发出一命令(command)，将该计算机 1 的演示文稿画面 5 透过网关器 2 传送至投影机 4 或所有计算机 1。

同样地，当其它计算机 1 对第一计算机 1a 发出演示文稿征询信号时，第一计算机 1a 也可以透过会议控制模块 3a 决定是否同意其它计算机 1 存取其演示文稿画面 5a 的权限。若第一计算机 1a 同意第二计算机 1b 存取其演示文稿画面 5a，之后也可以随时透过该会议控制模块 3a 取消第二计算机 1b 的存取权限。若第一计算机 1a 先同意第二计算机 1b 对其进行存取，后来又同意第三计算机 1c 对其进行存取时，此时第一计算机 1a 的会议控制模块 3a 会将权限设定给后同意者，即第三计算机 1c 取得第一计算机 1a 的存取权限。

此外，为了避免不相关人员透过计算机 7 连接至网关器 2 而干扰会议进行，在每一次网关器 2 与投影机 4 连接时，网关器 2 的会议控制模块 3 便会自动产生一组密码 81，并透过网关器 2 与投影机 4 将该组密码 81 投射至布幕 8 上，此时会场内的参加者在看到布幕 8 上的密码 81 后，将密码 81 输入至其所使用的

计算机 1 才能够进行多方演示文稿会议，而会场外的人员的计算机 7 纵可接收到网关器 2 的无线信号，但因为不知道密码 81，因此无法加入多方演示文稿会议。

请参阅图 4 所示，图 4 为本发明一实施例的多方演示文稿会议的控制方法流程图，其步骤包括：首先利用第一计算机与该网关器进行网络连接(见步骤，S41)，从网关器下载网络的使用者名单(见步骤，S42)，对使用者名单中的第二计算机发出演示文稿征询信号(见步骤，S43)，若第二计算机同意演示文稿征询，该第一计算机取得存取(access)第二计算机的演示文稿画面的权限(见步骤，S44)，最后再将第二计算机的演示文稿画面透过该网关器传送至一投影机或网络的多个计算机中(见步骤，S45)。

其中，当第一计算机取得存取第二计算机的演示文稿画面的权限时，第一计算机已将第一计算机加入其权限同意名单中，因此第一计算机可随时传送该第二计算机的演示文稿画面，而使用者名单与权限同意名单可利用一会议控制模块整合在一起。之后，若第三计算机也对第二计算机发出同意演示文稿征询，并获得第二计算机的同意时，将由最后获得第二计算机同意者取得存取权限，也就是第三计算机取得存取权限。此外，第二计算机也可发出一权限取消信号，主动取消第一计算机或第三计算机对其存取演示文稿画面的权限。

由以上说明可知，利用本发明所提供的控制系统与方法在进行多方演示文稿会议时，任何一台计算机只要取得其它计算机的演示文稿画面存取权限，便可以成为多方演示文稿会议的主机(host)，该主机的使用者只要透过会议控制模块所提供的权限同意名单，利用点选方式对名单中的计算机发出命令，进而将该计算机的演示文稿画面透过网关器传送至投影机或其它台计算机。

由于先于技术必须将所有演示文稿画面事先储存在一部计算机中，再依据开启、关闭各个演示文稿画面，之后才能够完成整个多方演示文稿会议，整个会议的过程不仅费时且烦琐。反之，本发明所提供的系统与方法在进行多方会议时，可事先将所有计算机的演示文稿画面开启，再由主机透过点选方式将各

计算机的演示文稿画面实时的传送出来，相对而言，会议的进行将会更流畅且更有效率，此外，任何计算机都可以成为主机，更可以增加多方会议的互动以及沟通效果。

以上仅为本发明的较佳实施例，上述实施例仅用于说明本发明的实施过程，并非用以限制本发明保护范围。

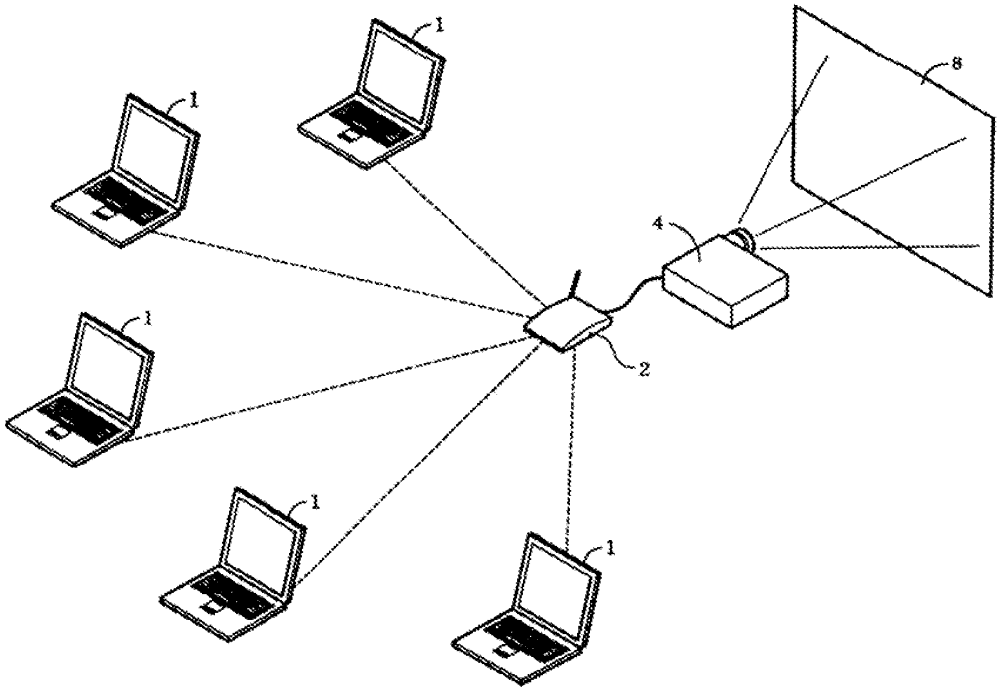


图 1

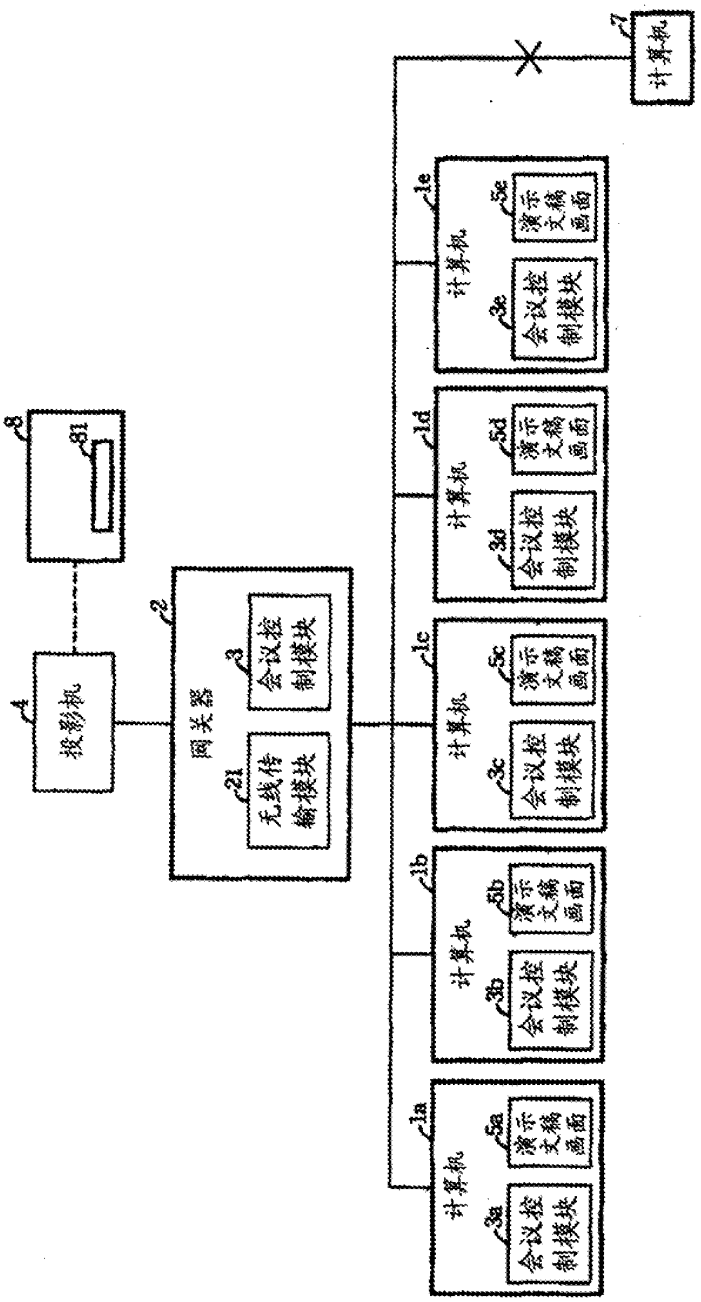

8
81
4
投影机
2
网关器
21
无线传输模块
3
会议控制模块
1a
计算机
3a
会议控制模块
5a
演示文稿画面
1b
计算机
3b
会议控制模块
5b
演示文稿画面
1c
计算机
3c
会议控制模块
5c
演示文稿画面
1d
计算机
3d
会议控制模块
5d
演示文稿画面
1e
计算机
3e
会议控制模块
5e
演示文稿画面
7
计算机

图 2

使用者名称	授权
第一计算机	是
第而计算机	是
第三计算机	否
第四计算机	否
第五计算机	是
⋮	⋮

图 3

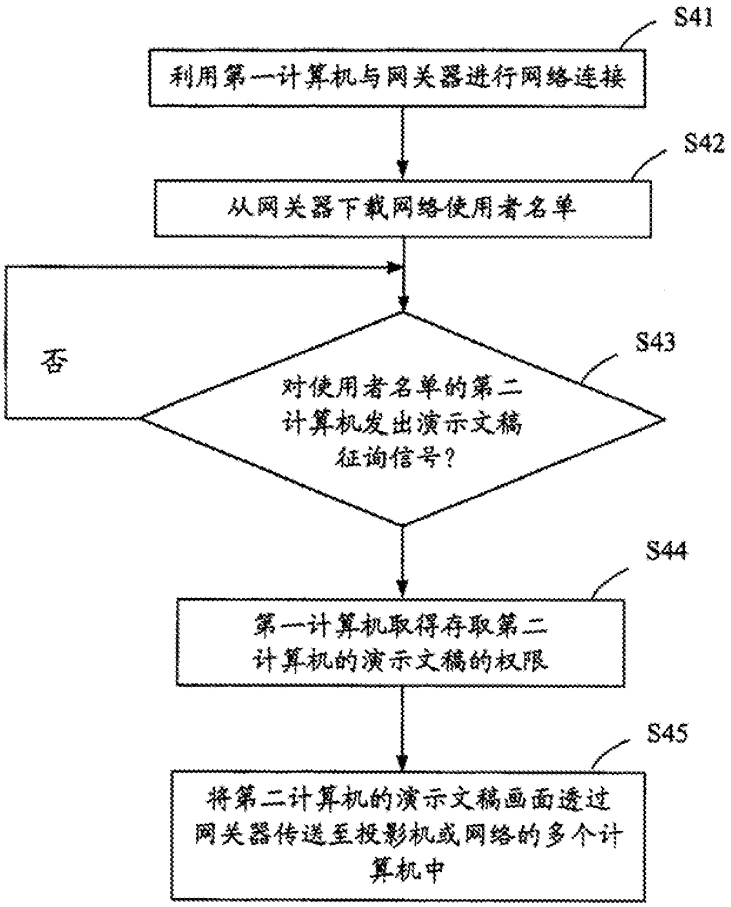

S41
利用第一计算机与网关器进行网络连接
S42
从网关器下载网络使用者名单
否
S43
对使用者名单的第二计算机发出演示文稿征询信号？
S44
第一计算机取得存取第二计算机的演示文稿的权限
S45
将第二计算机的演示文稿画面透过网关器传送至投影机或网络的多个计算机中

图 4

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Notice

This translation is machine-generated. It cannot be guaranteed that it is intelligible, accurate, complete, reliable or fit for specific purposes. Critical decisions, such as commercially relevant or financial decisions, should not be based on machine-translation output.

Description of CN101106681

The present invention provides a wireless video transmission apparatus includes a connection port, USB device control module, wireless communication module, a storage module; USB port and device control modules are connected to an external computer, a wireless communication module through the USB interface and USB device control module connected to the storage module is connected via a data bus and USB device control module, the USB device control module includes MCU chip. Memory module of the present invention and the wireless transmission module through the USB device control module integrated into a device, easy to carry; wireless communication module and the memory module can work independently and to be with each other for data transmission or storage; simple and easy to operate, that is plug and Play, no software to install, and more without having to restart the computer, desktop video image can be achieved with the two-way data transmission control functions.

Wireless video transmission apparatus and method

TECHNICAL FIELD

The present invention relates to wireless video transmission technology, specifically refers to the wireless video transmission apparatus and method thereof.

Background technique

At present, the common wireless video transmission equipment generally used for transmitting analog video data using this set Preparation of analog video data flaw is that the bandwidth is narrow, the amount of data transfer, the image resolution is not enough. When transmission 720 × 576 pixel image resolution is not high. If the device is used to transfer desktop image data, because the computer desktop images are generally in the 1024 × 768 pixels, or even higher, pass The amount of data transmission has become obvious bottleneck. On the other hand, remote login technology is commonly used for transferring digital video Frequency, the use of network technology and image compression technology to transmit computer data desktop images, but usually in the form of software as a product, users need to install the software and must be configured to require the user's computer network Network equipment. Thus, the user inconvenience caused.

To solve these problems, Application No. 03,126,817. China Patent X discloses a USB device its driver installation method (Figure 1), the patent is the use of a mechanical switch Two analog switches connected to the host USB devices and related modules, and the use of interactive operation mode of operation. The patent has two shortcomings: First, the use of a mechanical switch to select the USB device module access, will Shall be manually operated, operating complex; the second, by a mechanical switch to USB device module is selected, After access to the host, the other is not selected USB device module that is idle and can not be used, that is, at the same You can only select one device to access and use within a time. Application No. 200310104289.3 of Patent disclosure is a combination of storage media and wireless network card USB interface device (shown in Figure 2), The device uses USB hub controller connects USB memory module and USB wireless communication module, for PC host is concerned, the equivalent of three devices, and USB hub control can only play the role of a simple connection. Visible, the two patents and device structure is designed to have similarities, but also their defects and deficiencies.

SUMMARY

Object of the present invention to overcome the above-described drawbacks and disadvantages of the prior art, there is provided a data transmission Large, easy to use, simple operation of the wireless video transmission apparatus. Object of the present invention is to provide Said transmission method of wireless video transmission apparatus.

The object of the present invention is realized by the following technical scheme: the wireless video transmission apparatus comprising:

Port is to provide a data input or output communication port for connecting an external computer;

USB device control module, connected with the port, the USB device control module includes MCU chip;

Wireless communication module includes a USB port, a USB device is connected to the control module;

Memory module via the data bus and the USB device is connected to the control module.

In order to obtain a better implementation of the invention, the above wireless video device may further provided with a power source Converter, the power converter and the storage module, a connection port connected for providing a stable voltage to the Memory modules.

The above apparatus further provided with a wireless video indicator for displaying the state of equipment, said LED USB device connected to the control module.

The connection port USB port including but not limited to, PCMCIA port.

Drive sub-module of the memory module also includes a wireless communication module, which is loaded with the wireless driver Necessary program information module.

The memory module may also include a wireless video transmission sub-module, which is loaded with wireless video transmission process Sequence, the wireless video transmission program, for clients, then used the desktop image capture, image Compression, data transmission and reception, return processing control information; to the server, the connection is used Collect data, extract images, image playback and capture control information, return control information.

Wireless video transmission method using the wireless video transmission apparatus to: the wireless video transmission apparatus Set an external computer connected to the Plug and Play device utilization characteristics run automatically in the computer system, Drive sub-module wireless video transmission device automatically run the memory module to drive the wireless communication module, since Automatically detects wireless communication module and configuration parameters, automatically run the memory module wireless video transmission sub-mode Block wireless video transmission:

When an external computer as a client to an external computer for the desktop image capture, image compression, And the compressed image data passes through the port, USB device control module, wireless communication module to send To the server, while the wireless communication module receives the service side of the return control information and devices through USB The control module is transmitted to the wireless video transmission sub-module for processing;

When an external computer as the server, followed by an external computer via the wireless communication module, USB Device control module, a connection port receives the image data compression, and decompress images, play back images, Or directly to the compressed image data passes through the port, USB device control module to the storage Module storage; Meanwhile, the wireless communication control module to capture client information and return control information.

Compared with the prior art, it has the following advantages and benefits:

[1]

(1)Memory module and wireless transmission module through the USB device control module integrated into a single device, Easy to carry;

[2]

(2)Wireless communication module and the memory module can work independently and to be with each other for a few Data transmission or storage;

[3]

(3)Provides the user with simple and convenient operation: Plug and Play, no software to install, even without Restart the computer, you can achieve the desktop video and two-way data transmission control functions.

BRIEF DESCRIPTION

Figure 1 is a schematic view of the existing USB device and driver installation methods.

Figure 2 is a schematic structure of a conventional combination of storage media and wireless network card USB interface device FIG.

FIG. 3 is a block diagram of the present invention, a wireless video transmission device.

Figure 4 is shown in Fig. 3 wireless video transmission apparatus connected to an external computer running schematic

Figure 5 is a wireless video transmission device shown in Figure 3 with the server, the client works connected FIG.

Figure 6 is a flowchart of a wireless video transmission will be between server and client.

detailed description

Below with examples and drawings, the present invention will be described in further detail, but the embodiment of the present invention Not limited thereto.

Example one

3, of the wireless video transmission apparatus comprising:

USB connection port 310 is to provide a data input or output communication port for connecting an external meter Computer;

Port 310 may be PCIMIA port or other port plug and play.

USB device control module 320, and port 310 is connected;

USB device control module 320 comprises MCU chip.

Wireless communication module 331 includes a USB interface connected to the USB device control module 320;

Wireless communication module 331 may be a variety of uses 801.11g, 801.11n, WiMAX, UWB and other non Wireless communication module line broadband technology.

Wireless video device 341 may further set the indicator for a display device (such as a wireless communication module Block 331) working conditions, the LED 341 is connected with the USB device control module.

Storage module 332, and the USB device through the data bus 320 is connected to the control module.

Storage module 332 may be a variety of memory devices: Smart Media (SM), Memory Stick (MS), NAND Flash, Compact Flash I and II (CF), CF packages like miniature hard drive ATA hard drive Moving the like.

Drive sub-module of the storage module 332 also includes a wireless communication module, which is loaded with the wireless driver Procedures necessary communication module.

The storage module 332 may also include a wireless video transmission sub-module, which is loaded with a wireless video transmission Program, the wireless video transmission program, for clients, then used the desktop image capture, image Compression, data transmission and reception, return processing control information; to the server, it is used to receive Data, decompresses the image, and the image capture playback control information, transmission control information return.

The above-described wireless communication module 331 and memory module 332 may work independently and to be phase interaction with the data for transmission or storage.

As shown in Figure 3,4,6, connect the wireless video transmission device to an external computer, the use of plug With the characteristics of the device to run automatically in the computer system, wireless video transmission device automatically run memory module The drive block 332 sub-modules to drive the wireless communication module 331 automatically detects the wireless communication module 331 and Configuration parameters, automatic operation storage module 332 sub-modules for wireless video transmission wireless video transmission:

When an external computer as a client to an external computer for the desktop image capture, image compression, And the compressed image data passes through the port 310, USB device control module 320, a wireless communication module Block 331 is sent to the server at the same time, wireless communication module 331 receives the service end of the return control information, And to the wireless video transmission sub-module handles USB device control module 320 through the transmission;

When an external computer as a server, followed by an external computer via the wireless communication module 331, USB Device control module 320, a connection port 310 receives the image data compression, and decompress images, play images, or images directly into the compressed data passes through the port 310, USB device control module 320 Sent to the storage module 332 to store, at the same time, wireless communication module 331 capture client information and control Passback control information.

5 and 6, the two wireless video transmission apparatus respectively corresponding to the two-phase external computer Even, two external computers to each other server / client, according to the above process for wireless video transmission, Enables the service side, two-way control between the client wireless video transmission.

As described above, the present invention can be better implemented, the above-described embodiments are only preferred embodiments of the present invention, is not intended to limit the scope of the present invention; that is where the invention made under this content modifications and alterations. The present invention requires that rights are claimed range covered.

CLAIMS CN101106681

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[1]

1. Wireless video transmission apparatus includes a connection port, USB device control module, wireless communication module, Storage module; USB port and device control modules are connected to an external computer, a wireless communication module Block through the USB interface and the USB device is connected to the control module, a storage module and a USB device via a data bus Control module, wherein the USB device control module includes MCU chip.

[2]

2. 1 according to the wireless video transmission apparatus as claimed in claim wherein: said wireless video device Means provided with a further power converter, the power converter and the storage module connection port.

[3]

3. 1 according to the wireless video transmission apparatus as claimed in claim wherein: said wireless video device Set is also provided with lights, the lights connected to a USB device control module.

[4]

4. 1 according to the wireless video transmission apparatus as claimed in claim wherein: said packet connection port including but not limited to USB ports, PCMCIA ports.

[5]

5. 1 according to the wireless video transmission apparatus as claimed in claim wherein: said memory module Also includes a wireless communication module drive module.

[6]

6. 5 according to the wireless video transmission apparatus as claimed in claim wherein: said memory module Also includes a wireless video transmission module.

[7]

7. Wireless video transmission method defined in claim 6, wherein the wireless video transmission apparatus, characterized in that To: Connect the wireless video transmission device to an external computer, use the Plug and Play device in the computer system Characteristics of automatic operation, the drive sub-module wireless

video transmission device automatically run the memory module to drive Wireless communication module, wireless communication module and automatically detects the configuration parameters automatically run without a memory module Line video transmission wireless video transmission sub-module:

When an external computer as a client to an external computer for the desktop image capture, image compression, And the compressed image data passes through the port, USB device control module, wireless communication module to send To the server, while the wireless communication module receives the service side of the return control information and devices through USB The control module is transmitted to the wireless video transmission sub-module for processing;

When an external computer as a server, the computer passes through the external wireless communication module, USB set Device control module, a connection port receives the image data compression, and decompress images, play back images, or images directly into the compressed data sequentially sent to the storage memory module by connecting port, USB device control module Storage; Meanwhile, the wireless communication module to capture client information control and return control information.

Abstract of CN101106681 (A)

The invention provides a wireless video transmission device, including a connecting port, a USB device control module, a wireless communication module and a storing module; wherein the connecting port is connected with the USB device control module and an external computer, respectively, the wireless communication module is connected with the USB device control module through a USB interface, the storing module is connected with the USB device control module through a data bus, and the USB device control module includes a MCU chip. The storing module and the wireless transmission module in the invention are integrated into one equipment through the USB device control module, being convenient for carrying; the wireless communication module and the storing module can each work independently, or work together for data transmission or data storage; operation is simple and easy, plug-and-play, no need to install software, no need to restart computers, to realize desktop video image data transmission and two-way control functions.

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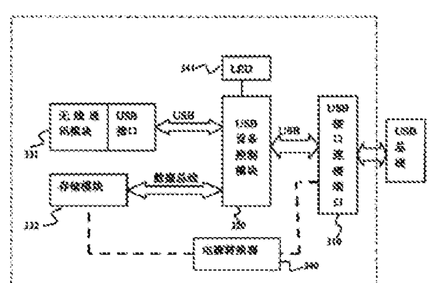
权利要求书 1 页 说明书 4 页 附图 3 页

[54] 发明名称

无线视频传输装置及其方法

[57] 摘要

本发明提供一种无线视频传输装置，包括连接端口、USB 设备控制模块、无线通讯模块、存储模块；连接端口与 USB 设备控制模块、外部计算机分别连接，无线通讯模块通过 USB 接口与 USB 设备控制模块相连接，存储模块通过数据总线与 USB 设备控制模块连接，所述 USB 设备控制模块包括 MCU 芯片。 本发明的存储模块与无线传输模块通过 USB 设备控制模块整合成一个设备，携带方便；无线通讯模块与存储模块可各自独立工作，也可以相互配合用于数据的传输或存储；操作方便简单，即插即用，无需安装软件，更无需重启电脑，即可实现桌面视频图像数据传输与双向控制功能。



1、无线视频传输装置，包括连接端口、USB设备控制模块、无线通讯模块、存储模块；连接端口与USB设备控制模块、外部计算机分别连接，无线通讯模块通过USB接口与USB设备控制模块相连接，存储模块通过数据总线与USB设备控制模块连接，其特征在于,所述USB设备控制模块包括MCU芯片。

2、根据权利要求1所述无线视频传输装置，其特征在于：所述无线视频装置还设置有一电源转换器，该电源转换器与存储模块、连接端口相连。

3、根据权利要求1所述无线视频传输装置，其特征在于：所述无线视频装置还设置有指示灯，所述指示灯与USB设备控制模块连接。

4、根据权利要求1所述无线视频传输装置，其特征在于：所述连接端口包括但不限于USB端口、PCMCIA端口。

5、根据权利要求1所述无线视频传输装置，其特征在于：所述的存储模块还包含无线通讯模块的驱动子模块。

6、根据权利要求5所述无线视频传输装置，其特征在于：所述的存储模块还包含无线视频传输子模块。

7、采用权利要求6所述无线视频传输装置的无线视频传输方法，其特征在于：将无线视频传输装置与外部计算机相连，利用即插即用设备在计算机系统中自动运行的特性，无线视频传输装置自动运行存储模块的驱动子模块以驱动无线通讯模块，自动检测无线通讯模块以及配置参数，自动运行存储模块的无线视频传输子模块进行无线视频传输：

当外部计算机作为客户端时，外部计算机进行桌面图像捕获、图像压缩，并把图像压缩数据依次通过连接端口、USB设备控制模块、无线通讯模块发送到服务端，同时，无线通讯模块接收服务端的回传控制信息，并通过USB设备控制模块传输给无线视频传输子模块处理；

当外部计算机作为服务端时，外部计算机依次通过无线通讯模块、USB 设备控制模块、连接端口接收图像压缩数据，并进行解压图像、播放图像，或者直接将图像压缩数据依次通过连接端口、USB 设备控制模块发送到存储模块存储；同时，无线通讯模块捕获客户端的控制信息并回传控制信息。

无线视频传输装置及其方法

技术领域

本发明涉及无线视频传输技术，具体是指无线视频传输装置及其方法。

背景技术

目前，常见的无线视频传输设备一般用于传输模拟视频数据，使用该设备传输模拟视频数据的缺陷在于带宽窄，传输数据量不大，图像分辨率不够，在传输720×576象素的图像时，清晰度不高。若将该设备用于传输电脑桌面图像数据的话，由于电脑桌面图像一般都在1024×768象素，甚至更高，传输数据量则成为明显的瓶颈。另一方面，远程登录技术也常用于传输数字视频，该技术利用网络以及图像压缩技术来传输电脑桌面图像数据，但通常是以软件形式作为产品，需要使用者安装软件并需要使用者的电脑必须配置网络设备。这样，对使用者造成了不便。

为解决上述问题，申请号为03126817.X的中国专利公开了一种USB设备及其驱动程序安装方法（如图1所示），该专利主要是利用一个机械开关与两个模拟开关连接主机及有关的USB装置模块，并利用交互作业模式运作。该专利的有两点缺陷：第一，利用机械开关来选择USB装置模块的接入，必须由人手操作，操作繁杂；第二，利用机械开关对USB装置模块进行选择，接入主机后，另外不被选择的USB装置模块即闲置，无法使用，即是，在同一时间内只能选择其中一个设备接入并使用。申请号为200310104289.3的中国专利公开的是一种结合存储媒体与无线网卡的USB接口装置（如图2所示），该装置利用USB集线控制器连接USB存储模块以及USB无线通讯模块，对于PC主机来讲，相当于三个设备，而USB集线控制器只能起到简单连接作用。可见，该两项专利设备结构和设计目的有相似性，也各自存在缺陷与不足。

发明内容

本发明的目的在于克服上述现有技术的缺点和不足，提供一种传输数据量大，使用方便，操作简单的无线视频传输装置。本发明的目的还在于提供上述无线视频传输装置的传输方法。

本发明的目的通过下述技术方案实现：无线视频传输装置包括：

连接端口，是提供数据输入或输出的通讯端口，用以连接外部计算机；

USB设备控制模块，与连接端口相连接，所述USB设备控制模块包含MCU芯片；

无线通讯模块，包含一USB接口，与USB设备控制模块相连接；

存储模块，通过数据总线与USB设备控制模块相连接。

为了更好得实现本发明，以上所述无线视频装置可进一步设置有一电源转换器，该电源转换器与存储模块、连接端口相连，用于提供一稳定电压至存储模块。

以上所述无线视频装置还设置有指示灯，用于显示设备工作状态，所述指示灯与USB设备控制模块连接。

所述连接端口包括但不限于USB端口、PCMCIA端口。

所述存储模块还包含无线通讯模块的驱动子模块，其加载有驱动无线通讯模块的必要程序。

所述存储模块还可包含无线视频传输子模块，其加载有无线视频传输程序，所述无线视频传输程序，对于客户端而言，则用于桌面图像捕获、图像压缩、数据发送以及接收、处理回传控制信息；对于服务端而言，则用于接收数据、解压图像、播放图像以及捕获控制信息、回传控制信息。

采用上述无线视频传输装置的无线视频传输方法为：将无线视频传输装置与外部计算机相连，利用即插即用设备在计算机系统中自动运行的特性，无线视频传输装置自动运行存储模块的驱动子模块以驱动无线通讯模块，自动检测无线通讯模块以及配置参数，自动运行存储模块的无线视频传输子模块进行无线视频传输：

当外部计算机作为客户端时，外部计算机进行桌面图像捕获、图像压缩，并把图像压缩数据依次通过连接端口、USB设备控制模块、无线通讯模块发送到服务端，同时，无线通讯模块接收服务端的回传控制信息，并通过USB设备控制模块传输给无线视频传输子模块处理；

当外部计算机作为服务端时，外部计算机依次通过无线通讯模块、USB设备控制模块、连接端口接收图像压缩数据，并进行解压图像、播放图像，或者直接将图像压缩数据依次通过连接端口、USB 设备控制模块发送到存储模块存储；同时，无线通讯模块捕获客户端的控制信息并回传控制信息。

本发明与现有技术相比，具有如下优点和有益效果：

（1）存储模块与无线传输模块通过USB设备控制模块整合成一个设备，携带方便；

（2）无线通讯模块与存储模块可各自独立工作，也可以相互配合用于数据的传输或存储；

（3）给使用者提供方便简单的操作：即插即用，无需安装软件，更无需重启电脑，即可实现桌面视频图像数据传输与双向控制功能。

附图说明

图1是现有的USB设备及其驱动程序安装方法的结构示意图。

图2是现有的一种结合存储媒体与无线网卡的USB接口装置的结构示意图。

图3是本发明无线视频传输装置的结构示意图。

图4是图3所示无线视频传输装置连接外部计算机的运行原理图。

图5是图3所示无线视频传输装置与服务端、客户端分别连接工作原理图。

图6是服务端与客户端之间进行无线视频传输的工作流程图。

具体实施方式

下面结合实施例及附图，对本发明作进一步地详细说明，但本发明的实施方式不限于此。

实施例一

如图3所示，本无线视频传输装置包括：

USB连接端口310，是提供数据输入或输出的通讯端口，用以连接外部计算机；

连接端口310也可以是PCIMIA端口或者其他即插即用端口。

USB设备控制模块320，与连接端口310相连接；

USB设备控制模块320包含MCU芯片。

无线通讯模块331，包含一USB接口，与USB设备控制模块320相连接；

无线通讯模块331可以是各种采用801.11g、801.11n、WiMAX、UWB等无线宽带技术的无线通讯模块。

无线视频装置还可进一步设置指示灯341，用于显示设备（如无线通讯模块331）的工作状态，所述指示灯341与USB设备控制模块连接。

存储模块332，通过数据总线与USB设备控制模块320相连接。

存储模块 332 可以是各种闪存设备：智能介质（SM）、记忆棒（MS）、NAND 闪存、压缩闪存 I 和 II（CF）、似微型硬盘驱动器的 CF 封装形式 ATA 硬盘驱动器等等。

所述存储模块332还包含无线通讯模块的驱动子模块，其加载有驱动无线通讯模块的必要程序。

所述存储模块 332 还可包含无线视频传输子模块，其加载有无线视频传输程序，所述无线视频传输程序，对于客户端而言，则用于桌面图像捕获、图像压缩、数据发送以及接收、处理回传控制信息；对于服务端而言，则用于接收数据、解压图像、播放图像以及捕获控制信息、发送回传控制信息。

以上所述的无线通讯模块 331 与存储模块 332 可各自独立工作，也可以相互配合用于数据的传输或存储。

如图3、4、6所示，将无线视频传输装置与外部计算机相连，利用即插即用设备在计算机系统中自动运行的特性，无线视频传输装置自动运行存储模块332的驱动子模块以驱动无线通讯模块331，自动检测无线通讯模块331以及配置参数，自动运行存储模块332的无线视频传输子模块进行无线视频传输：

当外部计算机作为客户端时，外部计算机进行桌面图像捕获、图像压缩，并把图像压缩数据依次通过连接端口310、USB设备控制模块320、无线通讯模块331发送到服务端，同时，无线通讯模块331接收服务端的回传控制信息，并通过USB设备控制模块320传输给无线视频传输子模块处理；

当外部计算机作为服务端时，外部计算机依次通过无线通讯模块331、USB设备控制模块320、连接端口310接收图像压缩数据，并进行解压图像、播放图像，或者直接将图像压缩数据依次通过连接端口310、USB设备控制模块320发送到存储模块332存储；同时，无线通讯模块331捕获客户端的控制信息并回传控制信息。

如图5、6所示，将两个无线视频传输装置相应与两台外部计算机分别相连，两台外部计算机互为服务端/客户端，按以上过程进行无线视频传输，则可实现服务端、客户端之间无线视频传输的双向控制。

如上所述，便可较好地实现本发明，上述实施例仅为本发明的较佳实施例，并非用来限定本发明的实施范围；即凡依本发明内容所作的均等变化与修饰，都为本发明权利要求所要求保护的范围所涵盖。

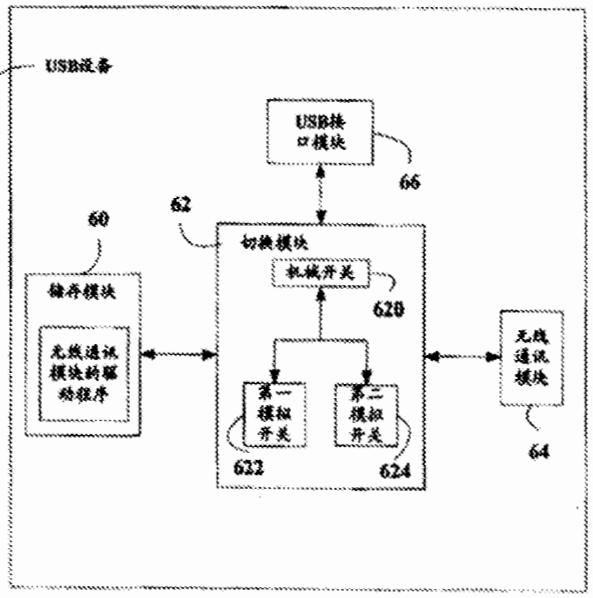

USB设备
6
USB接口模块
66
62
60
切换模块
机械开关
620
储存模块
无线通讯模块的驱动程序
第一模拟开关
622
第二模拟开关
624
无线通讯模块
64

图1

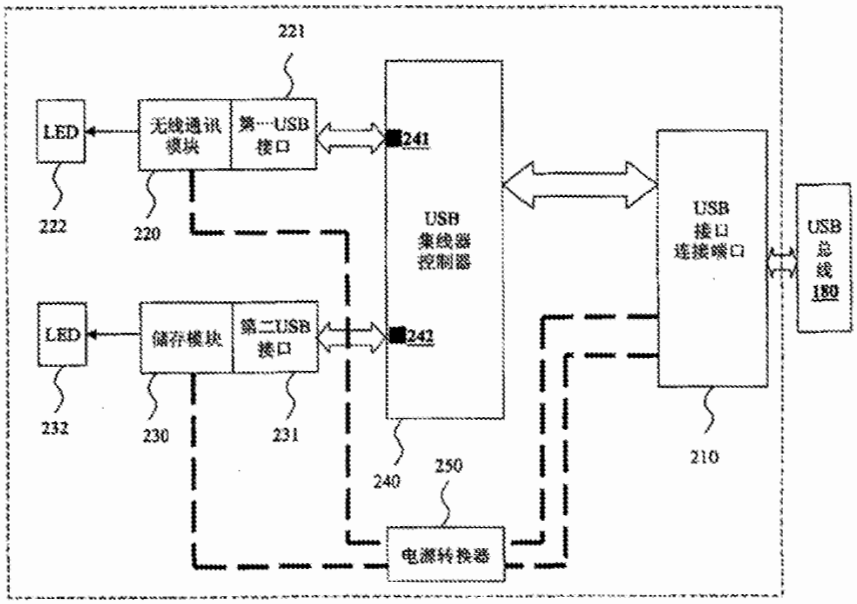

221
LED
无线通讯模块
第一USB接口
241
222
220
USB集线器控制器
USB接口连接端口
USB总线
180
LED
储存模块
第二USB接口
242
232
230
231
240
250
210
电源转换器

图2

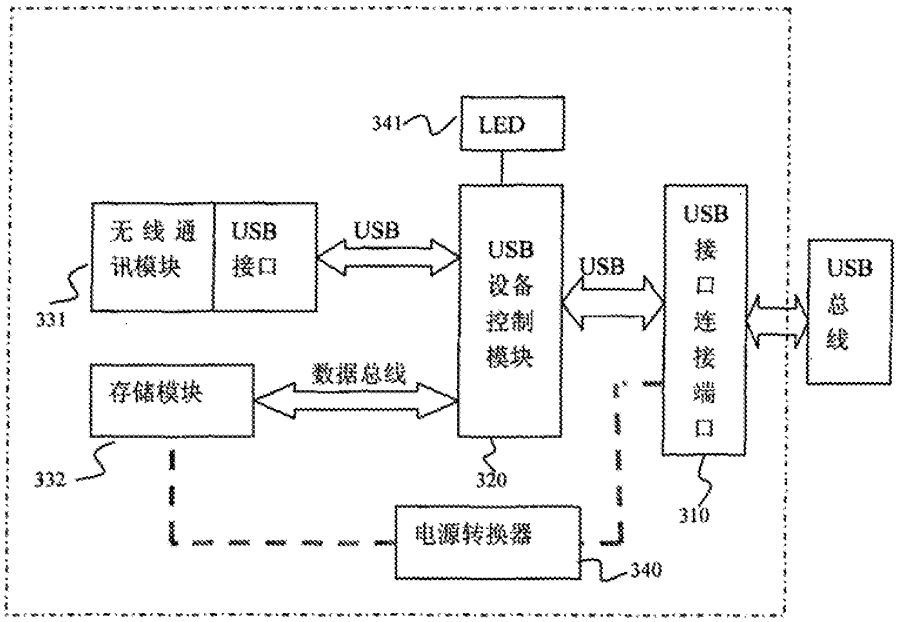

341
LED
无线通讯模块
USB接口
USB
USB设备控制模块
USB
USB接口连接端口
USB总线
331
存储模块
数据总线
332
320
310
电源转换器
340

图 3

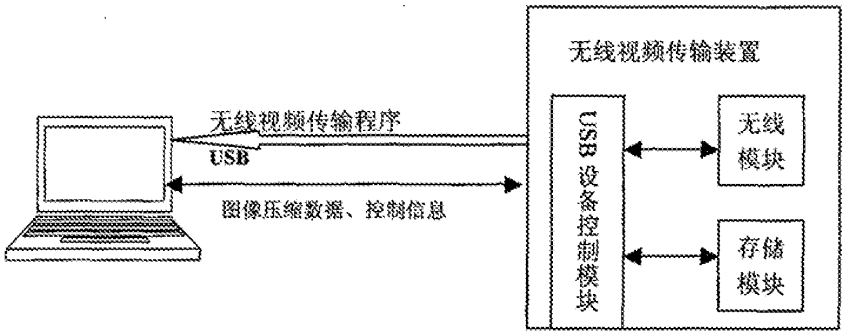

无线视频传输装置
无线视频传输程序
USB
图像压缩数据、控制信息
USB设备控制模块
无线模块
存储模块

图 4

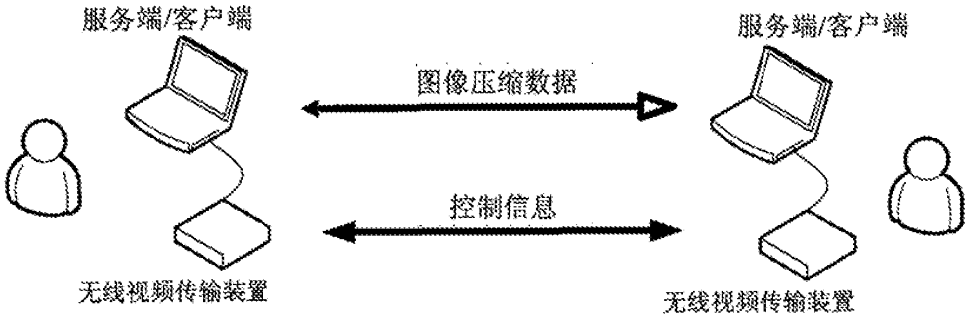

服务端/客户端
图像压缩数据
服务端/客户端
控制信息
无线视频传输装置
无线视频传输装置

图5

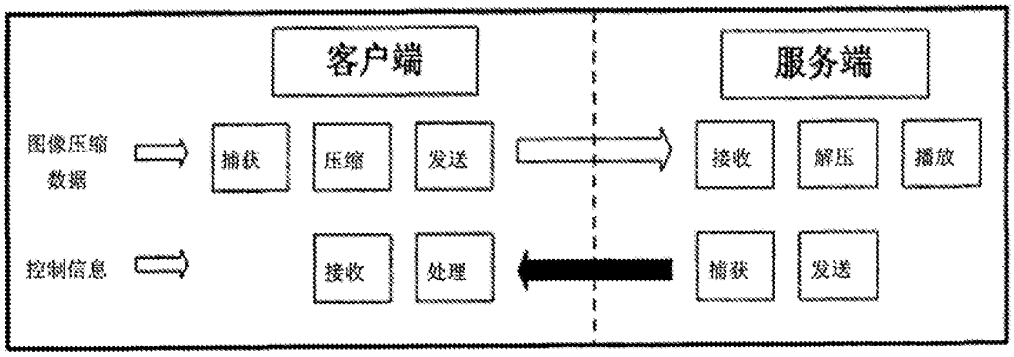

客户端
服务端
图像压缩数据
捕获
压缩
发送
接收
解压
播放
控制信息
接收
处理
捕获
发送

图6

Espacenet

Bibliographic data: CN101442500 (A) — 2009-05-27

Control method for multipartite voice interaction, share and decentralization of display content

Inventor(s): XIAOTAO YIN [CN] ± (YIN XIAOTAO)

Applicant(s): XIAOTAO YIN [CN] ± (YIN XIAOTAO)

Classification: **- international:** ***H04L12/58; H04L29/06; H04M3/56; H04M7/00***
- cooperative:

Application number: CN20071187267 20071119

Priority number(s): CN20071187267 20071119

Abstract of CN101442500 (A)

The invention relates to a method for multi-language interaction, display content sharing and decentralized control. A far human image is similar to be on the spot, the mutual communication can be performed by language, the display content can also be seen and operated (no camera exists, and only the display content of a field computer is transmitted to various terminals), and the terminals can all browse and operate the display content according to the operation authority. The method is widely applied, and can greatly improve the feasibility and convenience of remote support, remote conference, and remote cooperation.

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[51] Int. Cl.
H04L 12/58 (2006.01)
H04L 29/06 (2006.01)
H04M 3/56 (2006.01)
H04M 7/00 (2006.01)

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[21] 申请号 200710187267.6

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[72] 发明人 殷小涛

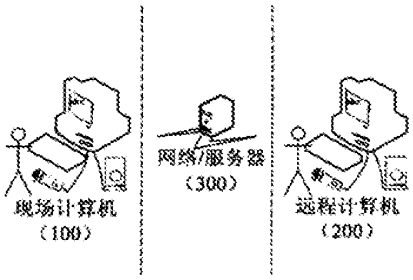
权利要求书 1 页 说明书 3 页 附图 1 页

[54] 发明名称

多方语音交互和显示内容共享且分权控制方法

[57] 摘要

本发明涉及一种多方语音交互和显示内容共享且分权控制方法。很类似于远方的人像在现场一样，既能用语言互相沟通，又能看到且操作其显示内容(无摄像头，只把现场电脑显示内容传输到各终端)，各端都可按照自已的操作权对显示内容进行浏览和操作。此方法应用广泛，会极大提高远程支持、远程会议、远程协作的可行性和方便性。



1、 一种多方语音交互和显示内容共享且分权控制方法，其特征是，多方语音沟通同时可以看到现场计算机显示的内容，并且各方都可以按一定权限对现场计算机显示内容进行操作。

2、 根据权利要求1所述的方法，其特征是，同时具有语音交互及可以看到并可以分权控制现场计算机显示内容。

3、 根据权利要求1所述的方法，其特征是，各方都可以按给定的权利对现场计算机显示内容进行操作，权利包括：接入权、浏览权、通话权、抓图权、显示内容操作权、完全控制权。

4、 根据权利要求1所述的方法，其特征是，为了直观显示各方的状态，现场计算机的显示内容会用一定形式体现各个终端的输入设备鼠标、键盘的操作或停放位置。

5、 根据权利要求1所述的方法，其特征是，为了体现发言者，现场计算机的显示内容会用一定形式体现正在发言人。

6、 根据权利要求1所述的方法，其特征是，各方权利由具有完全控制权的一方分配。

7、 根据权利要求1所述的方法，其特征是，作为现场的计算机和完全控制权可以转移。

8、 根据权利要求1所述的方法，其特征是，承载显示内容的主体包括显示器、投影仪，特殊情况下也可以没有。

9、 根据权利要求3所述的方法，其特征是，接入权包括有完全控制权的一方分配的连接权，也包括用加密狗实现的加密认证权力。

多方语音交互和显示内容共享且分权控制方法

技术领域

本发明涉及一种多方语音交互，同时可以看到一方显示内容，并且对其内容有分权控制权的方法。特别适用于远程协作、远程会议、远程操控等领域。

背景技术

现在人们在工作中的沟通方式大部分是邮件、电话会议、或视频电话等方式。这些方式存在很多弊端，邮件方式：非及时的；电话会议：看不到沟通内容对沟通造成影响；视频电话：软硬件成本都比较高，虽然可见但是对有用的沟通内容不一定看得很清楚。基于上述一些沟通方式的问题，现实工作中出现了很多出差现象，要现场解决问题或到异地出席一些会议。本发明就是考虑到这些问题为了方便远程参与、控制提出来的，目的是提高工作效率，减少出差成本，改善沟通方式。

比如，系统某一功能模块软件提供商和一个集成商之间的现有工作方式，通常是邮件、电话提问解答，如果涉及一些复杂问题，往往需要提供商派技术人员出差到现场和集成商的技术人员坐在一起对整个系统软件进行集成调试。

再比如，一个公司在外地有分部门，为了加强管理和项目沟通，需要经常开会，其实开会主要就是语音沟通以及共同浏览一些电脑要显示的内容比如 ppt 文档。而现有的沟通方式很难让不到现场的人达到既能用语言进行交流，又能看到会议内容并且及时评论会议内容，从而和出席现场的人没有实质差别。

现有一些组合技术虽说有一些这方面的功能比如语音聊天加上桌面共享，但是这些方式存在很多问题：1，不是专门工具，功能冗余；2，安全性差；3，需要组合使用；4，不能协作，因为没有以协作为目的开发所以要解决以上提出的问题很难实现。

发明内容

本发明的目的就是针对上述问题，提出的一种加强沟通的有效方法。

本发明的技术方案是：

首先，通过网络和现场计算机进行连接。此过程为了保证安全性，这里会有连接前鉴权（是否允许连接）和连接后授权（对现场计算机的操作权限）。连接前的鉴权可以通过加密狗等加密设备，根据实际需求安全措施可加强和减弱；

其次，连接成功后，现场计算机的显示内容会同时出现在远程计算机的显示设备上，而在现场计算机的显示内容上会显示访问者及访问者鼠标等输入设备的停放位置。这种显示的主要功能是知道谁在发言（标识访问者的图标指示），也知道发言者关注的位置（通过鼠标的指示）。这样在现场计算机显示上就会有多套指示图标，但是每套图标都仅有访问者自己控制，考虑到显示区的整洁性和易看性，这些指示只有在有人发言或操作显示内容时显示，平时或者半透明化或最小化隐藏起来；

最后，连接和鉴权、授权后沟通的多方就可以就具体问题讨论了，可以在语音沟通的同时，共同对现场计算机上的内容进行讨论，和远方的人正出席现场一样。这里如果有必要现场计算机操作者还可以授予远程操作权，远程计算机可以获得操作权，这样更方便了沟通，但是完全控制权限还是现场计算机，所以访问权方面的安全性主要由现场控制。

要实现本发明涉及到的技术有安全、网络、音频传输、图像传输等，这些技术可以按需选择具体实现方法。

通过本发明极大地加强了沟通能力，从而降低了出席现场的费用，提高了工作效率。为远程协作、远程会议等提供了更有效的方法；而且如果现场计算机是机械设备（可以没显示设备）或医疗设备的话也可以实现远程控制，远程医疗的目的，只要把控制权传给远程计算机；此方法的现场可以有多种形式从而它的功能也会很丰富。

附图说明

图 1 是远程支持实施例图。

图 2 是远程会议实施例图。

具体实施方式

下面结合附图和实施例对本发明进行进一步说明，所列实施例均以两个参与体为例多个参与情况类推。所列实施例在本发明技术方案为前提下进行实施，但本发明的保护范围不限于下述实施例。

在图 1 所示实施例中，系统由现场计算机 100、远程计算机 200、以及网络（服务器：可选，如果不知道互相的 ip 地址，建立连接时用）300 构成。其中现场计算机 100 和远程计算机 200 都有声音录入设备和播放设备如麦克及音箱。现场计算机 100 等待远程计算机 200 的连接，远程计算机 200 通过本地加密狗、连接权限等认证通过后就和现场计算机 100 建立了连接，这种认证可根据需求取舍。连接后远程计算机 200 显示设备上就会显示现场计算机 100 的显示内容，同时远程计算机 200 的鼠标的坐标位置也会传给现场计算机 100，从而现场计算机 100 的显示区会增加远程计算机 200 的一个鼠标指示标识和远程计算机 200 登录后的一个标识（这个标识在远程计算机 200 发言时会有变化，以显示发言主体）。远程计算机 200 的那个鼠标指示标识不仅为了指示远程计算机 200 关注的位置，还为了当它有操作权时通过这个远程鼠标可以操作现场计算机 100。如果系统也引入他输入设备比如键盘则处理方式和鼠标类似。

通过这样的方式，有些问题就可以不用必须到现场去解决。比如典型情况有，系统集成商在集成某一芯片时，软件驱动出现问题，从而芯片的技术支持可以及时地在远程解决问题。提高了工作效率，并降低了成本。

在图 2 所示远程会议实施例中，和图 1 所示实施例大体相同，不同处是现场计算机的显示是由投影仪来承载的。

通过这种应用对于部门分散在各地，又经常举行会议的公司部门来说，会极大降低出差成本，提高工作效率。

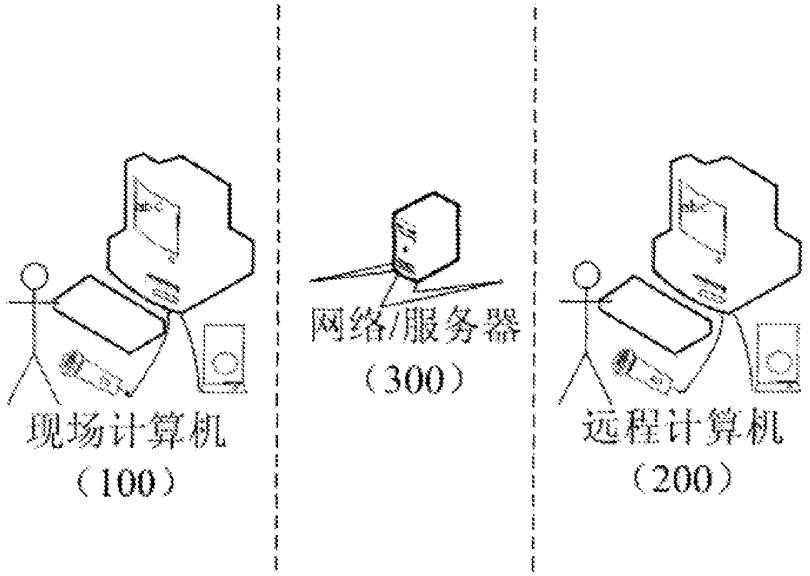

网络/服务器
（300）
现场计算机
（100）
远程计算机
（200）

图 1

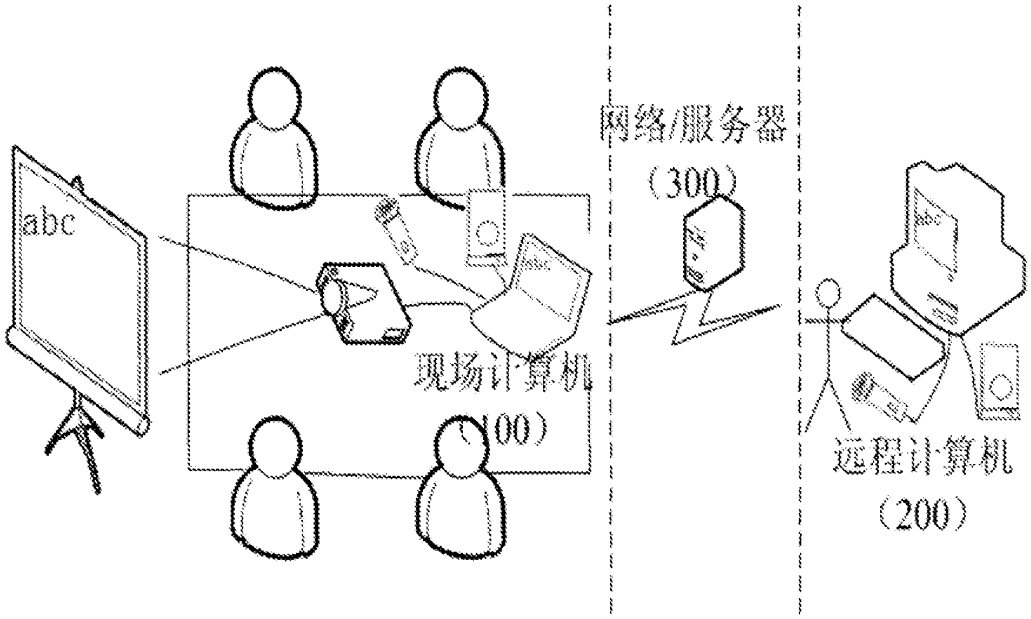

abc
网络/服务器
（300）
现场计算机
（100）
远程计算机
（200）

图 2

Espacenet

Bibliographic data: CN101828392 (A) — 2010-09-08

A method and system for processing a composite video image

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Applicant(s): CREATIVE TECH LTD ± (CREATIVE TECHNOLOGY LTD)

Classification: **- international:** ***H04N7/15***
- cooperative: **H04N1/00347**; **H04N5/272**; **H04N7/147**; H04N2101/00; H04N2201/3264; H04N2201/3267; H04N2201/3276

Application number: CN20088112233 20081015

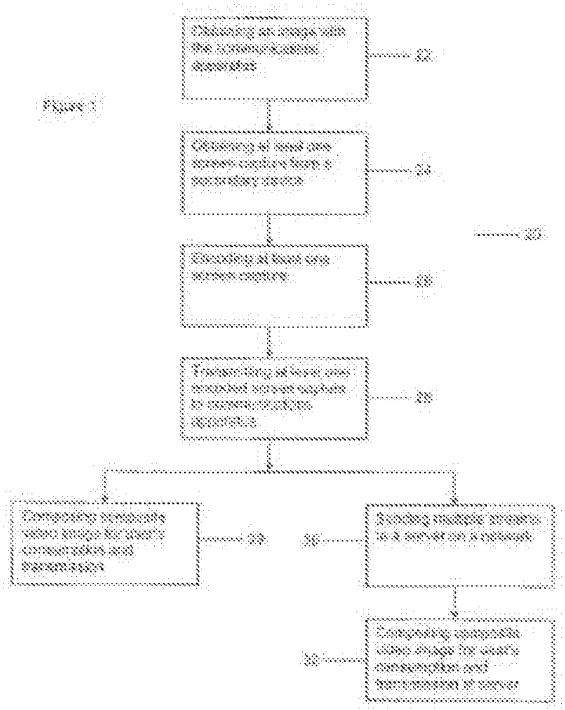
Priority number(s): WO2008SG00396 20081015 ; SG20070170475 20071019

Also published as: CN101828392 (B) WO2009051566 (A1) US2010208139 (A1) US8836798 (B2) TW200935906 (A) more

Abstract of CN101828392 (A)

There are provided methods and systems for processing a composite video image. The composite video image may be a combination of an image and at least one encoded screen capture at a communications apparatus either by a user or in accordance to pre-determined settings for the user's consumption and transmission to a network. Transmission to a network may be simultaneous during the user's consumption. It is advantageous that encoding of the at least one screen capture is independent of at least one application running on the at least one secondary device. It is possible that the at least one screen capture may or may not have audio signals.

Figure 1



(19)中华人民共和国国家知识产权局

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2010.04.19
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(87)PCT申请的公布数据
WO2009/051566 EN 2009.04.23
(71)申请人 创新科技有限公司
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(72)发明人 道·恩·德斯蒙德·许
(74)专利代理机构 北京东方亿思知识产权代理有限责任公司 11258
代理人 宋鹤 南霆
(51)Int.Cl.
H04N 7/15(2006.01)

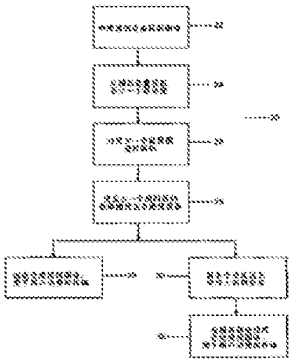
权利要求书 3 页 说明书 5 页 附图 6 页

(54)发明名称

用于处理合成视频图像的方法和系统

(57)摘要

提供了用于处理合成视频图像的方法和系统。合成视频图像可以是由用户或者根据预定设置组成的、用于用户消费和向网络传输的图像和至少一个编码后的截屏图的结合。向网络传输可以在用户消费期间同时进行。有利的是，至少一个截屏图的编码独立于在至少一个辅助装置上运行的至少一个应用。至少一个截屏图可以具有或不具有音频信号。



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1. 一种用于处理合成视频图像的方法，所述方法包括：

使用通信设备的图像捕捉装置获取图像；

从连接至所述通信设备的至少一个辅助装置获取至少一个截屏图；

在所述至少一个辅助装置处将所述至少一个截屏图编码为所述通信设备能够接收的格式；

将至少一个编码后的截屏图传送至所述通信设备；

在所述通信设备处对所述至少一个编码后的截屏图进行解码；以及

由用户或者根据预定设置在所述通信设备处组成所述图像和所述至少一个编码后的截屏图的结合的合成视频图像，以用于用户消费和向网络传输，

其中所述至少一个截屏图的编码独立于在所述至少一个辅助装置上运行的至少一个应用，并且其中所述至少一个截屏图是从包括以下内容的群组中选择的类型：具有音频信号和不具有音频信号。

2. 根据权利要求 1 所述的方法，其中所述至少一个截屏图是全屏幕视图或部分屏幕视图。

3. 根据权利要求 1 所述的方法，其中所述向网络传输是在用户消费期间同时进行的。

4. 根据权利要求 1 所述的方法，其中所述至少一个编码后的截屏图被作为序列流传送。

5. 根据权利要求 1 所述的方法，其中所述至少一个辅助装置是从包括以下装置的群组中选择的：媒体播放器、计算机、PDA、移动电话、便携式游戏控制终端、相机、以及电视调谐器。

6. 根据权利要求 1 所述的方法，其中所述合成视频图像包括作为背景的所述至少一个编码后的截屏图和覆盖在所述至少一个编码后的截屏图上的所述图像。

7. 根据权利要求 1 所述的方法，其中所述至少一个截屏图的源的变化或缺失导致所述合成视频图像的变化。

8. 一种用于处理合成视频图像的方法，所述方法包括：

使用通信设备的图像捕捉装置获取图像；

从连接至所述通信设备的至少一个辅助装置获取至少一个截屏图；

在所述至少一个辅助装置处将所述至少一个截屏图编码为所述通信设备能够接收的格式；

将所述至少一个编码后的截屏图传送至所述通信设备；

在所述通信设备处对所述至少一个编码后的截屏图进行解码；以及

将多个数据流传送至服务器，所述服务器通过用户或者根据预定设置在所述通信设备处组成所述图像和所述至少一个编码后的截屏图的结合的合成视频图像，以用于用户消费和进一步向网络传输，

其中所述至少一个截屏图的编码独立于在所述至少一个辅助装置上运行的至少一个应用，并且其中所述至少一个截屏图是从包括以下内容的群组中选择出来的类型：具有音频信号和不具有音频信号。

9. 根据权利要求 8 所述的方法，其中所述至少一个截屏图是全屏幕视图或部分屏幕视图。

10. 根据权利要求 8 所述的方法，其中所述进一步向网络传输是在所述用户消费期间同时进行的。

11. 根据权利要求 8 所述的方法，其中所述至少一个编码后的截屏图被作为序列流传送。

12. 根据权利要求 8 所述的方法，其中所述至少一个辅助装置是从包括以下装置的群组中选择的：媒体播放器、计算机、PDA、移动电话、便携式游戏控制装置、相机、以及电视调谐器。

13. 根据权利要求 8 所述的方法，其中所述合成视频图像包括作为背景的所述至少一个编码后的截屏图和覆盖在所述至少一个编码后的截屏图上的所述图像。

14. 根据权利要求 8 所述的方法，其中所述至少一个截屏图的源的变化或缺失导致所述合成视频图像的变化。

15. 一种用于处理合成视频图像的系统，所述系统包括：

通信设备的图像捕捉装置，用于获取图像；

连接至所述通信设备的至少一个辅助装置，用于获取至少一个截屏图；

所述至少一个辅助装置中的桥接编码器，用于将所述至少一个截屏图变换为所述通信设备能够接收的格式；

耦合至所述至少一个辅助装置中的所述桥接编码器的发射机，用于将所述至少一个编码后的截屏图传送至所述通信设备的桥接解码器；

耦合至所述桥接解码器的视频合成器，所述视频合成器由用户控制或根据所述通信设备中的预定设置而被控制，用于组成所述图像和所述至少一个编码后的截屏图的结合的合成视频图像，以用于用户消费和进一步向网络传输，

其中所述至少一个截屏图的编码独立于在所述至少一个辅助装置上运行的至少一个应用，并且其中所述至少一个截屏图是从包括以下内容的群组中选择的类型：具有音频信号和不具有音频信号。

16. 根据权利要求 15 所述的系统，其中所述至少一个截屏图是全屏幕视图或部分屏幕视图。

17. 根据权利要求 15 所述的系统，其中所述进一步向网络传输是在用户消费期间同时进行的。

18. 根据权利要求 15 所述的系统，其中所述至少一个编码后的截屏图被作为序列流传送。

19. 根据权利要求 15 所述的系统，其中所述至少一个辅助装置是从包括以下装置的群组中选择的：媒体播放器、计算机、PDA、移动电话、便携式游戏控制装置、相机、以及电视调谐器。

20. 根据权利要求 15 所述的系统，其中所述合成视频图像包括作为背景的所述至少一个编码后的截屏图和覆盖在所述至少一个编码后的截屏图上的所述图像。

21. 根据权利要求 15 所述的系统，其中所述至少一个截屏图的源的变化或缺失导致所述合成视频图像的变化。

22. 一种用于处理合成视频图像的系统，所述系统包括：

通信设备的图像捕捉装置，用于获取图像；

连接至所述通信设备的至少一个辅助装置，用于获取至少一个截屏图；

所述至少一个辅助装置中的桥接编码器，用于将所述至少一个截屏图变换为所述通信设备能够接收的格式；

耦合至所述至少一个辅助装置中的所述桥接编码器的发射机，用于将所述至少一个编码后的截屏图传送至所述通信设备的桥接解码器；

设置在连接至所述通信设备的服务器上的视频合成器，所述视频合成器由用户控制或者根据所述通信设备中的预定设置而被控制，用于组成所述图像和所述至少一个编码后的截屏图的结合的合成视频图像，以用于用户消费和进一步向网络传输，

其中所述至少一个截屏图的编码独立于在所述至少一个辅助装置上运行的至少一个应用，并且所述至少一个截屏图是从包括以下内容的群组中选择的类型：具有音频信号和不具有音频信号。

23. 根据权利要求 22 所述的系统，其中所述至少一个截屏图是全屏幕视图或部分屏幕视图。

24. 根据权利要求 22 所述的系统，其中所述进一步向网络传输是在用户消费期间同时进行的。

25. 根据权利要求 22 所述的系统，其中所述至少一个编码后的截屏图被作为序列流传送。

26. 根据权利要求 22 所述的系统，其中所述至少一个辅助装置是从包括以下装置的群组中选择的：媒体播放器、计算机、PDA、移动电话、便携式游戏控制装置、相机、以及电视调谐器。

27. 根据权利要求 22 所述的系统，其中所述合成视频图像包括作为背景的所述至少一个编码后的截屏图和覆盖在所述至少一个编码后的截屏图上的所述图像。

28. 根据权利要求 22 所述的系统，其中所述至少一个截屏图的源的变化或缺失导致所述合成视频图像的变化。

用于处理合成视频图像的方法和系统

技术领域

[0001] 本发明总地涉及处理包括来自多个源的内容的合成视频图像的领域，更具体但不排他地涉及独立于平台和应用的方法和系统。

背景技术

[0002] 不断增长的数据传输带宽、不断降低的数据传输费用、以及 VOIP 的无所不在是导致采用视频会议作为通信工具的潮流的一些因素。这个潮流已经使得专门用于视频会议的各种装置持续增多，这种装置类似于具有视频会议功能的电话。然而，这些专门用于视频会议的装置可以被设计为主要用于方便各种档次的技术能力的用户的使用。对于容易使用的装置的需求已经导致这种装置的装置功能的简化。

[0003] 对装置功能的限制通常会简化装置的可用性。在这种情况下，一般仅要求装置传送和接收视频信号，以进行视频会议。装置的用户将很难向接收方展示在诸如计算机、PDA、移动电话、便携式游戏控制装置、和电视调谐器之类的至少一个辅助装置 (secondary device) 上显示的内容。由于例如刷新率问题、图像质量 / 清晰度问题、以及分辨率问题等，使用装置的数码相机来捕捉辅助装置上显示的内容将导致接收者不希望出现的问题。由于相机与辅助装置之间的距离，导致相机可能不能清楚地捕捉内容。从辅助装置接口 (porting) 内容也可能需要简化后的装置不能提供的数据处理能力。

发明内容

[0004] 第一方面，提供了一种用于处理合成视频图像的方法。该方法包括：使用通信设备的图像捕捉装置获取图像；从连接至通信设备的至少一个辅助装置获取至少一个截屏图 (screen capture)；在至少一个辅助装置处将至少一个截屏图编码为通信设备能够接收的格式；将至少一个编码后的截屏图传送至通信设备；在通信设备处对至少一个编码后的截屏图进行解码；以及由用户或者根据预定设置在通信设备处组成所述图像和所述至少一个编码后的截屏图的结合的合成视频图像，以用于用户消费和向网络传输。向网络传输可以是在用户消费期间同时进行的。有利的是，至少一个截屏图的编码独立于在至少一个辅助装置上运行的至少一个应用。至少一个截屏图可以具有或不具有音频信号。

[0005] 至少一个截屏图可以是全屏幕视图或部分屏幕视图。优选地，至少一个编码后的截屏图被作为序列流 (sequential stream) 传送。至少一个截屏图的源的变化或缺失会导致合成视频图像的变化。优选地，合成视频图像包括作为背景的至少一个编码后的截屏图和覆盖在至少一个编码后的截屏图上的图像。

[0006] 至少一个辅助装置例如可以是媒体播放器、计算机、PDA、移动电话、便携式游戏控制装置、相机或者电视调谐器。

[0007] 第二方面，提供了另一种用于处理合成视频图像的方法。该方法包括：使用通信设备的图像捕捉装置获取图像；从连接至通信设备的至少一个辅助装置获取至少一个截屏图；在至少一个辅助装置处将至少一个截屏图编码为通信设备能够接收的格式；将至少一

个编码后的截屏图传送至通信设备；在通信设备处对至少一个编码后的截屏图进行解码；以及将多个数据流传送至服务器，该服务器通过用户或者根据预定设置在通信设备处组成所述图像和所述至少一个编码后的截屏图的结合的合成视频图像，以用于用户消费和进一步向网络传输。进一步向网络传输可以是在用户消费期间同时进行的。有利的是，至少一个截屏图的编码独立于在至少一个辅助装置上运行的至少一个应用。至少一个截屏图可以具有或不具有音频信号。

[0008] 至少一个截屏图可以是全屏幕视图或者部分屏幕视图。优选地，至少一个编码后的截屏图被作为序列流传送。至少一个截屏图的源的变化或缺失会导致合成视频图像的变化。优选地，合成视频图像包括作为背景的至少一个编码后的截屏图和覆盖在至少一个编码后的截屏图上的图像。

[0009] 第三方面，提供了一种用于处理合成视频图像的系统。该系统包括：通信设备的图像捕捉装置，用于获取图像；连接至通信设备的至少一个辅助装置，用于获取至少一个截屏图；至少一个辅助装置中的桥接编码器，用于将至少一个截屏图变换为通信设备能够接收的格式；耦合至至少一个辅助装置中的桥接编码器的发射机，用于将至少一个编码后的截屏图传送至通信设备的桥接解码器；耦合至桥接解码器的视频合成器，该视频合成器由用户控制或者根据通信设备中的预定设置而被控制，用于组成所述图像和所述至少一个编码后的截屏图的结合的合成视频图像，以用于用户消费和进一步向网络传输。优选地，至少一个截屏图的编码独立于在至少一个辅助装置上运行的至少一个应用。至少一个截屏图可以具有或不具有音频信号。

[0010] 至少一个截屏图可以是全屏幕视图或者部分屏幕视图。优选地，至少一个编码后的截屏图被作为序列流传送。至少一个截屏图的源的变化或缺失会导致合成视频图像的变化。优选地，合成视频图像包括作为背景的至少一个编码后的截屏图和覆盖在至少一个编码后的截屏图上的图像。

[0011] 至少一个辅助装置例如可以是媒体播放器、计算机、PDA、移动电话、便携式游戏控制装置、相机、或电视调谐器。

[0012] 最后，提供了另一种用于处理合成视频图像的系统。该系统包括：通信设备的图像捕捉装置，用于获取图像；连接至通信设备的至少一个辅助装置，用于获取至少一个截屏图；至少一个辅助装置中的桥接编码器，用于将至少一个截屏图变换为通信设备能够接收的格式；耦合至至少一个辅助装置中的桥接编码器的发射机，用于将至少一个编码后的截屏图传送至通信设备的桥接解码器；位于能够连接至通信设备的服务器上的视频合成器，该视频合成器由用户控制或者根据通信设备中的预定设置而被控制，用于组成所述图像和所述至少一个编码后的截屏图的结合的合成视频图像，以用于用户消费和进一步向网络传输。有利的是，至少一个截屏图的编码独立于在至少一个辅助装置上运行的至少一个应用。

附图说明

[0013] 为了使本发明被完全理解并被很容易地付诸实施，现在参考所附的说明性附图，仅通过非限制性的示例来描述本发明的优选实施例。

[0014] 图 1 示出了第一实施例中的本发明的方法的流程图。

[0015] 图 2 示出了第一实施例中的本发明的系统的示意图。

[0016] 图 3 示出了第一实施例的变形中的本发明的系统的示意图。

[0017] 图 4 示出了本发明的系统的概略图。

[0018] 图 5 示出了截屏图的示例。

[0019] 图 6 示出了使用通信设备的图像捕捉装置获取的图像的示例。

[0020] 图 7 示出了使用本发明的方法和 / 或系统获取的合成视频图像的示例。

具体实施方式

[0021] 在图 1 中所示的第一方面，提供了一种用于处理合成视频图像（这种合成图像的示例 200 在图 7 中示出）的方法 20。方法 20 包括使用通信设备的图像捕捉装置获取图像（这种图像的示例 300 在图 6 中示出）(22)。通信设备可以示例性地由图 2 中的 50 和图 3 中的 70 表示。50 和 70 表示通信设备的变形。图 4 也示出了使用期间的通信设备 100 的表示。

[0022] 方法 20 包括从连接至通信设备的至少一个辅助装置获取至少一个截屏图（这种截屏图的示例 400 在图 5 中示出）(24)。截屏图例如包括图表、表格、展示幻灯片、静止图像、运动图像等。至少一个辅助装置例如可以是媒体播放器、计算机、PDA、移动电话、便携式游戏控制装置、电视调谐器、相机等。辅助装置可以示例性地表示为图 2 和图 3 中的 40。图 5 也示出了辅助装置的说明性表示，即笔记本 120、移动电话 140、便携式游戏控制装置 160、电视机中的电视调谐器 180。到通信设备的连接可以经由有线或无线连接。至少一个截屏图可以在至少一个辅助装置处被编码为用于传输至通信设备的格式 (26)。在至少一个辅助装置处进行编码期间，至少一个截屏图还可以进行压缩。音频信号也可以在至少一个辅助装置处被捕捉。

[0023] 然后，至少一个编码后的截屏图可被作为序列流，经由到通信设备的连接传送至通信设备 (28)。类似地，音频信号也可以被传送至通信设备。

[0024] 然后，至少一个编码后的截屏图（和音频信号）和使用图像捕捉装置获取的图像可以被解码、结合、并组合为合成音频图像 (29)。合成图像的合成可以取决于用户，也可以根据预定设置。例如，用户可能喜欢使用截屏图作为合成视频图像的背景，而图像被覆盖在至少一个编码后的截屏图上。这在图 7 中的合成图像 200 中示出。至少一个编码后的截屏图的源可以在任意情况下改变。当至少一个编码后的截屏图的源被改变时，至少一个编码后的截屏图可以具有不同的内容，并且合成视频图像随后被以不同内容呈现。至少一个截屏图可以是全屏幕视图或者部分屏幕视图。预定设置可以包括涉及音频混合、将图像 / 截屏图分别布置或彼此相对布置等的设置。合成图像可以被用于用户消费（预览合成图像）和向网络传输。向网络传输可以在用户消费期间同时进行。应该注意，用户消费例如可以包括观看和编辑。在向网络传输之前，合成图像可以被编码和压缩。

[0025] 在至少一个编码后的截屏图（和音频信号）顺序传输至通信设备 (28) 之后，通信设备可以交替地将至少一个编码后的截屏图（和音频信号）和使用图像捕捉装置获取的图像作为独立流传送至网络 (30)。独立流可以在连接至网络的服务器上被解码、结合、并组合为合成视频图像 (32)。合成图像的合成可以取决于用户，也可以根据预定设置。至少一个编码后的截屏图的源可以在任何情况下被改变。当至少一个编码后的截屏图的源被改变时，至少一个编码后的截屏图可以具有不同内容（和音频），并且合成视频图像随后被以不

同内容呈现。当一个或多个辅助装置被从通信设备断开时，合成视频图像也可以被有差别地呈现。预定设置可考虑到编码后的截屏图的源的缺失，而不会在与其他方通信期间对用户产生中断。至少一个截屏图可以是全屏幕视图或者部分屏幕视图。预定设置可以包括涉及将图像／截屏图分别布置或彼此相对布置的设置。合成图像可以被用于用户消费或向网络传输。从服务器到网络的传输可以在用户消费期间同时进行。在向网络传输之前，合成图像可以被编码并压缩。

[0026] 方法 20 的截屏、编码和传输步骤可以在通信设备中由在例如 ActiveX 客户端、Java 或专有应用上运行的一组指令启动。在这方面，该组指令，即 ActiveX 客户端、Java applet/ 应用或专有应用可以驻留于通信设备本地。应该注意，通信设备可以是 USB 大容量存储装置，从而使得辅助装置可以在没有用户介入的情况下下载该组指令用于执行。通信设备还可以充当网络服务器。通信设备还可以执行作为网络服务器的任务。优选地，方法 20 独立于在至少一个辅助装置上运行的至少一个应用。这样，方法 20 在至少一个应用被增强／升级／更新的时候仍可以被执行。所以，方法 20 被启动，而不论辅助装置上的操作系统、辅助装置上的应用以及辅助装置上的应用版本怎样。诸如 jpg、mp4、mp3 等的广泛采用的用于传输的文件格式可以进一步帮助启动将要启动的方法 20，而不论辅助装置上的操作系统、辅助装置上的应用、以及辅助装置上的应用版本如何。

[0027] 第二方面，在图 2 中公开了一种用于处理合成视频图像（这种合成图像的示例 200 在图 7 中示出）的系统 41。系统 41 包括通信设备 50 的图像捕捉装置 42，用于获取图像（这种图像的示例 300 在图 6 中示出）。至少一个辅助装置 40 可以被连接 43 至通信设备 50，用于获取至少一个截屏图 44（这种截屏图的示例 400 在图 5 中示出）。截屏图例如可以包括图表、表格、展示幻灯片、静止图像、运动图像等。音频信号也可以在至少一个辅助装置处被捕捉。至少一个辅助装置 40 例如可以是媒体播放器、计算机、PDA、移动电话、便携式游戏控制装置、电视调谐器、相机等。图 4 也示出了辅助装置的说明性表示，即笔记本 120、移动电话 140、便携式游戏控制装置 160、电视机中的电视调谐器 180。

[0028] 至少一个辅助装置 40 可以包括用于将至少一个截屏图 44（和音频信号）变换为用于传输至通信设备 50 的格式的桥接编码器 (bridgingencoder)45。桥接编码器 45 还可以对至少一个截屏图 44 进行压缩。至少一个辅助装置 40 可以包括用于将至少一个编码后的截屏图（和音频信号）以序列流的形式传送至桥接解码器 49 继而传送至通信设备 50 的视频合成器 46 的发射机 47。

[0029] 视频合成器 46 可以由用户控制，或者根据预定设置控制。例如，用户可能喜欢使用截屏图作为合成视频图像的背景，同时图像被覆盖在至少一个编码后的截屏图上。这在图 7 中的合成图像 200 中示出。至少一个截屏图 44（和音频信号）的源可以在任何情况下被改变。当至少一个截屏图（和音频信号）的源被改变时，至少一个编码后的截屏图可以具有不同内容，并且视频合成器 46 相应地以不同内容呈现合成视频图像。当一个或多个辅助装置 40 被从通信设备 50 断开时，合成视频图像还可以被有区别地呈现。预定设置可考虑到编码后的截屏图的源的缺失，而不会在与其他方通信期间对用户造成任何中断。预定设置可以包括分别音频混合、图像／截屏图的分别布置或彼此相对布置等的设置。至少一个截屏图可以是全屏幕视图或部分屏幕视图。合成图像可以被用于显示器 60 上的用户消费以及向网络 48 传输。向网络 48 传输可以在用户消费的同时进行。应该注意，用户消费例

如可以包括观看和编辑。在向网络传输之前，合成图像可以被网络编码器 51 编码并压缩。

[0030] 系统 41 的第二方面的变形在图 3 中示出。在这个变形中，通信设备 70 不具有视频合成器。通信设备 70 可以将至少一个编码后的截屏图（和音频信号）和使用图像捕捉装置获取的图像作为独立流传送至网络 48。独立流可以由连接至网络 48 的服务器 90 的视频合成器 92 结合并组合为合成视频图像。服务器 90 可以包括网络解码器 94，以对来自网络 48 的信号进行解码。视频合成器 92 可以由用户控制，也可以根据预定设置控制。例如，用户可能喜欢使用截屏图作为合成视频图像的背景，同时图像覆盖在至少一个编码后的截屏图上。至少一个截屏图 44 的源可以在任何情况下被改变。当至少一个截屏图的源被改变时，至少一个编码后的截屏图可以具有不同内容，并且视频合成器 92 相应地以不同内容（和音频）呈现合成视频图像。预定设置可以包括涉及音频混合、图像 / 截屏图的分别布置或彼此相对布置等的设置。至少一个截屏图可以是全屏幕视图或部分屏幕视图。合成图像可以被用于显示器 60 上的用户消费以及向网络 48 传输。向网络 48 传输可以在用户消费期间同时进行。在向网络 48 传输之前，合成图像可以被网络编码器 96 编码并压缩。

[0031] 在系统 41 中，有利的是，至少一个截屏图的编码独立于在至少一个辅助装置上运行的至少一个应用。系统 41 的截屏、编码和传输步骤可以由 ActiveX 客户端、Java 或者专有应用启动。在这方面，该组指令，即 ActiveX 客户端、Java applet/ 应用或适当应用可以驻留于通信设备 70 本地。应该注意，通信设备 70 可以是 USB 大容量存储装置，从而辅助装置 40 可以在没有用户介入的情况下下载该组指令用于执行。通信设备 70 还可以充当网络服务器。这样，编码在至少一个应用被增强 / 升级 / 更新时仍可以执行。所以，编码被启动，而不论辅助装置上的操作系统、辅助装置上的应用、以及辅助装置上的应用版本如何。诸如 jpg、mp4、mp3 等的广泛采用的用于传输的文件格式的使用可以进一步帮助启动将要启动的方法 30，而不论辅助装置上的操作系统、辅助装置上的应用、以及辅助装置上的应用版本如何。

[0032] 参考图 3，示出了本发明的系统的概略图。通信设备 100 被示出为通过网络 102 连接至多个类似的通信设备 100。网络 102 可以是局域网或广域网。应该注意，通信设备 100 可以是处理能力小于相同年代的计算机的设备。该系统的关键方面涉及无论辅助装置上的运行系统、辅助装置上的应用、以及辅助装置上的应用版本如何都能够被连接至辅助装置的通信设备 100。可以看到，诸如笔记本 120、移动电话 140、便携式游戏控制装置 160、电视机中的电视调谐器 180 等的辅助装置被连接至通信设备 100。通信设备 100 的显示器 104 示出了包括来自笔记本 120 的截屏图 106 和由通信设备 100 的图像捕捉装置 110 获取的图像 108 的合成图像。根据系统 41 的变形的描述，服务器 190 被示出为连接至网络 102。

[0033] 尽管在前面的描述中描述了本发明的优选实施例，但是本领域技术人员将理解，在不脱离本发明的条件下，可以在设计或结构的很多细节上作出变形或修改。

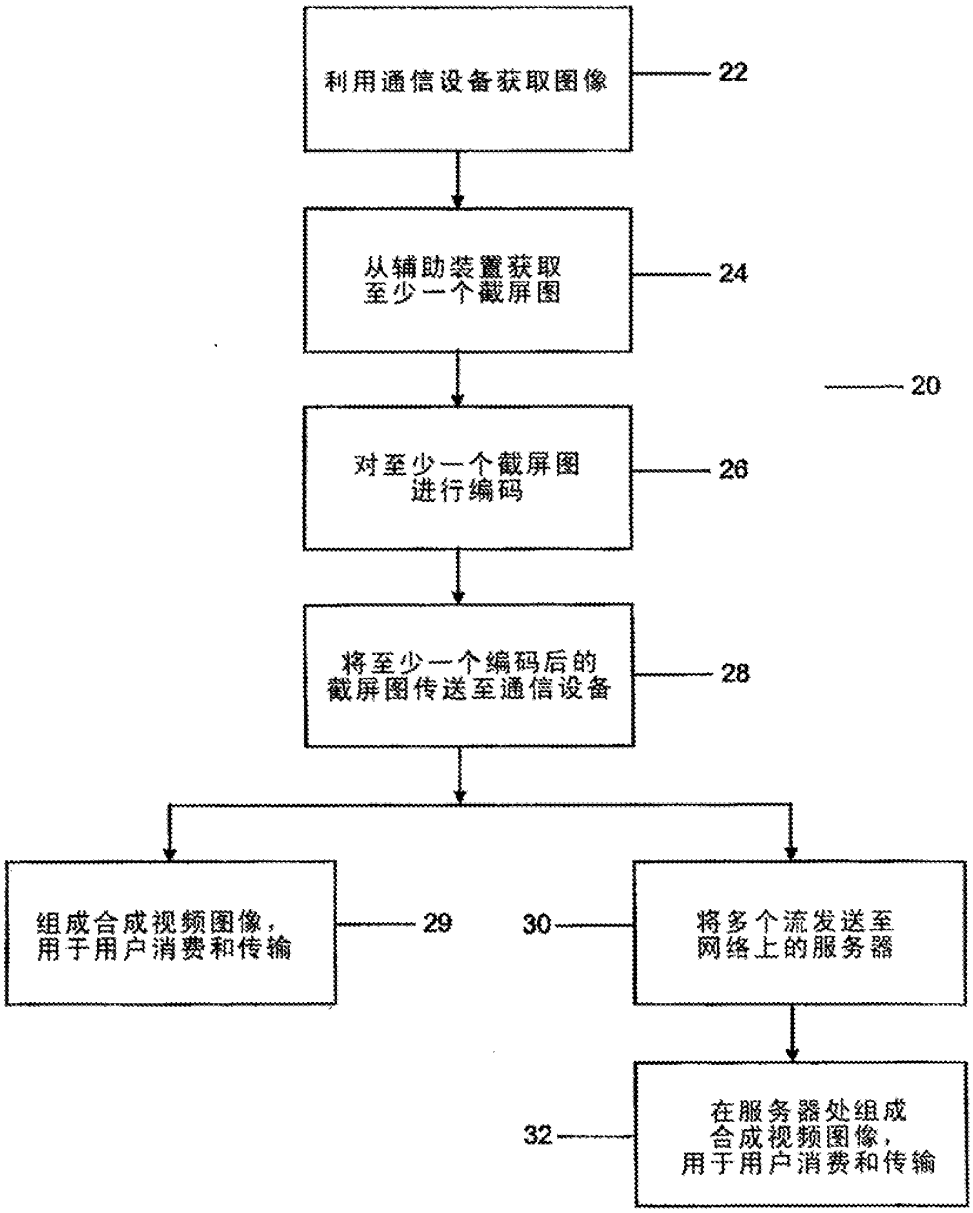
利用通信设备获取图像
22
从辅助装置获取
至少一个截屏图
24
20
对至少一个截屏图
进行编码
26
将至少一个编码后的
截屏图传送至通信设备
28
组成合成视频图像，
用于用户消费和传输
29
30
将多个流发送至
网络上的服务器
32
在服务器处组成
合成视频图像，
用于用户消费和传输

图 1

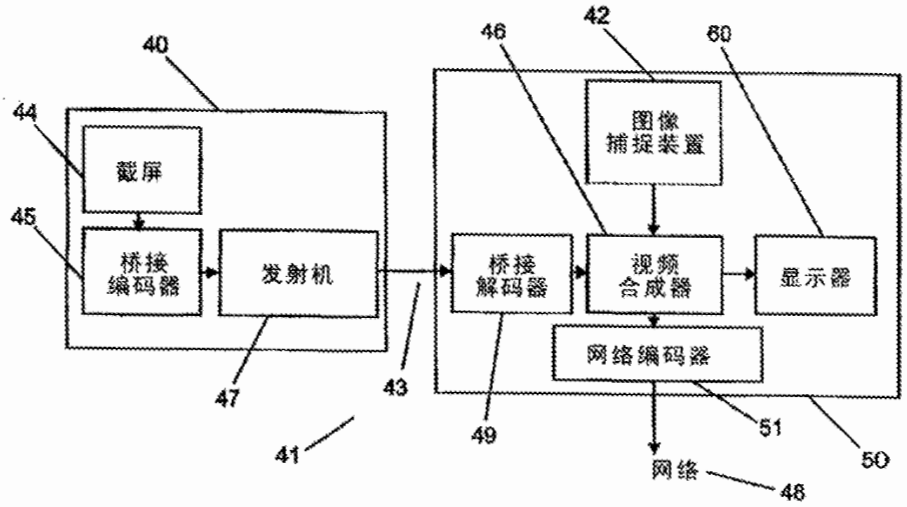
40
44
45
截屏
桥接
编码器
发射机
47
43
41
46
42
60
图像
捕捉装置
桥接
解码器
视频
合成器
显示器
网络编码器
49
51
50
网络
48

图 2

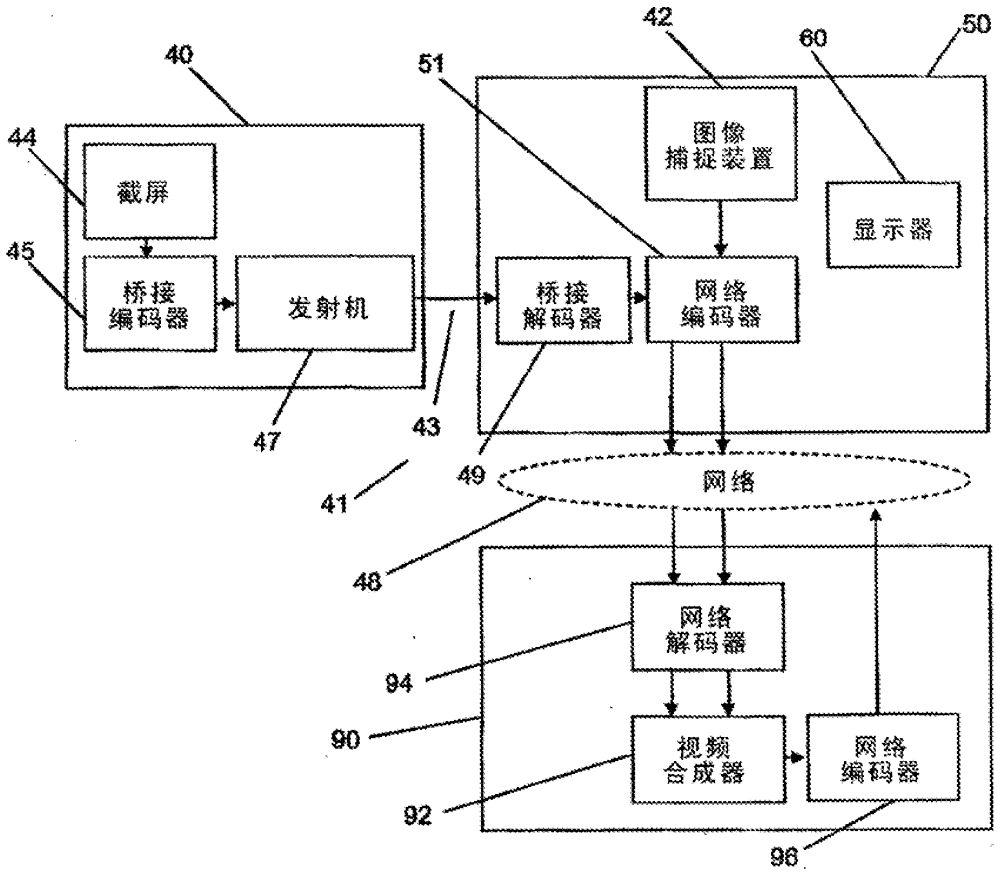
40
44
截屏
45
桥接
编码器
发射机
47
43
41
51
42
60
50
图像
捕捉装置
显示器
桥接
解码器
网络
编码器
49
网络
48
网络
解码器
94
90
视频
合成器
网络
编码器
92
96

图 3

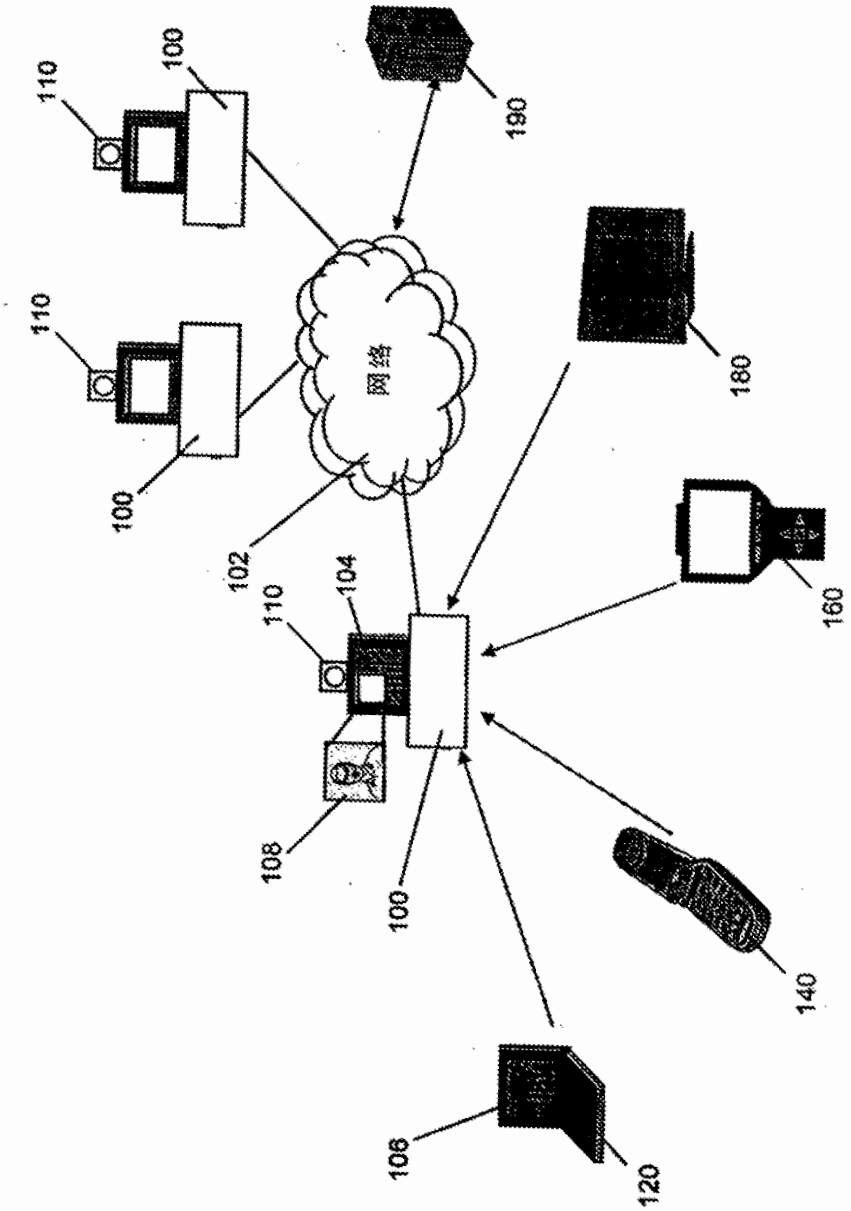

图 4

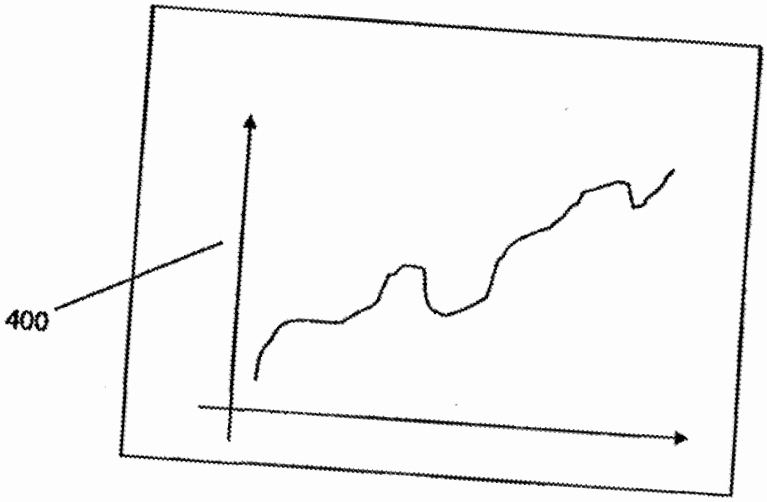

图 5

图 6

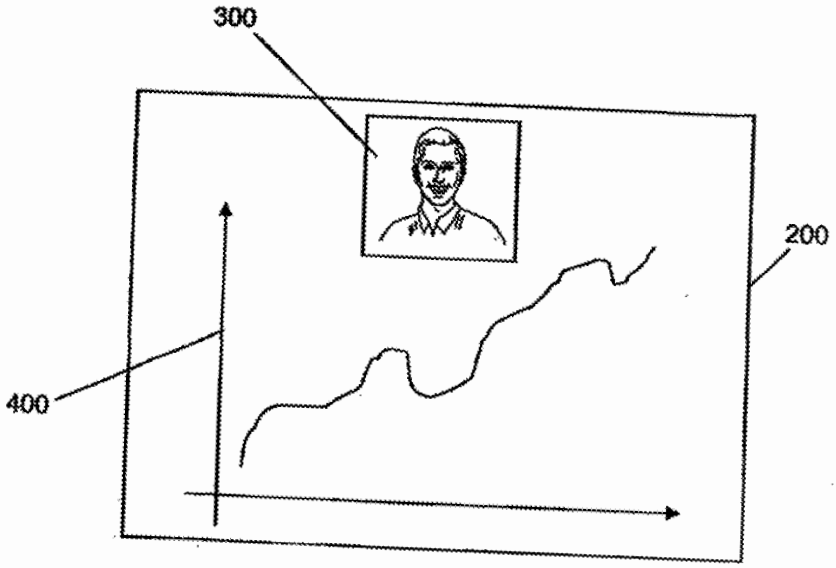

图 7

Espacenet

Bibliographic data: CN102023852 (A) — 2011-04-20

Screen capture method and system

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- cooperative:

Application number: CN20091190077 20090915

Priority number(s): CN20091190077 20090915

Abstract of CN102023852 (A)

The invention relates to the technical field of computers, and provides a screen capture method, which comprises the following steps of: receiving a screen capture command from a user, and acquiring a window body to be hidden; adding a layered attribute for the window body to be hidden, and setting alpha transparency to be proper transparency to make completely transparent the window body to be hidden; receiving a selected area input by the user, and capturing the screen contents of the selected area; recovering the attribute setting of the hidden window body; and processing the captured screen contents. The invention also discloses a system using the method. In the method and the system provided by the invention, the user does not need to worry about that unhidden and undesired window body contents are captured, the screen contents are the latest contents captured by the screen capture in live upgrade, and continuous screen capture does not cause the flickering of the window body; and the method and the system are applicable to the screen capture under the conditions, with high requirements on real-time, of monitoring the whole or a part of screen, and the like.

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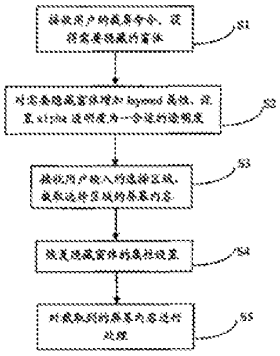
权利要求书 1 页 说明书 4 页 附图 1 页

(54)发明名称

一种截屏方法及系统

(57)摘要

本发明涉及计算机技术领域，提供了一种截屏方法，包括以下步骤：接收用户的截屏命令，获得需要隐藏的窗体；对需要隐藏窗体增加layered属性，设置alpha透明度为一合适的透明度使需要隐藏的窗体完全透明；接收用户输入的选择区域，截取选择区域的屏幕内容；恢复隐藏窗体的属性设置；对截取到的屏幕内容进行处理。本发明还公开了使用上述方法的系统。利用本发明公开的方法和系统，用户不需要担心会截取到未完全隐藏的不想被截取的窗体内容，且屏幕内容是实时更新时截屏截取到的内容也是最新的内容，连续截屏不会有窗体闪烁现象，适用于监视屏幕的整个或者部分区域等实时性要求很高情况下的截屏。



CN 102023852 A

1. 一种截屏方法，其特征在于，包括以下步骤：

S1）接收用户的截屏命令，获得需要隐藏的窗体；

S2）对需要隐藏窗体增加 layered 属性，设置 alpha 透明度为一合适的透明度使需要隐藏的窗体完全透明；

S3）接收用户输入的选择区域，截取选择区域的屏幕内容；

S4）恢复隐藏窗体的属性设置；

S5）对截取到的屏幕内容进行处理。

2. 如权利要求 1 所述方法，其特征在于，所述步骤 S2 进一步包括：获取并保存需要隐藏窗体未隐藏前的原始的 layered 属性值和 alpha 值。

3. 如权利要求 2 所述方法，其特征在于，所述步骤 S4 进一步包括：将隐藏窗体的 LAYERED 属性值和 alpha 值恢复为原始值。

4. 一种截屏系统，其特征在于，包括：

获取隐藏窗体模块：用于接收用户的截屏命令，从截屏命令中获取用户需要隐藏的窗体；

透明窗体形成模块：用于将需要隐藏的窗体处理为完全透明；

截屏模块：用于对用户输入的选择区域作为截屏区域进行截取；

隐藏窗体恢复模块：用于将隐藏窗体恢复到未隐藏前的设置；

图片处理模块：用于将截取到的屏幕内容进行处理。

5. 如权利要求 4 所述系统，其特征在于，所述透明窗体形成模块包括：

隐藏窗体属性获取单元：用于获取并保存需要隐藏窗体未隐藏前的原始的窗体属性值；

处理单元：用于将需要隐藏窗体处理为完全透明。

一种截屏方法及系统

技术领域

[0001] 本发明属于计算机技术领域，更具体地说，涉及一种截屏方法及系统。

背景技术

[0002] 目前对电脑屏幕内容进行截取时都是先将自身不想被截取的窗体使用普通隐藏窗体方式把窗体进行隐藏。如 Windows 系统下的 API(Application Programming Interface，应用程序编程接口)：ShowWindow(SW_HIDE)。 然后再对屏幕内容进行截取，最后将截取的内容保存或者显示在指定窗体。

[0003] 目前截屏技术需要对自身不想被截取的程序窗体进行隐藏后再进行截取，因为使用普通隐藏窗体方式，所以窗体隐藏时需要一定时间，当确保窗体已完全隐藏时才进行截取，否则将会截取到自身不想被截取的窗体内容。 由对窗体设置隐藏到窗体完全隐藏的时长就算是同一硬件配置下，也会因系统当时所要处理的任务轻重而有所不同，所以这个等待的时长也不好设置。 故若将等待时间设置得太长了，截取的内容可能不是最新的屏幕内容，若时间短了，也不能确保该隐藏的窗体已完全隐藏。 特别是如果要对屏幕内容进行实时的显示，由于对窗体不断的隐藏显示，将会使屏幕闪烁严重，影响视觉效果。

[0004] 中国专利局于 2008 年 2 月 13 日公开的第 200710077362.0 号专利中，其名称为“一种截屏方法及系统”，其揭露了一种截屏方法及系统：通过新生成一个半透明窗口覆盖整个屏幕，配置需要截屏的区域使需要截屏的区域与半透明窗口有明显的对比，从而使用户能更清晰地看清当前选择区域的范围，从而能更精确的选择需要截屏的区域。此方案并没有解决使用普通隐藏方式会导致截取到不想截取的窗口内容及闪烁问题。

[0005] 因此，需要一种性能更好，效率更高的使窗体快速隐藏，不会导致闪烁，从而对截屏不会造成影响的截屏方案，来克服现有技术中存在的上述缺陷。

发明内容

[0006] 本发明所要解决的技术问题在于，针对现有截屏技术中使用普通隐藏窗体方式隐藏窗体需要时间导致的会截取到未完全隐藏的窗体内容的问题和会出现闪烁的问题，提供一种截屏方法及系统。

[0007] 本发明解决其技术问题所采用的方案之一是：本发明提供了一种截屏方法，包括如下步骤：

[0008] S1) 接收用户的截屏命令，获得需要隐藏的窗体；

[0009] S2) 对需要隐藏窗体增加 layered 属性，设置 alpha 透明度为一合适的透明度使需要隐藏的窗体完全透明；

[0010] S3) 接收用户输入的选择区域，截取选择区域的屏幕内容；

[0011] S4) 恢复隐藏窗体的属性设置；

[0012] S5) 对截取到的屏幕内容进行处理。

[0013] alpha 是窗体设置透明度的参数，用灰阶值 0-255 共 256 级分别与 0%-100%透明度对应。透明度 100%时（对应 255 灰，白色）表示完全透明，透明度 0%时（对应 0 灰，黑色）表示完全不透明，其他透明度 1%-99%将按比例地取 1-254 之间的值。layered 为窗体的一个参数，使用了该属性，窗体才能设置 alpha 参数值，以支持透明功能。

[0014] 本发明所述的一种截屏方法，在步骤 S1 中，用户发出的截屏命令包括对当前已经打开的窗体确定哪些窗体需要隐藏或者确定哪些窗体需要截屏。

[0015] 本发明所述的一种截屏方法，步骤 S2 进一步包括：获取并保存需要隐藏窗体未隐藏前的原始的 layered 属性值和 alpha 值。

[0016] 本发明所述的一种截屏方法，在步骤 S3 中，用户输入的选择区域为整个屏幕或者部分区域。

[0017] 本发明所述的一种截屏方法，步骤 S4 进一步包括：将隐藏窗体的 layered 属性值和 alpha 值恢复为原始值。

[0018] 本发明解决其技术问题所采用的方案之二是：提供了一种截屏系统，包括：

[0019] 获取隐藏窗体模块：用于接收用户的截屏命令，从截屏命令中获取用户需要隐藏的窗体；

[0020] 透明窗体形成模块：用于将需要隐藏的窗体处理为完全透明从而达到隐藏目的；

[0021] 截屏模块：用于对用户输入的选择区域作为截屏区域进行截取；

[0022] 隐藏窗体恢复模块：用于将隐藏窗体恢复到未隐藏前的设置；

[0023] 图片文件处理模块：用于将截取到的屏幕内容进行处理。

[0024] 本发明所述的一种截屏系统，所述透明窗体形成模块包括：

[0025] 隐藏窗体属性获取单元：用于获取并保存需要隐藏窗体未隐藏前的原始的窗体属性值；

[0026] 处理单元：用于将需要隐藏窗体处理为完全透明。

[0027] 本发明所述的一种截屏系统，所述透明窗体形成模块的隐藏窗体属性获取单元获取并保存需要隐藏窗体未隐藏前的原始的 layered 属性值和 alpha 值。

[0028] 本发明所述的一种截屏系统，所述透明窗体控制模块的处理单元对需要隐藏窗体增加 layered 属性，配置 alpha 透明度为一合适的透明度使需要隐藏的窗体完全透明。

[0029] 本发明所述的一种截屏系统，根据隐藏窗体属性获取单元保存的需要隐藏窗体未隐藏前的原始的窗体属性值，隐藏窗体恢复模块将隐藏窗体的 layered 属性值和 alpha 值恢复为原始值。

[0030] 实施本发明的技术方案，具有以下有益效果：用户不需要担心会截取到未完全隐藏的不想被截取的窗体内容，且屏幕内容是实时更新时截屏截取到的内容也是最新的内容，连续截屏不会有窗体闪烁现象，适用于监视屏幕的整个或者部分区域等实时性要求很高情况下的截屏。

附图说明

[0031] 图 1 是本发明一较佳实施例提供的截屏方法的流程图；

[0032] 图 2 是本发明一较佳实施例提供的截屏系统的结构示意图。

具体实施方式

[0033] 为了使本发明的目的、技术方案及优点更加清楚明白，以下结合附图及实施例，对本发明进行进一步详细说明。应当理解，此处所描述的具体实施例仅仅用以解释本发明，并不用于限定本发明。

[0034] 图 1 为本发明一较佳实施例提供的截屏方法的流程图，如图 1 所示，详述如下：

[0035] 在步骤 S1 中，接收用户的截屏命令，获得需要隐藏的窗体。

[0036] 用户发出的截屏命令包括对当前已经打开的窗体确定哪些需要隐藏或者确定哪些窗体需要截屏。

[0037] 在步骤 S2 中，对需要隐藏窗体增加 layered 属性，设置 alpha 透明度为一合适的透明度使需要隐藏的窗体完全透明。

[0038] 作为本发明的实施例，步骤 S2 进一步包括：获取并保存需要隐藏窗体未隐藏前的原始的 layered 属性值和 alpha 值。

[0039] 作为本发明的实施例，窗体 alpha 透明度峰值的 90％以上就可使得窗体对用户完全透明，可以根据需要设置窗体的 alpha 透明度为在峰值 90％以上的一合适透明度。

[0040] 在步骤 S3 中，接收用户输入的选择区域，截取选择区域的屏幕内容。

[0041] 用户输入的选择区域为整个屏幕或者部分区域。用户需要通过输入装置在屏幕上选择一个区域作为截屏区域，截屏区域为整个屏幕或者部分区域，输入装置可以为鼠标、键盘等。作为本发明的实施例，可以使用快捷键来发出将整个屏幕进行截屏的命令。

[0042] 在步骤 S4 中，恢复隐藏窗体的属性设置。

[0043] 作为本发明的实施例，将隐藏窗体的 layered 属性值和 alpha 值恢复为原始值。

[0044] 在步骤 S5 中，对截取到的屏幕内容进行处理。

[0045] 作为本发明的一个实施例，可以将截取的屏幕内容显示在指定窗体；作为本发明的另一个实施例，可以将截取的屏幕内容保存为相应的图片文件；图片文件的类型可以为 JPG 文件、BMP 文件等。为了以后方便地使用该截屏图片文件，可以将该图片文件进行保存。作为本发明的实施例，可以选择将图片保存在内存或硬盘等存储介质中，或同时保存在多个存储介质中。

[0046] 图 2 示为本发明一较佳实施例提供的截屏系统的结构示意图。如图 2 所示，该截屏系统包括：获取隐藏窗体模块 21、透明窗体形成模块 22、截屏模块 23、隐藏窗体恢复模块 24 和图片处理模块 25。透明窗体形成模块 22 又进一步包括：隐藏窗体属性获取单元 221 和处理单元 222。

[0047] 当接收到用户的截屏命令时，获取隐藏窗体模块 21 从用户的命令中获取用户不想截屏从而想隐藏起来的窗体；然后，透明窗体形成模块 22 将需要隐藏的窗体处理为完全透明；当用户确定需要截屏的区域时，截屏模块 23 接收用户输入的选择区域，截取选择区域的屏幕内容；隐藏窗体恢复模块 24 将隐藏窗体恢复到未隐藏前的设置，使这些隐藏窗体恢复为可见；最后图片处理单元 25 对截取的屏幕内容进行处理。

[0048] 作为本发明的实施例，透明窗体形成模块 22 形成透明窗体的过程具体为：隐藏

窗体属性获取单元 221 获取并保存需要隐藏窗体的 layered 属性值和 alpha 值，处理单元 222 对需要隐藏窗体增加 layered 属性，设置 alpha 透明度为一合适的透明度使需要隐藏的窗体完全透明。

[0049] 作为本发明的实施例，隐藏窗体恢复模块 24 将隐藏窗体恢复到未隐藏前的设置的过程具体为：根据隐藏窗体属性获取单元保存的需要隐藏窗体未隐藏前的原始的窗体属性值，隐藏窗体恢复模块将隐藏窗体的 layered 属性值和 alpha 值恢复为原始值。

[0050] 以上所述仅为本发明的较佳实施例而已，并不用以限制本发明，凡在本发明的精神和原则之内所作的任何修改、等同替换和改进等，均应包含在本发明的保护范围之内。

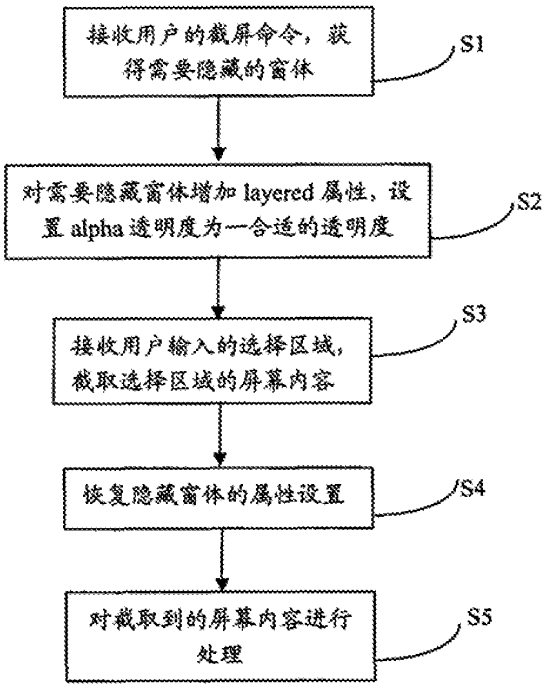

接收用户的截屏命令，获得需要隐藏的窗体
S1
对需要隐藏窗体增加 layered 属性，设置 alpha 透明度为一合适的透明度
S2
接收用户输入的选择区域，截取选择区域的屏幕内容
S3
恢复隐藏窗体的属性设置
S4
对截取到的屏幕内容进行处理
S5

图 1

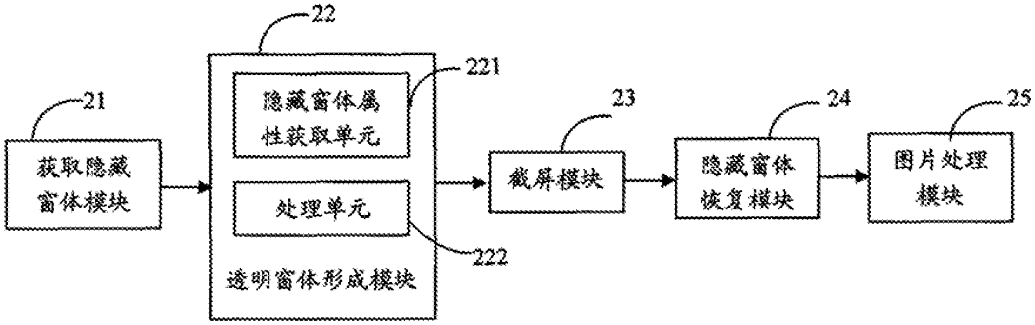

22
221
21
隐藏窗体属性获取单元
23
24
25
获取隐藏窗体模块
截屏模块
隐藏窗体恢复模块
图片处理模块
处理单元
222
透明窗体形成模块

图 2

Electronic Acknowledgement Receipt

EFS ID:	28354375
Application Number:	14344836
International Application Number:	
Confirmation Number:	1046
Title of Invention:	ELECTRONIC TOOL AND METHODS WITH AUDIO FOR MEETINGS
First Named Inventor/Applicant Name:	Koen Simon Herman Beel
Customer Number:	23364
Filer:	Thomas Lee/Kaitlyn Miller
Filer Authorized By:	Thomas Lee
Attorney Docket Number:	BEEL3004/BEU/TL
Receipt Date:	15-FEB-2017
Filing Date:	03-MAR-2015
Time Stamp:	11:03:37
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	BEEL3004_IDS_SB08_filing.pdf	613030 45476e0ba02251d56d9468c011e8d20e2ceb3c92	no	5

Warnings:

Information:					
2	Non Patent Literature	BEEL3001C_FOA_26JAN17.pdf	813769 62c485d150b4bfd776e4117d6677448b566caa79	no	20
Warnings:					
Information:					
3	Non Patent Literature	BEEL3002CIPC_FOA_26JAN17.pdf	963170 3ebdf3504deaffbd5656a1130b759c9283c7e979	no	24
Warnings:					
Information:					
4	Non Patent Literature	CN_OA_27DEC16_filing.pdf	7838598 c6c2143b94d71a4a8de149d14f34f61db7408a8c	no	23
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Warnings:					
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6	Foreign Reference	CN1788494A_filing.pdf	10336666 fe62dc09b2193b6e65684f338ff510a48806da1f	no	45
Warnings:					
Information:					
7	Foreign Reference	CN101022529A_filing.pdf	5409747 a1b955c5803d1974d365b2f84b05dad17d3ec446	no	25
Warnings:					
Information:					
8	Foreign Reference	CN101106469A_filing.pdf	2835535 e54deb7aff87e34f1171444821d463140c533889	no	15
Warnings:					
Information:					

9	Foreign Reference	CN101106681A_filing.pdf	3785898 e31baf2c181e4937041378a22ee9fd9b842a2053	no	18
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<u>National Stage of an International Application under 35 U.S.C. 371</u>
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.

<u>New International Application Filed with the USPTO as a Receiving Office</u>
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.

Doc code: IDS
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(Not for submission under 37 CFR 1.99)

Application Number	14344836
Filing Date	2015-03-03
First Named Inventor	Koen Simon Herman BEEL
Art Unit	2181
Examiner Name	Henry Tsai
Attorney Docket Number	BEEL3004/BEU/TL

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	1	1689275	CN	A	2005-10-26	SONY CORP	English abstract, corresponds to US 20020174254	X

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14344836
	Filing Date	2015-03-03
	First Named Inventor	Koen Simon Herman BEEL
	Art Unit	2181
	Examiner Name	Henry Tsai
	Attorney Docket Number	BEEL3004/BEU/TL

	1	Chinese Office Action dated November 4, 2016, for CN 201280001542.X, and English translation thereof.	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14344836
	Filing Date	2015-03-03
	First Named Inventor	Koen Simon Herman BEEL
	Art Unit	2181
	Examiner Name	Henry Tsai
	Attorney Docket Number	BEEL3004/BEU/TL

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☒ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

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

See attached certification statement.

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

A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Thomas Lee/	Date (YYYY-MM-DD)	2017-02-03
Name/Print	THOMAS LEE	Registration Number	66396

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Card type network interface, network conference terminal device and network conference system

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Applicant(s): SONY CORP [JP] ± (SONY CORP)

Classification: - **international:** ***G06F13/00; G06F13/10; H04L12/28; H04M3/56; H04N7/14;*** *H04M7/00;* (IPC1-7): H04L12/28
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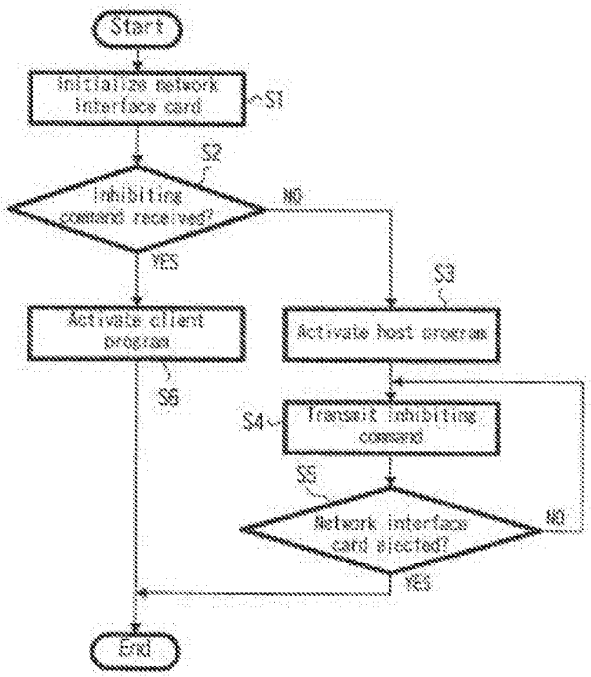
Also published as: CN100508473 (C) US2002174254 (A1) US2004006648 (A9) US6917964 (B2) TWI242137 (B) more

Abstract not available for CN1689275 (A)
Abstract of corresponding document: US2002174254 (A1)

A wireless LAN conference system can be constructed without increasing the cost of equipment of a conference hall and without imposing a burden upon participants to execute a network setting. There are provided network conference terminal devices 11(2) to 11(n) in which network interface cards 1 are attached to information terminal devices.; The network interface card 1 includes a connecting means for connecting the information terminal device to a wireless LAN, a determining means for determining whether the information terminal device is served as a host or a client of the wireless LAN, a setting means for requesting the host to transmit setting information necessary for executing the network setting to connect the information terminal device to the wireless LAN based on the fact that the information terminal device is determined as the client and executing the network setting by using the setting information transmitted from the host and a processing means for transmitting a requested setting information to the client based on the fact that the information terminal device is determined as the host and transmitting presentation data to the client in which the network setting was

completed.


Start
Initialize network interface card
S1
S2
Inhibiting command received?
NO
YES
S3
Activate client program
Activate host program
S6
S4
Transmit inhibiting command
S5
Network interface card elected?
NO
YES
End

[19] 中华人民共和国国家知识产权局

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H04L 12/28
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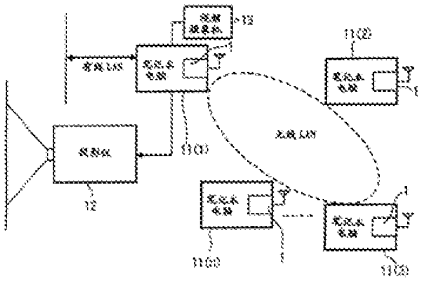
代理人 李 强

权利要求书 7 页 说明书 28 页 附图 19 页

[54] 发明名称 卡式网络接口、网络会议终端设备和网络会议系统

[57] 摘要

一种无线 LAN 会议系统，无需增加会议室的设备成本，也无需强制参与者执行网络设置，就能构建该会议系统。提供网络会议终端设备 11(2) 到 11(n)，在这些终端设备内将网络接口卡 1 连接到信息终端设备。网络接口卡 1 包括：连接装置，用于将信息终端设备连接到无线 LAN；确定装置，用于确定信息终端设备为无线 LAN 的主机还是客户机；设置装置，用于请求主机传送执行网络设置所需的设置信息，以便基于将信息终端设备确定为客户机的事实，将信息终端设备连接到无线 LAN，并且通过使用主机传送的设置信息，执行所述网络设置；以及处理装置，基于将信息终端设备确定为主机的事实，向客户机传送请求的设置信息，并且向完成网络设置的客户机传送演示数据。



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1. 一种能够连接到信息终端设备的卡式网络接口，包括:

连接装置，用于将所述信息终端设备连接到一个局域网；以及

设置装置，用于请求所述局域网的一个主机传送设置信息，该设置信息是根据将所述卡式网络接口连接到所述信息终端设备的事实而执行网络设置以便将所述信息终端设备连接到所述局域网以及通过使用所述主机传送的所述设置信息而执行所述网络设置所必需的。

2. 根据权利要求1的卡式网络接口，还包括:

确定装置，用于基于将所述卡式网络接口连接到所述信息终端设备的事实，确定所述信息终端设备是作为所述局域网的主机还是客户机；以及

处理装置，如果所述确定装置确定所述信息终端设备作为所述主机，则向所述客户机传送所所述请求的设置信息，如果所述确定装置确定所述信息终端设备作为所述客户机，则所述设置装置请求所述设置信息。

3. 根据权利要求 1 的卡式网络接口，其中在所述卡式网络接口中，存储用于显示和控制演示数据的演示应用程序软件。

4. 根据权利要求 3 的卡式网络接口，其中所述信息终端设备自动启动硬盘中存储的能够自动启动的应用程序软件，并且所述卡式网络接口允许所述信息终端设备将所述卡式网络接口识别为硬盘，从而在所述信息终端设备中自动启动所述演示应用程序软件。

5. 根据权利要求 2 的卡式网络接口，其中基于将所述卡式网络接口连接到所述信息终端设备的事实，如果通过所述局域网并未收到禁止将所述信息终端设备确定为所述主机的命令，则所述确定装置确定所述信息终端设备为所述主机，并且通过所述局域网传送禁止将所述其他信息终端设备确定为所述主机的命令。

6. 根据权利要求2的卡式网络接口，还包括:

处理装置，用于基于所述确定装置确定所述信息终端设备为所述客户机，由所述设置装置完成所述网络设置以及由所述信息终端设备执行预

定操作的事实，请求所述主机获得演示权限，并且基于获得所述演示权限的事实，向所述主机和所述其他客户机传送演示数据；以及

处理装置，用于基于所述确定装置确定所述信息终端设备为所述主机，并且请求所述主机获得所述演示权限的事实，允许所述客户机获得所述演示权限。

7. 根据权利要求 2 的卡式网络接口，其中所述连接装置还包括处理装置，用于将所述信息终端设备连接到无线局域网，基于所述确定装置将所述信息终端设备确定为所述主机的事实，在轮询系统中接收已完成所述网络设置的所述客户机的请求，并且在轮询周期结束时等待所述设置信息的请求，其中所述设置装置在所述轮询周期结束时请求所述设置信息。

8. 根据权利要求 2 的卡式网络接口，其中在所述卡式网络接口中，存储用于显示和控制演示数据的演示应用程序软件。

9. 根据权利要求 8 的卡式网络接口，其中所述信息终端设备自动启动硬盘中存储的能够自动启动的应用程序软件，并且所述卡式网络接口允许所述信息终端设备将所述卡式网络接口识别为硬盘，从而在所述信息终端设备中自动启动所述演示应用程序软件。

10. 一种网络会议终端设备，其中将卡式网络接口连接到信息终端设备，网络会议终端设备包括演示处理装置，用于根据需要显示和控制演示数据，所述卡式网络接口包括：

连接装置，用于将所述信息终端设备连接到无线局域网；以及

设置装置，用于请求所述无线局域网的主机传送设置网络所需的设置信息，以便基于将所述卡式网络接口连接到所述信息终端设备的事实，将所述信息终端设备连接到所述无线局域网，并且用于通过使用所述主机传送的所述设置信息执行所述网络设置。

11. 根据权利要求 10 的网络会议终端设备，其中所述卡式网络接口还包括：

确定装置，用于基于将所述卡式网络接口连接到所述信息终端设备的事实，确定所述信息终端设备是作为所述无线局域网的主机还是客户机；

以及

处理装置，如果所述确定装置确定所述信息终端设备作为所述主机，则向所述客户机传送所述请求的设置信息，并且向完成所述网络设置的客户机传送所述演示数据，如果所述确定装置确定所述信息终端设备作为所述客户机，则所述设置装置请求所述设置信息。

12. 根据权利要求 10 的网络会议终端设备，其中通过执行所述卡式网络接口中存储的演示应用程序软件，所述演示处理装置显示所述演示数据。

13. 根据权利要求 12 的网络会议终端设备，其中所述信息终端设备自动启动硬盘中存储的能够自动启动的应用程序软件，并且所述卡式网络接口允许所述信息终端设备将所述卡式网络接口识别为硬盘，从而在所述信息终端设备中自动启动所述演示应用程序软件。

14. 根据权利要求 11 的网络会议终端设备，其中基于将所述卡式网络接口连接到所述信息终端设备的事实，如果通过所述无线局域网并未收到禁止将所述信息终端设备确定为所述主机的命令，则所述确定装置确定所述信息终端设备为所述主机，并且通过所述无线局域网传送禁止将所述其他信息终端设备确定为所述主机的命令。

15. 根据权利要求 11 的网络会议终端设备，其中所述卡式网络接口还包括:

处理装置，用于基于所述确定装置确定所述终端设备为所述客户机，由所述设置装置完成所述网络设置以及由所述终端设备执行预定操作的事实，请求所述主机获得演示权限，并且基于获得所述演示权限的事实，向所述主机和所述其他客户机传送所述演示数据；以及

处理装置，用于基于将所述终端设备确定为所述主机，并且请求所述主机获得所述演示权限的事实，允许所述客户机获得所述演示权限。

16. 根据权利要求 11 的网络会议终端设备，其中所述卡式网络接口还包括:

处理装置，基于所述确定装置将所述终端设备确定为所述主机的事实，在轮询系统中接收已完成所述网络设置的所述客户机的请求，并且

在轮询周期结束时等待所述设置信息的请求，其中所述设置装置在所述轮询周期结束时请求所述设置信息。

17. 根据权利要求 11 的网络会议终端设备，其中通过执行所述卡式网络接口中存储的演示应用程序软件，所述演示处理装置显示所述演示数据。

18. 根据权利要求 17 的网络会议终端设备，其中所述信息终端设备自动启动硬盘中存储的能够自动启动的应用程序软件，并且所述卡式网络接口允许所述信息终端设备将所述卡式网络接口识别为硬盘，从而在所述信息终端设备中自动启动所述演示应用程序软件。

19. 一种网络会议系统，包括:

无线局域网的一台主机;

一个所述无线局域网的一台客户机，其中所述客户机包括连接卡式网络接口的信息终端设备，以及根据需要显示和控制演示数据的演示处理装置，所述卡式网络接口包括，连接装置，用于将所述信息终端设备连接到所述无线局域网，和设置装置，用于请求所述主机传送执行网络设置所需的设置信息，以便基于将所述卡式网络接口连接到所述信息终端设备的事实，将所述信息终端设备连接到所述无线局域网，并且用于通过使用所述主机传送的所述设置信息，执行所述网络设置，所述主机基于所述设置信息的请求向所述客户机传送所述设置信息，并且向完成所述网络设置的所述客户机传送所述演示数据。

20. 根据权利要求 19 的网络会议系统，其中所述卡式网络接口还包括:

确定装置，用于基于将所述卡式网络接口连接到所述信息终端设备的事实，确定所述信息终端设备是作为所述无线局域网的主机还是客户机;以及

处理装置，如果所述确定装置确定所述信息终端设备作为所述主机，则向所述客户机传送所述请求的设置信息，并且向完成所述网络设置的所述客户机传送所述演示数据，如果所述确定装置确定所述信息终端设备作为所述客户机，并且所述主机为以下主机，即所述确定装置确定连

接所述卡式网络接口的信息终端设备为主机的主机，则所述设置装置请求所述设置信息。

21. 根据权利要求 19 的网络会议系统，其中通过执行所述卡式网络接口中存储的演示应用程序软件，所述演示处理装置显示所述演示数据。

22. 根据权利要求 21 的网络会议系统，其中所述信息终端设备自动启动硬盘中存储的能够自动启动的应用程序软件，并且所述卡式网络接口允许所述信息终端设备将所述卡式网络接口识别为硬盘，从而在所述信息终端设备中自动启动所述演示应用程序软件。

23. 根据权利要求 20 的网络会议系统，其中基于将所述卡式网络接口连接到所述信息终端设备的事实，如果通过所述无线局域网并未收到禁止将所述信息终端设备确定为所述主机的命令，则所述确定装置确定所述信息终端设备为所述主机，并且通过所述无线局域网传送禁止将所述其他信息终端设备确定为所述主机的命令。

24. 根据权利要求 20 的网络会议系统，其中所述卡式网络接口还包括：

处理装置，用于基于所述确定装置确定所述终端设备为所述客户机，由所述设置装置完成所述网络设置以及由所述终端设备执行预定操作的事实，请求所述主机获得演示权限，并且基于获得所述演示权限的事实，向所述主机和所述其他客户机传送所述演示数据；以及

处理装置，用于基于所述确定装置确定所述卡式网络接口为所述主机，并且请求所述主机获得所述演示权限的事实，允许所述客户机获得所述演示权限。

25. 根据权利要求 20 的网络会议系统，其中所述卡式网络接口还包括处理装置，用于基于所述确定装置确定所述卡式网络接口为所述主机的事实，在轮询系统中接收已完成所述网络设置的所述客户机的请求，并且在轮询周期结束时等待所述设置信息的请求，其中所述设置装置在所述轮询周期结束时请求所述设置信息。

26. 根据权利要求 20 的网络会议系统，其中通过执行所述卡式网络接口中存储的演示应用程序软件，所述演示处理装置显示所述演示数据。

27. 根据权利要求 26 的网络会议系统，其中所述终端设备自动启动硬盘中存储的能够自动启动的应用程序软件，并且所述卡式网络接口允许所述终端设备将所述卡式网络接口识别为硬盘，从而在所述终端设备中自动启动所述演示应用程序软件。

28. 一种网络会议系统，包括一台图像显示设备和无线局域网的一台客户机，其中所述图像显示设备具有一台能够连接卡式网络接口的信息终端设备，所述信息终端设备连接有所述卡式网络接口，并且包括用于显示和控制演示数据的演示处理装置；

构造所述客户机以至将所述卡式网络接口连接到信息终端设备，并且所述客户机包括与需求相应的所述演示处理装置；

所述卡式网络接口包括：

连接装置，用于将所述信息终端设备连接到无线局域网；

确定装置，用于基于将所述卡式网络接口连接到所述信息终端设备的事实，确定所述信息终端设备是作为所述无线局域网的主机还是客户机；

设置装置，用于请求所述主机传送执行网络设置所需的设置信息，以便基于所述确定装置确定所述信息终端设备为所述客户机，以及通过使用所述主机传送的所述设置信息执行所述网络设置的事实，将所述信息终端设备连接到所述无线局域网；

处理装置，用于基于所述确定装置确定所述信息终端设备为所述主机的事实，向所述客户机传送所述请求的设置信息，并且向完成所述网络设置的所述客户机，传送所述演示数据；

处理装置，用于基于所述确定装置确定所述终端设备为所述客户机，由所述设置装置完成所述网络设置以及由所述终端设备执行预定操作的事实，请求所述主机获得演示权限，并且基于获得所述演示权限的事实，向所述主机和所述客户机传送所述演示数据；以及

处理装置，用于基于所述确定装置确定所述信息终端设备为所述主机，请求所述主机获得所述演示权限，并且构造所述图像显示设备以至所述确定装置确定连接所述图像显示设备的所述信息终端设备为主机的事实，允许所述客户机获得所述演示权限。

29. 根据权利要求 28 的网络会议系统，其中基于将所述卡式网络接口连接到所述信息终端设备的事实，如果通过所述无线局域网并未收到禁止将所述信息终端设备确定为所述主机的命令，则所述确定装置确定所述信息终端设备为所述主机，并且通过所述无线局域网传送禁止将所述其他信息终端设备确定为所述主机的命令。

30. 根据权利要求 28 的网络会议系统，其中所述卡式网络接口还包括处理装置，用于基于所述确定装置确定所述卡式网络接口为所述主机的事实，在轮询系统中接收已完成所述网络设置的所述客户机的请求，并且在轮询周期结束时等待所述设置信息的请求，其中所述设置装置在所述轮询周期结束时请求所述设置信息。

31. 根据权利要求 28 的网络会议系统，其中通过执行所述卡式网络接口中存储的演示应用程序软件，所述演示处理装置显示所述演示数据。

32. 根据权利要求 31 的网络会议系统，其中所述终端设备自动启动硬盘中存储的能够自动启动的应用程序软件，并且所述卡式网络接口允许所述终端设备将所述卡式网络接口识别为硬盘，从而在所述终端设备中自动启动所述演示应用程序软件。

卡式网络接口、网络会议终端设备和网络会议系统

技术领域

本发明涉及与诸如个人计算机之类的信息终端设备相连的卡式网络接口，使用此类卡式网络接口的网络会议终端设备，以及使用此类网络会议终端设备的网络会议系统。

背景技术

作为基于 PCMCIA（个人计算机存储卡接口适配器）标准的 PC 卡并且能够将个人计算机连接到 LAN（局域网）的网络 I/F（接口）卡越来越普及。当将此类网络接口卡插入到个人计算机的 PC 卡插槽时，可以将个人计算机连接到 LAN。

为了将一台个人计算机（以下称为“个人计算机”）连接到 LAN，必须预先执行将个人计算机连接到 LAN 的设置操作（以下称为“网络设置”）。网络设置包含个人计算机在 LAN 中的 IP 地址（用于控制路径的标识信息和位置信息）设置，以及 DNS 服务器（用于提供 IP 地址和域名之间的转换的服务器）的 IP 地址设置。

图 1 表示一台个人计算机，该计算机连接有常规网络接口卡，以下参照此类个人计算机解释用于执行以上网络设置的部分功能。在个人计算机的操作系统（如，Windows 95 或 Windows 98（“Windows”为注册商标））中，支持网络功能。该网络功能包括为根据用户的输入操作执行网络设置而显示网络设置画面的功能。

另一方面，作为控制常规网络接口卡的软件的设备驱动程序并不包含网络设置功能。为此，通过使用个人计算机的操作系统的网络功能执行个人计算机的网络设置。

图 2 表示用户将图 1 所示的个人计算机连接到 LAN 时执行的工作程序。用户将网络接口卡插入到个人计算机中，然后启动个人计算机的操作系统，以便在个人计算机的屏幕上显示控制面板。然后，用户从控制

面板中选择网络设置图标，并根据用户选择相应图标时显示的网络设置画面上的说明，输入数据。此后，用户重新启动操作系统完成网络设置。

如上所述，为了将常规网络接口卡连接到个人计算机，以便将个人计算机连接到 LAN，用户必须启动个人计算机的操作系统执行网络设置操作。因此，不太了解操作系统的用户难以理解上述操作。例如，当携带笔记本电脑到达不同位置并连接到 LAN 时，需要在每个位置执行上述操作，因此，对于非常了解操作系统的用户，上述操作也很麻烦。

在操作系统支持 DHCP 的情况中，由于操作系统端自动执行网络设置处理，所以用户无需执行网络设置操作，其中 DHCP 为能够管理信息以便以集中方式执行网络设置的协议。然而，实际上，大部分用户的个人计算机的操作系统并不支持 DHCP。

考虑到以上方面，本发明要解决的第一个问题是，当将网络接口卡连接到个人计算机以便将个人计算机连接到 LAN 时，即使个人计算机的操作系统不支持 DHCP，也能够在不麻烦用户的情况下执行网络设置操作。

另一方面，迄今为止，在诸如会议、演示、学术会议（在本说明书中，会议、演示和学术会议统称为“会议”）之类的各种场合中，通过在投影仪上显示诸如图像和插图之类演示数据进行演示。然而，取决于会议厅的大小以及投影仪的屏幕的大小，其座位远离投影仪的人员通常看不清楚投影仪和显示的演示数据。

近几年来，在与会议厅中各座位上的 LAN 插口相连的个人计算机上显示演示数据的形式越来越普遍。如上所述，如果通过有效地利用 LAN 举行会议，则所有座位上的参与者均能满意地观看演示数据。

然而，如果作为设备在每个座位上安装个人计算机，则不可避免地要增加会议室中的设备成本。如果将与会者携带的笔记本电脑连接到会议室内的 LAN，则能够避免增加设备成本。如果是那样的话，则参与者必须执行令人厌烦的网络设置操作。

考虑到上述方面，本发明要解决的第二个问题是，在不增加会议室的设备成本的情况下，并且在不向参与者强加网络设置负担的情况下，构建使用 LAN 的会议系统。

为了解决以上第一个问题，建议采用与诸如个人计算机之类的信息终端设备相连的卡式网络接口。卡式网络接口包括：一个连接装置，用于将信息终端设备连接到 LAN；以及一个设置装置，用于请求 LAN 的主机传送设置信息，设置信息用于设置网络以便将信息终端设备连接到 LAN，并且基于将卡式网络接口连接到信息终端设备的事实，通过使用主机传送的设置信息设置网络。

卡式网络接口不仅包括用于将信息终端设备连接到 LAN 的连接装置（即，将信息终端设备连接到 LAN 的功能），而且包括用于设置网络的设置装置。因此，当将此卡连接到信息终端设备时，设置装置请求 LAN 的主机传送设置网络所需的设置信息，并通过使用主机传送的设置信息设置网络。

如上所述，当将卡式网络接口连接到信息终端设备时，由于由设置装置自动设置网络，所以无需麻烦用户就能设置网络。

因此，例如，在使用 LAN 的会议中，如果在会议室中配备卡式网络接口，并且将这些卡式网络接口连接到与会者携带的笔记本电脑之类的信息终端设备，则无需麻烦与会者就能设置出席会议成员所使用的网络。同时，与作为设备在每个座位上配备诸如个人计算机之类的信息终端设备的情况不同，本发明能够避免增加会议室的设备成本。

卡式网络接口还包括：一个确定装置，用于基于将卡式网络接口连接到信息终端设备的事实，确定信息终端设备是作为 LAN 的主机还是客户机；以及一个处理装置，如果确定装置确定信息终端设备作为主机，则向客户机传送所请求的设置信息。如果确定装置确定信息终端设备作为客户机，则设置装置请求设置信息。

所以，LAN 的主机还包括连接卡式网络接口的信息终端设备。因此，无需配备专用设备作为与卡式网络接口和信息终端设备独立的主机，就能构建 LAN 系统。因此，在使用 LAN 的会议中，能够进一步抑制会议室中的设备成本。

基于将卡式网络接口连接到信息终端设备的事实，如果通过 LAN 并

未收到禁止将信息终端设备确定为主机的命令，则确定装置确定该信息终端设备为主机，同时通过 LAN 传送禁止将其他信息终端设备确定为主机的命令。因此，确定在该 LAN 区域内与卡式网络接口相连的第一信息终端设备为主机。

卡式网络接口还包括：一个处理装置，用于基于确定装置确定该信息终端设备为客户机，由设置装置完成网络设置以及由信息终端设备执行预定操作的事实，请求主机获得演示权限，并且基于主机获得演示权限的事实，向主机和其他客户机传送演示数据；以及一个处理装置，用于基于确定装置确定信息终端设备为主机，并且处理装置请求主机获得演示权限的事实，允许客户机获得演示权限。

所以，在使用 LAN 的会议中，例如，通过操纵手头的信息终端设备，与会者可以获得演示权限，并且能够传送演示数据。因此，与会者无需离开座位就能进行演示。

当连接装置将信息终端设备连接到无线 LAN 时，卡式网络接口还包括一个处理装置，用于在轮询系统中接收客户机的请求，其中基于确定装置确定信息终端设备为主机的事实，完成网络设置，并且设置装置在轮询周期结束时请求设置信息。

所以，主机能够准确接收完成网络设置的众多客户机通过无线 LAN 传送的请求。同时，主机能够通过无线 LAN 准确接收设置信息请求。

在卡式网络接口中存储演示应用程序软件（其内记录有用于显示和控制演示数据之处理过程的程序）。

因此，在使用 LAN 的会议中，例如，当与会者携带并未安装演示应用程序软件的信息终端设备时，如果将卡式网络接口连接到该信息终端设备，则信息终端设备能够执行上述演示应用程序软件，并且能够显示演示数据。

当信息终端设备为自动启动硬盘中存储的应用程序软件之类的设备时（如，其内安装有用于自动启动硬盘中存储的应用程序软件的操作系统的个人计算机），卡式网络接口允许信息终端设备将卡式网络接口识别为硬盘，从而能够在信息终端设备中自动启动演示应用程序软件。

所以，与会者无需执行启动演示应用程序软件的操作，并且能够进一步减轻强加给与会者的负担。

为了解决以上第二个问题，建议采用网络会议终端设备，其中将卡式网络接口连接到诸如个人计算机之类的信息终端设备，网络会议终端设备包括一个演示处理装置，用于显示和控制演示数据。卡式网络接口包括：一个连接装置，用于将信息终端设备连接到无线 LAN；以及一个设置装置，用于请求无线 LAN 的主机传送设置网络所需的设置信息，以便基于将卡式网络接口连接到信息终端设备的事实，将信息终端设备连接到无线 LAN，并且用于通过使用主机传送的设置信息设置网络。

通过将卡式网络接口用于以上卡式网络接口的无线 LAN，构建网络会议终端设备。因此，如果在会议室中配备卡式网络接口，并且由与会者携带信息终端设备，则无需麻烦与会者，就能设置出席使用无线 LAN 的会议的参与者所用的网络。同时，与作为设备在每个座位上配备信息终端设备的情况不同，本发明能够避免增加会议室的设备成本。

网络会议终端设备包括一个演示处理装置，用于显示和控制演示数据。网络会议终端设备能够利用演示处理装置显示演示数据。

另外，在网络会议终端设备中，卡式网络接口还包括：一个确定装置，用于基于将卡式网络接口连接到信息终端设备的事实，确定信息终端设备是作为 LAN 的主机还是客户机；以及一个处理装置，如果确定装置确定信息终端设备作为主机，则向客户机传送所请求的设置信息。如果确定装置确定信息终端设备作为客户机，则设置装置请求设置信息。

所以，LAN 的主机还包括网络会议终端设备。因此，无需配备专用设备作为与网络会议终端设备独立的主机，就能构建无线 LAN 会议系统。因此，能够进一步抑制会议室中的设备成本。

如上所述，确定装置确定在该无线 LAN 区域内与卡式网络接口相连的第一信息终端设备为主机。

网络会议终端设备还包括：一个处理装置，用于基于确定装置确定该信息终端设备为客户机，由设置装置完成网络设置以及由信息终端设备执行预定操作的事实，请求主机获得演示权限，并且基于主机获得演示

权限的事实，向主机和其他客户机传送演示数据；以及一个处理装置，用于基于确定装置确定信息终端设备为主机，并且处理装置请求主机获得演示权限的事实，允许客户机获得演示权限。

所以，在使用 LAN 的会议中，例如，通过操纵手头的信息终端设备，与会者可以获得演示权限，并且能够传送演示数据。因此，与会者无需离开座位就能进行演示。

另外，在网络会议终端设备中，卡式网络接口还包括一个处理装置，用于在轮询系统中接收客户机的请求，其中基于确定装置确定信息终端设备为主机的事实，完成网络设置，并且设置装置在轮询周期结束时请求设置信息。

所以，主机能够准确接收完成网络设置的众多客户机通过无线 LAN 传送的请求。同时，主机能够通过无线 LAN 准确接收设置信息请求。

在网络会议终端中，当信息终端设备执行网络接口卡中存储的演示应用程序软件时，能够实现演示处理装置。

所以，其中并未安装演示应用程序软件的信息终端设备能够显示演示数据。

当信息终端设备为自动启动硬盘中存储的应用程序软件之类的设备时，卡式网络接口允许信息终端设备将卡式网络接口识别为硬盘，从而能够在信息终端设备中自动启动演示应用程序软件。

所以，与会者无需执行启动演示应用程序软件的操作，并且能够进一步减轻强加给与会者的负担。

为了解决以上第二个问题，建议采用网络会议系统（无线 LAN 会议系统），其中提供一台无线 LAN 主机和一台无线 LAN 客户机，构建客户机以至将卡式网络接口连接到信息终端设备，信息终端设备包括一个演示处理装置，用于显示和控制演示数据。卡式网络接口包括：一个连接装置，用于将信息终端设备连接到无线 LAN；以及一个设置装置，用于请求无线 LAN 的主机传送设置网络所需的设置信息，以便基于将卡式网络接口连接到信息终端设备的事实，将信息终端设备连接到无线 LAN，并且用于通过使用主机传送的设置信息设置网络。主机基于设置信息请

求向客户机传送设置信息，并且向完成网络设置的客户机传送演示数据。

通过使用上述网络会议终端设备（如，上述无线 LAN 卡式网络接口）作为客户机，构建网络会议系统。

因此，无需麻烦与会者就能设置客户机网络，并且无需增加会议室的设备成本就能构建该系统。

另外，在该网络会议系统中，卡式网络接口还包括：一个确定装置，用于基于将卡式网络接口连接到信息终端设备的事实，确定信息终端设备是作为 LAN 的主机还是客户机；以及一个处理装置，如果确定装置确定信息终端设备作为主机，则向客户机传送所请求的设置信息。如果确定装置确定信息终端设备作为客户机，则设置装置请求设置信息。

从而，由于 LAN 的主机还包括相同的网络会议终端设备，所以无需在该系统内配备专用设备作为主机，因此，能够进一步抑制会议室中的设备成本。

如上所述，确定装置确定在该无线 LAN 区域内与卡式网络接口相连的第一信息终端设备为主机。

另外，在该网络会议系统中，卡式网络接口还包括：一个处理装置，用于基于确定装置确定该信息终端设备为客户机，由设置装置完成网络设置以及由信息终端设备执行预定操作的事实，请求主机获得演示权限，并且基于主机获得演示权限的事实，向主机和其他客户机传送演示数据；以及一个处理装置，用于基于确定装置确定信息终端设备为主机，并且处理装置请求主机获得演示权限的事实，允许客户机获得演示权限。

所以，通过操纵手头的网络会议终端设备，与会者可以获得演示权限，并且能够传送演示数据。因此，与会者无需离开座位就能进行演示。

另外，在该网络会议系统中，卡式网络接口还包括一个处理装置，用于在轮询系统中接收客户机的请求，其中基于确定装置确定信息终端设备为主机的事实，完成网络设置，并且设置装置在轮询周期结束时请求设置信息。

所以，主机能够准确接收完成网络设置的众多客户机通过无线 LAN 传送的请求。同时，主机能够通过无线 LAN 准确接收设置信息请求。

另外，在该网络会议系统中，当信息终端设备执行网络接口卡中存储的演示应用程序软件时，能够实现演示处理装置。

所以，使用其内并未安装演示应用程序软件的信息终端设备的主机和客户机，能够显示演示数据。

当信息终端设备为自动启动硬盘中存储的应用程序软件之类的设备时，卡式网络接口允许信息终端设备将卡式网络接口识别为硬盘，从而能够在信息终端设备中自动启动演示应用程序软件。

所以，与会者无需执行启动演示应用程序软件的操作，并且能够进一步减轻强加给与会者的负担。

为了解决以上第二个问题，建议采用网络会议系统，其中提供一台图像显示设备和一台无线 LAN 客户机。图像显示设备包括一台能够连接卡式网络接口的信息终端设备。将卡式网络接口连接到信息终端设备，信息终端设备包括一个演示处理装置，用于显示和控制演示数据。构建客户机以至将卡式网络接口连接到信息终端设备，并且包括演示处理装置。卡式网络接口包括：一个连接装置，用于将信息终端设备连接到无线 LAN；一个确定装置，用于基于将卡式网络接口连接到信息终端设备的事实，确定信息终端设备是作为无线 LAN 的主机还是客户机；一个设置装置，用于请求无线 LAN 的主机传送设置网络所需的设置信息，以便基于确定装置确定信息终端设备为客户机的事实，将信息终端设备连接到无线 LAN，并且用于通过使用主机传送的设置信息设置网络；一个处理装置，用于基于确定装置确定信息终端设备为主机的事实，向客户机传送所请求的设置信息，并且向完成网络设置的客户机传送演示数据；一个处理装置，用于基于确定装置确定该信息终端设备为客户机，由设置装置完成网络设置以及由信息终端设备执行预定操作的事实，请求主机获得演示权限，并且基于主机获得演示权限的事实，向主机和其他客户机传送演示数据；以及一个处理装置，用于基于确定装置确定信息终端设备为主机，并且请求主机获得演示权限的事实，允许客户机获得演示权限。图像显示设备是确定装置确定属于图像显示设备的信息终端设备为主机的设备。

网络会议系统的结构是将以上网络会议终端设备用作客户机（例如，使用以上无线 LAN 卡式网络接口），提供具有信息终端设备的图像显示设备座位图像显示设备，如投影仪，其中信息终端设备可以连接卡式网络接口，该图像显示设备同时作为图像显示设备和主机。

因此，无需麻烦与会者就能设置客户机网络，并且无需增加会议室的设备成本就能构建该系统。另外，与会者无需离开座位就能进行演示。

再者，通过无线 LAN，可以从图像显示设备向客户机直接传送与图像显示设备上显示的演示数据相同的演示数据，从而在客户机上显示。同时，通过无线 LAN，可以从客户机向图像显示设备直接传送演示数据，从而能够在图像显示设备上显示演示数据。

另外，在该网络会议系统中，卡式网络接口还包括一个处理装置，用于在轮询系统中接收客户机的请求，其中基于确定装置确定信息终端设备为主机的事实，完成网络设置，并且在轮询周期结束时等待设置信息的请求，其中设置装置在轮询周期结束时请求设置信息。

所以，主机能够准确接收完成网络设置的众多客户机通过无线 LAN 传送的请求。同时，主机能够通过无线 LAN 准确接收设置信息请求。

另外，在该网络会议系统中，当信息终端设备执行网络接口卡中存储的演示应用程序软件时，能够实现演示处理装置。

所以，使用其内并未安装演示应用程序软件的信息终端设备的主机和客户机，能够显示演示数据。

当信息终端设备为自动启动硬盘中存储的应用程序软件之类的设备时，卡式网络接口允许信息终端设备将卡式网络接口识别为硬盘，从而能够在信息终端设备中自动启动演示应用程序软件。

所以，与会者无需执行启动演示应用程序软件的操作，并且能够进一步减轻强加给与会者的负担。

附图的简要描述

图 1 是一个功能框图，表示具有常规网络接口卡的个人计算机部分，该部分用于执行网络设置。

图 2 表示执行图 1 所示的个人计算机网络设置所需的工作程序。

图 3 是一个透视图，表示应用本发明的网络接口卡的外观示例。

图 4 是一个框图，表示图 3 所示的网络接口卡的电路结构示例。

图 5 表示根据本发明的网络会议系统的总体结构示例。

图 6 是一个流程图，参照该图说明“主机/客户机判定程序”的处理内容。

图 7 是一个流程图，参照该图说明与“客户机程序”的网络设置处理相对应的“主机程序”的处理内容。

图 8 是一个流程图，参照该图说明作为“客户机程序”的一部分处理内容的网络设置处理。

图 9 是一个定时图，表示按照轮询系统传送或接收请求信号的方式。

图 10A 表示图 9 所示的轮询命令和请求信号的格式。

图 10B 表示数据或命令的内容示例。

图 11 是一个功能框图，表示图 5 所示的用于执行网络设置的客户机部分。

图 12 表示用于执行图 5 所示的客户机的网络设置的工作过程。

图 13 是一个流程图，参照该图说明“主机程序”的处理内容部分。

图 14 是一个流程图，参照该图说明“客户机程序”的处理内容部分。

图 15 是一个流程图，参照该图说明“主机程序”的处理内容部分。

图 16 是一个流程图，参照该图说明“客户机程序”的处理内容部分。

图 17 表示根据部分们的网络会议系统的总体结构的其他示例。

图 18 表示根据部分们的网络会议系统的总体结构的不同示例。

图 19 表示根据部分们的网络会议系统的总体结构的其他不同示例。

本发明的最佳实施模式

以下参照附图说明根据本发明的实施方式。

图 3 表示应用本发明的网络接口卡的外观和结构示例，以及能够连接该网络接口卡的笔记本电脑。网络接口卡 1 具有基于 PCMCIA 标准类型 2 或类型 3 的形状和尺寸。笔记本电脑 2 包括一个个人计算机插卡插槽 2a，可以将网络接口卡 1 插入到插槽 2a 中。

图 4 表示网络接口卡 1 的电路结构示例。网络接口卡 1 包括一个

PCMCIA 接口 3，一个网络接口 4，一个 RF 调制器 5，一个 RF 解调器 6，一个天线 7，一个 CPU 8，一个快闪 ROM 9 和一个 RAM 10。

PCMCIA 接口 3 是一个接口部分，该部分与具有 PC 卡插槽的个人计算机（如图 3 所示的笔记本电脑 2）相互作用。通过 PCMCIA 接口 3，在具有网络接口卡 1 的个人计算机和网络接口卡 1 之间传送和接收数据和命令。

网络接口 4 将个人计算机通过 PCMCIA 接口 3 传送的数据和命令，转换为符合预定无线 LAN 标准（如，IEEE 802 之 802 中 11 工作组的标准）之格式的数据和命令，将经过转换的数据和命令传送到 RF 调制器 5，反向转换 RF 解调器 6 传送的数据和命令，将经过反向转换的数据和命令传送到 PCMCIA 接口 3。

RF 调制器 5 将网络接口 4 传送的数据和命令，调制为基于标准的射频信号，然后从天线 7 传送射频信号。RF 解调器 6 解调在天线 7 接收的射频信号，以提供数据和命令，然后将该数据和命令传送到网络接口 4。尽管图 3 表示天线 7 为内部天线的外观结构，但是本发明并不限于此，可以使用其形状暴露在外的天线响应频带等。

CPU 8 通过执行快闪 ROM 9 中存储的微程序（固件）控制 PCMCIA 接口 3，从而能够在网络接口卡和具有网络接口卡 1 的个人计算机之间传送、接收数据和命令，同时，CPU 8 控制网络接口 4，从而能够根据预定通信协议（如，TCP/IP 协议），通过无线 LAN 传送、接收数据和命令。

作为本发明的特征，快闪 ROM 9 存储以下微程序（1）到（4）。在稍后说明的网络会议系统的主机和客户机的操作示例中，说明程序（1）到（3）处理的内容。

（1）：能够使具有网络接口卡 1 的个人计算机作为管理无线 LAN 的主机的程序（以下称为“主机程序”）。

（2）：能够使具有网络接口卡 1 的个人计算机作为使用主机管理的无线 LAN 的客户机的程序（以下称为“客户机程序”）。

（3）：用于确定应执行主机程序还是执行客户机程序的程序（以下称为“主机/客户机判定程序”）。

（4）：演示应用程序软件（用于显示、控制诸如图像和图形之类演示数据的程序）。应用程序软件包含图形查看程序，后者为用于显示图像的软件，用于创建、显示、控制图形的软件（如，由 Microsoft 制造的“Microsoft PowerPoint”，“ Microsoft”和“PowerPoint”为 Microsoft 的注册商标），以及 WWW 浏览器，WWW 浏览器为用于访问因特网上的 WWW 服务器以显示网页图像的软件。

RAM 10 存储 CPU 8 执行快闪 ROM 9 中的微程序时的各种数据。

接着，图 5 表示根据本发明的网络会议终端设备（无线 LAN 会议终端设备）的结构示例，以及根据本发明的网络会议系统（无线 LAN 会议系统）的总体结构示例。

各个无线 LAN 会议系统包括许多（如，约 30 台到 50 台）无线 LAN 会议终端设备 11（11(1)到 11(n)），一台投影仪 12 和一部视频摄象机 13.

无线 LAN 会议终端设备 11 的构造方式为：将图 3 和图 4 所示的网络接口卡 1 连接到图 3 所示的笔记本电脑 2 之类的笔记本电脑（例如，安装 Windows 95 或 Windows 98 操作系统）。参加者携带笔记本电脑，而在会议室中配备网络接口卡 1.

无线 LAN 会议终端设备 11 的一个设备（11(1)）作为无线 LAN 的主机，剩余（n-1）终端设备（11(2)到 11(n)）作为无线 LAN 的客户机。

基于将网络接口卡 1 连接到笔记本电脑后启动笔记本电脑的操作系统的事实（或基于将网络接口卡 1 连接到已启动其操作系统的笔记本电脑的事实），当网络接口卡 1 启动上述快闪 ROM 9 中存储的“主机/客户机判定程序”时，确定无线 LAN 会议终端设备 11。

图 6 表示“主机/客户机判定程序”的处理内容。首先，初始化网络接口卡 1（删除连接该网络接口卡时存储的数据以及笔记本电脑使用的数据）（步骤 S1）。接着，确定是否通过无线 LAN 收到禁止启动“主机程序”的命令。（步骤 S2）。

如果未收到该命令，则启动“主机程序”（步骤 S3）。接着，通过无线 LAN 连续不断地传送禁止启动“主机程序”的命令，直至从笔记本电脑中拔出网络接口卡 1 或关闭笔记本电脑的操作系统（步骤 S4、S5）。

于是，当从笔记本电脑中拔出网络接口卡 1 或关闭操作系统时，结束控制。

另一方面，如果在步骤 S2 中收到上述命令，则启动“客户机程序”（步骤 S6），然后结束控制。

因此，在通过执行步骤 S2 到 S4 启动“主机程序”后，无线 LAN 会议终端设备 11 中连接网络接口卡 1 并在会议室内（在无线 LAN 区域内）启动笔记本电脑之操作系统的第一台终端设备作为主机。

在通过执行步骤 S1、S2 和 S5 启动“客户机程序”后，由于无线 LAN 会议终端设备 11 中连接网络接口卡 1 并启动笔记本电脑之操作系统的第二台终端设备，接收到连接网络接口卡 1 并启动笔记本电脑之操作系统的第一台无线 LAN 会议终端设备 11 传送的命令，所以该终端设备作为客户机。

实际上，充当会议主持人的参与者首先将网络接口卡 1 连接到笔记本电脑，或者该参与者首先启动笔记本电脑之操作系统，以使其自己的无线 LAN 会议终端设备 11 成为主机。

正如图 5 所示，通过笔记本电脑的外部显示输出终端，将主机 11(1)连接到会议室中的投影仪 12，并且通过笔记本电脑的 DV 终端，将其连接到视频摄象机 13。

通过笔记本电脑的网络端口，将主机 11(1)连接到无线 LAN（如，以太网），其中预先在会议室中的建筑内构建无线 LAN。通过网关（未示出）将无线 LAN 连接到因特网。

“客户机程序”包含用于执行网络设置以便将客户机 11(2)到 11(n)连接到无线 LAN 的处理。立即启动其“客户机程序”的客户机 11(2)到 11(n)的网络接口卡 1 启动以上网络设置处理。

“主机程序”包含响应以上“客户机程序”的网络设置处理，传送客户机 11(2)到 11(n)的网络设置所需的设置信息的处理。主机 11(1)立即启动“主机程序”的处理。

图 7 表示与网络设置处理相对应的“主机程序”的处理内容。图 8 表示网络设置处理的内容。正如图 7 所示，主机 11(1)的网络接口卡 1 显

示通知笔记本电脑用户输入以下信息（a）到（d）的画面:

（a）：输入网络掩码（用于将 IP 地址划分为预先确定的网络部分和可以自由设置的主机部分的信息）;

（b）：输入主机的 IP 地址;

（c）：输入 DNS 服务器（用于提供 IP 地址和域名之间的转换的服务器）的 IP 地址；以及

（d）：输入网关（位于图 3 所示的无线 LAN 和因特网之间的连接部分的装置）的 IP 地址。

随后，当会议主持人根据屏幕上显示的说明，通过操作笔记本电脑输入上述信息时，将以上信息记录到 RAM 10 中作为数据库（步骤 S12）。其后，主机进入待机模式，等待客户机的网络设置请求（步骤 S13）。

“主机程序”包含用于在轮询系统中接收已完成网络设置的客户机（已记录其 IP 地址作为数据库的客户机）的网络接口卡 1 的各种请求，以便顺序呼叫所有客户机的处理。另外，“客户机程序”包含用于响应以上呼叫，传送完成网络设置后生成的请求的处理。

图 9 表示根据以上轮询系统传送、接收请求的方式。主机 11(1)的网络接口卡 1 传送一个轮询命令，以允许将该请求传送到已完成网络设置的客户机 11(2)到 11(i)中的一个客户机 11(2)。然后，该网络接口卡在固定时间 t 内等待该请求。

客户机 11(2)的网络接口卡 1 获知允许它传送该请求，并且在时间 t1 内传送该请求，如果有任何请求的话。另一方面，不允许客户机 11(3)到 11(i)的网络接口卡 1 传送请求，因此它们不传送请求。所以，在时间 t1 内，主机 11(1)只收到客户机 11(2)的请求。

其后，主机 11(1)的网络接口卡 1 传送一个轮询命令，以允许将该请求传送到下一客户机 11(3)，并在时间 t1 内等待请求。在时间 t1 内，主机只收到客户机 11(3)的请求。

同样，主机顺序向客户机 11(4)到 11(i)依次传送轮询命令，并在时间 t1 内等待其请求。因而，由于依次从客户机 11(2)到 11(i)传送请求，并由主机 11(1)接收，所以该主机能够准确接收所有客户机的请求，而不会受

同时通过无线 LAN 接收众多客户机的请求时造成的干扰的影响。

将表示已完成网络设置的客户机的一个呼叫周期结束的数据“轮询结束”（表示轮询周期结束），添加到要传送到最后一台客户机 11(i)的轮询命令中。接着，在主机在时间 t1 内等待客户机 11(i)的请求后，该主机在固定时间 t2 内再次进入待机模式。如果在时间 t2 内，主机未收到请求，则主机立即呼叫下一客户机（即，主机再次顺序向客户机 11(2)到 11(i)依次传送轮询命令，并在时间 t1 内等待请求）。

图 10A 表示轮询命令和请求信号的格式。轮询命令和请求信号依次包含传送目的地的 IP 地址，传送源的 IP 地址，一个表示后继信号的字节数的值，表示轮询命令和请求信号的内容的数据或命令，以及一个校验和。

图 10B 表示图 10A 所示数据或命令的内容示例。“轮询结束”是为了表示轮询结束而添加到传送给最后一台客户机的轮询命令中的数据。

在以上轮询周期内，与笔记本电脑连接的客户机 11(i+1)的网络接口卡 1（未执行网络设置），继续监视以上轮询命令，直至收到附加了数据“轮询结束”的轮询命令（即，直至轮询周期结束）如图 8 所示（步骤 S21、S22）。接着，在轮询周期结束时，在经过允许图 9 所示的客户机 11(i)传送请求信号的时间 t1 后，在时间 t2 内向主机 11(1)传送网络设置请求信号（当在时间 t1 内收到客户机 11(i)传送的请求信号时，可以在时间 t1 过去前，向主机传送请求信号）（步骤 S23）。

根据图 10A 所示的信号格式，传送网络设置请求信号。然而，由于没有从主机 11(1)给出客户机 11(i+1)的 IP 地址，所以将传送源的 IP 地址设置为一个哑地址，例如，由客户机 11(i+1)的网络接口卡 1 确定哑地址。正如图 10B 所示，在该网络设置请求信号中，将数据或命令的内容设置为“请求 IP 地址”。

在图 7 所示的步骤 S13 中，在图 9 中的轮询周期结束后的每个时刻 t2，主机 11(1)的网络接口卡 1 等待该网络设置请求信号。所以，客户机能够准确接收网络设置请求，而不会受同时接收已经完成网络设置的客户机的请求和该网络设置请求时造成的干扰的影响。

接着，如果该主机在时间 t2 内收到网络设置请求，则暂停接收图 9 所示处理的轮询系统（步骤 S14）。然后，给出客户机 11(i+1)的 IP 地址，并且如图 9 所示，向客户机 11(i+1)传送该 IP 地址以及在步骤 S12 记录的主机 IP 地址和 DNS 服务器的 IP 地址，作为网络的设置信息（步骤 S15）。

根据图 10A 所示的信号格式传送上述 IP 地址。将传送目的地的 IP 地址设置为哑地址，由上述客户机 11(i+1)的网络接口卡 1 确定哑地址。

正如图 8 所示，传送网络设置请求信号的客户机 11(i+1)等待接收以上 IP 地址（步骤 S24）。接着，如果收到上述 IP 地址，则通过将上述 IP 地址存储到 RAM 10 中，执行用于将客户机 11(i+1)连接到无线 LAN 的设置（步骤 S25）。然后，通过无线 LAN 传送表示完成网络设置的数据（步骤 S26）。然后，结束控制。

根据图 10A 所示的信号格式，传送表示完成网络设置的数据。接着，将传送源的 IP 地址设置为主机 11(1)给出的 IP 地址。正如图 10B 所示，在该数据中，将该数据或命令的内容设置为“完成设置 IP 地址”。

如图 7 所示，主机 11(1)的网络接口卡 1 等待接收表示完成网络设置的数据（步骤 S16）。接着，当收到该数据时，记录给予客户机 11(i+1)的 IP 地址作为数据库（步骤 17）。

其后，重新开始临时中断的轮询系统请求接收处理过程（步骤 S18）。在重新启动的轮询系统请求接收处理中，顺序呼叫客户机 11(2)到客户机 11(i+1)，包括完成网络设置的客户机 11(i+1)。

接着，回到步骤 S13，主机等待其他客户机执行网络设置。执行图 7 所示的处理，直至从笔记本电脑中拔出网络接口卡 1 或关闭笔记本电脑的操作系统。

在恢复的轮询系统请求接收处理中，顺序呼叫客户机 11(2)到客户机 11(i+1)，包括完成网络设置的新的客户机。

在仍未完成某一台客户机的网络设置的阶段中，根据该轮询系统，主机 11(1)的网络接口卡 1 不接收请求信号。因此，在该阶段中，例如，当主机 11(1)的网络接口卡 1 在图 7 所示的步骤 S13 中连续不断地等待该客户机的网络设置请求时，如果主机 11(1)仍未传送轮询命令，则该客户机

的网络接口卡 1 随时传送网络设置请求。

假设参与者要加入无线 LAN，则通过图 7 和图 8 所示的处理，完成将图 5 所示的各客户机 11(2)到 11(n)连接到无线 LAN 的网络设置。

图 11 表示用于执行以上网络设置的客户机 11(2)到 11(n)的任意部分的功能。用于控制网络接口卡 1 的设备驱动程序（图 4 所示的快闪 ROM 9 内存储的微程序），包括网络设置功能（“主机程序”和“客户机程序”）。通过使用网络接口卡 1 的设备驱动程序功能，执行客户机 11(2)到 11(n)的网络设置。

因此，与表示常规网络接口卡的图 1 形成鲜明对比，无需使用连接网络接口卡 1 的笔记本电脑的操作系统，就能执行网络设置。

图 12 表示为执行客户机 11(2)到 11(n)的网络设置而由与会者执行的操作过程。当将网络接口卡 1 连接到笔记本电脑并启动笔记本电脑的操作系统时（也可以在启动笔记本电脑的操作系统后，将网络接口卡 1 连接到笔记本电脑），由图 7 和图 8 所示的处理过程自动执行网络设置。

因此，与表示常规网络接口卡的图 2 形成鲜明对比，假设参与者要加入无线 LAN，则无需向与会者强加负担，就能完成客户机 11(2)到 11(n)的网络设置。

“主机程序”和“客户机程序”分别包含通过使用快闪 ROM 9 中存储的演示应用程序软件进行演示的处理过程。在完成任意一台客户机的网络设置后，已经启动“主机程序”的主机 11(1)的网络接口卡 1，立即开始该处理过程。在完成各网络设置后，已经启动“客户机程序”的客户机 11(2)到 11(n)的网络接口卡 1 也开始该处理过程。

图 13 和 14 分别表示“主机程序”和“客户机程序”的处理内容。正如图 13 所示，主机 11(1)的网络接口卡 1 使得主机 11(1)的笔记本电脑的操作系统将网络接口卡 1 识别为硬盘。同时，该网络接口卡安装一个自动启动文档（步骤 S31）。

Windows 95 和 Windows 98 具有以下功能，即，当将自动启动文档安装到硬盘上时，可以自动启动硬盘上存储的应用程序软件。因此，基于步骤 S31 的处理，主机 11(1)的笔记本电脑将网络接口卡 1 识别为硬盘，

从而自动启动快闪 ROM 9 中存储的演示应用程序软件。

例如，步骤 S31 的处理可以为采用“存储条”的现有处理。

通过根据自动启动的演示应用程序软件，操纵主机 11(1)的笔记本电脑，会议主持人可以在主机 11(1)的笔记本电脑上显示演示数据，并且通过主机 11(1)的笔记本电脑的外部显示输出终端，在投影仪（图 5）上显示相同的演示数据。

具体而言，例如，通过使用“Microsoft PowerPoint”，可以在主机 11(1)的笔记本电脑和投影仪 12 上，显示从主机 11(1)的笔记本电脑的硬盘和软盘上重显的图表等内容，以及从无线 LAN 的服务器传送的图表等内容。

通过使用图形查看程序，可以在主机 11(1)的笔记本电脑和图 5 所示的投影仪 12 上，显示通过使用图像查看程序从主机 11(1)的笔记本电脑的硬盘和软盘上重显的图像，从无线 LAN 的服务器传送的图像，以及视频摄象机 13（图 5）拾取的图像。

另外，通过利用 WWW 浏览器经由无线 LAN 访问因特网的 WWW 服务器，可以在主机 11(1)的笔记本电脑和图 5 所示的投影仪 12 上，显示网页的图像等。

正如图 14 所示，客户机 11(2)到 11(n)的网络接口卡 1，使得客户机 11(2)到 11(n)的笔记本电脑分别将网络接口卡 1 识别为硬盘。同时，上述网络接口卡安装自动启动文档（步骤 41）。

因此，客户机 11(2)到 11(n)的笔记本电脑将网络接口卡 1 识别为硬盘，从而可以自动启动快闪 ROM 9 中存储的演示应用程序软件。

通过分别利用演示应用程序软件操纵客户机 11(2)到 11(n)的笔记本电脑，除主持人之外的其他与会者，能够在客户机 11(2)到 11(n)的笔记本电脑上显示演示数据。

正如图 13 所示，主机 11(1)的网络接口卡 1，等待利用演示应用程序软件在主机 11(1)的笔记本电脑上显示演示数据的操作（步骤 S32）。

接着，在执行该操作时（即，在主机 11(1)的笔记本电脑和投影仪 12 上显示演示数据时），将相同的演示数据传送到客户机 11(2)到 11(n)，

并且向客户机 11(2)到 11(n)传送使用与该演示数据相对应的演示应用程序软件（例如，在图像情况中使用图像查看程序）显示数据的命令，以及以与主机 11(1)同步的方式（使换页定时等一致）显示演示数据的命令。

正如图 14 所示，客户机 11(2)到 11(n)的网络接口卡 1 等待接收该演示数据和命令（步骤 S42）。接着，如果网络接口卡收到演示数据和命令，则分别根据该命令利用演示应用程序软件在客户机 11(2)到 11(n)的笔记本电脑上显示该演示数据（步骤 S43）。

因此，在客户机 11(2)到 11(n)的笔记本电脑上，显示与投影仪 12 上显示的演示数据相同的演示数据。

如图 13 所示，在执行步骤 S32 和 S33 时，主机 11(1)的网络接口卡 1 重复确定是否收到任一客户机 11(2)到 11(n)的演示权限获得请求（步骤 S34）。在图 13 和 14 所示的处理中，在图 9 所示的轮询系统中，传送、接收该请求信号。

如图 14 所示，在执行步骤 S42 和 S43 时，客户机 11(2)到 11(n)的网络接口卡 1，重复确定客户机 11(2)到 11(n)的笔记本电脑是否执行了获得演示权限的预定操作（步骤 S44）。如果执行了该操作，则向主机 11(1)传送演示权限获得请求（步骤 S45）。

如图 13 所示，如果收到任一客户机 11(2)到 11(n)的演示权限获得请求，则主机 11(1)的网络接口卡 1 向相应客户机传送演示权限获得命令（步骤 S35）。

如图 14 所示，在传送演示权限获得请求的客户机的网络接口卡 1 传送演示权限获得请求后，该网络接口卡 1 等待接收演示权限获得命令（步骤 S46）。

在收到该命令时，该网络接口卡等待有关客户机的笔记本电脑利用演示应用程序软件显示演示数据（步骤 S47）。

如果执行上述操作（即，如果在有关客户机的笔记本电脑上显示演示数据），则向主机 11(1)和其他客户机传送相同的演示数据，并且向主机 11(1)和其他客户机传送使用与演示数据相对应的演示应用程序软件显示演示数据的命令，以及以与有关客户机同步的方式显示演示数据的命令

（步骤 S48）。

如图 13 所示，由主机 11(1)的网络接口卡 1 确定是否收到该演示数据和命令（步骤 S36）。如果收到演示数据和命令，则利用演示应用程序软件在主机 11(1)的笔记本电脑和投影仪 12 上显示该演示数据（步骤 S37）。在图 14 所示的步骤 S42、S43 中，其他客户机的网络接口卡 1 显示该演示数据。

因此，在主机 11(1)和其他客户机的笔记本电脑以及投影仪 12 上，显示与获得演示权限的客户机的笔记本电脑上显示的演示数据相同的演示数据。

如图 13 所示，在执行步骤 S36 和 S37 时，主机 11(1)的网络接口卡 1 重复确定主机 11(1)的笔记本电脑是否执行了用于返回演示权限的预定操作，并且重复确定是否收到其他客户机的新的演示权限获得请求（步骤 S39）。

随后，如果执行了演示返回操作，则向获得演示权限的客户机传送返回演示权限的命令（步骤 S40）。然后，控制返回到步骤 S32。

如果收到任一其他客户机的演示权限获得请求，则在步骤 S35 中，向该客户机传送新的演示权限获得命令。

如图 14 所示，在执行步骤 S47 和 S48 并传送演示数据和命令时，由获得演示权限的客户机的网络接口卡 1，重复确定是否收到演示权限返回命令或用于使其他客户机获得演示权限的命令（步骤 S49）。接着，如果收到命令，则控制返回到步骤 S42。

因此，再次将演示权限转移到主机 11(1)或其他客户机，并且在主机 11(1)和客户机 11(2)到 11(n)的笔记本电脑以及投影仪 12 上，显示从主机 11(1)或该客户机传送的演示数据。

连续不断地执行图 13 和 14 所示的处理，直至从笔记本电脑中拔出网络接口卡 1 或结束笔记本电脑的操作系统。

通过图 13 和 14 所示的处理，在客户机 11(2)到 11(n)的笔记本电脑上，显示与投影仪 12 上显示的演示数据相同的演示数据。另外，其他客户机的笔记本电脑和投影仪 12 上显示从该客户机（获得演示权限的客户机）

传送的演示数据。

因此，通过观看手头客户机的笔记本电脑的屏幕，其座位远离投影仪的参与者能够在视觉上很好地确认演示数据。而其座位靠近投影仪 12 的参与者，能够从投影仪 12 或从其客户机的笔记本电脑上观看演示数据（如，通过具有较大屏幕的投影仪 12 观看图像，并且通过手头客户机的笔记本电脑观看较小的插图）。

另外，当坐下时，与会者能够利用手边的客户机获得演示权限，并且能够传送演示数据。因此，参与者无需离开座位就能进行演示。

“主机程序”和“客户机程序”包含用于在各客户机 11(2)到 11(n)的笔记本电脑上，分别显示来自无线 LAN 的服务器上的数据以及来自因特网的 WWW 服务器上的数据的处理程序。在图 13 和 14 所示的演示处理中自动启动演示应用程序软件后，主机 11(1)和客户机 11(2)到 11(n)的网络接口卡 1 立即启动上述处理。

图 15 和 16 分别表示有关“主机程序”和“客户机程序”的处理内容。如图 15 所示，由主机 11(1)的网络接口卡 1，确定是否收到各客户机 11(2)到 11(n)对无线 LAN 的服务器和因特网的 WWW 服务器的访问请求（步骤 S51）。在图 15 和 16 所示的处理中，根据图 7 所示的轮询系统，传送、接收该请求。

如图 16 所示，由客户机 11(2)到 11(n)的网络接口卡 1，确定有关客户机 11(2)到 11(n)的笔记本电脑是否访问无线 LAN 的服务器或因特网的 WWW 服务器（步骤 S61）。如果执行此操作，则向主机 11(1)传送对此服务器的访问请求（步骤 S62）。

如图 15 所示，如果收到客户机的访问请求，则主机 11(1)的网络接口卡 1 根据此访问请求访问服务器（无线 LAN 的服务器或因特网的 WWW 服务器），并客户机传送从该服务器传送的数据（步骤 S52）。

因此，在该客户机的笔记本电脑上，分别显示无线 LAN 的服务器上的数据或因特网的 WWW 服务器上的数据。

如果正由图 13 和 4 所示的处理执行演示，则在步骤 S52 中向该客户机传送此服务器上的数据，而不是迄今为止传送的演示数据。因此，在

该客户机的笔记本电脑上，显示该服务器上的数据（即，与主机 11(1)和其他客户机的笔记本电脑显示的演示数据不同的数据），而不是迄今为止显示的演示数据。

在执行步骤 S52 时，由主机 11(1)的网络接口卡 1 重复确定是否收到来自客户机的访问结束请求（步骤 S53），是否收到新的访问请求（步骤 S54），以及是否正在执行演示，是否显示的新的演示数据已改变（换页等）（步骤 S55）。

如图 16 所示，在传送访问请求后，由客户机 11(2)到 11(n)的网络接口卡 1 重复确定有关客户机 11(2)到 11(n)的笔记本机电脑是否结束访问（步骤 S63），以及它们是否访问新的服务器（步骤 S64）。

接着，如果确定执行了访问结束操作，则向主机 11(1)传送访问结束请求（步骤 S65），然后控制返回到步骤 S61。如果确定执行访问不同服务器的操作，则控制返回到步骤 S62。

如图 15 所示，如果收到访问结束请求，则主机 11(1)的网络接口卡 1 结束对该服务器的访问（步骤 S56），然后控制返回到步骤 S51。因此，在执行演示时，在该客户机的笔记本电脑上再次显示该演示数据。

如果收到新的访问请求，则根据该访问请求，此时在步骤 S52 中访问该服务器，并向客户机传送数据。

如果此刻正在执行演示并且显示的新的演示数据已改变，则在常数时间内中断传送该服务器上的数据（步骤 S57）。

当在步骤 S57 中中断传送该服务器上的数据时，利用图 13 和 14 所示的处理向客户机传送演示数据，因此，每当显示的演示数据改变时，均在客户机的笔记本电脑上显示已改变的演示数据，其中在常数时间内，显示无线 LAN 的服务器上的数据以及因特网的 WWW 服务器上的数据。

连续不断地执行图 15 和 16 所示的处理，直至从笔记本电脑中拔出网络接口卡 1 或结束笔记本电脑的操作系统。

因为图 15 和 16 所示的处理，当与会者希望在演示前检查无线 LAN 的服务器上的数据和因特网的 WWW 服务器上的数据时，可以利用手头的客户机检查服务器上的数据。

当该参与者在其他参与者进行演示时检查数据时，由于每当显示的演示数据改变时均在常数时间内显示已改变的演示数据，所以能够防止由于错误而忽略演示数据。

如上所述，在该无线 LAN 会议系统中，由于在会议室中配备卡式网络接口卡 1，并且由与会者携带笔记本电脑和卡式网络接口卡 1 组成各客户机，因此无需向与会者强加负担就能构建客户机网络，并且与作为设备在每个座位上安装个人计算机的情况不同，能够在不增加会议室的设备成本的情况下构建该系统。

另外，由于主机由与客户机相同的网络会议终端设备组成，所以无需提供专用设备作为主机，因此能够进一步降低会议室的设备成本。

另外，由于在网络接口卡 1 上存储演示应用程序软件，所以即使与会者携带未安装该演示应用程序软件的笔记本电脑，此类笔记本电脑也能显示演示数据。

再者，能够自动启动以上演示应用程序软件。因此，与会者无需执行启动该演示应用程序软件的操作，从而能够进一步减轻强加给参与者的负担。

由于利用无线 LAN 连接主机和客户机，所以无需在会议室中铺设同轴电缆和光纤之类的有线传输介质，从该观点看，能够降低设备成本。另外，与铺设有线传输介质的情况不同，会议室内的无线 LAN 会议终端设备的位置是不固定的（因此，座位的布局是不固定的），因此可以自由确定座位布局。

此外，无需改变其内配备有会议室的建筑内预先构建的有线 LAN，就能构建 LAN 会议系统。

在上例中，“主机/客户机判定程序”的处理内容在于：连接网络接口卡 1 并且在会议室内启动笔记本电脑的操作系统的第一台无线 LAN 会议终端设备 11 作为主机。

然而，“主机/客户机判定程序”的处理内容并不限于此，并且处理内容可以为，利用适当方法确定任意一台无线 LAN 会议终端设备 11 作为主机（如，在笔记本电脑上显示供参与者选择主机或客户机的图片，

然后根据笔记本电脑的操作确定主机或客户机）。

尽管在上例中提供投影仪，但是作为另一个示例，通过仅仅在主机或客户机的笔记本电脑上显示演示数据，无需提供投影仪，也能构建无线 LAN 会议系统。

由于通过上例中的笔记本电脑的外部显示终端，将投影仪仅仅连接到主机，所以当除会议主持人之外的其他参与者进行演示时，该主机将从客户机传送到该主机的演示数据，传送到投影仪。

然而，作为另一个示例，如图 17 所示，通过使用可与无线 LAN 连接的投影仪（如，与个人计算机相连的投影仪，其中可以将个人计算机连接到无线 LAN）14，从客户机 11(2)到 11(n)，通过无线 LAN，可以直接将演示数据传送到投影仪 14（通过无线 LAN，主机 11(1)也可以将演示数据传送到投影仪 14）（在图 17 中，利用相同的参考号数表示与图 5 所示部分相同的部分，并且该关系同样适用于图 18 和 19）。

在上例中，作为独立部分提供主机和投影仪。然而，作为另一个示例，如图 18 所示，可以提供带有个人计算机 15 的投影仪 16，其中个人计算机 15 具有 PC 卡插槽。将网络接口卡 1 插入到个人计算机 15 中，并且将此台个人计算机作为主机，从而也可以将投影仪作为主机。

在图 18 所示的无线 LAN 会议系统中，通过无线 LAN，直接将投影仪 16 显示的相同演示数据，从投影仪 16 传送到到客户机 11(2)到 11(n)，从而在客户机 11(2)到 11(n)上进行显示。与图 17 所示的无线 LAN 会议系统相似，通过无线 LAN，可以直接将演示数据从客户机 11(2)到 11(n)传送到投影仪 16，从而在投影仪 16 上显示该演示数据。

另外，在图 18 所示的示例中，当可以从所有座位上清楚观看投影仪 16 上显示的数据并且只有一个参与者进行演示时，如图 19 所示，例如，仅仅提供一台无线 LAN 会议终端设备（客户机）11(2)。因此，可以连接无线 LAN 会议终端设备 11 与有线 LAN 和视频摄象机 13，从而将进行演示的参与者自始至终利用客户机 11(2)获得演示权限，并且可以将演示数据传送到投影仪 16。

在示例中，在网络接口卡中不仅存储“客户机程序”，而且存储“主

机/客户机判定程序”和“主机程序”，从而可以将连接有网络接口卡的笔记本电脑作为主机。

然而，作为另一个示例，也可以不在网络接口卡中存储“主机/客户机判定程序”和“主机程序”，并且基于将网络接口卡插入到笔记本电脑中的事实，继续启动“客户机程序”。 如果是那样的话，作为主机，可以使用安装有“主机程序”和演示应用程序软件并且连接普通（与本发明无关）网络接口卡的个人计算机（在图 18 和 19 所示的示例中，可以在与投影仪相连的个人计算机上安装“主机程序”和演示应用程序软件，并且将普通网络接口卡连接到该个人计算机）。

在上例中，“主机程序”和“客户机程序”包含客户机获得演示权限的处理。然而，当与会者无需利用手头的客户机传送演示数据时（如，特定人物进行单方面演示的广播会议），“主机程序”和“客户机程序”无需包含此类处理。

在上例中，在网络接口卡中存储演示应用程序软件。然而，作为不同示例，也可以不在网络接口卡中存储演示应用程序软件，而是将网络接口卡连接到安装有演示应用程序软件的笔记本电脑中。

在上例中，将网络接口卡连接到笔记本电脑，从而导致正在构建的客户机和主机。然而，本发明并不限于此，通过将网络接口卡连接到能够连接 PC 卡的任何合适信息终端设备（除笔记本电脑之外的其他个人计算机，作为高度复杂的电子记事本的个人数字助理，打印机，具有内置摄象机的图像记录设备等），也可以构建客户机和主机。

在上例中，网络接口卡采用射频系统作为无线 LAN 系统。然而，作为不同示例，也可以采用红外系统作为无线 LAN 系统。

在上例中，将网络接口卡应用于无线 LAN 会议系统。然而，本发明并不限于此，也可以将网络接口卡应用于除无线 LAN 会议系统之外的其他用途。然而，如果是那样的话，网络接口卡可以通过有线 LAN 传送、接收数据。

在上例中，将本发明应用于基于 PCMCIA 标准的网络接口卡。然而，本发明并不限于此，可以将本发明应用于能够连接到信息终端设备的任

何合适的卡式（包括超薄芯片类型的）网络接口卡。

本发明并不限于以上示例，更不用说本发明可以采取各种结构而并不背离其实质。

如上所述，根据本发明的卡式网络接口卡，达到在不向用户强加负担的情况下，执行用于连接诸如个人计算机之类的信息终端设备的网络设置的目的。

因此，在使用 LAN 的会议中，例如，如果在会议室中配备以上卡式网络接口卡，并且将以上卡式网络接口卡连接到诸如与会者携带的笔记本电脑之类信息终端设备中，则能够在不向出席会议的参与者强加负担的情况下执行网络设置。另外，与作为设备在每个座位上连接诸如个人计算机之类的信息终端设备的情况不同，本发明能够避免增加会议室的设备成本。

根据以上卡式网络接口卡，由于 LAN 的主机是由连接卡式网络接口卡的信息终端设备组成的，所以能够在不提供专用设备作为主机的情况下达到构建 LAN 系统的目的。因此，在使用 LAN 的会议中，例如，能够进一步抑制会议室的设备成本。

根据以上卡式网络接口卡，在使用 LAN 的会议中，例如，与会者无需离开座位就能进行演示。

根据以上卡式网络接口卡，能够实现以下目的，即，主机能够准确接收通过无线 LAN 完成其网络设置的众多客户机的请求，并且该主机能够通过无线 LAN 准确接收设置信息请求。

根据以上卡式网络接口卡，在使用 LAN 的会议系统中，例如，实现以下目的，即，未安装演示应用程序软件的信息终端设备能够显示演示应用程序数据。另外，由于与会者无需执行启动演示应用程序软件的操作，所以能够实现以下目的，即，进一步减轻强加给参与者的负担。

其次，根据本发明的网络会议终端设备，能够实现以下目的，即，能够在不向出席使用无线 LAN 的会议的参与者强加负担的情况下，执行使用的网络设置，并且与作为设备在每个座位上安装信息终端设备的情况不同，本发明能够避免增加会议室的设备成本。

根据以上网络会议终端设备，由于无线 LAN 的主机也是由该网络会议终端设备组成的，所以能够实现以下目的，即，能够在不提供专用设备作为主机的情况下构建无线 LAN 会议系统。因此，能够进一步抑制会议室的设备成本。

根据以上网络会议终端设备，在使用无线 LAN 的会议中，例如，与会者无需离开座位就能进行演示。

根据以上网络会议终端设备，能够实现以下目的，即，主机能够准确接收已完成网络设置的众多客户机的请求，并且该主机能够准确接收用于设置网络的设置信息请求。

根据以上网络会议终端设备，在使用无线 LAN 的会议系统中，例如，能够实现以下目的，即，未安装演示应用程序软件的信息终端设备能够显示演示数据。另外，由于与会者无需执行启动演示应用程序软件的操作，所以能够实现以下目的，即，进一步减轻强加给参与者的负担。

其次，根据本发明的网络会议系统，能够实现以下目的，即，能够在不向参与者强加负担的情况下，执行网络设置，并且能够在不增加会议室的设备成本的情况下构建该系统。

根据以上网络会议系统，由于主机也是由与客户机相同的网络会议终端设备组成的，所以能够实现以下目的，即，无需提供专用设备作为主机，因此，能够进一步抑制会议室的设备成本。

根据以上网络会议系统，与会者无需离开座位就能进行演示。

根据以上网络会议系统，能够实现以下目的，即，主机能够准确接收已完成网络设置的众多客户机的请求，并且该主机能够准确接收用于设置网络的设置信息的请求。

根据以上网络会议系统，能够实现以下目的，即，使用未安装演示应用程序软件的信息终端设备的客户机或主机，能够显示演示数据。由于与会者无需执行启动演示应用程序软件的操作，所以能够进一步减轻强加给参与者的负担。

其次，根据本发明的另一种网络会议系统，能够实现以下目的，即，能够在不向与会者强加负担的情况下，执行客户机的网络设置，并且能

够在不增加会议室的设备成本的情况下构建该系统，同时参与者无需离开座位就能进行演示。

根据另一种网络会议系统，能够实现以下目的，即，通过无线 LAN，能够直接从图像显示设备向客户机传送与该图像显示设备上显示的演示数据相同的演示数据，然后在客户机上显示，并且通过无线 LAN，能够直接从客户机向图像显示设备传送演示数据，然后在图像显示设备上显示此类演示数据。

另外，根据另一种网络会议系统，能够实现以下目的，即，图像显示设备（主机）能够准确接收已完成网络设置的众多客户机的请求，并且该图像显示设备能够准确接收用于设置网络的设置信息请求。

此外，根据另一种网络会议系统，能够实现以下目的，即，使用未安装演示应用程序软件的信息终端设备的客户机和图像显示设备能够显示演示数据。由于与会者无需执行启动演示应用程序软件的操作，所以能够实现以下目的，即，进一步减轻强加给参与者的负担。

图 1

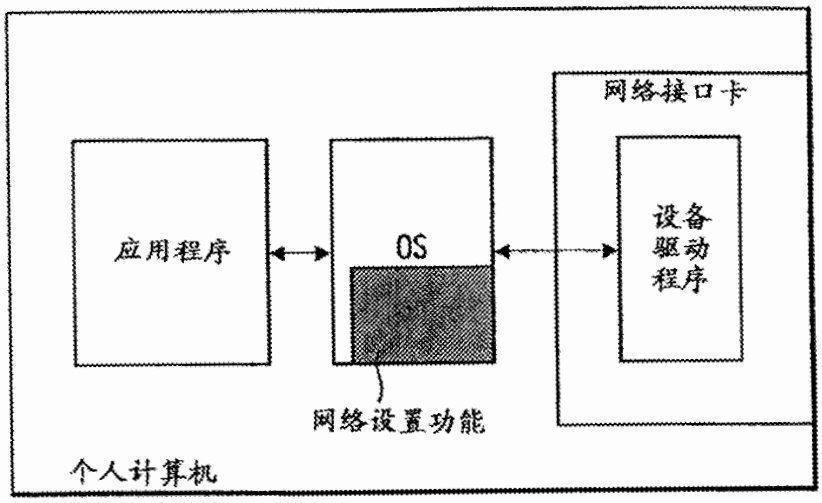


图 2

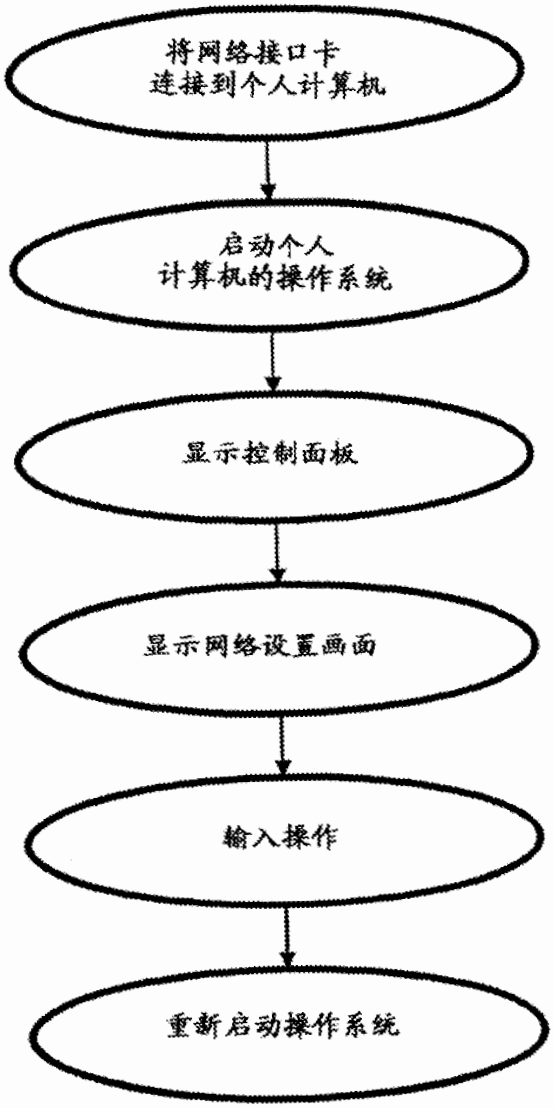

将网络接口卡
连接到个人计算机
启动个人
计算机的操作系统
显示控制面板
显示网络设置画面
输入操作
重新启动操作系统

图 3

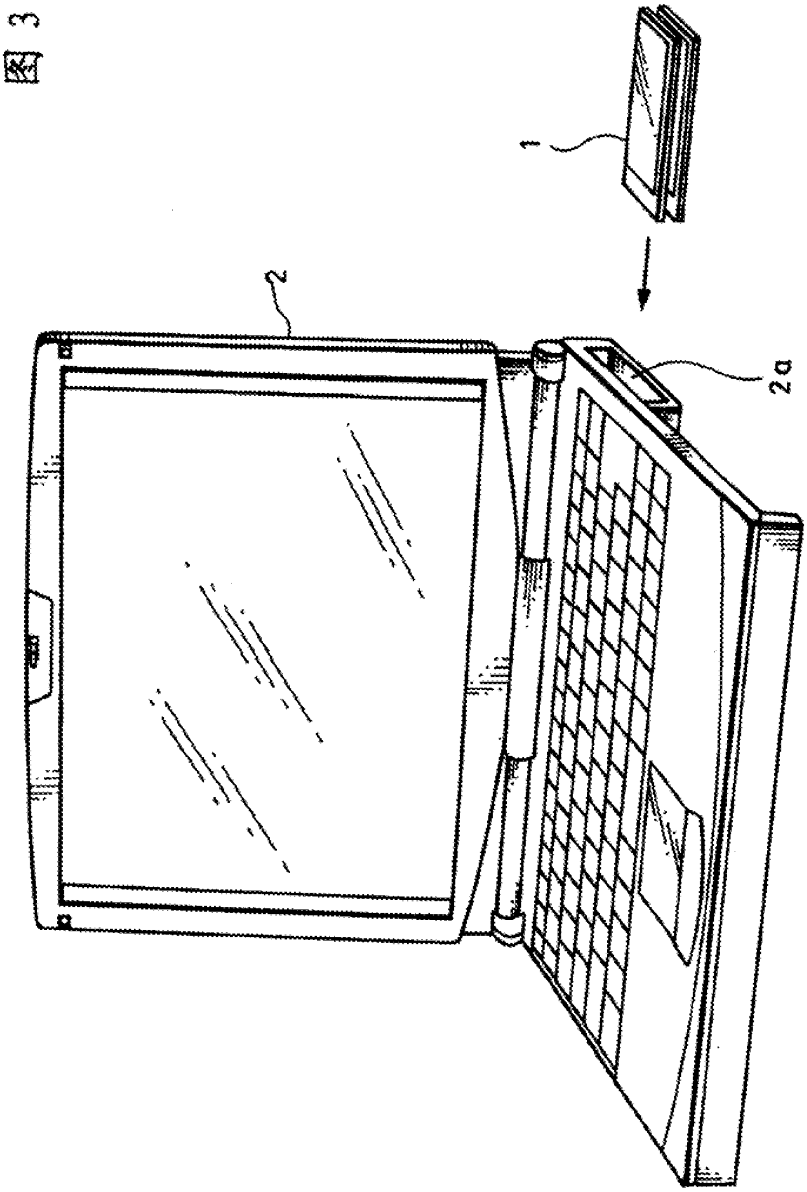


图 4

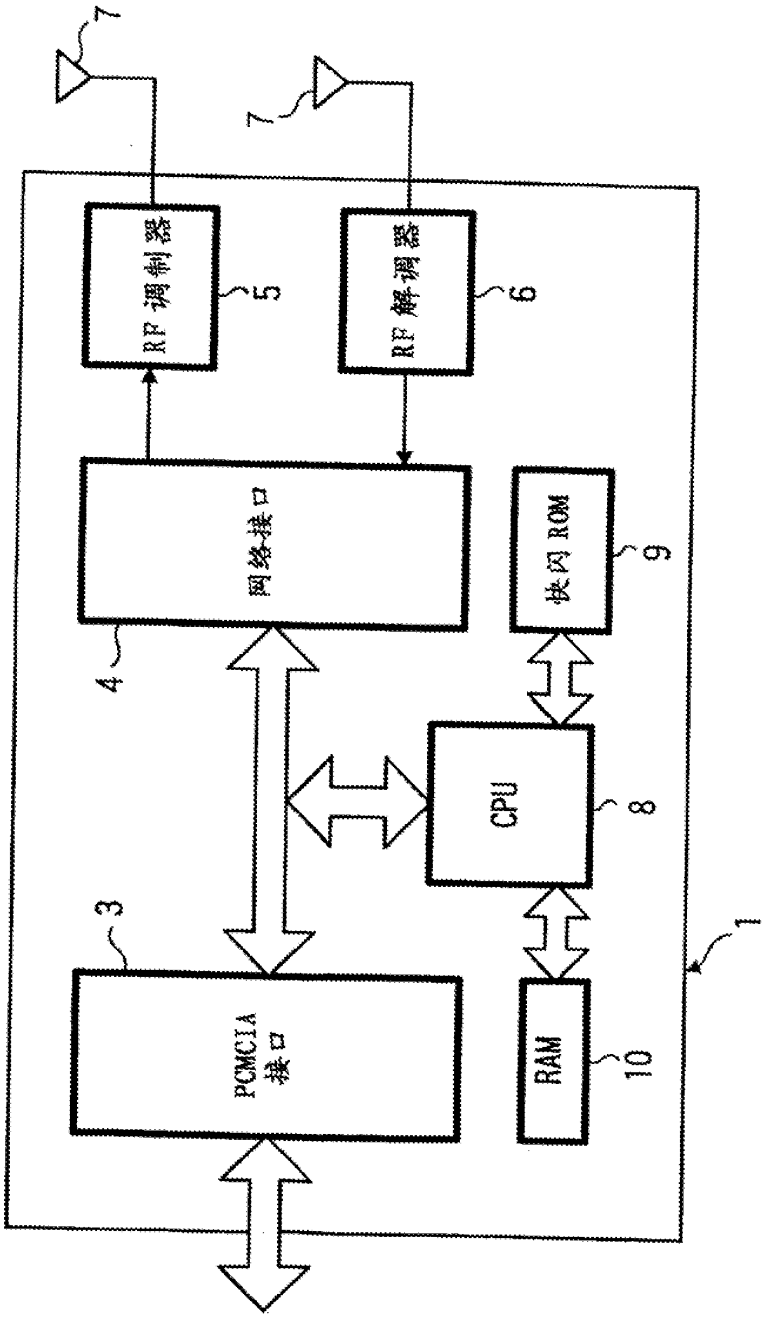


图 5

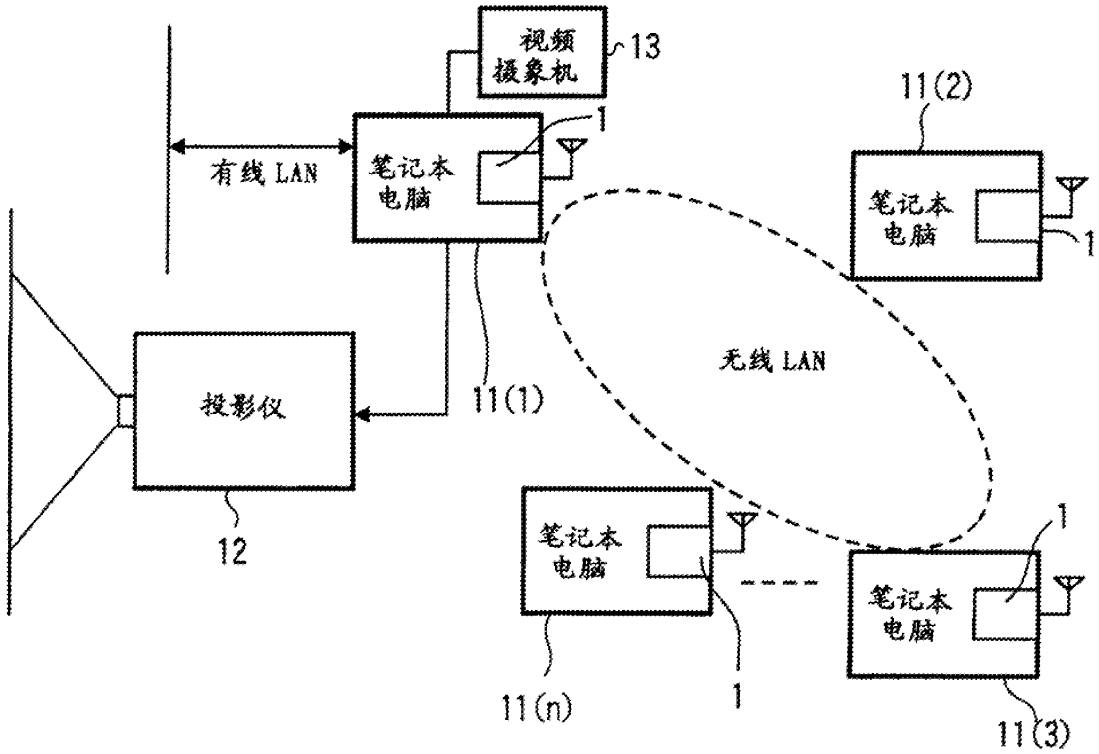

视频
摄象机
13
有线 LAN
笔记本
电脑
1
11(1)
11(2)
笔记本
电脑
1
无线 LAN
投影仪
12
笔记本
电脑
11(n)
1
笔记本
电脑
1
11(3)

图 6

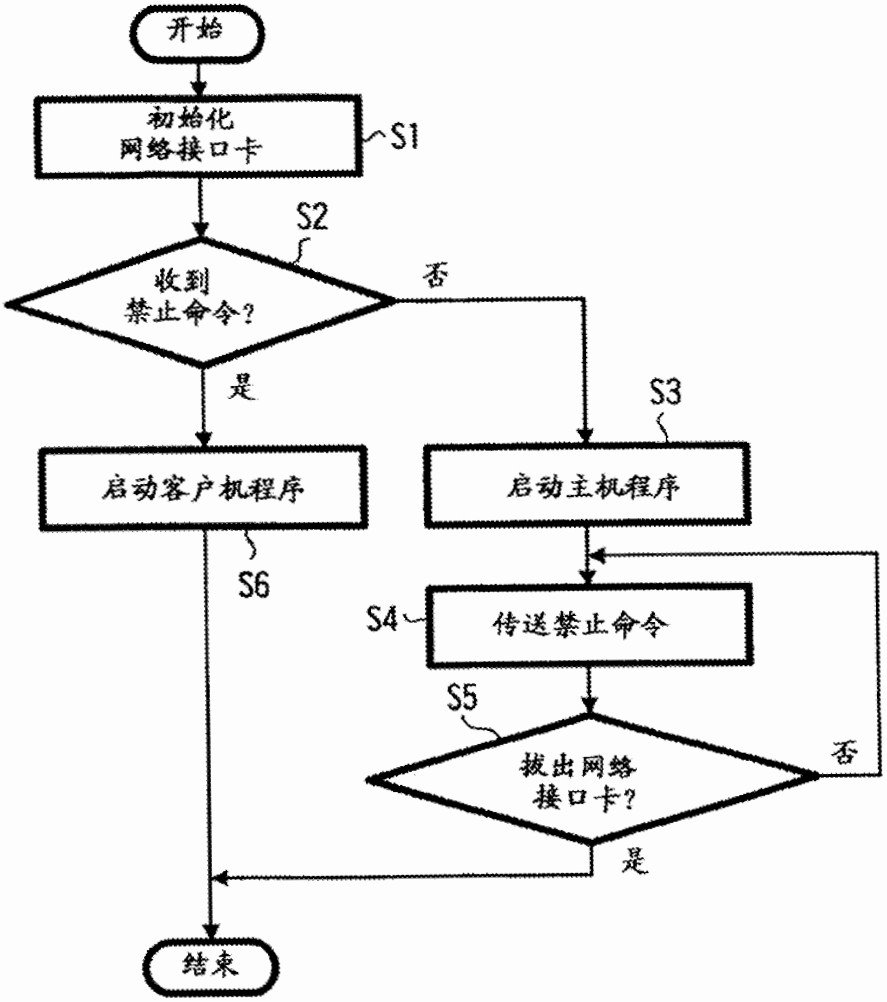

开始
初始化
网络接口卡
S1
S2
收到
禁止命令?
否
是
S3
启动客户机程序
启动主机程序
S6
S4
传送禁止命令
S5
拔出网络
接口卡?
否
是
结束

图 7

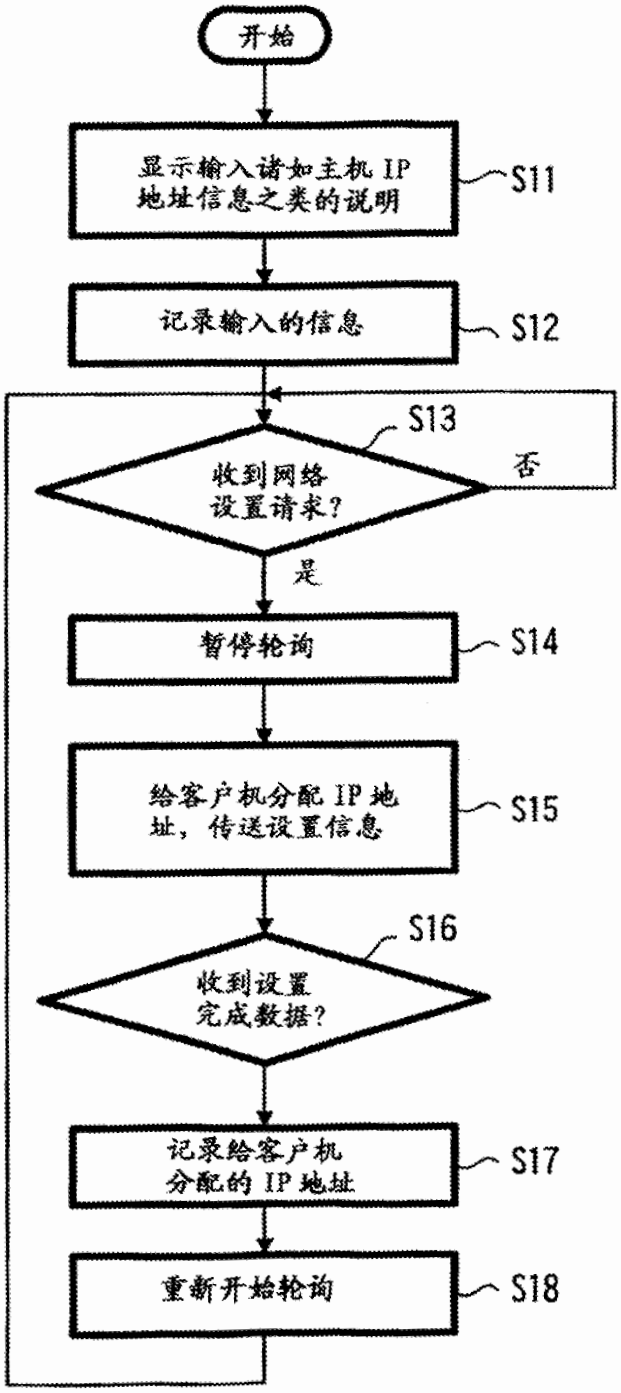

开始
显示输入诸如主机 IP 地址信息之类的说明
S11
记录输入的信息
S12
S13
收到网络设置请求?
否
是
暂停轮询
S14
给客户机分配 IP 地址，传送设置信息
S15
S16
收到设置完成数据?
记录给客户机分配的 IP 地址
S17
重新开始轮询
S18

图 8

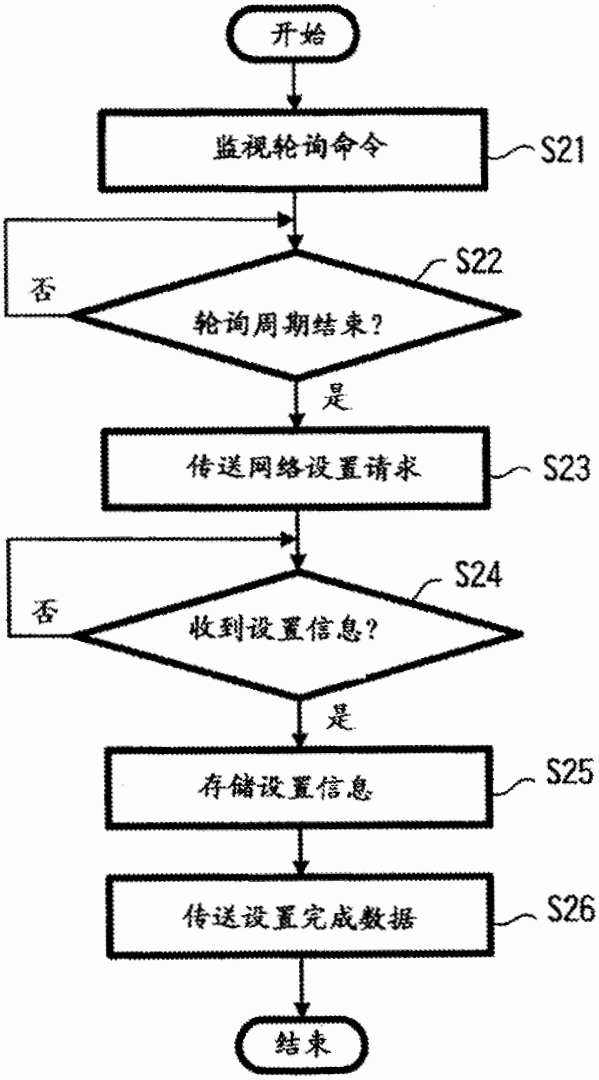

开始
监视轮询命令
S21
S22
否
轮询周期结束?
是
传送网络设置请求
S23
S24
否
收到设置信息?
是
存储设置信息
S25
传送设置完成数据
S26
结束

图 9

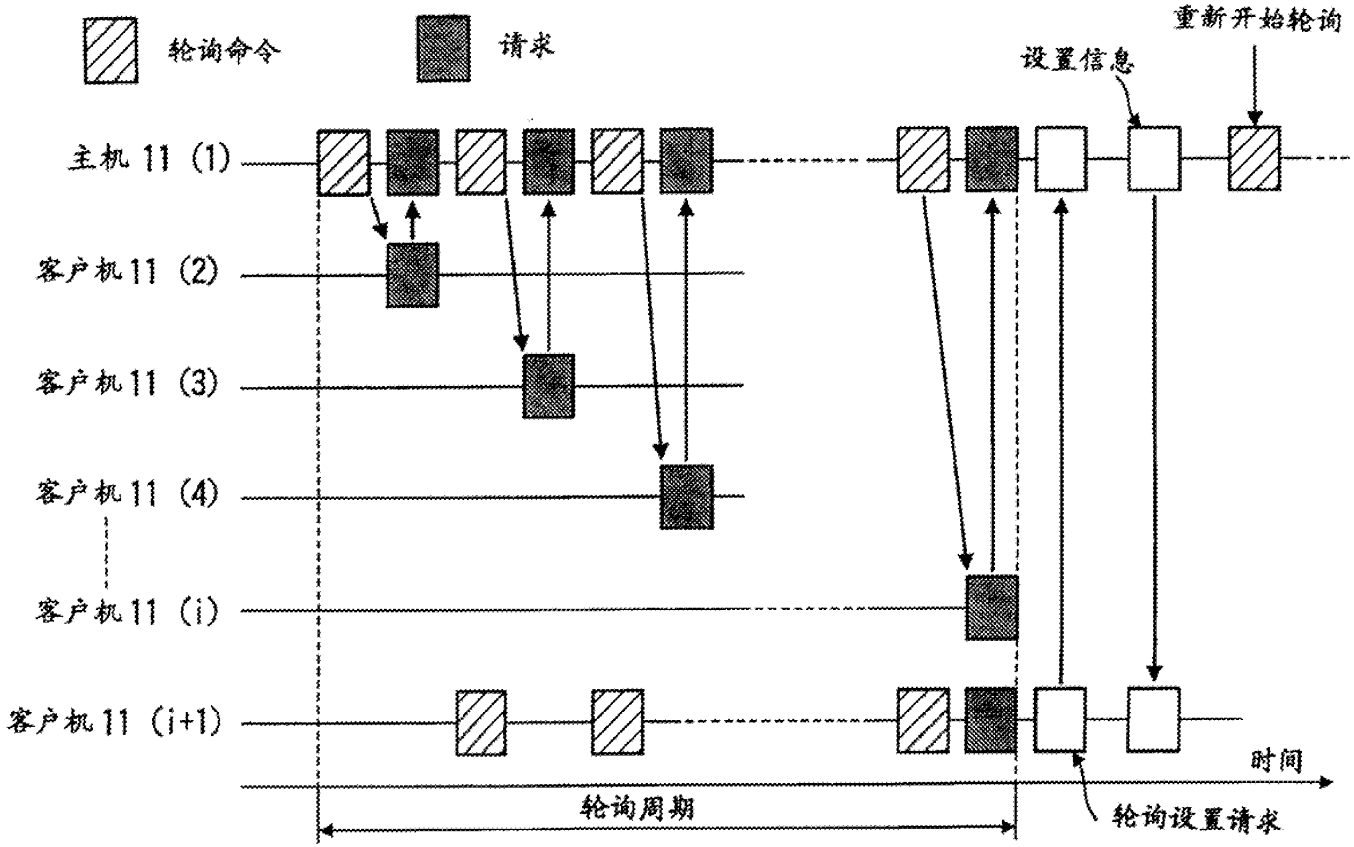

轮询命令
请求
重新开始轮询
设置信息
主机 11（1）
客户机 11（2）
客户机 11（3）
客户机 11（4）
客户机 11（i）
客户机 11（i+1）
时间
轮询周期
轮询设置请求

图10A

传输目的地的地址	传输源的地址	后继字节数	数据或命令	校验和

图10B

轮询结束
请求 IP 地址
完成设置 IP 地址

图 11

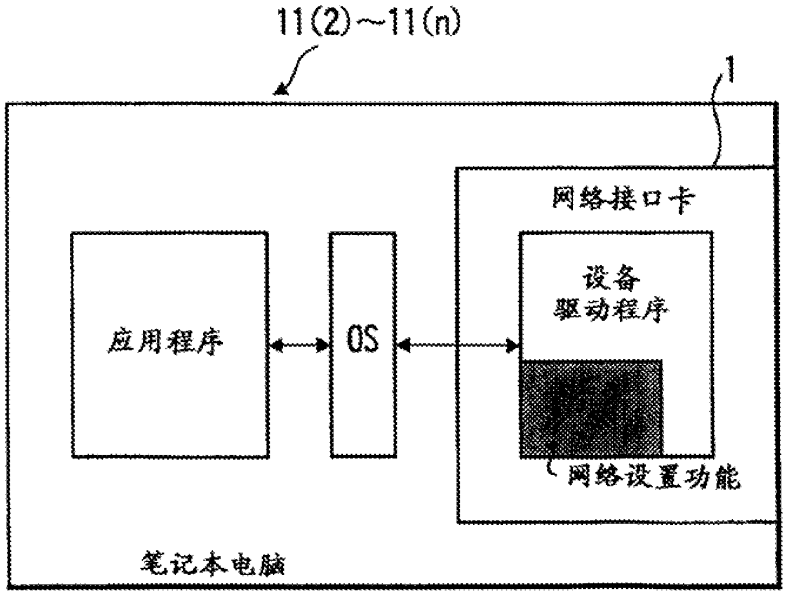


图 12

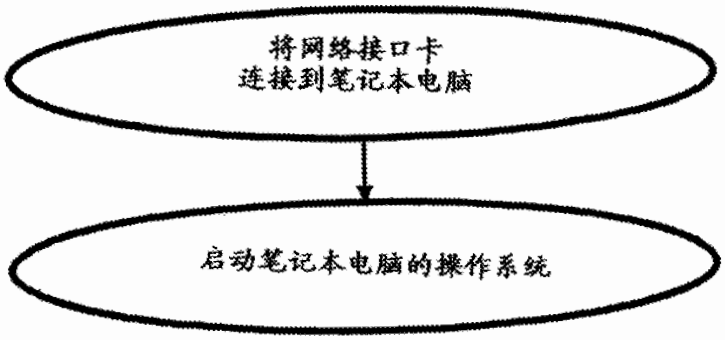


图 13

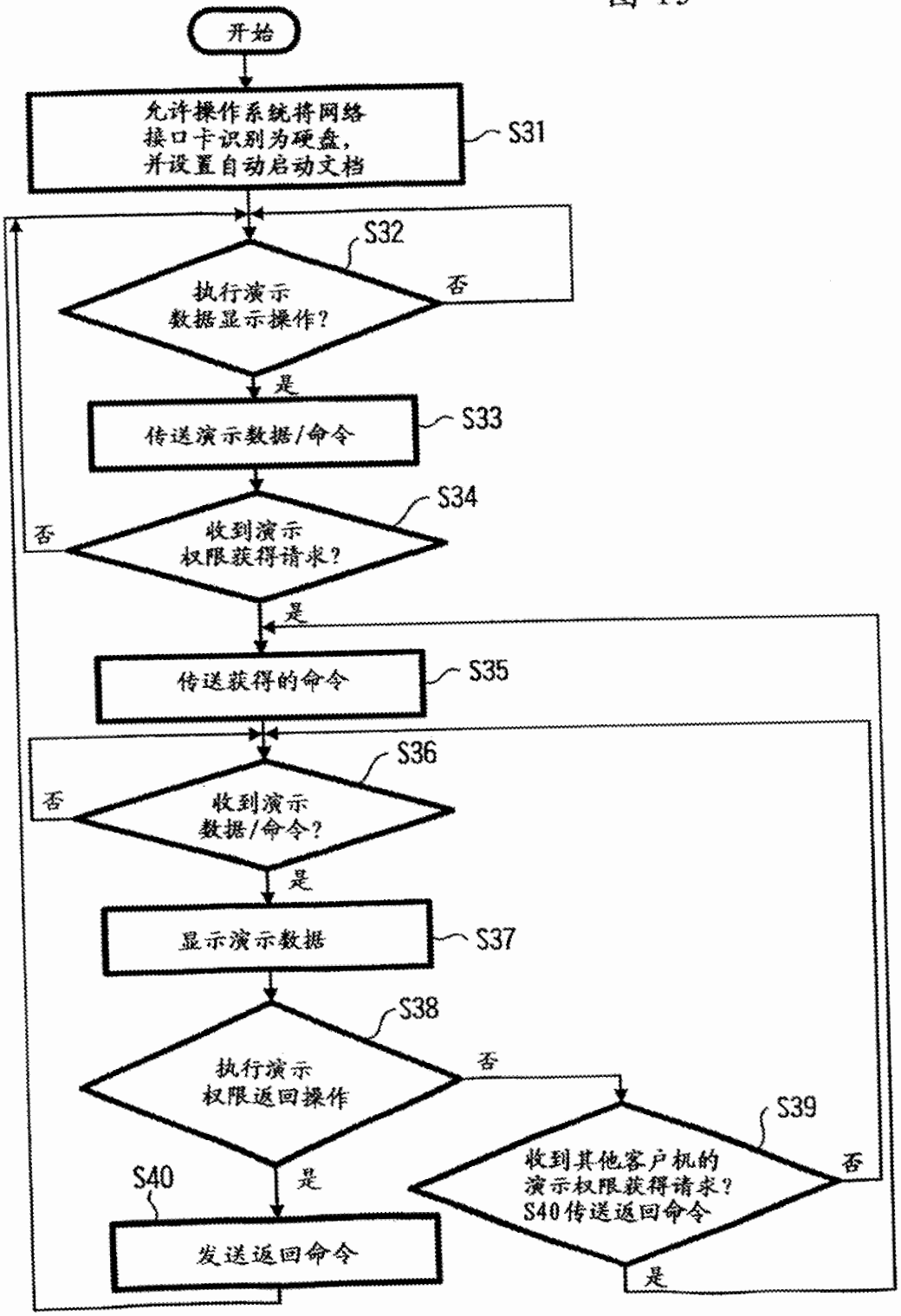

开始
允许操作系统将网络接口卡识别为硬盘，并设置自动启动文档
S31
S32
执行演示数据显示操作？
否
是
传送演示数据/命令
S33
S34
收到演示权限获得请求？
否
是
传送获得的命令
S35
S36
收到演示数据/命令？
否
是
显示演示数据
S37
S38
执行演示权限返回操作
否
是
S39
收到其他客户机的演示权限获得请求？S40传送返回命令
否
是
S40
发送返回命令

图 14

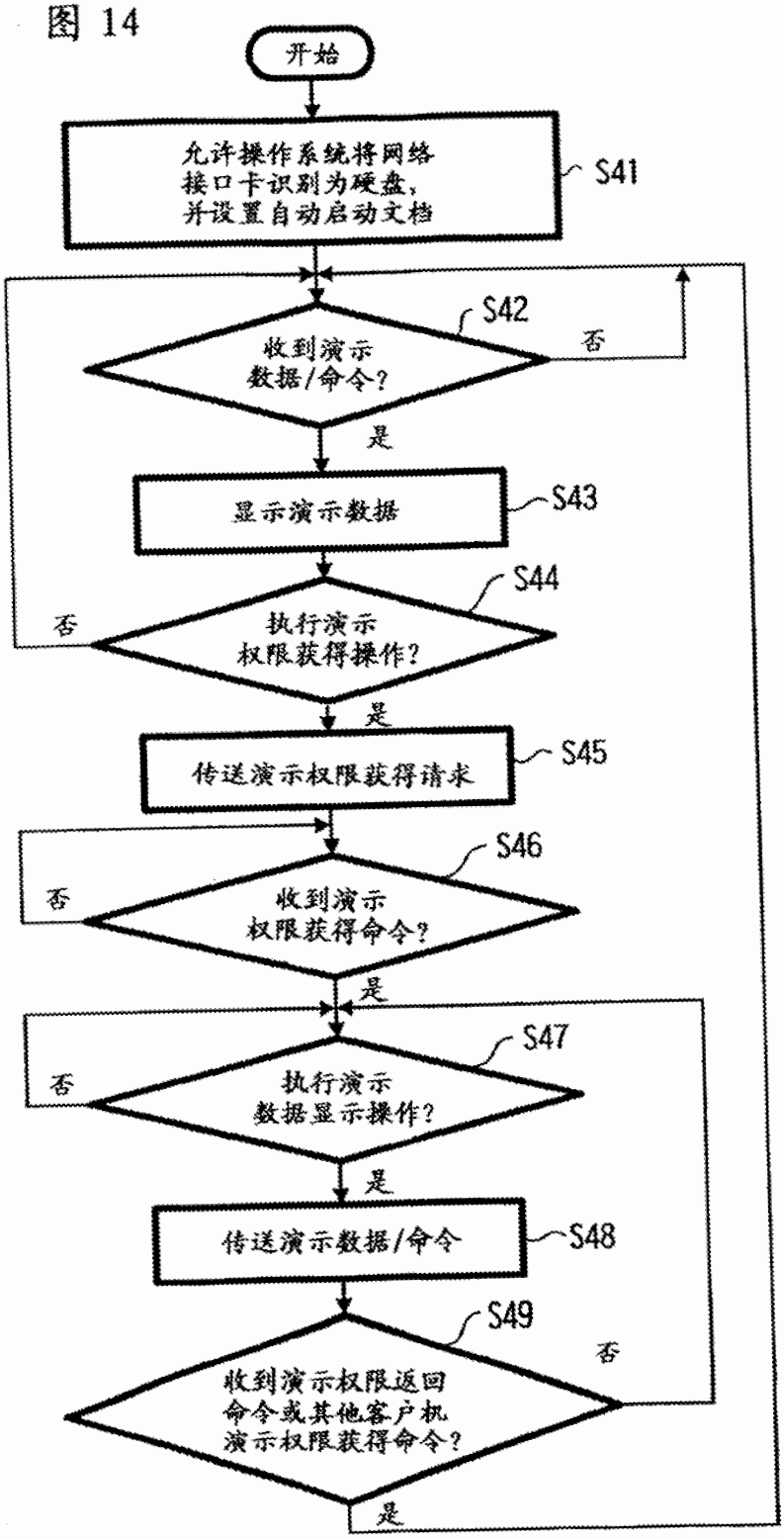

开始
允许操作系统将网络接口卡识别为硬盘，并设置自动启动文档
S41
收到演示数据/命令？
S42
否
是
显示演示数据
S43
执行演示权限获得操作？
S44
否
是
传送演示权限获得请求
S45
收到演示权限获得命令？
S46
否
是
执行演示数据显示操作？
S47
否
是
传送演示数据/命令
S48
收到演示权限返回命令或其他客户机演示权限获得命令？
S49
否
是

图 15

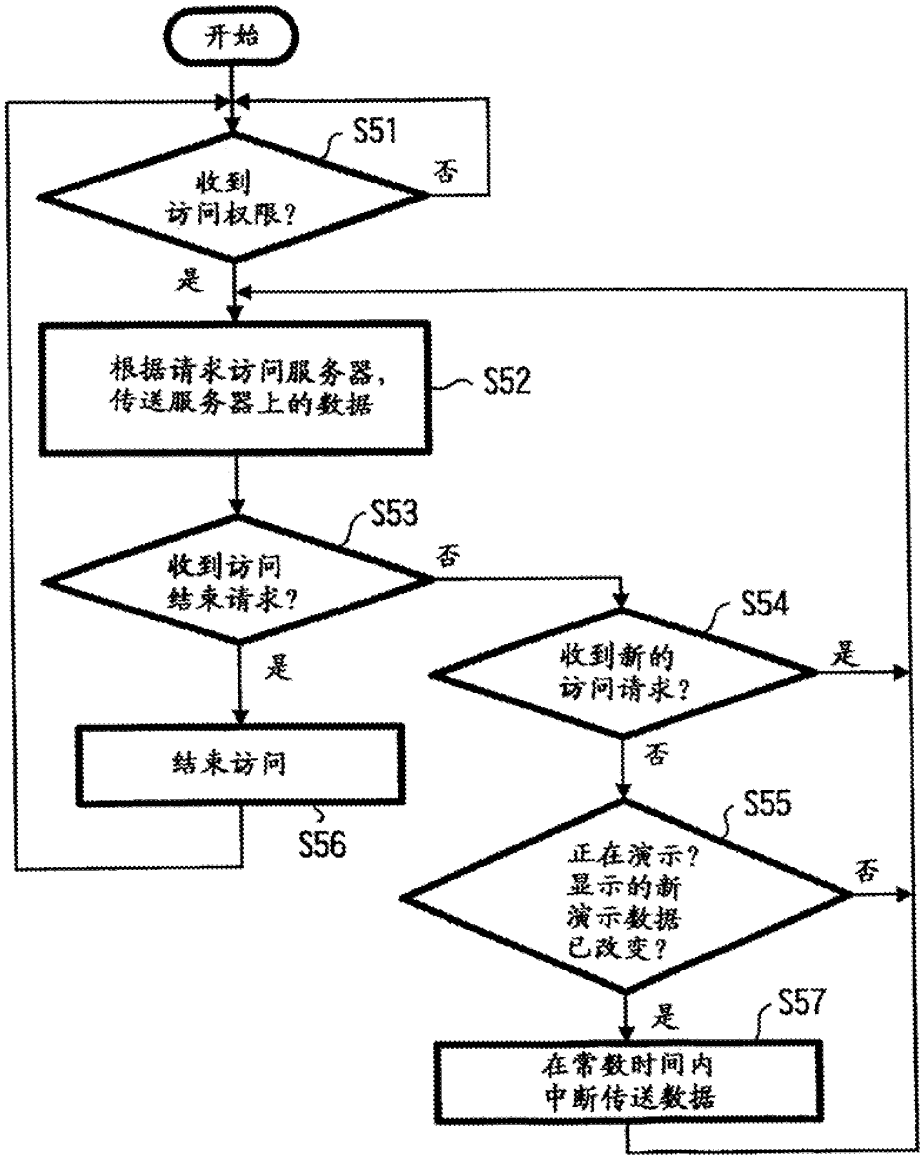

开始
S51
收到
访问权限？
否
是
根据请求访问服务器，
传送服务器上的数据
S52
S53
收到访问
结束请求？
否
是
结束访问
S56
S54
收到新的
访问请求？
是
否
S55
正在演示？
显示的新
演示数据
已改变？
否
是
S57
在常数时间内
中断传送数据

图 16

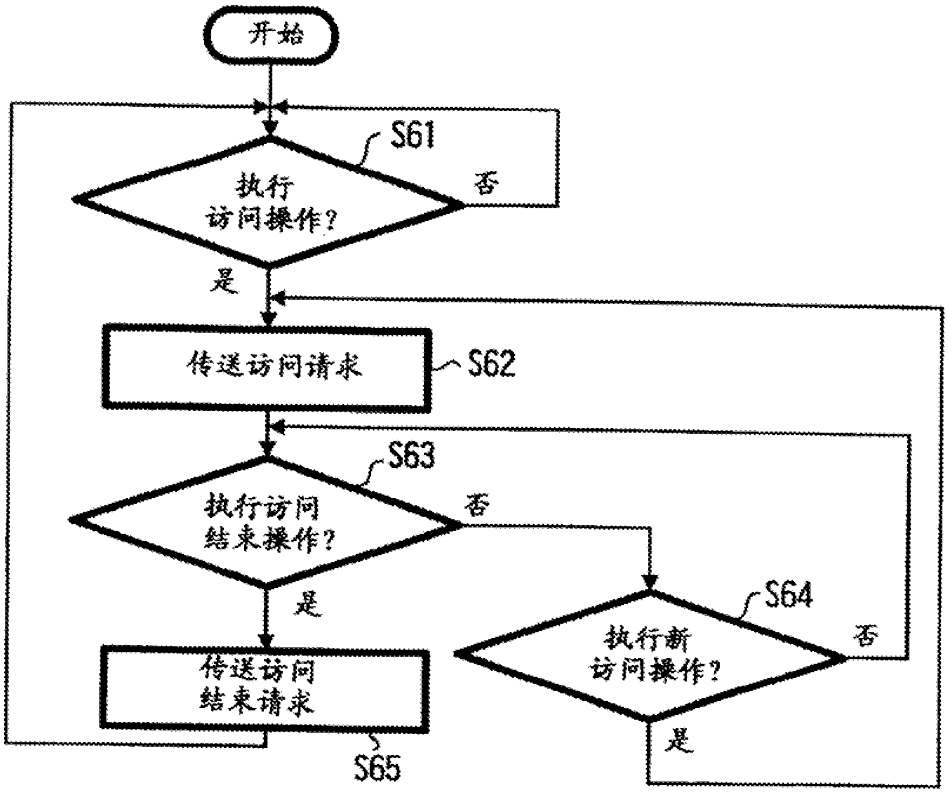

开始
S61
执行
访问操作？
否
是
传送访问请求
S62
S63
执行访问
结束操作？
否
是
S64
执行新
访问操作？
否
是
传送访问
结束请求
S65

图 17

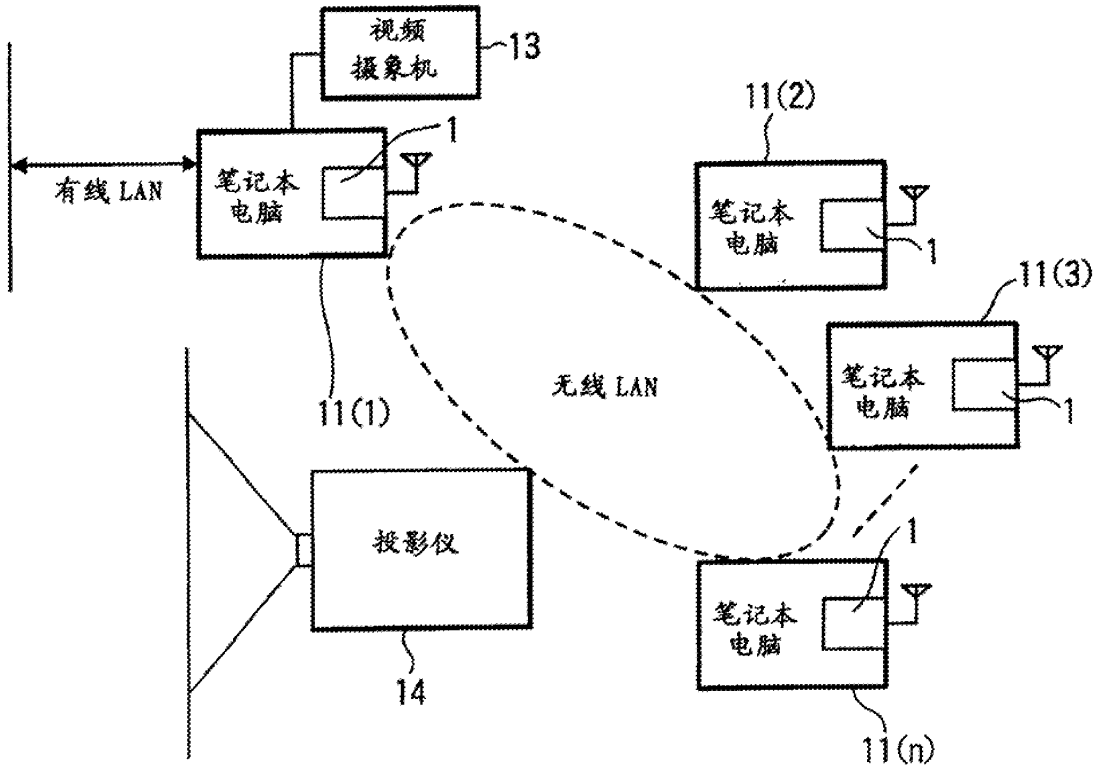

视频
摄象机
13
有线 LAN
笔记本
电脑
1
11(1)
11(2)
笔记本
电脑
1
11(3)
笔记本
电脑
1
无线 LAN
投影仪
14
笔记本
电脑
1
11(n)

图 18

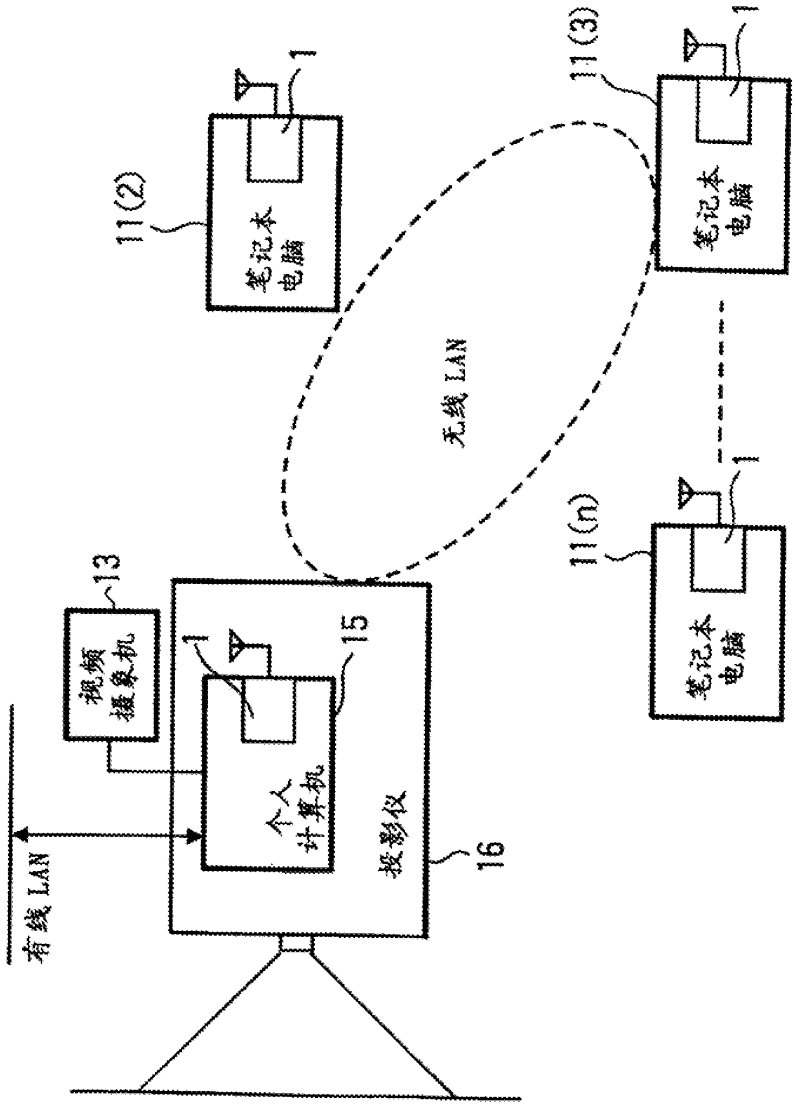
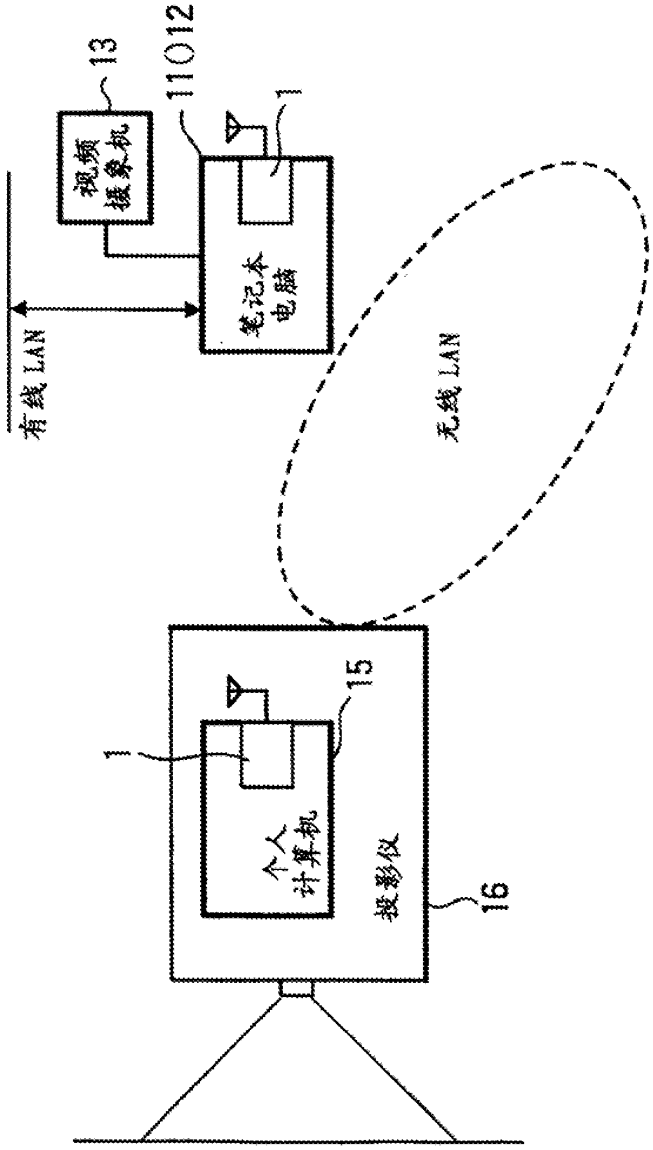

有线 LAN
视频
摄象机
13
1
15
个人
计算机
投影仪
16
无线 LAN
11(2)
笔记本
电脑
1
11(3)
笔记本
电脑
1
11(n)
笔记本
电脑
1

图 19



参看号数描述

1 … 网络接口卡
2 … 笔记本电脑
2a … PC卡插槽
3 … PCMCIA接口
4 … 网络接口
5 … RF调制
6 … RF解调
7 … 天线
8 … CPU
9 … 快闪ROM
10 … RAM
11(1) … 无线LAN会议终端设备（主机）
11(2)到11(n) … 无线LAN会议终端设备（客户机）
12,14,16 … 投影仪
13 … 视频摄象机
15 … 个人计算机

Electronic Acknowledgement Receipt

EFS ID:	28254410
Application Number:	14344836
International Application Number:	
Confirmation Number:	1046
Title of Invention:	ELECTRONIC TOOL AND METHODS WITH AUDIO FOR MEETINGS
First Named Inventor/Applicant Name:	Koen Simon Herman Beel
Customer Number:	23364
Filer:	Thomas Lee/Kaitlyn Miller
Filer Authorized By:	Thomas Lee
Attorney Docket Number:	BEEL3004/BEU/TL
Receipt Date:	03-FEB-2017
Filing Date:	03-MAR-2015
Time Stamp:	11:26:48
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	BEEL3004_IDS_SB08.pdf	612252 ff236c0abe81f7534ecb4b2000da072b0d1563c6	no	4

Warnings:

Information:					
2	Foreign Reference	CN1689275A_filing.pdf	11341786 3231840f887b249753d6702db961f52e154d4682	no	57
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<u>New International Application Filed with the USPTO as a Receiving Office</u>
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Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

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	Filing Date	2015-03-03
	First Named Inventor	Koen Simon Herman BEEL
	Art Unit	2181
	Examiner Name	Henry Tsai
	Attorney Docket Number	BEEL3004/BEU/TL

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	1	20110179182	A1	2011-07-21	VADLA RAVNAS	cited in EP Search Report
	2	20050015719	A1	2005-01-20	MARCHON et al.	cited in EP Search Report
	3	20090300520	A1	2009-12-03	Ashutosh	
	4	20050122392	A1	2005-06-09	Johansen	
	5	20090092198	A1	2011-04-21	Miyata	

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	Filing Date	2015-03-03
	First Named Inventor	Koen Simon Herman BEEL
	Art Unit	2181
	Examiner Name	Henry Tsai
	Attorney Docket Number	BEEL3004/BEU/TL

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	1476242	CN	A	2004-02-18	SEIKO EPSON CORP	English abstract of corresponding EP 1385336, cited in CN OA	☒
	2	2010/105335	WO	A1	2010-09-23	SMART TECHNOLOGIES ULC	cited in CN OA	☐
	3	102045864	CN	A	2011-05-04	NEC CASIO MOBILE COMM LTD	English abstract (Corresponds U.S. 2011/0092198), cited in CN OA	☒
	4	101631223	CN		2011-04-20	SHANGHAI HUAPING INFORMATION TECHNOLOGY CO LTD	Cited in CN OA dated 10-10-16, English abstract	☒
	5	101454762	CN		2013-06-12	SMART TECHNOLOGIES ULC	Cited in CN OA dated 10-10-16, English abstract	☒
	6	1550996	CN		2004-12-01	SEIKO EPSON CORP	Cited in CN OA dated 10-14-16, English abstract	☒
	7	101965609	CN		2011-02-02	SMART TECHNOLOGIES ULC	Cited in CN OA dated 10-14-16, English abstract	☒
	8	1385336	EP	A2	2004-01-28	SEIKO EPSON CORP		☐

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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14344836
	Filing Date	2015-03-03
	First Named Inventor	Koen Simon Herman BEEL
	Art Unit	2181
	Examiner Name	Henry Tsai
	Attorney Docket Number	BEEL3004/BEU/TL

	1	European Extended Search Report dated November 3, 2016, for EP 16170760.9.	
	2	Chinese Office Action dated October 14, 2016, for CN 201280055744.2.	
	3	Chinese Office Action dated October 10, 2016, for CN 201280055667.0.	
	4	Office Action in corresponding U.S. app. 14/344,830 dated October 6, 2016.	
	5	Final Office Action in corresponding U.S. app. 14/395,364 dated November 2, 2016.	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14344836
	Filing Date	2015-03-03
	First Named Inventor	Koen Simon Herman BEEL
	Art Unit	2181
	Examiner Name	Henry Tsai
	Attorney Docket Number	BEEL3004/BEU/TL

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Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☒ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

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

See attached certification statement.

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

A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Thomas Lee/	Date (YYYY-MM-DD)	2017-01-06
Name/Print	THOMAS LEE	Registration Number	66396

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6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

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(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
23 September 2010 (23.09.2010)

PCT

(10) International Publication Number
WO 2010/105335 A1

(51) International Patent Classification:
G06F 3/00 (2006.01) *H04W 12/02* (2009.01)
G06F 13/38 (2006.01)

(21) International Application Number:
PCT/CA2010/000185

(22) International Filing Date:
12 February 2010 (12.02.2010)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
12/407,994 20 March 2009 (20.03.2009) US

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(54) Title: PLUG-AND-PLAY INTERFACE DEVICE

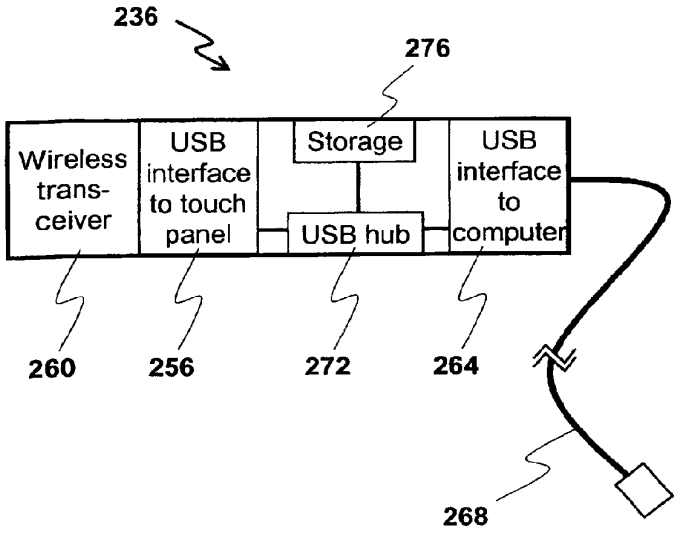

FIG. 5

(57) Abstract: A plug-and-play device comprises a first plug-and-play interface for establishing a connection with a first computing device and a second plug- and-play interface for establishing a connection with a second computing device. Storage stores code that is automatically executed by the second computing device when the plug-and-play device is connected to the second computing device via the second plug-and-play interface. The code when executed by the second computing device initiates a screen display data exchange between the first and second computing devices through the plug- and-play device. A controller controls the first plug-and-play interface, the second plug-and-play interface and the storage.

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PLUG-AND-PLAY INTERFACE DEVICE

Related Application

[0001] The subject application is a continuation-in-part of U.S. Patent Application No. 11/420,600 to Hill et al. filed on May 26, 2006 for an invention entitled "Plug-And-Play Device And Method Of Using The Same", the contents of which are incorporated herein by reference.

Field

[0002] The subject application relates generally to computer peripheral devices and, more specifically, to a plug-and-play device and a method of using the same.

Background

[0003] Plug-and-play devices are well known and many types of plug-and-play standards exist, including for example universal serial bus ("USB"), IEEE1394 ("FireWire") and PCMCIA ("PC Card"), with the most common being USB. Such plug-and-play devices have a set of functionality that is accessible to a computer through a plug-and-play interface. The functionality of common plug-and-play devices can include, but is not limited to, storage, input registration, image capturing, audio input and output, etc. The sets of functionality available on common plug-and-play devices are pre-defined as device classes. Upon connection of a plug-and-play device to a computer, an electronic circuit is completed and the operating system of the computer is alerted to the connection. The operating system in response polls the plug-and-play device to determine what functionality is available on the plug-and-play device.

[0004] Many operating systems possess a number of pre-loaded drivers for generic plug-and-play device classes, such as USB mass storage, a two-button mouse, etc. If the operating system is in possession of a driver for the device class of the plug-and-play device connected to the computer, the computer loads the driver so that the functionality of the plug-and-play device can be accessed by the computer. If the operating system does not possess a

driver corresponding to the device class of the plug-and-play device, the operating system typically prompts the user to install the appropriate software to enable the computer to access the functionality of the plug-and-play device.

[0005] U.S. Patent Application Publication No. 2004/0205778 to Wong et al. discloses a peripheral device that includes driver storage. The peripheral device connects to a computer via a plug-and-play interface and cycles through the emulation of a number of plug-and-play device classes recognized by the operating system until one is found that permits auto-execution of a driver installation program.

[0006] U.S. Patent Application Publication No. 2005/0038934 to Gotze et al. discloses a USB-based peripheral printer that can be conditioned between two modes. In a first mode, the printer emulates USB mass storage to permit installation of drivers stored in memory of the printer on a computer to which the printer is connected. Once the drivers are installed on the computer, the printer is conditioned to a second mode, in which the printer behaves as a printer.

[0007] The need to install software/drivers can be undesirable in a number of situations, such as where a user does not possess administrative rights for the computer or simply does not desire to install yet more software on the computer, especially where connection of the plug-and-play device to the computer is infrequent or a one-time affair. Installing software may also prove to be a difficult or complicated task. For example, the user may need to download software from the Internet or may need to locate media upon which the software/drivers are located.

[0008] When the plug-and-play device is a touch panel, calibration to map the coordinate system of the input field of the touch panel to the display coordinate system of the computer to which the plug-and-play device is connected is typically required in order to ensure proper registration of touch input. Following the calibration process, the calibration settings are registered and stored by the computer. Unfortunately, because the computer stores the calibration settings, when the touch panel is plugged into a computer to which it

was not previously connected, the calibration process must be carried out again in order to establish the calibration settings on the new computer.

Summary

[0009] Accordingly, in one aspect there is provided a plug-and-play device comprising: a first plug-and-play interface for establishing a connection with a first computing device; a second plug-and-play interface for establishing a connection with a second computing device; storage storing code that is automatically executed by the second computing device when said plug-and-play device is connected thereto via said second plug-and-play interface, said code when executed initiating a screen display data exchange between said first and second computing devices; and at least one controller controlling said first plug-and-play interface, said second plug-and-play interface and said storage.

[0010] In one embodiment, the first plug-and-play interface comprises a wireless transceiver and establishes a wireless connection with the first computing device. The wireless connection may be a secure wireless connection. In this case, the storage further stores at least one of at least one key, at least one biometric and at least one code that is used to establish the secure wireless connection. The plug-and-play device further comprises a physical connection to the second computing device. The physical connection may be in the form of a universal serial bus cable or the plug-and-play device may be configured as a dongle.

[0011] In another embodiment, the plug-and-play device comprises a physical connection to the first computing device and a physical connection to the second computing device. Each physical connection may be in the form of a universal serial bus cable.

[0012] The screen display data exchange may comprise transmission of second computing device display screen data to the first computing device. The second computing device display screen data is compressed prior to transmission to the first computing device. Differences between previously

transmitted second computing device display screen data and current second computing device display screen data are transmitted. The code when executed may also permit file sharing between the first and second computing devices through the plug-and-play device.

[0013] The screen display data exchange alternatively may comprise transmission of first computing device display screen data to the second computing device. Similarly, the first computing device display screen data is compressed prior to transmission to the second computing device. Differences between previously transmitted first computing device display screen data and current first computing device display screen data are transmitted.

Brief Description of the Drawings

[0014] Embodiments will now be described with reference to the accompanying drawings in which:

[0015] Figure 1 shows a plug-and-play device comprising a touch panel, a controller and a cable, coupled to a computer;

[0016] Figure 2 is a schematic diagram of the cable of Figure 1;

[0017] Figure 3 is a flow chart of the general operation of the plug-and-play device of Figure 1;

[0018] Figure 4 shows another plug-and-play device allowing for screen sharing between a master computer and a remote computer;

[0019] Figure 5 is a schematic diagram of the plug-and-play device of Figure 4;

[0020] Figure 6 is a flow chart of the general operation of the plug-and-play device of Figure 4;

[0021] Figure 7 shows the plug-and-play device of Figure 4 with a touch panel and projector communicating with the master computer;

[0022] Figure 8 shows yet another plug-and-play device allowing for bi-direction screen sharing between a master computer and a remote computer;

[0023] Figure 9 is a schematic diagram of the plug-and-play device of Figure 8;

[0024] Figure 10 is a flow chart of the general operation of the plug-and-play device of Figure 8; and

[0025] Figure 11 shows the plug-and-play device of Figure 8 with a touch panel and projector communicating with the master computer.

Detailed Description of the Embodiments

[0026] Turning now to Figure 1, a system or network 20 of operatively connected components is illustrated. As can be seen, system 20 comprises a plug-and-play (PnP) device 24 for receiving and digitizing input. In this embodiment, the plug-and-play device 24 comprises an interactive input system that includes a touch panel 28, a controller 32 and a cable 36. Touch panel 28 may be of the type employing analog resistive or machine vision technology to register pointer input such as those disclosed in U.S. Patent Nos. 5,448,263; 6,141,000; 6,337,681; 6,747,636; 6,803,906; 7,232,986; 7,236,162; and 7,274,356 and in U.S. Patent Application Publication No. 2004/0179001 assigned to SMART Technologies ULC of Calgary, Alberta, Canada, assignee of the subject application, the contents of which are incorporated by reference. Alternatively, touch panel 28 may be of the type employing electromagnetic, capacitive, acoustic or other technologies to register pointer input. The controller 32 controls the operation of the touch panel 28 and is in communication with a computer 40 via the cable 36. The computer 40 is also connected to a projection unit 44 such as for example, a liquid crystal display (LCD) projector, via a video graphics array (VGA) cable 48 and controls the LCD projector 44. In response to image data received from the computer 40, the LCD projector 44 projects images onto a touch surface 46 of the touch panel 28. The LCD projector 44 may be positioned in front of or behind the touch panel 28.

[0027] The touch panel 28 provides a user with the ability to interact with the image projected onto the touch surface 46 of the touch panel 28 and inject input into an application program running on the computer 40 using an active pointer (e.g. a pointer that emits light, sound or other signal) or a passive

pointer (e.g. a finger, cylinder or other object). Although the touch panel 28 requires no extra software other than that provided by the operating system of the computer 40 in order to work as a mouse, the functionality of the touch panel 28 can be greatly enhanced by additional software not available on the operating system of the computer 40, as will be described below.

[0028] The controller 32 comprises a processor (not shown) that executes firmware stored in non-volatile storage. Generally, the firmware causes the controller 32 to operate in one of two operational modes. In an initial mode, the controller 32 operates two USB profiles, namely an absolute mouse human interface device ("HID") profile and a SMARTBoard HID profile. The absolute mouse HID profile enables the controller 32 to relay absolute position information for a pointer contacting the touch surface 46 of the touch panel 28 along with basic mouse functions. The SMARTBoard HID profile is a device class that enables enhanced functionality for the touch panel 28. The enhanced functionality comprises all of the functionality available in the absolute mouse HID device class as well as inking information, additional tool information (buttons, eraser, pen selection, etc.) and two-way communications with the controller 32. In a "native" operating mode, the controller 32 terminates the absolute mouse HID profile and only operates the SMARTBoard HID profile.

[0029] The components of the cable 36 are better illustrated in Figure 2. As can be seen, the cable 36 comprises a USB hub component 52 having a USB interface 56 for connection to a USB cable segment 60 that extends to the touch panel 28, and a USB interface 64 for connection to a USB cable segment 68 that extends to the computer 40. Both USB interfaces 56, 64 are in communication with a USB hub 72. Also in communication with the USB hub 72 is storage 76, namely flash memory, solid-state memory or other suitable computer memory. The storage 76 is configured to operate in accordance with a mass storage device and defines itself as compact disk read only memory (CD-ROM) according to the compact disk ("CD") HID profile. Storage 76 stores a set of software applications, including a user application (SMARTBoardTools.exe), a service application (SMARTBoardService.exe), a

launcher application (SBLauncher.exe), a calibration application (SMARTBoardCalibrate.exe) and an autorun feature (autorun.inf) for a Windows® operating system file that references the launcher application. Further, the storage 76 stores calibration settings associated with the configuration of the system 20. In particular, the calibration settings include data for mapping touch coordinates generated by the touch panel 28 in response to pointer contacts with the touch surface 46 to the display coordinate system of the computer 40.

[0030] The SMARTBoardTools.exe user application permits a richer set of features than basic mouse functionality. In this embodiment, the SMARTBoardTools.exe user application contains a number of presentation applications, integration into popular drawing and presentation applications, and an application to allow users to ink over documents in any application or over the desktop of the graphical user interface of the computer 40 that is projected and displayed on the touch surface 46 of the touch panel 28.

[0031] The method of operation of the plug-and-play device 24, when the plug-and-play device 24 is connected to a new computer 40 that has not been previously connected to the plug-and-play device, is shown in Figure 3. When a session is commenced and the plug-and-play device 24 is connected to the computer 40 (step 104), and the connection of the plug-and-play device 24 to the computer 40 is detected by the operating system of the computer 40, the computer 40 queries the plug-and-play device 24 to determine what functionality is provided by the plug-and-play device 24 (step 108). As the USB hub 72 is connected to storage 76 as well as the controller 32, the USB hub 72 queries both the storage 76 and the controller 32 to determine what profiles are available. In this embodiment, the storage 76 responds by indicating that it supports the CD HID profile. The controller 32, in the initial mode, responds by indicating that it supports the absolute mouse HID profile and the SMARTBoard HID profile.

[0032] The computer 40, upon receiving the available HID profiles, detects that functionality corresponding to the absolute mouse HID profile, the SMARTBoard HID profile and CD HID profile is available (step 112). The

computer 40 then loads the drivers for the devices recognized by the operating system for which the operating system has drivers, in this example the absolute mouse HID and CD HID (step 116). As each of these sets of functionality is detected by the computer 40, the computer 40 recognizes them as separate devices. The computer 40 does not load the SMARTBoard HID profile as the operating system of the computer 40 does not possess a corresponding driver. The computer 40 then assigns the plug-and-play device 24 which is recognized as a CD HID device, the next available drive letter (step 120).

[0033] Computer 40 is configured as the majority of computers are by default; that is, the computer 40 is configured to search CD HID devices for an autorun.inf file that will direct the computer 40 to automatically execute a specific application upon connection to a CD HID device. Accordingly, the computer 40 queries the plug-and-play device 24 that has been recognized as a CD HID device for an autorun.inf file and upon receiving the autorun.inf file, loads and executes the instructions contained therein (step 124). The autorun.inf file is used by the Microsoft Windows® family of operating systems to execute, under certain conditions, the instructions contained therein upon detection of certain types of storage devices. For example, under certain conditions, the autorun.inf file is executed when a CD-ROM disk, containing the autorun.inf file, is inserted into the bay of a CD-ROM drive. Execution typically begins without delay after the information in the autorun.inf file becomes available to or is recognized by the computer operating system.

[0034] The autorun.inf file contains a pointer to the executable launcher application, SBLauncher.exe. Upon parsing the autorun.inf file, the computer 40 uses the pointer to obtain the SBLauncher.exe launcher application from the storage 76, along with a set of corresponding dynamic link libraries ("DLLs"), and executes the SBLauncher.exe launcher application (step 128). The SBLauncher.exe launcher application, when executed, directs the computer 40 to copy the SMARTBoardTools.exe user application and the SMARTBoardService.exe service application, along with some associated DLLs, from the storage 76 to a temporary directory on the computer 40 and then execute the SMARTBoardTools.exe user and SMARTBoardService.exe

service applications (step 132). Upon execution of the SMARTBoardService.exe service application, the SBLauncher.exe launcher application terminates execution and the SMARTBoardService.exe service application directs the computer 40 to send a command to the controller 32 to switch the controller to the SMARTBoard HID mode (step 136).

[0035] Upon launch, the SMARTBoardTools.exe user application queries and obtains from storage 76 the calibration settings and other settings (step 140). The calibration settings enable the SMARTBoardTools.exe user application to map touch input generated by the touch panel 28 in response to pointer contacts with the touch surface 46 to the display coordinate system of the computer 40. The other settings include pen tray settings, COM port settings, contact filter settings and user settings for software applications. All of these settings are stored in a standard Windows® INI file. Further, several XML files are used to store layout and menu settings for various applets forming part of the SMARTBoardTools.exe user application. These applets provide a floating window of toolbuttons for accessing various functionality, an on-screen keyboard, etc. These layout and menu settings are stored in XML files in the storage 76 of the plug-and-play device 24, and are loaded and saved in a directory ("C:\Documents and Settings\<user name>\Application Data\SMART Technologies\SMARTBoard Software\") during execution of the SMARTBoardTools.exe user application, where <user name> is the login name of the current user.

[0036] Upon obtaining the calibration settings, the SMARTBoardTools.exe user application maps touch input generated by the touch panel 28 in response to pointer contacts with the touch surface 46 to the display coordinate system of the computer 40. In this manner, the user is able to interact effectively with the image projected onto the touch surface 46 of the touch panel 28 by the LCD projector 44. During execution, some settings are stored in the "HKEY_CURRENT_USER" key of the registry and, in particular, in the "Software\SMART Technologies\SMARTBoard Software\" subkey. These settings include application window positions, user settings for each application and a list of recently used files. The "HKEY_CURRENT_USER" key is used as

there are generally no restrictions on modifications made to this key. In addition, if there are no access restrictions on the "HKEY_LOCAL_MACHINE" key, spell checker settings are written there.

[0037] Upon termination of the session, the computer 40 can be unplugged from the plug-and-play device 24 and removed. When the plug-and-play device 24 is disconnected from the computer 40, the computer 40 notifies the SBLauncher.exe launcher application (step 144). The SBLauncher.exe launcher application in turn proceeds to terminate execution of and delete the SMARTBoardTools.exe user application, the SMARTBoardService.exe service application, the various related DLLs and settings from the temporary locations on the computer 40 and then does the same for itself (step 148). Before termination of the SBLauncher.exe launcher application, the SBLauncher.exe launcher application writes the user settings stored in the "C\Documents and Settings\<user name>\Application Data\SMART Technologies Inc.\SMARTBoard Software\" directory to XML files which it then stores in storage 76 of the plug-and-play device 24. The SBLauncher.exe launcher application then deletes the user settings from the directory and those stored in the registry. Once the settings and files are deleted from the computer 40, the SBLauncher.exe launcher application places an entry in the HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion \RunOnce registry key which tells Windows to delete the SBLauncher.exe launcher application when the user logs in next, and then terminates execution. If the user stops the SMARTBoard software by closing the SMARTBoardTools.exe user application, then the SBLauncher.exe launcher application executes the instance of itself found in the storage 76 of the plug-and-play device 24. Upon execution of the SBLauncher.exe launcher application instance from the plug-and-play device 24, the instance of the SBLauncher.exe launcher application stored on the computer 40 is deleted.

[0038] As noted above, in order for touch input generated by the touch panel 28 in response to pointer contacts with the touch surface 46 to be mapped to the display coordinate system of the computer 40, the system 20 is

calibrated. As the spatial relation between the image projected onto the touch surface 46 of the touch panel 28 by the LCD projector 44 and the touch panel 28 changes only when the LCD projector 44 and the touch panel 28 are moved relative to one another, calibration is generally performed after the touch panel 28 and LCD projector 44 are fixed at a location. In order to calibrate the system 20, the SMARTBoardCalibrate.exe calibration application is launched. Once the SMARTBoardCalibrate.exe calibration application is launched, the user is prompted to touch a number of points on the image that is projected onto the touch surface 46 of the touch panel 28. The resulting touch panel output is used to determine calibration settings which map the raw touch coordinates generated by the touch panel 28 in response to the pointer contacts on the touch surface 46 to the display coordinate system of the computer 40. The calibration settings are then recorded in the Windows® INI file so that they can be used by other computers to map raw touch coordinates generated by the touch panel 28 in response to the pointer contacts on the touch surface 46 to the display coordinate system of the computer 40. This process allows for calibration at system installation and subsequent use of the calibration settings by all users of the system 20.

[0039] Turning now to Figure 4, another system or network 220 of operatively connected components is shown. As can be seen, system 220 comprises a plug-and-play device 236, a master computer 238 and at least one remote computer 240. The plug-and-play device 236 is physically connected to the remote computer 240 and communicates with the master computer 238 over a wireless communications link. In this embodiment, plug-and-play device 236 captures and compresses screen display data generated at the remote computer 240 and allows screen sharing between the remote computer 240 and the master computer 238 by automatically launching software stored on the plug-and-play device 236.

[0040] In this embodiment, the master computer 238 comprises a wireless communication device 238a, for example a radio frequency (RF) communication device such as a Bluetooth™, WiFi or other RF adapter, or an infrared (IR) communication device. The master computer 238 also runs a

mobile device manager software application to accept and manage connections from the remote computer 240, provide screen sharing functionality, allow remote control from the remote computer 240, and optionally, provide the remote computer 240 with Internet access.

[0041] The components of the plug-and-play device 236 are better illustrated in Figure 5. As can be seen, the plug-and-play device 236 comprises an interface 256 in the form of a USB interface to wireless communication device adapter connected to a wireless transceiver 260. Similar to wireless communication device 238a, the wireless transceiver 260 is, for example, an RF communication device such as a Bluetooth™, WiFi or other RF adapter, or an infrared (IR) communication device. The wireless communication device 238a and wireless transceiver 260 are paired to enable a peer-to-peer wireless connection between the master computer 238 and the remote computer 240 to be established. The plug-and-play device 236 also comprises an interface 264 in the form of a USB interface to computing device adapter. The interface 264 comprises a port (not shown) to receive a cable segment 268 thereby to enable the physical connection to the remote computer 240 to be made. Both interfaces 256 and 264 are also in communication with a controller 272 in the form of a USB hub.

[0042] Controller 272 also communicates with storage 276 that is configured to store and automatically launch software applications thereon via an autorun feature that the operating system of the remote computer 240 supports. Similar to the previous embodiment, storage 276 is flash memory, solid-state memory or other non-volatile computer memory. The storage 276 is configured to operate in accordance with a mass storage device and defines itself as compact disk read only memory (CD-ROM). Storage 276 stores an executable launcher application, LinQLauncher.exe and may also store one or more access codes, biometrics or keys to automatically form a secure encrypted and authenticated wireless network connection with the master computer 238.

[0043] The operation of the system 220, when a peer-to-peer wireless connection between the master computer 238 and the remote computer 240 is

established, will now be described with particular reference to Figure 6. When the plug-and-play device 236 is physically connected to the remote computer 240 via the cable segment 268 (step 304) and the connection of the plug-and-play device 236 is detected by the operating system of the remote computer 240, the remote computer 240 queries the plug-and-play device 236 to determine what functionality is provided by the plug-and-play device 236 (step 308). In particular, the controller 272 queries the wireless transceiver 260 and the storage 276 to determine what profiles or connections are available. In this embodiment, the storage 276 responds by indicating that it supports the mass storage device and the wireless transceiver 260 responds by indicating its device type, interface profile and other parameters such as for example wireless network protocol, wireless network speed, encryption keys, biometrics, etc. The plug-and-play device 236 then returns the determined functionality information to the remote computer 240.

[0044] The remote computer 240, upon receiving the functionality information from the plug-and-play device 236, determines that mass storage device and wireless communications functionality for the plug-and-play device 236 is available (step 312). The remote computer 240 then loads at least the driver for the mass storage device recognized by its operating system and initializes the plug-and-play device 236 (step 316). The remote computer 240 then assigns the plug-and-play device 236 which is recognized as a mass storage device the next available drive letter (step 320).

[0045] The remote computer 240, similar to the previous embodiment, is configured as the majority of computers are by default; that is, the remote computer 240 is configured to search mass storage devices for a file name that will direct the remote computer 240 to automatically execute instructions contained therein upon connection to a mass storage device. In this embodiment, the remote computer 240 queries the plug-and-play device 236 for the autorun.inf file and upon receiving the autorun.inf file, loads and executes the instructions contained therein (step 324).

[0046] The autorun.inf file contains a pointer to the executable launcher application, LinQLauncher.exe stored in the storage 276. Upon parsing the

autorun.inf file, the remote computer 240 uses the pointer to load a LinQ software application from the storage 276 (step 328). The LinQLauncher.exe application directs the remote computer 240 to copy all necessary files of the LinQ software application from storage 276 to a temporary directory on the remote computer 240 and then start the LinQ software application (step 332). The LinQ software application is used for setting up and managing the peer-to-peer wireless connection on the remote computer 240, screen sharing and communications between the remote computer 240 and the master computer 238.

[0047] Upon launch, the LinQ software application loads the necessary driver for the wireless transceiver 260, configures the wireless transceiver 260, finds the master computer 238 and establishes the peer-to-peer wireless connection between the LinQ software application and the mobile device manager application running on the master computer 238 (step 337). The LinQ software application, which manages the peer-to-peer wireless connection on the remote computer 240, then reads the access codes, biometrics or keys from the storage 276. The access codes, biometrics or keys are in turn exchanged with the master computer 238 and used as a parameter to create a secure authenticated and encrypted peer-to-peer wireless connection. The mobile device manager application running on the master computer 238 manages the peer-to-peer wireless connection on the master computer 238. In cases where multiple systems 220 may be operating, an ad-hoc network identifier may be necessary to allow the plug-and-play device 236 to determine the appropriate network to which to connect. In such cases, the ad-hoc network identifier is configured to be read from storage 276 in similar manner to the access codes, biometrics or keys.

[0048] Once the remote computer 240 is connected to the master computer 238 over the peer-to-peer wireless connection, the remote computer 240 may send a request to share the screen display data of the remote computer 240 to the master computer 238. If a request to share the screen display data is sent to the master computer 238 and accepted, the screen display data displayed on the remote computer 240 is compressed using a

suitable compression algorithm such as for example MJPEG compression. The compressed screen display data is then compared with previous screen display data sent to the master computer 238 in the same peer-to-peer wireless connection session to detect differences in the screen display data. The detected differences are then sent to the master computer 238 via the peer-to-peer wireless connection and displayed on the screen of the master computer 238. The master computer 238 passes input events, such as keyboard, mouse, trackball and/or pen-touch events, that it receives to the remote computer 240 thereby to remotely control the remote computer 240 (step 339). As will be appreciated, by compressing the screen display data of the remote computer 240, the time required to transmit the screen display data to the master computer 238 is reduced. Also, compressing the screen display data and only transmitting differences between screen display data, reduces the amount of screen display data that needs to be transmitted to the master computer 238 during screen sharing. This of course reduces the required transmission bandwidth required for screen sharing and thus, decreases latency.

[0049] When the peer-to-peer wireless connection is established between the master computer 238 and the remote computer 240, those skilled in the art will appreciate that, besides sharing the screen display data of the remote computer 240, file sharing between the master computer 238 and the remote computer 240 can also be carried out. To share files stored on the master computer 238, one or more shared directories are set up on the master computer 238 with appropriate access right settings for the user of the remote computer 240. The user of the remote computer 240 can then open the shared directories and access the files therein. Alternatively, shared directories can also be set up on the remote computer 240 with appropriate access right settings for the user of the master computer 238 and/or for users of other remote computers 240. The user of the master computer 238 or other remote computer 240 can similarly open the shared directories and access the files therein. Further, the LinQLauncher.exe application can be configured to send

files directly to and from the master and other remote computers 238 and 240 respectively.

[0050] With the peer-to-peer wireless connection established between the master computer 238 and the remote computer 240, those skilled in the art will appreciate that the user of the remote computer 240 may also be allowed to access the Internet through the master computer 238. To enable Internet access, the master computer 238 must be connected to the Internet via a wired or wireless local area network, dial-up network or other suitable type of network. With Internet access granted by the master computer 238, Internet access requests initiated by the remote computer 240 are transmitted to the master computer 238 over the peer-to-peer wireless connection. The master computer 238 in response to received Internet access requests sends the received Internet access requests either directly to the Internet or indirectly to the Internet via a proxy server. Responses returned from the Internet that are received directly by the master computer 238 or indirectly by the master computer 238 from the proxy server are returned to the remote computer 240 over the peer-to-peer wireless connection.

[0051] Upon termination of the session between the remote computer 240 and the master computer 238, the plug-and-play device 236 can be unplugged from the remote computer 240 and removed. When the plug-and-play device 236 is disconnected from the remote computer 240, the remote computer 240 notifies the LinQLauncher.exe application (step 344). The LinQLauncher.exe application in turn stops the screen sharing, disconnects the peer-to-peer wireless connection with the master computer 238, terminates the execution of the LinQ software application, deletes the files in the temporary directory on the remote computer 240 that were copied from the storage 276, and then terminates the execution of itself (step 348). Those skilled in the art will appreciate that other clean up tasks, such as removing items in the system registry that were written by the LinQ software application when it was launched may also be performed upon the disconnection of the plug-and-play device 236 from the remote computer 240.

[0052] Although Figure 4 shows the master computer 238 communicating with a single remote computer 240 over a peer-to-peer wireless connection, those of skill in the art will appreciate that this is simply for ease of illustration and that the master computer 238 may communicate with a plurality of remote computers 240 over peer-to-peer wireless connections via respective plug-and-play interfaces 236. In situations where the master computer 238 is communicating with multiple remote computers 240 over peer-to-peer wireless connections, compressed screen display data transmitted by one remote computer 240 to the master computer 238 may also be shared by the master computer 238 with one or more other remote computers 240. In addition, if a remote computer 240 establishes a connection to the master computer 238 over a peer-to-peer wireless connection and a peer-to-peer wireless connection between the master computer 238 and another remote computer 240 already exists over which screen display data is being shared, the master computer 238 can automatically share the screen display data with the newly connected remote computer 240. Control commands initiated on the newly connected remote computer 240 that are sent to the master computer 238 may be sent to the remote computer that is sharing its screen display data to remotely manipulate its operation provided that remote computer has enabled remote control.

[0053] Although the remote computer 240 is described as loading the wireless transceiver driver at step 328 when the LinQLauncher.exe application is loaded from storage 276, if desired, the driver for the wireless transceiver 260 may be loaded at step 318 when the driver for the plug-and-play device 236 which is recognized as a mass storage device is being loaded.

[0054] Similar to the embodiment of Figure 3, if desired, the master computer 238 can be connected to an interactive input system 228 of one of the types described previously as shown in Figure 7. In this case, shared screen display data received by the master computer 238 can be presented on the touch surface 246 of the interactive input system 228 via a projection device 244 that is connected to the master computer 238 by a physical cable 248

allowing a user to interact with the shared screen display data through pointer contacts with the touch surface 246.

[0055] Those of skill in the art will appreciate that the physical form of the plug-and-play device 236 may be changed. For example, although the plug-and-play device 236 is shown as being connected to the remote computer 240 via cable segment 268, the plug-and-play device 236 alternatively may take the form of a dongle similar to a USB flash drive or the like that plugs directly into the remote computer 240.

[0056] In the above embodiment, rather than establishing a peer-to-peer wireless connection, alternatively, the LinQ software application may be configured to direct the remote computer 240 to use its wireless network card to establish a wireless connection between the remote computer 240 and the master computer 238 over existing network infrastructure.

[0057] Figure 8 illustrates yet another embodiment of a system or network 420 of operatively connected components. Similar to the embodiment of Figure 4, system 420 comprises a plug-and-play device 436, a master computer 438 and at least one remote computer 440. The plug-and-play device 436 is physically connected to both the remote computer 440 and the master computer 438. The plug-and-play device 436 enables bi-directional transmission of screen display and remote control data in real-time between the master computer 438 and remote computer 440 by automatically launching software stored on the plug-and-play device 436.

[0058] The master computer 438, similar to the previous embodiment, runs a mobile device manager application to accept and manage connections from the remote computer 440, provide bi-directional screen sharing functionality, allow remote control from the remote computer 440, and optionally, provide the remote computer 440 with Internet access.

[0059] The components of the plug-and-play device 436 are better illustrated in Figure 9. As can be seen, the plug-and-play device 436 comprises an interface 456 in the form of a USB interface to computing device adapter and an interface 464 also in the form of a USB interface to computing device

adapter. The interface 456 comprises a port (not shown) to receive a cable segment 460 that extends and connects to the master computer 438. The interface 464 also comprises a port (not shown) to receive a cable segment 468 that extends and connects to the remote computer 440. The plug-and-play device 436 also comprises a controller 472 in the form of a USB host-to-host controller, and a USB hub 478. The USB host-to-host controller 472 allows bi-direction screen data sharing in real-time between the remote computer 440 and the master computer 438. The interface 456 is in communication with the USB hub 478 and the interface 464 is in communication with the USB host-to-host controller 472. The USB hub 478 communicates with the USB host-to-host controller 472.

[0060] Also in communication with the USB hub 478 is storage 476, for example flash memory, solid-state memory or other suitable computer memory. The storage 476 is configured to store and automatically launch software applications thereon via an autorun feature that the operating system of the remote computer 440 supports. The storage 476 is configured to operate in accordance with a mass storage device that defines itself as a CD ROM. Similar to the previous embodiment, storage 476 stores the executable LinQLauncher.exe application.

[0061] The operation of the system 440 when a connection between the master computer 438 and the remote computer 440 via the plug-and-play device 436 is established will now be described with particular reference to Figure 10. When the plug-and-play device 436 is physically connected to the remote computer 440 via the cable segment 468 (step 501) and the connection of the plug-and-play device 436 is detected by the operating system of the remote computer 440, the remote computer 440 queries the plug-and-play device 436 to determine what functionality is provided by the plug-and-play device 436 (step 502). In response to this query, the plug-and-play device 436 determines that it supports the mass storage device and USB host-to-host controller and returns this functionality information to the remote computer 440.

[0062] The remote computer 440, upon receiving the functionality information from the plug-and-play device 436, determines that mass storage

device and USB host-to-host controller functionality for the plug-and-play device 436 is available (step 503). The remote computer 440 then loads at least the driver for the mass storage device recognized by its operating system and initializes the plug-and-play device 436 (step 504). The remote computer 440 then assigns the plug-and-play device 436 which is recognized as a mass storage device, the next available drive letter (step 505).

[0063] The remote computer 440, similar to the previous embodiments, is configured as the majority of computers are by default; that is, the remote computer 440 is configured to search the mass storage devices for a file name that will direct the remote computer 440 to automatically execute instructions contained therein upon connection to the mass storage device. In this embodiment, the remote computer 440 queries the plug-and-play device 436 for the autorun.inf file and upon receiving the autorun.inf file, loads and executes the instructions contained therein (step 506).

[0064] The autorun.inf file contains a pointer to the executable launcher application, LinQLauncher.exe stored in storage 476. Upon parsing the autorun.inf file, the remote computer 440 uses the pointer to load a LinQ software application from the storage 476 (step 507). The LinQLauncher.exe application directs the remote computer 440 to copy all necessary files of the LinQ software application from storage 476 to a temporary directory on the remote computer 440 and then start the LinQ software application (step 508). The LinQ software application is used for setting up and managing the connection on the remote computer 440, screen sharing and other communications between the remote computer 440 and the master computer 438.

[0065] In this embodiment, the mass storage device functionality of the plug-and-play device 436 is only exposed to the remote computer 440. The mobile device manager software application running on the master computer 438 detects the insertion of cable segment 460 and communicates with it through a pre-installed driver on the master computer 438.

[0066] Upon launch, the LinQ software application on the remote computer 440 finds the master computer 438 and establishes a USB host-to-

host data channel between the remote computer 440 and master computer 438 and automatically connects to the mobile device manager software application running on the master computer 438 (step 509). The mobile device manager software application running on the master computer 438 manages the connection on the master computer 438.

[0067] Once the remote computer 440 is connected to the master computer 438, the remote computer 440 may send a request to share the screen display data of the remote computer 440 with the master computer 438. If a request to share the screen display data is sent to the master computer 438 and accepted, the screen display data of the remote computer 440 is compressed, sent to the master computer 438 and displayed on the screen of the master computer 438. The master computer 438 passes input events, such as keyboard, mouse, trackball and/or pen-touch events, that it receives to the remote computer 440 thereby to remotely control the remote computer 440 (step 510). As mentioned previously, the advantage of compressing the screen display data of the remote computer 440 before sending it to the master computer 438 is that the amount of data required to be transmitted to the master computer 438 is reduced. This of course reduces the transmission bandwidth and latency required for screen sharing.

[0068] If at the time the remote computer 440 is connected to the master computer 438 and another remote computer 440 in the network is sharing its screen display data with the master computer 438, the remote computer 440 automatically receives the compressed screen display data from the master computer 438, decompresses it and displays it on its display screen. Also, control commands initiated on the other remote computer 440 may be sent to the master computer 438 and then to the remote computer 440 to enable operation of the remote computer 440 to be remotely controlled provided the remote computer has enabled remote control.

[0069] If desired, the remote computer 440 can be configured to display the master computer desktop image on its display screen and pass input events, such as keyboard, mouse, trackball and/or pen-touch events that it

receives to the master computer 438 to remotely control the master computer 438 provided the master computer has enabled remote control.

[0070] When the connection is established between the master computer 438 and the remote computer 440, those skilled in the art will appreciate that, besides sharing the screen display data of the remote computer 440, file sharing between the master computer 438 and the remote computer 440 can also be carried out. To share files stored on the master computer 438, one or more shared directories are set up on the master computer 438 with appropriate user access right settings for the user of the remote computer 440. The user of the remote computer 440 can then open the shared directories and access the files therein. Alternatively, shared directories can also be set up on the remote computer 440 with appropriate access right settings for the user of the master computer 438 and/or for users of other remote computers 440.

[0071] With the connection established between the master computer 438 and the remote computer 440, those skilled in the art will appreciate that the user of the remote computer 440 may also be allowed to access Internet through the master computer 438. To enable the Internet access, the master computer 438 must be connected to the Internet via a wired or wireless local area network, dial-up network or any other type of network. With the allowance of Internet access granted by the user of the master computer 438, Internet access requests initiated by the remote computer 440 are transferred to the master computer 438. Responses returned from the Internet that are received directly by the master computer 438 or indirectly by the master computer 438 from the proxy server are returned to the remote computer 440.

[0072] Upon termination of the session between the remote computer 440 and the master computer 438, the plug-and-play device 436 can be unplugged from the remote computer 440 and removed. When the plug-and-play device 436 is disconnected from the remote computer 440, the remote computer 440 notifies the LinQLauncher.exe application (step 511). The LinQLauncher.exe application in turn stops the screen sharing, disconnects the connection with the master computer 438, terminates the execution of the LinQ

software application, deletes the files in the temporary directory on the remote computer 440 that were copied from the storage 476, and then terminates the execution of itself (step 512). Those skilled in the art will appreciate that other clean up tasks, for example removing items in the system registry that were written by the LinQ software application when it was launched, may be performed upon the disconnection of the plug-and-play device 436 from the remote computer 440.

[0073] In an alternative embodiment, the mass storage device functionality of the plug-and-play device 36 is exposed to both the master and remote computers 438 and 440 so that the LinQ software application is automatically launched on both the master and remote computers 438 and 440 respectively. Because the mobile device manager software application is running on the master computer 438, the LinQ software application launched on the master computer 438 closes itself so the mobile device manager software can communicate with the USB host-to-host controller 472. Upon launch of the LinQ software application on the remote computer 440, the LinQ software application finds the master computer 438 and establishes the USB host-to-host data channel and automatically connects to the mobile device manager software application running on the master computer 438 (step 309). The mobile device manager software application running on the master computer 438 manages the connection on the master computer 438.

[0074] Similar to the previous embodiments, if desired, the master computer 438 can be connected to an interactive input system 228 of one of the types described previously as shown in Figure 11. In this case, shared screen display data received by the master computer 438 can be presented on the touch surface 246 of the interactive input system 228 via a projection device 244 that is connected to the master computer 438 by a physical cable 248 allowing a user to interact with the shared screen display data through pointer contacts with the touch surface 246.

[0075] In the embodiments described above, the computers are described as using the autorun.inf file to perform auto-execution. Those of skill

in the art will appreciate that other auto-execution methods such as for example Autoplay may be employed.

[0076] In the embodiments where the plug-and-play devices use cable segments to connect to the remote computers and master computers, if desired, the cable segments may be retractably accommodated by the plug-and-play devices.

[0077] In the embodiments of Figures 4 to 11, rather than carrying out Internet connections over the connections between the remote computers and master computers, if desired, the remote computers may be directed to use their wireless network cards to establish an Internet connection over existing network infrastructure.

[0078] While the systems have been described with specificity to USB, other types of plug-and-play architectures can be utilized. For example, those of skill in the art will readily understand how to adapt the systems described herein for use with FireWire and PCMCIA architectures and the like.

[0079] While embodiments have been described with reference to a touch panel, the system can be any one of a number of other devices, such as cameras, sound systems, mice, keyboards, printers, displays, etc. For example, where the plug-and-play device is a sound system, the settings can include the output volumes for each speaker that has been previously calibrated to desired levels for the set configuration.

[0080] While an LCD projector has been described as projecting image data on the touch panel, those of skill in the art will appreciate that other devices such as with an LCD displays, plasma displays, cathode ray tubes, or other display devices known to those of skill in the art may be used to generate images that are presented on the touch panel.

[0081] Although embodiments have been described with reference to the accompanying drawings, those of skill in the art will appreciate that modifications and variations may be made without departing from the spirit and scope thereof as defined by the appended claims.

What is claimed is:

1. A plug-and-play device comprising:

a first plug-and-play interface for establishing a connection with a first computing device;

a second plug-and-play interface for establishing a connection with a second computing device;

storage storing code that is automatically executed by the second computing device when said plug-and-play device is connected to said second computing device via said second plug-and-play interface, said code when executed by said second computing device initiating a screen display data exchange between said first and second computing devices through said plug-and-play device; and

at least one controller controlling said first plug-and-play interface, said second plug-and-play interface and said storage.

2. The plug-and-play device of claim 1 wherein the first plug-and-play interface comprises a wireless transceiver and wherein the first plug-and-play interface establishes a wireless connection with said first computing device.

3. The plug-and-play device of claim 2 wherein said wireless connection is a secure wireless connection.

4. The plug-and-play devive of claim 3 wherein said storage further stores at least one of at least one key, at least one biometric and at least one code used to establish said secure wireless connection.

5. The plug-and-play device of claim 2 wherein the second plug-and-play interface receives a physical connection extending to said second computing device.

6. The plug-and-play device of claim 5 wherein said physical connection is a universal serial bus (USB) cable.

7. The plug-and-play device of claim 2 further comprising a physical connection to said second computing device.

8. The plug-and-play device of claim 7 wherein said physical connection is a USB cable.

9. The plug-and-play device of claim 7 wherein said wireless connection is a secure wireless connection.

10. The plug-and-play device of claim 2 wherein the plug-and-play device is configured as a dongle to plug into a port of said second computing device.

11. The plug-and-play device of claim 10 wherein said wireless connection is a secure wireless connection.

12. The plug-and-play device of claim 2 wherein the storage is non-volatile memory.

13. The plug-and-play device of claim 2 wherein the at least one controller is a USB hub.

14. The plug-and-play device of claim 13 further comprising a physical connection to said second computing device.

15. The plug-and-play device of claim 14 wherein said wireless connection is a secure wireless connection.

16. The plug-and-play device of claim 13 wherein the plug-and-play device is configured as a dongle to plug into a port of said second computing device.

17. The plug-and-play device of claim 16 wherein said wireless connection is a secure wireless connection.

18. The plug-and-play device of claim 1 wherein said screen display data exchange comprises transmission of second computing device display screen data to said first computing device.

19. The plug-and-play device of claim 18 wherein the second computing device display screen data is compressed prior to transmission to said first computing device.

20. The plug-and-play device of claim 19 wherein differences between previously transmitted second computing device display screen data and current second computing device display screen data are transmitted.

21. The plug-and-play device of claim 1 wherein said screen display data exchange comprises transmission of first computing device display screen data to said second computing device.

22. The plug-and-play device of claim 21 wherein the first computing device display screen data is compressed prior to transmission to said second computing device.

23. The plug-and-play device of claim 24 wherein differences between previously transmitted first computing device display screen data and current first computing device display screen data are transmitted.

24. The plug-and-play device of claim 18 wherein the code when executed further permits file sharing between said first and second computing devices through said plug-and-play device.

25. The plug-and-play device of claim 21 wherein the code when executed further permits file sharing between said first and second computing devices through said plug-and-play device.

26. The plug-and-play device of claim 2 wherein said screen display data exchange comprises transmission of second computing device display screen data to said first computing device.

27. The plug-and-play device of claim 26 wherein the second computing device display screen data is compressed prior to transmission to said first computing device.

28. The plug-and-play device of claim 27 wherein differences between previously transmitted second computing device display screen data and current second computing device display screen data are transmitted.

29. The plug-and-play device of claim 2 wherein said screen display data exchange comprises transmission of first computing device display screen data to said second computing device.

30. The plug-and-play device of claim 29 wherein the first computing device display screen data is compressed prior to transmission to said second computing device.

31. The plug-and-play device of claim 30 wherein differences between previously transmitted first computing device display screen data and current first computing device display screen data are transmitted.

32. The plug-and-play device of claim 7 wherein said screen display data exchange comprises transmission of second computing device display screen data to said first computing device.

33. The plug-and-play device of claim 32 wherein compresses the second computing device display screen data is compressed prior to transmission to said first computing device.

34. The plug-and-play device of claim 33 wherein differences between previously transmitted second computing device display screen data and current second computing device display screen data are transmitted.

35. The plug-and-play device of claim 7 wherein said screen display data exchange comprises transmission of first computing device display screen data to said second computing device.

36. The plug-and-play device of claim 35 wherein the first computing device display screen data is compressed prior to transmission to said second computing device.

37. The plug-and-play device of claim 38 wherein differences between previously transmitted first computing device display screen data and current first computing device display screen data are transmitted.

38. The plug-and-play device of claim 1 wherein the first plug-and-play interface receives a physical connection extending to said first computing device and wherein the second plug-and-play interface receives a physical connection extending to the second computing device.

39. The plug-and-play device of claim 38 wherein each physical connection is a USB cable.

40. The plug-and-play device of claim 1 further comprising a physical connection to said first computing device and a physical connection to said second computing device.

41. The plug-and-play device of claim 40 wherein each physical connection is a USB cable.

42. The plug-and-play device of claim 40 wherein said screen display data exchange comprises transmission of second computing device display screen data to said first computing device.

43. The plug-and-play device of claim 42 wherein the second computing device display screen data is compressed prior to transmission to said first computing device.

44. The plug-and-play device of claim 43 wherein differences between previously transmitted second computing device display screen data and current second computing device display screen data are transmitted.

45. The plug-and-play device of claim 40 wherein said screen display data exchange comprises transmission of first computing device display screen data to said second computing device.

46. The plug-and-play device of claim 45 wherein the first computing device display screen data is compressed prior to transmission to said second computing device.

47. The plug-and-play device of claim 46 wherein differences between previously transmitted first computing device display screen data and current first computing device display screen data are transmitted.

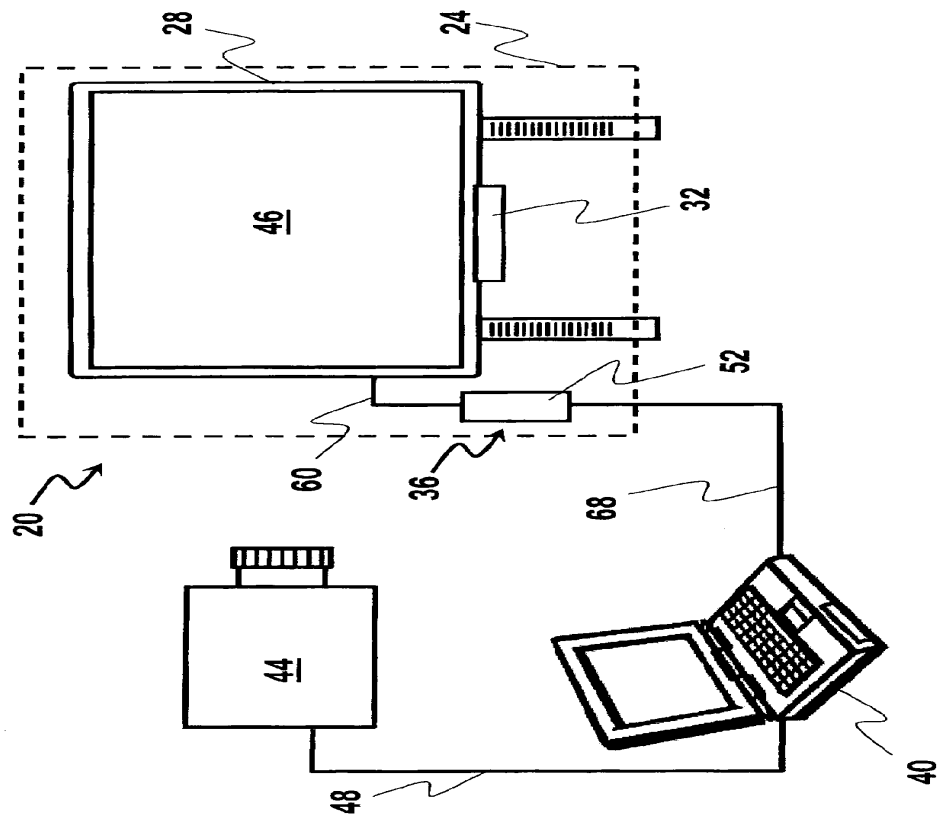

FIG. 1

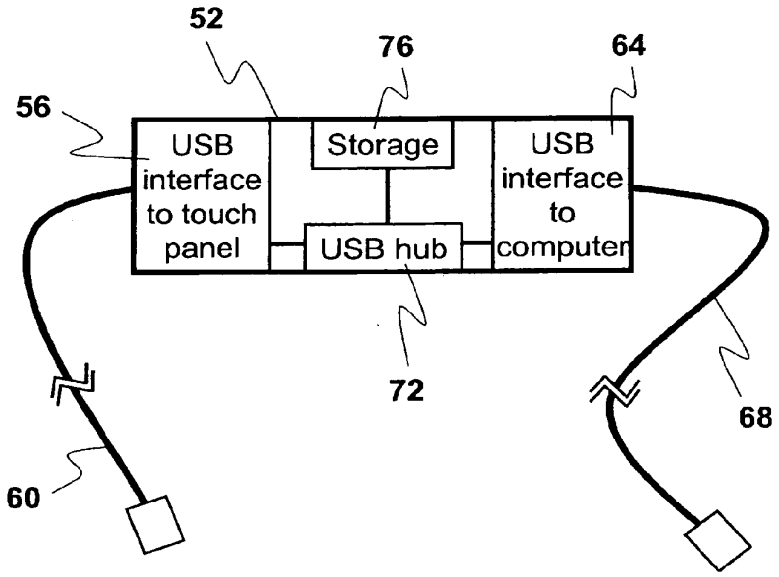
52
76
64
56
USB interface to touch panel
Storage
USB hub
USB interface to computer
72
68
60

FIG. 2

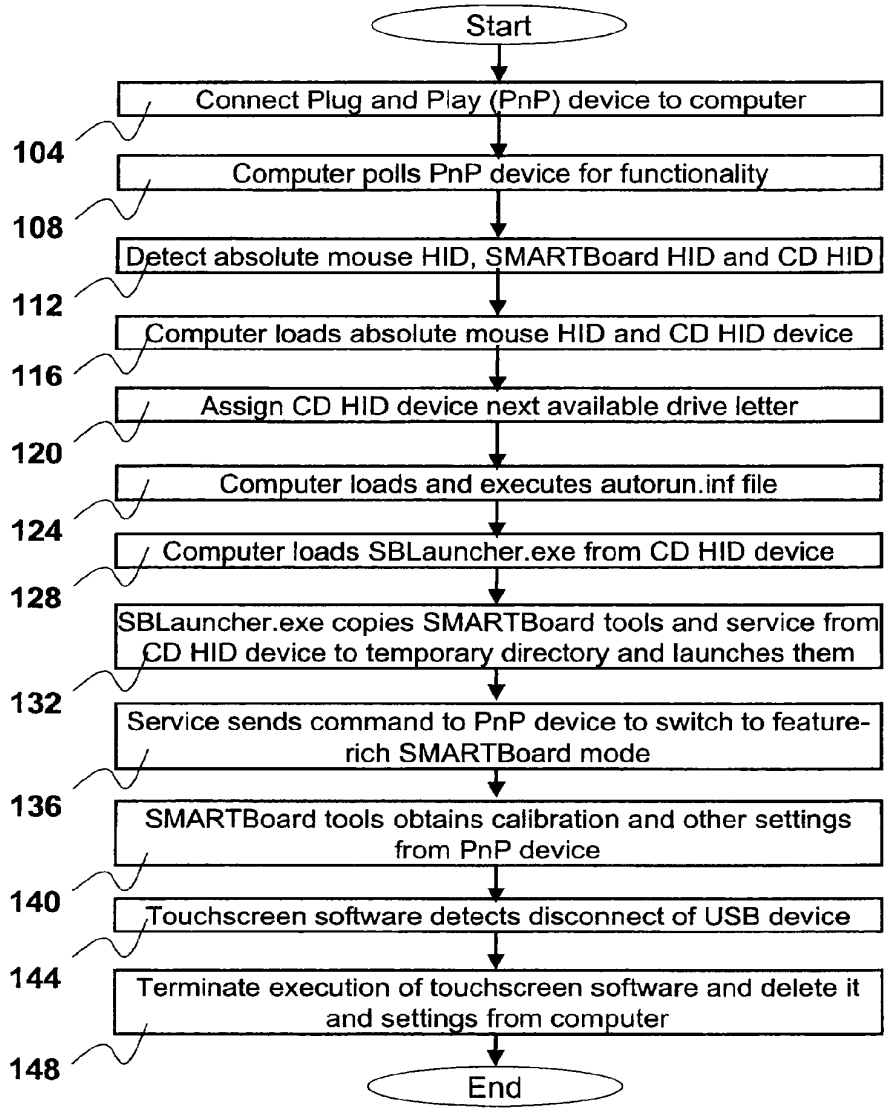
Start
Connect Plug and Play (PnP) device to computer
104
Computer polls PnP device for functionality
108
Detect absolute mouse HID, SMARTBoard HID and CD HID
112
Computer loads absolute mouse HID and CD HID device
116
Assign CD HID device next available drive letter
120
Computer loads and executes autorun.inf file
124
Computer loads SBLauncher.exe from CD HID device
128
SBLauncher.exe copies SMARTBoard tools and service from CD HID device to temporary directory and launches them
132
Service sends command to PnP device to switch to feature-rich SMARTBoard mode
136
SMARTBoard tools obtains calibration and other settings from PnP device
140
Touchscreen software detects disconnect of USB device
144
Terminate execution of touchscreen software and delete it and settings from computer
148
End

FIG. 3

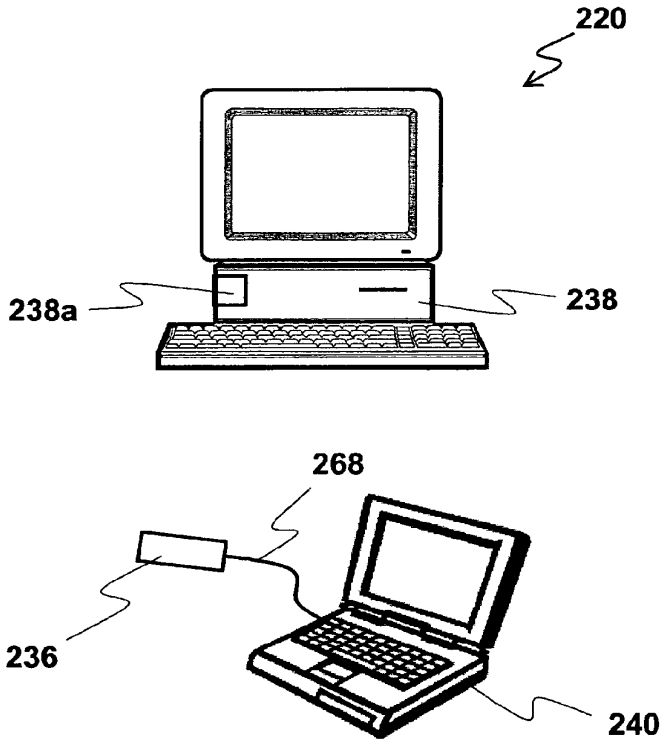

FIG. 4

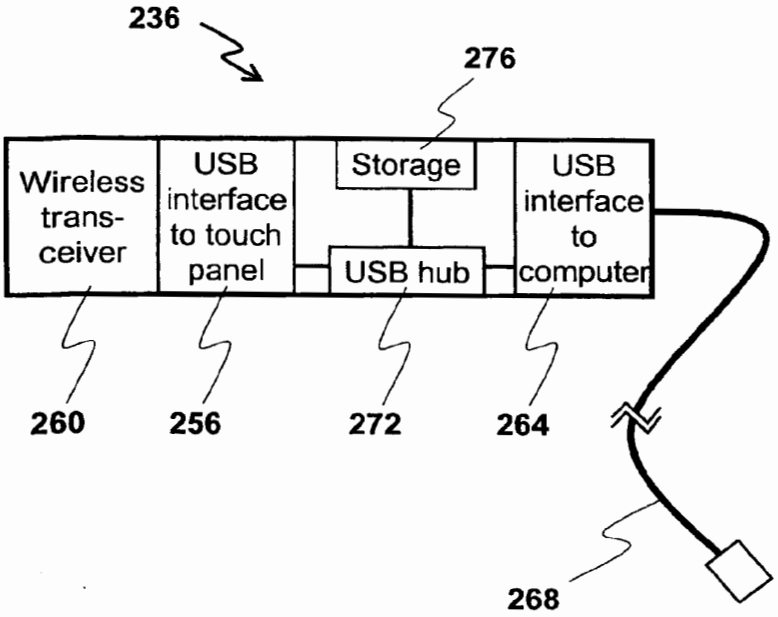
236
276
Wireless trans-ceiver
USB interface to touch panel
Storage
USB hub
USB interface to computer
260
256
272
264
268

FIG. 5

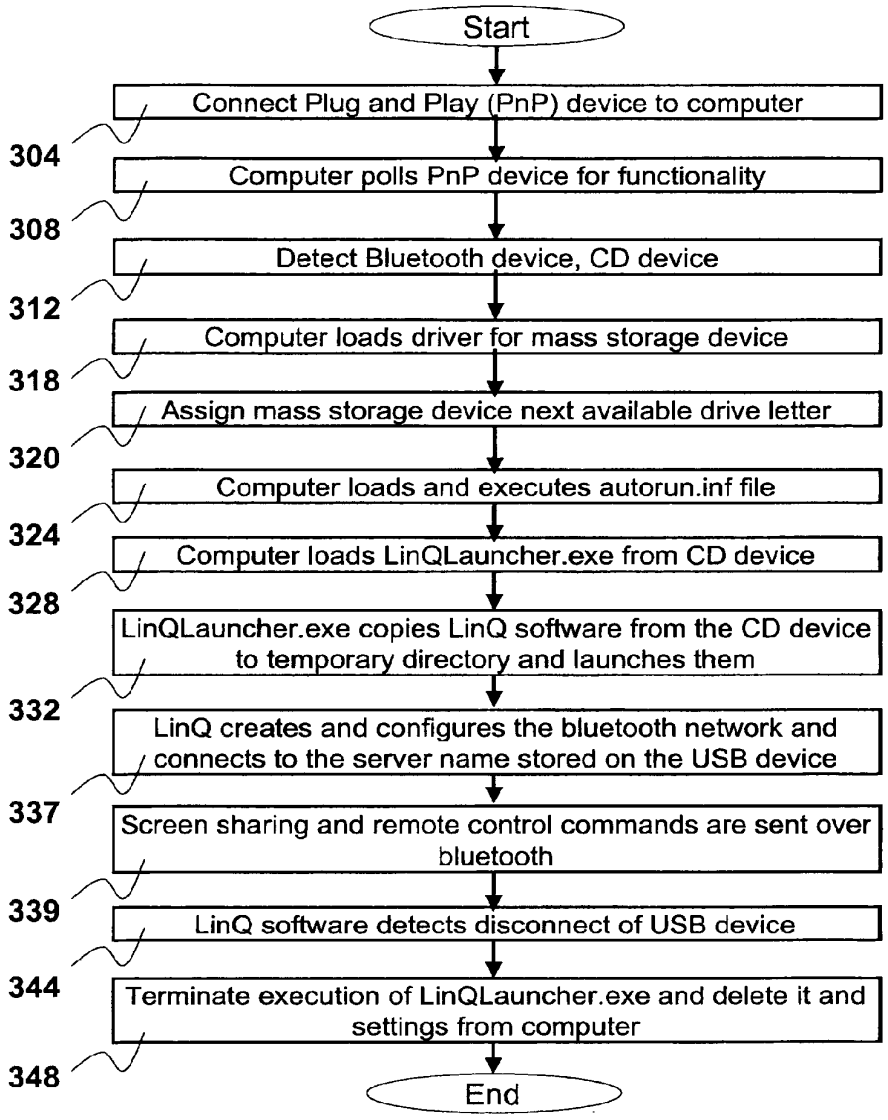
Start
Connect Plug and Play (PnP) device to computer
304
Computer polls PnP device for functionality
308
Detect Bluetooth device, CD device
312
Computer loads driver for mass storage device
318
Assign mass storage device next available drive letter
320
Computer loads and executes autorun.inf file
324
Computer loads LinQLauncher.exe from CD device
328
LinQLauncher.exe copies LinQ software from the CD device to temporary directory and launches them
332
LinQ creates and configures the bluetooth network and connects to the server name stored on the USB device
337
Screen sharing and remote control commands are sent over bluetooth
339
LinQ software detects disconnect of USB device
344
Terminate execution of LinQLauncher.exe and delete it and settings from computer
348
End

FIG. 6

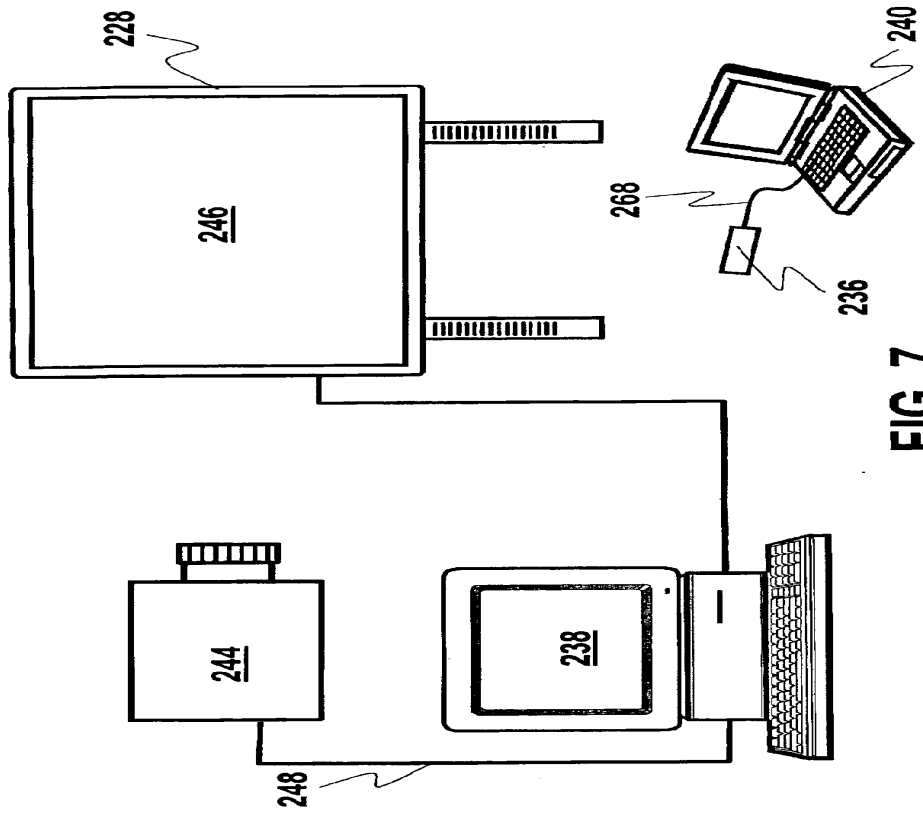

FIG. 7

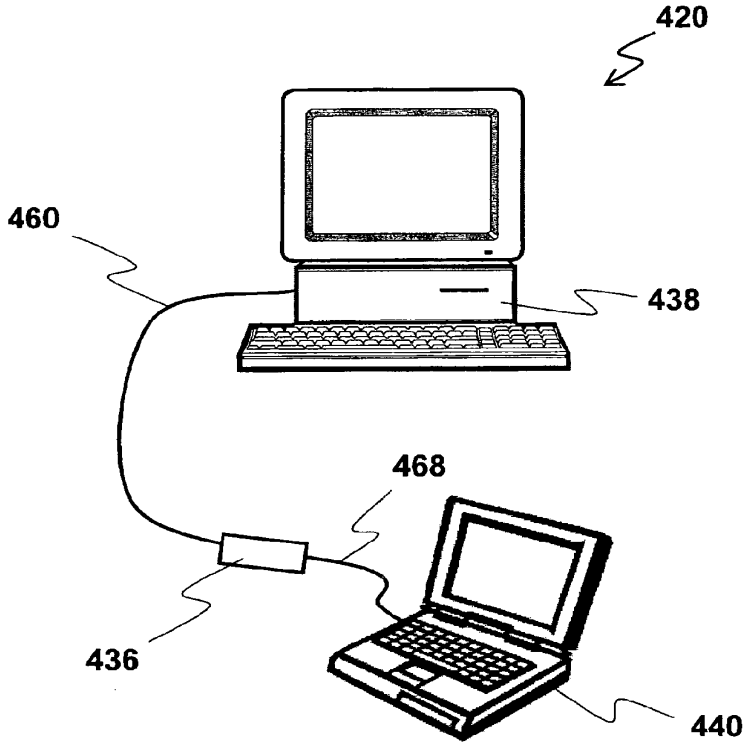

FIG. 8

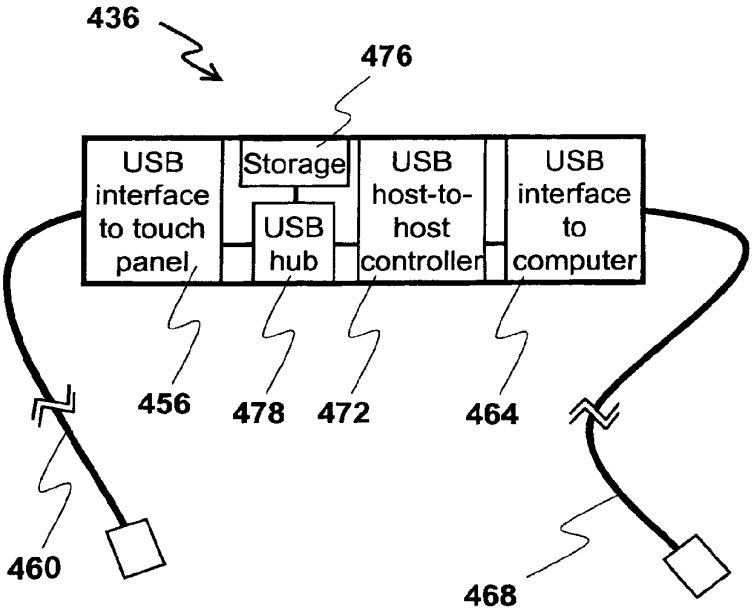
436
476
USB interface to touch panel
Storage
USB hub
USB host-to-host controller
USB interface to computer
456
478
472
464
460
468

FIG. 9

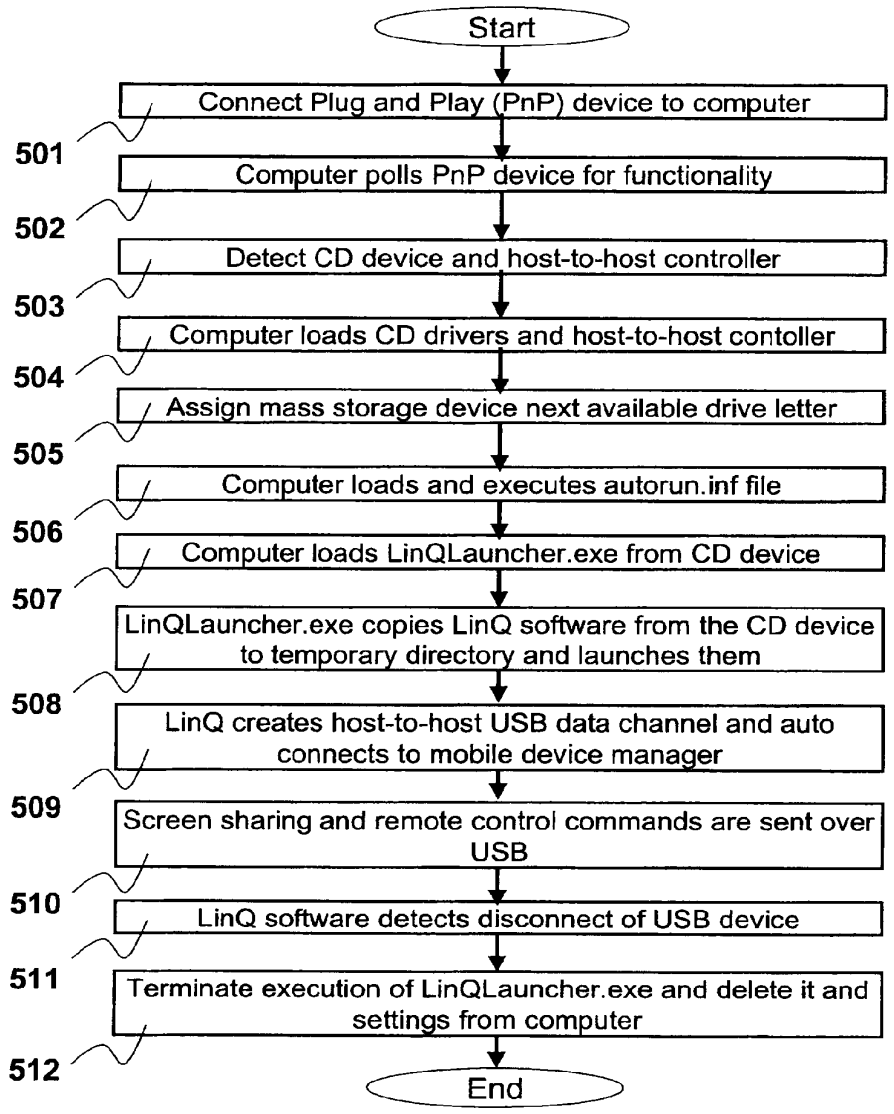
Start
Connect Plug and Play (PnP) device to computer
501
Computer polls PnP device for functionality
502
Detect CD device and host-to-host controller
503
Computer loads CD drivers and host-to-host contoller
504
Assign mass storage device next available drive letter
505
Computer loads and executes autorun.inf file
506
Computer loads LinQLauncher.exe from CD device
507
LinQLauncher.exe copies LinQ software from the CD device to temporary directory and launches them
508
LinQ creates host-to-host USB data channel and auto connects to mobile device manager
509
Screen sharing and remote control commands are sent over USB
510
LinQ software detects disconnect of USB device
511
Terminate execution of LinQLauncher.exe and delete it and settings from computer
512
End

FIG. 10

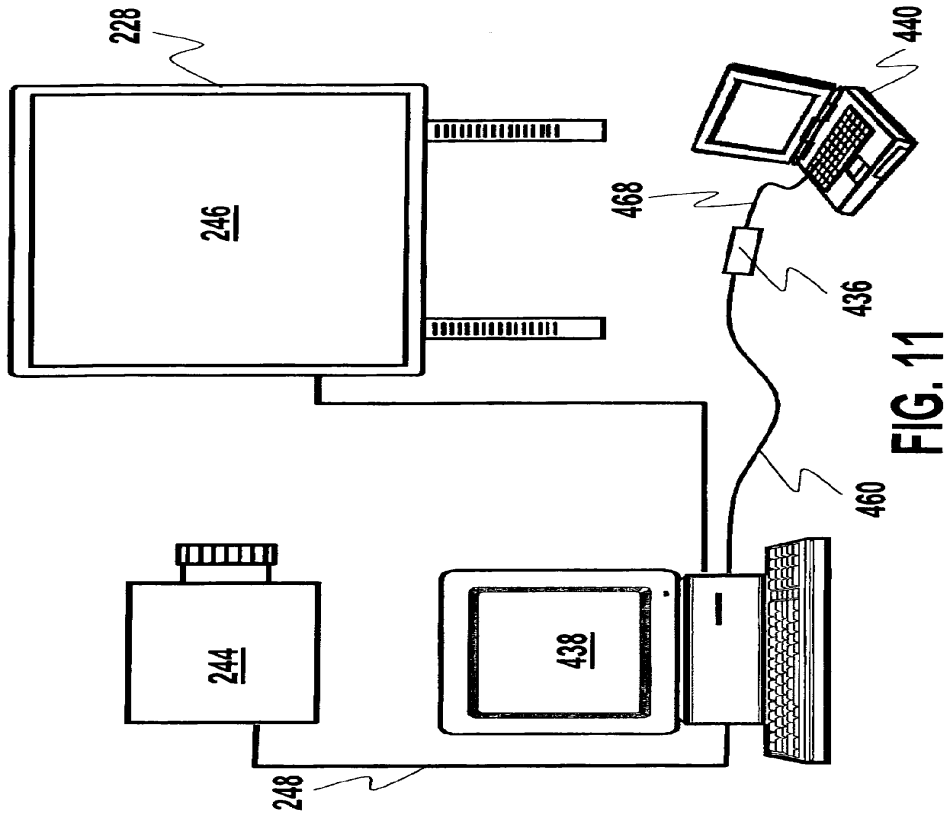

FIG. 11

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CA2010/000185

A. CLASSIFICATION OF SUBJECT MATTER
IPC: ***G06F 3/00*** (2006.01) , ***G06F 13/38*** (2006.01) , ***H04W 12/02*** (2009.01)
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC: ***ALL*** (2006.01)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Delphion & keywords:
silent/auto-/self- installation/execution/configuration/download/launch;
plug-and-play/PnP/"Universal Plug-and-Play"/UPnP/USB/Firewire/PCMCIA adapter/connecting/device;
screen/display/video/image/visual data/information/content;
exchange/transfer/send/share/transmit/swap/communicate/interchange/channel;
download "device driver"/"peripheral driver"/code/software/program;
two-way/"two way"/bi-directional/bidirectional/dual/send&receive

Electronic database(s) consulted during the international search (name of database(s) and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	US 2009/0069049 A1 (*Jain*) - 12 March 2009 (12-03-2009) * abstract; [0018]; [0025]; [0037]; [0040]; [0045]; [0052]-[0053]; [0056]; [0068]; Fig. 1 *	1-12, 18-47 13-17
Y	US 2005/0278461 A1 (*Otha et al.*) - 15 December 2005 (15-12-2005) * abstract; [0004]; [0010]-[0011]; [0032]-[0033]; [0042]-[0043] *	13-17
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[ ] Further documents are listed in the continuation of Box C. [X] See patent family annex.

*	Special categories of cited documents :	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E"	earlier application or patent but published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search	Date of mailing of the international search report
12 April 2010 (12-04-2010)	21 April 2010 (21-04-2010)
Name and mailing address of the ISA/CA Canadian Intellectual Property Office Place du Portage I, C114 - 1st Floor, Box PCT 50 Victoria Street Gatineau, Quebec K1A 0C9 Facsimile No.: 001-819-953-2476	Authorized officer Cristian S. Popa (819) 997-2299

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
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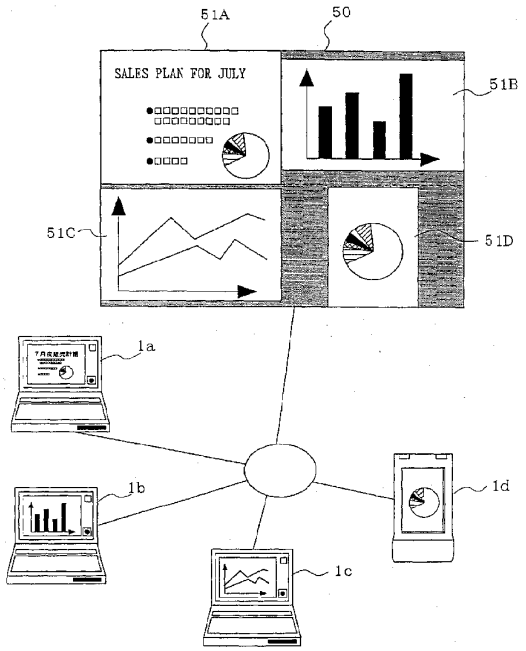
(54) **Display system, network interactive display device, terminal, and control program**

(57) A technique for presenting display screens of a plurality terminals (1a - 1d) connected to a network (3) on a multi-window screen of a display screen of a display device (2). A communication unit (28) receives image data captured and then sent by each terminal having a screen capture function. A display control unit (22) controls an image synthesizer (42) to synthesize the captured image data into single screen multi-window format data. A multi-window screen is thus presented.

FIG. 8



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Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to a technique that presents screens of a plurality terminals connected to a network on a single screen of a display device in a multi-window presentation fashion.

2. Description of the Related Art

[0002] FIG. 25 shows a structure of a conventional display system. Connected to a network 210 as shown are a projector 220, a notebook computer 230, and desk-top computers 251, 252, 253, and 254 as network interactive display devices. Further connected to the network 210 are tablets 261, 262, 263, and 264, each of which directly inputs drawings to the projector 220 and inserts data in the already projected drawings. A screen capture software program is already installed on each of the notebook computer 230 and the desk-top computers 251, 252, 253, and 254.

[0003] In the conventional display system thus constructed, the screen capture software program captures the content displayed on the screen of the notebook computer 230, and the captured image data is then sent to the projector 220 through the network 210. The screen presented on the notebook computer 230 is thus projected and displayed on the projector 220. Operating a remote controller as an attachment to the projector 220, the projected image on the projector 220 is switched from a screen of the notebook computer 230 to a screen of the desk-top computer 251, for example.

[0004] The image presented on the projector 220 in the conventional display system is one of the computer screen images of the notebook computer 230, and the desk-top computers 251, 252, 253, and 254. To compare the contents of one screen to another of the notebook computer 230 and the desk-top computers 251, 252, 253, and 254, the user is forced to switch the screens from one to another. There is a growing need for a function that allows screens of a plurality of personal computers on a single screen of a display device.

[0005] To satisfy such a need, development efforts have been made. However, no such a display system satisfying the need exist. For one reason, a large throughput is required of a projector (a network interactive display device) in a display system, and a workload on a network also increases.

SUMMARY OF THE INVENTION

[0006] Accordingly, it is an object of the present invention to provide a network interactive display device and a display control program for presenting display screens of a plurality of terminals, connected to a network, on a screen of a display of the display device in a multi-window presentation fashion.

[0007] It is also another object of the present invention to provide a display system, a network interactive display device, a display control software program, a network interactive projector, a network interactive plasma display apparatus, a network interactive liquid-crystal display apparatus, a terminal, and a control software program, each for presenting display screens of a plurality of terminals, connected to a network, on a screen of a display of the network interactive display device in a multi-window presentation fashion without introducing an increase in workload on the network interactive display device and the network.

[0008] A display system in one aspect of the present invention includes a plurality of terminals, each terminal having a screen capture function, and sending image data, captured using the screen capture function, over a network, and a network interactive display device, including a display, and receiving the captured image data transmitted from the terminal through the network, and having a multi-window screen presentation function for synthesizing the captured image data into single screen multi-window format data to be displayed on a display screen of the display, wherein, as processes required to present the single screen multi-window format data on the display screen of the display of the network interactive display device, the terminal performs a size conversion process of an image size of the image data captured using the screen capture function and the network interactive display device acquires the captured image data subsequent to the size conversion thereof from the terminal, and synthesizes the received captured image data.

[0009] The size conversion process for a multi-window screen presentation function is performed on the terminal. The display system presents the screens of the plurality terminals connected to the network on the display of the network interactive display device in a multi-window format without introducing an increase in workload on the network interactive display device and the network.

[0010] In the display system of a preferred embodiment of the present invention, the network interactive display device may divide the display screen of the display into windows of the number equal to the number of terminals to be displayed, may determine a display size of the window assigned to each terminal to be displayed, and may send information of the display size to the terminal, and the terminal may perform the size conversion on the image size of the captured image data to the received display size when the terminal receives the display size.

[0011] In accordance with the preferred embodiment of the present invention, the terminal performs the size conversion process based on the display size determined by the network interactive display device.

[0012] In the display system of a preferred embodi-

ment of the present invention, the terminal may further perform a color conversion process on the captured image data in accordance with a color count of the display of the network interactive display device before sending the captured image data to the network interactive display device, in addition to the size conversion process on the image data captured using the screen capture function.

[0013] In the preferred embodiment of the present invention, the workload on the network interactive display device is further reduced because the terminal performs the color conversion process before sending the captured image data to the network interactive display device.

[0014] In the display system of a preferred embodiment of the present invention, the network interactive display device may also send the color count of own display to the terminal when sending the display size to the terminal, while the terminal may perform the color conversion process in response to the color count received from the network interactive display device.

[0015] In accordance with the preferred embodiment of the present invention, the terminal performs the color conversion process in response to the color count designated by and received from the network interactive display device.

[0016] In the display system of a preferred embodiment of the present invention, the network interactive display device may include a projector.

[0017] In accordance with the preferred embodiment of the present invention, the network interactive display device is the projector.

[0018] In the display system of a preferred embodiment of the present invention, the network interactive display device may include a plasma display.

[0019] In accordance with the preferred embodiment, a plasma display is used as the network interactive display device.

[0020] In the display system of a preferred embodiment of the present invention, the network interactive display device may include a liquid-crystal monitor.

[0021] In accordance with the preferred embodiment, a liquid-crystal monitor is used as the network interactive display device.

[0022] In the display system of a preferred embodiment of the present invention, the network interactive display device may include an organic EL display.

[0023] In accordance with the preferred embodiment, an organic EL (Electroluminescent) display is used as the network interactive display device.

[0024] In the display system of a preferred embodiment of the present invention, the terminal may include one of a personal computer and a PDA (Personal Digital Assistant).

[0025] In accordance with the preferred embodiment of the present invention, one of a personal computer and a PDA is used as the terminal.

[0026] A network interactive display device in another aspect of the present invention is connected to a plurality of terminals through a network, each terminal having a screen capture function, and includes a display, a communication unit for communicating in a two-way fashion with each of the terminals, and a display control unit, wherein the communication unit receives the image data which has been captured by each terminal through the screen capture function thereof, and which has been size converted to a predetermined image size by each terminal, and the display control unit has a multi-window screen presentation function for synthesizing the captured image data received by the communication unit into single screen multi-window format data to be displayed on a display screen of the display.

[0027] Since the network interactive display device receives the captured image data in the size converted form thereof from the terminal, and synthesizes the received image data, the workload of processing in the multi-window presentation is reduced in the network interactive display device.

[0028] In the network interactive display device of a preferred embodiment of the present invention, the display control unit may have an insertion function for inserting a new window into a current display screen to display the new window.

[0029] In accordance with the preferred embodiment, the network interactive display device has the insertion function.

[0030] In the network interactive display device of a preferred embodiment of the present invention, the user may select at will a terminal, which provides the captured image data to be displayed on the display screen of the display, from among the plurality of terminals connected to the network interactive display device.

[0031] In accordance with the preferred embodiment, the network interactive display device allows the user to select at will a terminal, which is to provide the captured image data to be displayed on the display screen of the display, from among the plurality of terminals connected to the network interactive display device.

[0032] In the network interactive display device of a preferred embodiment of the present invention, the terminal that provides the captured image data to be displayed on the display screen of the display may be selected in a two-way communication of the communication unit by one of the network interactive display device and the terminals.

[0033] In accordance with the preferred embodiment, the network interactive display device allows the terminal displaying the captured image data on the display screen to be selected in a two-way communication of the communication unit by one of the network interactive display device and the terminal.

[0034] In the network interactive display device of a preferred embodiment of the present invention, the display control unit may have an expansion display function for expanding a predetermined window from among a plurality of windows forming a multi-window screen dis-

played on the display screen of the display.

[0035] In accordance with the preferred embodiment, the network interactive display device has the expansion display function for expanding the predetermined window.

[0036] In the network interactive display device of a preferred embodiment of the present invention, the display control unit may have a single-window screen selection function for switching the display screen from a predetermined window from among a plurality of windows forming a multi-window screen displayed on the display screen to a single-window full screen.

[0037] In accordance with the preferred embodiment, the network interactive display device has the single-window screen selection function for switching the display screen from the predetermined window to the single-window full screen.

[0038] In the network interactive display device of a preferred embodiment of the present invention, the display control unit may have an erase function for erasing a predetermined window from among a plurality of windows forming a multi-window screen displayed on the display screen of the display.

[0039] In accordance with the preferred embodiment, the network interactive display device has the erase function for erasing the predetermined window.

[0040] In the network interactive display device of a preferred embodiment of the present invention, the predetermined window may be selected in response to an operation by the user.

[0041] In accordance with preferred embodiments, the network interactive display device allows the user to select the window to be expanded, the window to be switched to the single-window full screen, and the window to be erased.

[0042] In the network interactive display device of a preferred embodiment of the present invention, the predetermined window may be selected by one of the network interactive display device and the terminal in a two-way communication of the communication unit thereof.

[0043] In the preferred embodiment, the window to be expanded, the window to be switched to the single-window full screen, or the window to be erased is designated by one of the network interactive display device or the terminal.

[0044] In the network interactive display device of a preferred embodiment of the present invention, the image captured data received from the terminal may be obtained by designating the whole or a portion of the display screen of the terminal.

[0045] In accordance with the preferred embodiment, the network interactive display device displays the captured image data, which is obtained using full-screen capturing or partial-screen capturing.

[0046] In the network interactive display device of a preferred embodiment of the present invention, the captured image data received from the terminal may be obtained by detecting and capturing only a change on the display screen of the terminal.

[0047] In accordance with the preferred embodiment, the workload on the network is reduced by capturing only the change on the screen of the terminal. The network interactive display device thus presents image data which is a combination of existing captured data and the changed component of data.

[0048] In a preferred embodiment of the present invention, the network interactive display device may include a display size determining unit that divides the display screen of the display into windows of the number equal to the number of terminals to be displayed, and determines a display size of the window to which the terminal to be displayed is assigned, and a controller that sends the display size determined by the display size determining unit to the corresponding terminal through the communication unit, wherein the controller receives, through the communication unit, the captured image data, having the converted size equal to the display size of the window assigned to the terminal, from the terminal to which the display size is sent, and controls the display control unit to synthesize the received captured image data into single screen multi-window format data to be displayed on the display screen of the display.

[0049] In accordance with the preferred embodiment, the display size converted by the terminal is set to be display size determined by the display size determining unit.

[0050] In the network interactive display device of a preferred embodiment of the present invention, an aspect ratio of the window assigned to the terminal to be displayed may be equalized to an aspect ratio of the display screen of the display of the terminal.

[0051] In accordance with the preferred embodiments of the present invention, the network interactive display device provides a display screen free from discordance.

[0052] In the network interactive display device of a preferred embodiment of the present invention, through the communication unit, the controller may also send a display color count of the display to the terminal when sending the display size to the terminal, may receive the captured image data having the converted size equal to the display size of the window assigned to the terminal and having the display color count converted to the display color count of the display of the network interactive display device, from the terminal to which the display size and the display color count have been sent, and may control the display control unit to synthesize the received captured image data into single screen multi-window format data to be displayed on the display screen of the display.

[0053] In accordance with the preferred embodiment, the network interactive display device receives, from the terminal, the captured image data the terminal has color converted in addition to the size conversion process for contraction and synthesizes the received image data. The workload of processing in the multi-window presen-

tation is reduced in the network interactive display device.

[0054] In the network interactive display device of a preferred embodiment of the present invention, a communication protocol of the communication unit may include the TCP/IP protocol.

[0055] In accordance with the preferred embodiment, the widely used TCP/IP is used as the communication protocol of the communication unit.

[0056] In the network interactive display device of a preferred embodiment of the present invention, the network may include one of a LAN, a radio LAN, and a near-field communication radio LAN.

[0057] In accordance with the preferred embodiment, one of the LAN (Local-Area Network), the radio LAN, the near-field communication radio LAN is used as the network.

[0058] A network interactive projector in yet another aspect of the present invention includes one of the above-referenced network interactive display devices.

[0059] In accordance with the above aspect, the projector has the above-referenced advantages of the network interactive display device.

[0060] In the network interactive projector of a preferred embodiment of the present invention, the display may include one of a liquid-crystal light valve, an LCoS light valve, and a DMD (Digital Micromirror Device) (Trademark of Texas Instruments).

[0061] In accordance with the preferred embodiment, the projector including one of the liquid-crystal light valve, the LCoS light valve, and the DMD has the above-referenced advantages of the network interactive display device.

[0062] A network interactive plasma display apparatus in yet another aspect of the present invention includes one of the above-referenced network interactive display devices, wherein the display includes a plasma display panel.

[0063] In accordance with the above aspect of the present invention, the plasma display apparatus provides the above-referenced advantages of the network interactive display device.

[0064] A network interactive liquid-crystal display apparatus in yet another aspect of the present invention includes one of the above-referenced network interactive display devices, wherein the display includes a liquid-crystal panel.

[0065] In accordance with the above aspect of the present invention, the liquid-crystal display apparatus have the above-referenced embodiments of the network interactive display device.

[0066] A network interactive organic EL display apparatus in a further aspect of the present invention includes one of the above-referenced network interactive display devices, wherein the display includes an organic EL panel.

[0067] In accordance with the above aspect of the present invention, the network interactive organic EL display apparatus provides the above-referenced advantages of the network interactive display device.

[0068] The present invention in a further aspect relates to a display control software program of a CPU that constitutes the display control unit of one of the above-referenced network interactive display devices.

[0069] In accordance with the above aspect of the present invention, the display control program allows a display device to provides the above-referenced advantages of the network interactive display device.

[0070] In yet another aspect of the present invention, a terminal, connected to one of the above-referenced network interactive display devices includes a display, a communication unit that communicates in a two-way fashion with the network interactive display device, a screen capture processor that captures the content displayed on the display screen of the display, an image converter which converts the image data captured by the screen capture processor to image data having a predetermined image size, and a controller that sends the captured image data, size converted by the image converter, from the communication unit to the network interactive display device, wherein the terminal generates the captured image data that is to be displayed on one of the multi windows displayed on the display screen of the network interactive display device.

[0071] When the captured image data to be displayed on one of the windows of the screen of the network interactive display device is generated, a part of the process required for the multi-window presentation, i.e., the size conversion process is performed by the terminal. The terminal thus contributes to a reduction in the workload on the network interactive display device.

[0072] In the terminal of a preferred embodiment of the present invention, the display screen of the display of the network interactive display device may be divided into windows of the number equal to the number of terminals to be displayed, a display size of the window assigned to each terminal to be displayed is determined, and the image converter converts the image data captured by the screen capture processor to image data having the display size assigned to own terminal.

[0073] In accordance with the preferred embodiment, the size conversion process is carried out based on the display size determined by the network interactive display device.

[0074] In the terminal of a preferred embodiment of the present invention, the image converter may perform a color conversion on the captured image data to match the display color count of the display of the network interactive display device in addition to the size conversion process, and the controller may send the captured image data, which has been subjected to the size conversion process and the color conversion process, from the communication unit to the network interactive display device.

[0075] In accordance with the preferred embodiment, the image converter performs the color conversion on

the captured image data in addition to the size conversion process, thereby further reducing the workload on the network interactive display device.

[0076] The present invention in a further aspect relates to a control software program of a CPU that constitutes each processor of one of the above-referenced terminals.

[0077] In accordance with the above aspect, the control program allows a terminal to have the above-referenced advantages of the above terminal.

[0078] The present invention in a further aspect relates to a network interactive display device connected to each of a plurality of terminals through a network, each terminal having a screen capture function, and includes a display, a communication unit for communicating in a two-way fashion with each of the terminals, and a display control unit, wherein the display control unit has a multi-window screen presentation function for synthesizing the captured image data, captured by each terminal through the screen capture function and received by the communication unit, into single screen multi-window format data to be displayed on a display screen of the display.

[0079] The network interactive display device presents the screens of the plurality terminals connected to the network on the display screen of a display of the network interactive display device in a multi-window format.

[0080] In the network interactive display device of a preferred embodiment of the present invention, the display control unit may have an insertion function for inserting a new window into a current display screen to display the new window.

[0081] In accordance with the preferred embodiment, the network interactive display device has the insertion function.

[0082] In the network interactive display device of a preferred embodiment of the present invention, the user may select at will a terminal, which provides the captured image data to be displayed on the display screen of the display, from among the plurality of terminals connected to the network interactive display device.

[0083] In accordance with the preferred embodiment, the network interactive display device allows the user to select at will a terminal, which is to provide the captured image data to be displayed on the display screen of the display, from among the plurality of terminals connected to the network interactive display device.

[0084] In the network interactive display device of a preferred embodiment of the present invention, the terminal that provides the captured image data to be displayed on the display screen of the display may be selected in a two-way communication of the communication unit by one of the network interactive display device and the terminal.

[0085] In accordance with the preferred embodiment, the network interactive display device allows the terminal providing the captured image data on the display screen to be selected in a two-way communication of the communication unit by one of the network interactive display device and the terminal.

[0086] In the network interactive display device of a preferred embodiment of the present invention, the display control unit may have an expansion display function for expanding a predetermined window from among a plurality of windows forming a multi-window screen displayed on the display screen of the display.

[0087] In accordance with the preferred embodiment, the network interactive display device has the expansion display function for expanding the predetermined window.

[0088] In the network interactive display device of a preferred embodiment of the present invention, the display control unit may have a single-window screen selection function for switching the display screen from a predetermined window from among a plurality of windows forming a multi-window screen displayed on the display screen of the display to a single-window full screen.

[0089] In accordance with the preferred embodiment, the network interactive display device has the single-window screen selection function for switching the display screen from the predetermined window to the single-window full screen.

[0090] In the network interactive display device of a preferred embodiment of the present invention, the display control unit may have an erase function for erasing a predetermined window from among a plurality of windows forming a multi-window screen displayed on the display screen of the display.

[0091] In accordance with the preferred embodiment, the network interactive display device has the erase function for erasing the predetermined window.

[0092] In the network interactive display device of a preferred embodiment of the present invention, the predetermined window may be selected in response to an operation by the user.

[0093] In accordance with preferred embodiments, the network interactive display device allows the user to select the window to be expanded, the window to be switched to the single-window full screen, and the window to be erased.

[0094] In the network interactive display device of a preferred embodiment of the present invention, the predetermined window may be selected by one of the network interactive display device and the terminal in a two-way communication of the communication unit thereof.

[0095] In the preferred embodiment, any of the window to be expanded, the window to be switched to the full-screen mode, or the window to be erased is designated by one of the network interactive display device and the terminal.

[0096] In the network interactive display device of a preferred embodiment of the present invention, the captured image data received from the terminal may be obtained by designating the whole or a portion of the dis-

play screen of the terminal.

[0097] In accordance with the preferred embodiment, the network interactive display device displays the captured image data, which is obtained using full-screen capturing or partial-screen capturing.

[0098] In the network interactive display device of a preferred embodiment of the present invention, the captured image data received from the terminal may be obtained by detecting and capturing only a change on the display screen of the terminal.

[0099] In accordance with the preferred embodiment, the workload on the network is reduced by capturing only the change on the screen of the terminal. The network interactive display device thus presents image data which is a combination of existing captured data and the changed component of data.

[0100] In the network interactive display device of a preferred embodiment of the present invention, the display control unit may include a window area information generator which divides the display screen of the display into windows of the number equal to the number of terminals to be displayed, and generates window area information containing a display size of the window to which the terminal to be displayed is assigned, and information identifying a display position of the window, an image synthesizer which synthesizes the captured image data from the terminals into single screen multi-window format data in accordance with the window area information generated by the window area information generator, thereby generating synthesized image data, and an image processor which processes the synthesized image data generated by the image synthesizer, thereby generating display image data and outputting the display image data to the display.

[0101] In the network interactive display device of a preferred embodiment of the present invention, the image synthesizer may synthesize the captured image data by contracting or expanding the captured image data from each terminal with an aspect ratio of the image size of the captured image data maintained.

[0102] In accordance with the preferred embodiment, the network interactive display device provides a display screen free from discordance.

[0103] In the network interactive display device of a preferred embodiment of the present invention, a communication protocol of the communication unit may include the TCP/IP protocol.

[0104] In accordance with the preferred embodiment, the widely used TCP/IP is used as the communication protocol of the communication unit.

[0105] In the network interactive display device of a preferred embodiment of the present invention, the network may include one of a LAN, a radio LAN, and a near-field communication radio LAN.

[0106] In accordance with the preferred embodiment, one of the LAN, the radio LAN, the near-field communication radio LAN is used as the network.

[0107] A network interactive projector in a further aspect of the present invention includes one of the above-referenced network interactive display devices.

[0108] In accordance with the above aspect of the present invention, the projector has the above-referenced advantages of the network interactive display device.

[0109] In the network interactive projector of a preferred embodiment of the present invention, the display may include one of a liquid-crystal light valve, an LCoS light valve, and a DMD.

[0110] In accordance with the preferred embodiment, the projector including one of the liquid-crystal light valve, the LCoS light valve, and the DMD has the above-referenced advantages of the network interactive display device.

[0111] A network interactive plasma display apparatus in a further aspect of the present invention includes one of the above-referenced network interactive display devices, wherein the display includes a plasma display panel.

[0112] In accordance with the above aspect, the plasma display apparatus have the above-referenced advantages of the network interactive display device.

[0113] A network interactive liquid-crystal display apparatus in a further aspect of the present invention includes one of the above-referenced network interactive display devices, wherein the display includes a liquid-crystal panel.

[0114] In accordance with the above aspect, the liquid-crystal display apparatus have the above-referenced embodiments of the network interactive display device.

[0115] A network interactive organic EL display apparatus in a further aspect of the present invention includes one of the above-referenced network interactive display devices, wherein the display includes an organic EL panel.

[0116] In accordance with the above aspect, the network interactive organic EL display apparatus provides the above-referenced advantages of the network interactive display device.

[0117] The present invention in a further aspect relates to a display control software program of a CPU that constitutes the display control unit of one of the above-referenced network interactive display devices.

[0118] In accordance with the above aspect, the display control program provides a display device with the above-referenced advantages of one of the above network interactive display devices.

BRIEF DESCRIPTION OF THE DRAWINGS

[0119]

FIG. 1 illustrates a network of a display system including a network interactive display device in accordance with preferred embodiments of the present invention;

FIG. 2 is a block diagram illustrating the structure of a terminal in accordance with a first preferred embodiment of the present invention;
FIG. 3 is a block diagram illustrating the structure of a network interactive display device of the first preferred embodiment;
FIG. 4 is a functional diagram illustrating the function of the network interactive display device of the first preferred embodiment;
FIG. 5 illustrates items of terminal information managed in a display status management file;
FIG. 6 is a flow diagram illustrating the operation of the first preferred embodiment;
FIG. 7 is a continuation of the flow diagram of FIG. 6;
FIG. 8 illustrates the configuration of the display system in which display screens of four terminals 1a-1d are presented on a display screen of a display device;
FIG. 9 is a flow diagram illustrating the flow of a window area information generation process;
FIG. 10 illustrates a specific structure of the display status management file;
FIG. 11A illustrates a specific structure of a table held in a tentative window area setting file, and FIG. 11B illustrates a tentative window area based on the table of FIG. 11A;
FIG. 12 illustrates a true window area size and a true origin;
FIG. 13 illustrates one example of a window area information file;
FIG. 14 is a flow diagram of an operation of the terminal which has received a capture start command and a display status management file from the display device of the first preferred embodiment;
FIG. 15 diagrammatically illustrates the display system to explain an expansion display function;
FIG. 16A illustrates a tentative window area setting table which is referenced when a priority order is updated, and FIG. 16B illustrates a tentative window area based on the table of FIG. 16A;
FIG. 17 illustrates a true window area with the priority order modified;
FIG. 18 illustrates a window area information file that is produced when the priority order is modified;
FIG. 19 diagrammatically illustrates a single-window screen presentation function;
FIG. 20 diagrammatically illustrates an insertion function;
FIG. 21 diagrammatically illustrates a window erase function;
FIG. 22 is a flow diagram illustrating an operation of terminal which has received a difference capture start command and a display status management file from the display device;
FIG. 23 illustrates a screen comparison process wherein a mouse pointer is moved;
FIG. 24 illustrates the screen comparison process of FIG. 23;
FIG. 25 illustrates a conventional display system;
FIG. 26 is a block diagram illustrating a structure of the terminal in accordance with a second preferred embodiment of the present invention;
FIG. 27 is a block diagram illustrating a structure of the network interactive display device of the second preferred embodiment;
FIG. 28 is a functional diagram of an operation of the network interactive display device of the second preferred embodiment of the present invention;
FIG. 29 is a flow diagram illustrating an operation of the display system of the second preferred embodiment of the present invention; and
FIG. 30 is a flow diagram illustrating the operation of the terminal which has received a capture start command and a display status management file from the display device of the second preferred embodiment of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

First Embodiment

[0120] FIG. 1 illustrates a network of a display system 100 including a network interactive display device 2 in accordance with preferred embodiments of the present invention.

[0121] The display system 100 includes a plurality of terminals (only four terminals 1a, 1b 1c, and 1d are shown in FIG. 1), and the network interactive display device 2 (a projector here) having a multi-window screen presentation function as one of major functions of the present invention. The plurality of terminals 1 are respectively connected to the network interactive display device 2 (hereinafter simply referred to the display device 2) through a network 3 in a two-way communication based on the TCP/IP protocol. A unique name is provided beforehand to each terminal 1 (hereinafter referred to as a terminal name). The network 3 may be any of a LAN (Local Area Network), a radio LAN, and a near-field communication radio LAN such as Bluetooth (Tradename of Bluetooth SIG Inc., U.S.A.).

[0122] The display system 100 allows screens presented on the plurality of terminals 1 to be concurrently presented on a multi-window display screen of the display device 2. Such a system 100 is useful in a conference or a presentation. The terminal 1 and the display device 2 will now be discussed in detail.

[0123] FIG. 2 is a block diagram illustrating the structure of the terminal 1 in accordance with a first preferred embodiment of the present invention.

[0124] The terminal 1 may be a personal computer or a PDA (Personal Digital Assistant). The terminal 1 includes a display 11 for presenting a diversity of information such as materials for presentation, a video memory 12 for storing the content to be presented on the display 11, an input section 13 including of a tablet, a mouse,

or a keyboard, a user interface 14 for detecting an operational input entered from the input section 13 and outputting the operational input to a controller (CPU) 16, a storage 15 for storing application software programs (such as a control program) for performing the processes of the present invention and a variety of pieces of data, the controller 16, and a communication unit 17.

[0125] The control program stored in the storage 15 is used to perform a terminal control function to perform a multi-window screen presentation function on the network interactive display device 2, a screen capture function to capture a whole or a part of the screen of the display 11, an image conversion function to convert captured image data acquired using the screen capture function into data in a format of a display 21 of the network interactive display device 2, and a function to detect a change on the screen of the display 11. The application software programs and the CPU constitute a data management processor 18, a screen capture processor 19, an image converter 19A, and a screen comparison processor 20.

[0126] The controller 16 receives a variety of requests, including a connection request, a display request, an expansion display request, a request to switch to a single-window full screen, and an erase request through the user interface 14 or the communication unit 17, and performs processes responsive to each request. Under the control of the controller 16, the image converter 19A converts the image data acquired by the screen capture processor 19, and the communication unit 17 sends the converted captured image data to the network interactive display device 2.

[0127] The communication unit 17 carries out a two-way communication with the network interactive display device 2. The communication protocol used here is the TCP/IP. The communication unit 17 has a protocol processing function for ARP, ICMP, IP, TCP, UDP, etc. required for the TCP/IP connection. This protocol processing function is carried out under the control of an OS.

[0128] The conversion processes performed by the image converter 19A are required when the display device 2 to be discussed later performs a multi-window screen presentation. Specifically, the conversion processes include a size conversion process to convert the captured image data into data in a display size of a window assigned to own terminal 1, and a color conversion process to convert the captured image data into data having a display color count of the display 21 of the display device 2. The terminal 1 performs the conversion processes, required to present a multi-window screen on the display device 2, on the captured image data acquired by the screen capture processor 19, and then sends the converted captured image data to the display device 2.

[0129] FIG. 3 is a block diagram illustrating the structure of the display device 2 of the first preferred embodiment.

[0130] The display device 2 includes the display 21, a display control unit 22 which has a multi-window screen presentation function, an expansion display function, a function to switch to the single-window full screen, an insertion function, and an erase function, and controls the display screen to be presented on the display 21, an input section 23 including a remote controller, a mouse, or a keyboard, a user interface 24 for detecting an operational input from the input section 23 and for outputting the operational input to a controller 27 to be discussed later, a program storage 25 for storing the display control program to perform the multi-window screen presentation function of the present invention, a data storage 26 for storing a variety of files and data required to carry out the display control program, a controller (CPU) 27 for generally controlling the display device 2, and a communication unit 28 for performing a two-way communication with each terminal 1.

[0131] The communication unit 28 carries out a two-way communication with the terminal 1. The communication protocol used here is the TCP/IP. The communication unit 28 has a protocol processing function for ARPICMP, IP, TCP, UDP, etc. required for the TCP/IP connection.

[0132] The display device 2 may be a plasma display, or a liquid-crystal display instead of the projector shown in FIG. 1. FIG. 3 shows major portions only related to the context of the present invention, and does not show other elements respectively uniquely relating to the projector, the plasma display, and the liquid-crystal display because they are not closely related to the context of the present invention. If the elements shown in FIG. 3 are added to each of an existing projector, an existing plasma display, and an existing liquid-crystal display, they respectively become a network interactive projector, a network interactive plasma display, and a network interactive liquid-crystal display. The display 21 is different depending on the type of the display device 2. Specifically, the display 21 is one of a liquid-crystal light valve, an LCoS light valve, or a DMD (Digital Micromirror Device) (Trademark of Texas Instruments) in the projector. The display screen of the display 21 becomes a projecting screen. The display 21 is a plasma display panel in a plasma display device, a liquid-crystal panel in a liquid-crystal display device, or an organic EL (Electroluminescent) panel in an organic EL display device.

[0133] Referring to FIG. 4, a variety of files stored in the data storage 26 is discussed.

[0134] The data storage 26 stores a display specification management file 30, a permitted connection management file 31, a permitted display management file 32, a connection status management file 33, a display status management file 34, a tentative window area setting file 35, and a window area information file 36. The data storage 26 further includes a captured image data memory 37 for storing the captured image data sent from each terminal 1.

[0135] The display specification management file 30

registers a screen size representing the number of pixels in vertical and horizontal directions of the display screen of the display 21, and color count information representing a display color count of the display 21. In this preferred embodiment, the screen size is 1280x1024 (SXGA), and the color count is 167,777,216 colors.

[0136] The permitted connection management file 31 registers a terminal name of a terminal 1 which is permitted for connection. The permitted display management file 32 registers a terminal name of a terminal 1 which is permitted for screen display.

[0137] The connection status management file 33 registers a terminal name of a terminal 1 which is currently connected to the display device 2.

[0138] The display status management file 34 manages a display status of the current display 21. The display status management file 34 manages, in a table form, terminal information relating to the terminal 1 that is a source of the captured image data currently presented on the display screen of the display 21. The display status management file 34 is updated each time the display screen of the display 21 is modified. For example, if the display screen is switched from a four-window screen to a three-window screen, terminal information of the terminal 1 corresponding to an erased window is deleted. If the display screen is switched from a four-window screen to a five-window screen, terminal information of the terminal 1 corresponding to an added window is newly registered.

[0139] FIG. 5 illustrates items of the terminal information managed in the display status management file 34.

[0140] The display status management file 34 contains, as items thereof, a "terminal name", an "IP address", a "screen size", "color count information", "priority", a "capture area management flag", a "difference capture management flag", a "captured image size", a "difference captured image size 1", a "difference captured image size 2", a "difference capture origin 1", and a "difference capture origin 2".

[0141] The "terminal name" is a name provided beforehand to the terminal 1. The "screen size" is the number of pixels in the vertical and horizontal directions of the display screen of the display 11. For example, an SXGA terminal has 1280x1024 pixels, and an XGA terminal has 1024x768 pixels. The "color count information" represents the number of display colors of the display 11, and may be 256 colors, or 167,777,216 colors, for example. The terminal name, the IP address, the screen size, and the color count information are the items that must be stored in the display status management file 34 during a registration. Other items are set (updated) by the user as necessary.

[0142] The "priority" determines the size of the display size of each window assigned to the terminal 1 that is identified by the terminal name. The priority takes "highest", "high" or "none". As will be discussed in detail, the display size having a higher priority order becomes larger. The "capture area management flag" manages the capturing as to whether the screen of the terminal 1 identified by the terminal name is captured in a full-screen capture mode or a partial-screen capture mode. The capture area management flag is "0" in the full-screen capture mode, which is a standard capture mode, and "1" in the partial-screen capture mode.

[0143] The "difference capture management flag" manages the capture of whether the screen of the terminal 1 identified by the terminal name is captured in a normal capture mode or a change capture mode (hereinafter referenced to as a difference capture mode). The difference capture management file is "0" in the normal capture mode, or "1" in the difference capture mode.

[0144] The "captured image size" is the size of the captured image data (the number of pixels in the vertical and horizontal directions) when the capture area management flag is "1", i.e., in the partial-screen capture mode.

[0145] The "difference captured image size 1" and the "difference captured image size 2" represent the sizes of two different areas acquired in the difference capture when the difference capture management flag is "1". The "difference capture origin 1", and the "difference capture origin 2" are the origins of the two different areas acquired in the difference capture, and are the absolute coordinates within an area defined by the captured image size.

[0146] The tentative window area setting file 35 is a file in which information identifying a tentative window area assigned to the terminal 1 is set beforehand. The tentative window area setting file 35 contains a plurality of tables, each table prepared for the terminals. The table has a structure as shown in FIG. 11A and FIG. 16A. The table will be discussed in more detail later. The window area information file 36 will also be discussed later.

[0147] When a predetermined operation is performed on the input section 23, the display 21 displays the contents of the files 30, 31, 32, 33, 34, 35, and 36. The user thus checks and modifies the data on the display screen at will.

[0148] Returning to FIG. 4, the display control unit 22 includes a window area information generator 41 as a display size determining unit, an image synthesizer 42, and an image processor 43. The controller 27 receives a variety of requests such as a connection request, a display request, an insertion display request, an erase request, etc., received through the user interface 24 or the communication unit 28. In response to these requests, under the control of the controller 27, the processors 41, 42, and 43 respectively perform required processes while accessing necessary files in the data storage 26. The controller 27 thus controls the display 21. A display control program, stored in the program storage 25, for providing a multi-window screen presentation function and the controller (CPU) 27 constitute the display control unit 22.

[0149] From the display status management file 34,

the window area information generator 41 learns the number of terminals 1 to be presented, and the priority order and the screen size of each terminal 1. The window area information generator 41 splits the display screen of the display 21 in accordance with the number of terminals 1 to be presented, and the priority order and the screen size of each terminal 1. The window area information generator 41 generates the window area information containing display size (hereinafter referred to as a window area size) of the window on the display 21 assigned to each terminal 1 to be displayed, and information identifying the display position of the window (the absolute coordinates at the top left corner of the window with respect to the display screen, hereinafter also referred to as an origin). The information is stored in the data storage 26 as the window area information file 36.

[0150] The controller 27 sends, to each terminal 1 to be displayed from the communication unit 28, the window area size of the window assigned to each terminal 1 to be displayed in the window area information file 36 generated in the window area information generator 41 together with the display color count of the display 21 held in the display specification management file 30. The captured image data memory 37 then stores the captured image data returned from each terminal 1 that has received these pieces of information, namely, the captured image data that has been subjected to the size conversion process and the color conversion process in accordance with the received window area size and display color count. The information referred to as the window area size is identical to a true window area size in the discussion that follows.

[0151] The image synthesizer 42 synthesizes the size converted and color converted captured image data from each terminal 1 stored in the captured image data memory 37 in accordance with the window area information file 36 generated by the window area information generator 41. Synthesized image data thus results.

[0152] The image processor 43 performs a scanning frequency conversion process on a variety of pieces of image data such as the synthesized image data generated by the image synthesizer 42, and the display status management file 34 of the data storage 26 which is referenced using an OSD (on-screen display) function, thereby generating display image data and outputting the display image data to the display 21. The image processor 43 includes a scan converter, for example.

[0153] The operation of the first preferred embodiment of the present invention will now be discussed. FIGS. 6 and 7 are flow diagrams illustrating the operation of the first preferred embodiment.

[0154] A predetermined operational input is entered in the input section 23 in the display device 2 in a preliminary step for multi-window screen presentation. Upon detecting the operational input through the user interface 24, the controller 27 broadcasts a request to return a terminal name and an IP address together with the IP address of the display device 2 through the communication unit 28 and the network 3. When each terminal 1 receives the broadcast request to return the terminal name and the IP address, the terminal 1 returns own terminal name and IP address to the display device 2.

[0155] The display device 2 receives a reply (the terminal name and the IP address) from each terminal 1 through the communication unit 28, and determines whether each terminal is a connection permitted terminal. Specifically, the display device 2 determines whether the returned terminal name agrees with a terminal name registered in the permitted connection management file 31. If it is determined that the returned terminal name agrees with the registered terminal name, the display device 2 handles the terminal 1 as a connection permitted terminal.

[0156] The terminal names and the IP addresses of the terminals 1 determined as connection permitted terminals are successively registered in the connection status management file 33. The connection status management file 33 allows the display device 2 to learn how many terminals 1 are currently connected. Since the determination of whether the connection is permitted or not is based on the terminal name, the system works even if the IP address, provided to the terminal 1 using the DHCP, becomes different each time connection is made.

[0157] The display device 2 waits on standby for any request after the above preliminary step is complete. For example, the display screens of the four terminals 1a-1d, out of the terminals 1 operated by conference participants, are presented on a multi-window display screen 50 of the display device 2. As for the resolutions thereof, the terminal 1a has an SXGA resolution (1280x1024 pixels), the terminal 1b has an SVGA resolution (800x600 pixels), the terminal 1c has an XGA resolution (1024x768 pixels), and the terminal 1d has a resolution of 480x640 pixels.

Multi-Window Screen Presentation Function

[0158] FIG. 8 illustrates the configuration of the display system in which display screens of four terminals 1a-1d are presented on the display screen of the display device 2.

[0159] The user operates the remote controller in the input section 23 to enter an operational input to display the screens of the terminals 1a-1d. Through the user interface 24, the controller 27 is notified of the input information, namely, a request to display the screens of the terminals 1a-1d together with identification information of the terminals 1a-1d (step S1) When the request is placed, the priority order, the partial capture, and the difference capture may also be designated. Here, no particular designation is performed.

[0160] Upon receiving the display request, the controller 27 in the display device 2 performs processes in

steps S3-S9 for each of the terminals 1a-1d to be displayed (step S2). More specifically, the controller 27 references the permitted connection management file 31 and the permitted display management file 32 according to the terminal name indicated by the identification information contained in the display request, thereby determining whether or not each terminal 1 is permitted for connection and whether or not each terminal 1 is permitted for display (step S3). If it is determined that each terminal 1 is permitted for both connection and display (step S4), the controller 27 requests, through the communication unit 28, each terminal 1 to send the terminal information (the terminal name, the IP address, the screen size, and the color count information) (step S5). The controller 27 receives the terminal information which has been sent in response to the request (step S6), and registers the terminal information in the display status management file 34 (step S7). If the priority order, the partial capture, and the difference capture are designated during the placement of the display request, the priority order, the capture area management flag, and the difference capture management flag are also registered in the registration in step S7.

[0161] The controller 27 sends the display status management file 34 and a screen capture start command to the terminal 1 which is permitted for connection and display (step S8). When any terminal 1 is not permitted for connection and display, the controller 27 sends a notification to that effect to the terminal 1 (step S9).

[0162] If all four terminals 1a-1d are permitted for connection and display, the terminal information from the terminals 1a-1d is registered in the display status management file 34 in the processes in steps S2-S9. At the same time, the screen capture start command is sent together with the display status management file 34 to each of the terminals 1a-1d through the communication unit 28.

[0163] Subsequent to the above processes, the controller 27 notifies the window area information generator 41 in the display control unit 22 of a window area split request. The display device 2 then enters a window area information generation process (step S10). The operation of the terminal 1 having received the screen capture start command will be discussed later. Discussed first is the window area information generation process performed by the window area information generator 41 in response to the window area split request.

[0164] FIG. 9 is a flow diagram illustrating the flow of a window area information generation process. The operation of the window area information generator 41 is specifically discussed on the assumption that the display status management file 34 is constructed as shown in FIG. 10. As shown in FIG. 10, terminal names PC-1, PC-2, PC-3, and PDA-1 correspond to the terminals 1a, 1b, 1c and 1d, respectively.

[0165] Upon receiving the window area split request from the controller 27, the window area information generator 41 learns the number of the terminals 1 to be displayed (here, four terminals 1) referencing the display status management file 34. The window area information generator 41 also learns the priority order of each of the terminals 1a-1d (step S21). The window area information generator 41 references the tentative window area setting file 35 according to the number of terminals 1 and the priority order of each of the terminals 1a-1d, and acquires a tentative size and a tentative origin of each tentative window area assigned to each of the terminals 1a, 1b 1c, and 1d (step S22). As will be clarified later, the adjective "tentative" is used because the area window here assigned to the terminal 1 is updated in a later step to size convert the captured image data.

[0166] As shown in FIG. 10, the four terminals 1 are to be displayed here and no priority order is set to all of the four terminals 1. A tentative area setting table in the tentative window area setting file 35 is organized as shown in FIG. 11A. Here, the display screen of the display 21 has a resolution of 1280x1024 (SXGA), and the tentative area setting table shown in FIG. 11A is organized based on this display screen. FIG. 11B shows the tentative window area based on the table window area setting table shown in FIG. 11A.

[0167] The priority order shown in FIG. 11A is determined based on the "priority" item in the display status management file 34, and the terminals 1 are first, second, third, and fourth from the high order to the low order. The terminals 1 are assigned the "tentative size" and the "tentative origin" for the tentative window area in the lower table. All the terminals 1a-1d have "none" in the priority order row with no priority order set therefor (see FIG. 10). If no priority order is set, the order of assignment may be a predetermined one, or may be the order of registration to the display status management file 34. In the first preferred embodiment, the terminals 1a, 1b 1c, and 1d (hereinafter referred to as the terminal names PC-1, PC-2, PC-3, and PDA-1 as appropriate) are assigned tentative window areas 50A, 50B, 50C, and 50D in that order.

[0168] The window area information generator 41 further acquires the screen sizes of the PC-1, PC-2, PC-3, and PDA-1 from the display status management file 34 (see FIG. 10), and determines the sizes and origins of true windows respectively assigned thereto based on the acquired screen sizes (step S23).

[0169] FIG. 12 illustrates the true window area size and the true origin. As shown, 51A, 51B, 51C, and 51D represent the true window areas assigned to the PC-1, PC-2, PC-3, and PDA-1, respectively. The captured image data to be displayed on the tentative window area is size converted with the aspect ratio thereof maintained. The true window areas are display areas of the tentative window areas 50A, 50B, 50C, and 50D in which the converted images are respectively displayed with the centers thereof aligned to be centered on the respective tentative window areas. The PC-2 is now specifically discussed in connection with the true win-

dow area size to determine the true window area. The screen size of the PC-2 is 1024x768 pixels (see FIG. 10). The image data of this size is contracted with the aspect ratio thereof (namely, the aspect ratio of the display screen of the display 11) maintained so that the image data is displayed within the window area 50B having the size of 640x512 pixels assigned to the PC-2. The contracted size is thus the true window area size. The true origin is used to place the window of that size at the center of the window area 50B as shown in FIG. 12, and is represented in pixel coordinates at the top left corner of the window (the absolute coordinates with respect to the entire display screen).

[0170] The window area information generator 41 determines the above-referenced true window area sizes and true origins for the PC-1, PC-2, PC-3, and PDA-1, and generates window area information containing the terminal name item, the window area item, and the origin item as shown in FIG. 13, and then stores the window area information in the data storage 26 as the window area information file 36 (step S24). The window area information generation process thus ends. The window area information file 36 is tagged with processing date (May 21, 2002, 17:00:32, for example).

[0171] Returning to FIG. 6, the controller 27 in the display device 2 performs processes in steps S12-S14 to each of the terminals 1a, 1b 1c, and 1d to be displayed (step S11) when the window area information generator 41 completes the window area information generation process (step S10). More specifically, the controller 27 places a request to send the captured image data (step S12). The sent request to send the captured image data includes the true window area size assigned to the terminal 1 to which the request is sent, and the display color count of the display 21 of the display device 2 stored in the display specification management file 30. For example, the request to send the captured image data including the true window area size of 640x512 (see FIG. 13) and the display color count of 167,777,216 of the display device 2 is sent to the terminal 1a (PC-1).

[0172] Upon receiving the capture start command sent from the display device 2 in step S8, the terminal 1 starts capturing the screen thereof. If the screen capture performed by the terminal 1 is a full-screen capture, the terminal 1 sends, to the display device 2, the captured image data which has been subjected to the size conversion process and the color conversion process in accordance with the true window area size and the display color count contained in the request to send the captured image data, in response to the request to send the captured image data sent in step S12. If the screen capture performed by the terminal 1 is a partial-screen capture, an image size of the partial-captured image is sent to the display device 2.

[0173] The display device 2 receives the reply from the terminal 1 (step S13). If the rely is the captured image data, the display device 2 determines that the screen capture performed by the terminal 1 is a full-screen capture (step S14), and the received captured image data is written onto the captured image data memory 37 (step S18).

[0174] If the reply from the terminal 1 received in step S13 is the image size, the controller 27 determines the screen capture performed by the terminal 1 is a partial-screen capture (step S14). The captured image size in the display status management file 34 is updated with the received image size. The controller 27 regenerates the window area information (the true window area size and the true origin) based on the received image size (step S15). The controller 27 updates the required portion of the window area information file 36, and sends a request to send recaptured image data responsive to the regenerated true window area size and the display color count of the display 21 (step S16). The terminal 1 receives the request to send the recaptured image data. The terminal 1 returns, to the display device 2, the captured image data which has been subjected to the size conversion process and the color conversion process in accordance with the true window area size and the display color count of the display 21, contained in the request to send the recaptured image data. The display device 2 receives the reply from the terminal 1 (step S17), and writes the reply onto the captured image data memory 37 (step S18).

[0175] The above process is performed for each of the terminals 1a-1d. When the captured image data is received from all terminals 1a-1d, the controller 27 sends an image synthesis command to the image synthesizer 42. The display device 2 enters an image synthesis process (step S19).

[0176] Upon receiving the image synthesis command, the image synthesizer 42 identifies locations of synthesis of the size-converted captured image data and the color-converted captured image data stored in the captured image data memory 37 in accordance with the true origin of the window area information in the window area information file 36, and synthesizes the captured image data into a single screen image data, thereby generating the synthesized image data. The synthesized image data is then output to the image processor 43.

[0177] The image processor 43 converts the synthesized data from the image synthesizer 42 in display image data having a scanning frequency of the display 21. The display image data is then output to the display 21. As shown in FIG. 8, a multi-window screen is thus present on the display screen 50 in which the captured image data (display screen) of the terminals 1a, 1b 1c, and 1d is presented on the true window areas (hereinafter also referred to as window screens) of 51A, 51B, 51C, and 51D (step S20).

[0178] The operation of the terminal 1 having received the capture start command and the display status management file 34 from the display device 2 is discussed below.

[0179] FIG. 14 is a flow diagram of the operation of

the terminal 1 which has received the capture start command and the display status management file 34 from the display device 2. The terminal 1 is here 1a (PC-1).

[0180] The controller 16 in the terminal 1a receives, through the communication unit 17, the capture start command and the display status management file 34 sent from the display device 2 (step S31). The controller 16 references the capture area management flag in the terminal 1a in the display status management file 34 (step S32). Since the capture area setting flag is "0" (step S33), the full-screen capture is determined to be activated. The controller 16 sends a full-screen capture command to the screen capture processor 19. In response to the full-screen capture command, the screen capture processor 19 stores the content of the video memory 12 (i.e., the content currently displayed on the display screen of the display 11) in the storage 15 in a bit-map format (a full-screen capture process) (step S34).

[0181] When the terminal 1a receives, from the display device 2, the request to send the captured image data (step S35), the terminal 1a performs the size conversion on the captured image data acquired in the full-screen capture process in step S34 in accordance with the true window area size contained in the request to send the captured image data while performs the color conversion process on the captured image data in accordance with the display color count contained in the request to send the captured image data (step S36). Since the terminal 1a (PC-1) has a screen size of 1280x1024 pixels (see FIG. 10), the captured image data of this size is converted (in a contraction process) into data of size as large as the assigned window area size of 640x512 (see FIG. 13). No color conversion is performed because the display 11 has the same color count of 167,777,216 as the display device 2. If the display 11 has a color count larger than that of the display device 2, the color count is down-converted to match that of the display device 2. The captured image data, size converted and color converted in this way, is sent through the communication unit 17 (step S37).

[0182] If the capture area setting flag is determined to be "1" in step S33, a partial capture is determined to be activated. A capture area designation screen indicating a message saying "designate a capture area" is presented on the display 11 (step S38), and a partial capture command is sent to the screen capture processor 19. When the user, who reads the message on the capture area designation screen, selects a window or encloses a desired area using the input section 13, the screen capture processor 19 recognizes the user operation through the user interface 14. The image data on the video memory 12 corresponding to the designated area and the image size is stored in the storage 15 (a partial capture process) (step S39).

[0183] Upon receiving the request to send the captured image data from the display device 2 (step S40), the terminal 1a returns the size of the partial captured image captured in the partial capture process in step S39 (step S41). The reply is received by the display device 2 as already discussed. The display device 2 regenerates the true window area size based on the image size in the partial capture process, and sends, to the terminal 1a, the request to send the recaptured image data containing the regenerated true window area size and the display color count of the display 21 of the display device 2. Upon receiving the request, the terminal 1a performs the size conversion process on the partial captured image data stored in the storage 15 in step S39, based on the true window area size contained in the request to send the captured image data, while performing the color conversion process on the partial captured image data in accordance with the color count contained in the request to send the captured image data (step S36). The terminal 1a then sends the captured image data, which has been size converted and color converted in this way, to the display device 2 through the communication unit 17 (step S37).

[0184] The above-referenced process is similarly performed on each of the remaining terminals 1b 1c, and 1d in addition to the terminal 1a. As a result, the display device 2 receives, from each of the terminals 1a, 1b 1c, and 1d, the captured image data which has been size converted into the true window area size assigned thereto, and which has been color converted to the display color count of the display 21 of the display device 2.

[0185] Each terminal 1 receives the display status management file 34 from the display device 2. The display status management file 34 is used to check the status of the capture area setting flag of own terminal 1. Furthermore, the content of the file may be displayed on the display 11 by performing a predetermined operation on the input section 13. The permitted connection management file 31, the permitted display management file 32, and the connection status management file 33 may also be acquired from the display device 2 as necessary to be presented on the display 11. In this way, the user may learn what terminals are displayed other than own terminal operated by the user himself and the range of authority granted to own terminal 1.

Expansion Display Function

[0186] An expansion display function for expanding any one of a plurality of currently presented windows is discussed below. The expansion display function is performed by updating the priority order in the above-referenced arrangement.

[0187] FIG. 15 diagrammatically illustrates the display system to explain the expansion display function. The screen of the terminal 1a is expanded by heightening the priority order of the terminal 1a.

[0188] The screen of the terminal 1a is designated by operating the remote controller. If the terminal 1a is assigned any key in the remote controller, the user designates the terminal 1a by pressing that key. If no partic-

ular key is assigned, the user may operate the remote controller to select the terminal 1a on a menu screen on the display 21, or may click the screen of the terminal 1a with a pointer on the display screen using the remote controller.

[0189] Designation information input in this way, i.e., an expansion display request containing the identification information of the terminal 1a, is sent to the controller 27 through the user interface 24. The controller 27 identifies the terminal 1a based on the identification information contained in the expansion display request. The controller 27 sets the priority of the terminal 1a (PC-1) in the display status management file 34 to be "highest", and sends a window area split request to the window area information generator 41.

[0190] The window area information generator 41 generates the window area information file 36 as already described. The tentative window area setting table, which is referenced in the generation of the window area information file 36, is organized as illustrated in FIG. 16A. FIG. 16B shows tentative window areas based on the tentative window area setting table. The priority order illustrated in FIG. 16B is determined based on the priority order in the display status management file 34. The priority order of the terminal 1a is higher than those of the remaining terminals 1b, 1c, and 1d. The terminal 1a is thus assigned the tentative window area 52A (the window area for the first terminal) having the first priority in FIG. 16B. The assignment of the window areas to the remaining terminals 1b, 1c, and 1d having no priority order set therefor is arbitrary. For example, the terminals 1b, 1c, and 1d are now assigned tentative window areas 52B, 52C, and 52D, respectively. As already described, the true window areas to be assigned to the terminals 1b, 1c, and 1d are determined.

[0191] FIG. 17 illustrates the true window areas. The terminals 1a, 1b 1c, and 1d are assigned the true window areas 53A, 53B, 53C, and 53D, respectively. The window area information file 36 is then organized as illustrated in FIG. 18.

[0192] As already described, the captured image data (display screen) of the terminals 1b 1c, and 1d appears on the true window areas 53A, 53B, 53C, and 53D, respectively. The designated window 51A is shown in an expanded state thereof on the multi-window screen 50.

Function to Switch to Single-Window Screen

[0193] One of the plurality of multi windows is shown on a single-window screen as shown in FIG. 19. The user may operate the remote controller to enter an operational input for the function to switch to a single-window screen. More specifically, the controller 27 is notified of the input information, namely, the single-window display request containing the identification information of the terminal 1c corresponding to the window 51C to be displayed on the single-window screen. The controller 27 identifies the terminal 1c based on the identification information contained in the single-window display request. The controller 27 sets the priority order item of the terminal 1c (PC-3) in the display status management file 34 to be the highest, thereby sending a window area split request to the window area information generator 41.

[0194] As a result, the multi-window screen is replaced with the single-window screen as shown in FIG. 19. The user may return to the multi-window screen by performing a predetermined operation on the remote controller to set the priority order to "none".

[0195] The switching to the single-window screen allows the user to recognize details, which are not visible in the contracted scale on the window. The ease of use is assured because the predetermined operation quickly returns the screen to the multi-window screen.

Insertion Function

[0196] As shown in FIG. 20, a new window may be inserted into a currently presented multi-window screen. Such an insertion corresponds to a display request subsequent to the display of a multi-window screen. The screen insertion is thus performed in the same process as in the display request process.

Erase Function

[0197] As shown in FIG. 21, one of the plurality of currently presented windows may be erased. The user operates the remote controller to enter an operational input for the erase function. More specifically, the input information, namely, an erase request containing the identification information of the terminal 1d corresponding to the window 51D to be erased is sent to the controller 27 through the user interface 24. The controller 27 identifies the terminal 1d based on the identification information contained in the erase request. The controller 27 deletes the terminal information of the terminal 1d from the display status management file 34, and sends a window area split request to the window area information generator 41. The subsequent process remains identical to the one already discussed. The window 50D designated for erasure is erased as shown in FIG. 21. The multi-window screen is reorganized so that a plurality of windows corresponding to the number of terminals subsequent to the erasure are presented. Alternatively, the window 51D designated for erasure may be merely erased.

[0198] The first preferred embodiment of the present invention provides the display system 100 having the multi-window screen presentation function in which the screens of the plurality of terminals 1 connected to the network are presented on the plurality of windows on the display screen of the display device 2. The processes required to perform the multi-window screen presentation function, i.e., the size conversion process and the color conversion process, are performed on the terminal

1. This arrangement dramatically reduces the workload on the display device 2, in comparison with the case in which the display device 2 performs the same processes on the captured image data sent from the terminal 1. Since the size conversion process and the color conversion process are performed by the terminal 1, the effect of an increase in the number of terminals 1 on processes to be performed by the display device 2 is minimized in the display system 100.

[0199] The workload on the network 3 is also reduced because the terminal 1 performs the size conversion process on the captured image data before the transmission of the captured image data to the display device 2 over the network 3.

[0200] The ease of use of the system 100 is assured because the expansion display function, the switching function to the single-window screen, the insertion function, and the erase function are available in addition to the multi-window screen presentation function.

[0201] The captured image data acquired in the terminal 1 is presented on the corresponding window on the display screen of the display device with the aspect ratio thereof maintained. The display screen of the display device is thus free from discordance.

[0202] Rather than updating the display screen each time the conference participant (the user) places the display request through the input section 23, the display device 2 itself updates the display screen thereof every three seconds, for example. In this case, the controller 27 in the display device 2 controls timings, thereby performing subsequent processes as described above at regular intervals. The constantly updated display screen of each terminal 1 is viewed on the display of the display device 2.

Difference Capture Function

[0203] The full-screen capture method and the partial-screen capture method have been described. The display system 100 also provides a method in which a change in the display screen on the terminal 1 is detected and image data obtained by capturing the change only is sent.

[0204] The user operates the remote controller of the input section 23 to enter an operational input to perform a difference capture on each of the terminals 1a-1d. More specifically, the difference capture management flag in the display status management file 34 is set to be "1".

[0205] For a first cycle of process immediately subsequent to the setting of the difference capture management flag to "1", steps S1-S20 are performed as described above to present the multi-window screen.

[0206] After the completion of the multi-window presentation, the controller 27 in the display device 2 sends a difference capture start command together with the display status management file 34 to the terminal 1 with the difference capture management flag thereof set to "1" through the communication unit 28 and the network 3.

[0207] The operation of the terminal 1 having received the difference capture start command and the display status management file 34 from the display device 2 will be discussed below.

[0208] FIG. 22 is a flow diagram illustrating the operation of terminal which has received the difference capture start command and the display status management file 34 from the display device 2. Here, the terminal of interest is the terminal 1a (PC-1).

[0209] The data management processor 18 in the terminal 1a receives, through the communication unit 17, the difference capture start command and the display status management file 34 sent by the display device 2 (step S41). The terminal 1a thus performs a subsequent full-screen capture process. More specifically, the screen capture processor 19 stores the content of the video memory 12 in the storage 15 (step S42). The image data obtained here is referred to as pre-full-screen data.

[0210] The screen comparison processor 20 references the difference capture management flag in the display status management file 34, received by the data management processor 18, at any regular intervals set (once every 0.5 second, for example) (step S43). If the difference capture management flag is "1" (step S44), a subsequent difference capture operation is performed.

[0211] To quit the difference capture operation, the user simply sets the difference capture management flag to "0" in the same way as the display status management file 34 is modified. The screen comparison processor 20 determines whether or not the capture operation is suspended, by referencing the difference capture management flag.

[0212] After performing the full-screen capture process, the screen capture processor 19 stores the content of the video memory 12 in the storage 15 (step S45). The image data obtained here is referred to as post-full-screen data. The screen comparison processor 20 in the controller 16 compares the pre-full-screen data with the post-full-screen data (step S46).

[0213] A screen comparison process is discussed in which a mouse pointer is moved (see FIG. 23). The mouse pointer changes the position thereof from pre-full-screen data 60 and post-full-screen data 61. As shown in FIG. 24, two areas 70 and 71 are recognized as being changed. The screen comparison processor 20 detects a change. If it is determined that there has been a change in the screen (step S47), the screen comparison processor 20 acquires image data of an area that has undergone a change, a size of the image data (the number of pixels in vertical and horizontal directions), and coordinates of an origin of the image data (absolute coordinates within the area defined by the captured image size in the display status management file 34).

[0214] In this case, the screen comparison processor

20 acquires, with respect to the area 70, captured image data of the area 70 (hereinafter referred to difference captured image data 1), a difference captured image size 1, and a difference capture origin 1, and with respect to the area 71, captured image data of the area 71 (hereinafter referred to difference captured image data 2), a difference captured image size 2, and a difference capture origin 2. The screen comparison processor 20 then stores these pieces of information in the storage 15 while notifying the data management processor 18 that the difference captured image data has been acquired (step S48). The difference captured image size 1, the difference captured image size 2, the difference capture origin 1, and the difference capture origin 2 are written on the respective portions thereof in the display status management file 34.

[0215] The data management processor 18 sends these pieces of data to the display device 2 through the communication unit 17 and the network 3 (step S49). The difference capture function is different from the full-screen capture and the partial-screen capture. More specifically, the difference capture function is performed not in response to the request to send received from the display device 2 but in response to the change in the screen detected by the screen comparison processor 20. The transmission operation of the captured image data is then performed.

[0216] The post-full-screen data is set to be pre-full-screen data for a subsequent screen comparison process (step S50).

[0217] The display device 2 then receives the difference captured image data 1, the difference captured image data 2, and the display status management file 34 from the terminal 1a. The operation of the display device 2 subsequent to the reception of these pieces of data will now be discussed.

[0218] Upon receiving the difference captured image data 1, the difference captured image data 2, and the display status management file 34 from the terminal 1a at the communication unit 28, the controller 27 transfers an image synthesis command to the image synthesizer 42. The display device 2 enters the image synthesis process in the difference capture function.

[0219] Upon receiving the image synthesis command, the image synthesizer 42 rewrites portions of the captured image data stored in the captured image data memory 37 corresponding to the difference captured image data 1 and the difference captured image data 2, based on the window area information file 36 corresponding to the image displayed on the display 21 and the display status management file 34 (the difference captured image size 1, the difference captured image size 2, the difference capture origin 1, and the difference capture origin 2) received from the terminal 1a. The process subsequent to this operation are identical to those in steps S19 and S20.

[0220] The amount of image data transmitted over the network 3 is smaller in the difference capture process than in the full-screen capture (or the partial-screen capture) process. The workload on the network 3 is thus reduced. The user constantly monitors an updated image of the terminal 1.

[0221] The above description of the difference capture process is based on the assumption that a dedicated program installed on the terminal 1 is used to capture the screen. If a driver for directly detecting a difference in the content of the video memory is available on the operating system (OS), such a driver may be used.

[0222] The image data may be exchanged in a compression standard format (such as JPEG) between the terminal 1 and the display device 2 to reduce the workload on the network 3.

[0223] In the above description, a variety of requests such as the display request and the single-window screen display request is performed by operating the input section 23 on the display device 2. In other words, the display device 2 has the initiative in the organization of the screen. Alternatively, each terminal 1 may have the initiative. The conference participant (the user) enters a desired operational input by operating the input section 13 on own terminal 1. The input information is transferred to the controller 16 through the user interface 14. The controller 16 in turn sends the request, including the terminal name and the IP address of own terminal 1, responsive to the input information to the display device 2 via the communication unit 17 and the network 3. The request is received by the communication unit 28 in the display device 2 through the network 3. The request is then transferred to the controller 27. The operation subsequent thereto remains the same as those already discussed. In this way, a variety of requests may be placed using the terminal 1.

[0224] The terminal 1 may designate the capture area by containing information, which designates the full-screen capture or the partial-screen capture, in the variety of requests.

[0225] The priority order may be designated by the user as necessary as described above. Alternatively, a plurality of terminals 1 which are scheduled to be connected to the display device 2 may be assigned beforehand priority order. If the terminals 1 are assigned beforehand the priority order, the priority assigned to each terminal 1 is automatically set in the priority item of the display status management file 34 when the terminal information is registered in the display status management file 34.

[0226] In the above description, the tentative window area is determined based on the tentative window area setting file 35. Alternatively, the tentative window area may be determined through calculation each time.

[0227] In the partial capture, the terminal 1 returns the image size to the display device 2. The display device 2 regenerates the true window area in response to the received image size. The regeneration of the true window area may be performed by the terminal 1.

Second Embodiment

[0228] FIG. 1 illustrates a network of a display system 100 including a network interactive display device 2 in accordance with preferred embodiments of the present invention.

[0229] The display system 100 includes a plurality of terminals (only four terminals 1a, 1b, 1c, and 1d are shown in FIG. 1), and the network interactive display device 2 (a projector here) having a multi-window screen presentation function as one of major functions of the present invention. The plurality of terminals 1 are respectively connected to the network interactive display device 2 through a network 3 in a two-way communication based on the TCP/IP protocol. A unique name is provided beforehand to each terminal 1 (hereinafter referred to as a terminal name). The network 3 may be any of a LAN (Local Area Network), a radio LAN, and a near-field communication radio LAN such as Bluetooth (Tradename of Bluetooth SIG Inc., U.S.A.).

[0230] The display system 100 allows screens presented on the plurality of terminals 1 to be concurrently presented on a multi-window display screen of the network interactive display device 2. Such a system 100 is useful in a conference or a presentation. The terminal 1 and the network interactive display device 2 will now be discussed in detail.

[0231] FIG. 26 is a block diagram illustrating the structure of the terminal 1 in accordance with a second preferred embodiment of the present invention.

[0232] The terminal 1 may be a personal computer or a PDA (Personal Digital Assistant). The terminal 1 includes a display 11 for presenting a diversity of information such as materials for presentation, a video memory 12 for storing the content to be presented on the display 11, an input section 13 including a tablet, a mouse, or a keyboard, a user interface 14 for detecting an operational input from the input section 13 and outputting the operational input to an arithmetic unit (CPU) 16, a storage 15 for storing application software programs (such as a control program) for performing the processes of the present invention, the arithmetic unit 16, and a communication unit 17.

[0233] The control program stored in the storage 15 is used to perform a terminal control function to achieve a multi-window screen presentation function on the network interactive display device 2, a screen capture function to capture a whole or a part of the screen of the display 11, an image conversion function to convert captured image data acquired by the screen capture function into data in a format of a display 21 of the network interactive display device 2, and a function to detect a change on the screen of the display 11. The application software programs and the CPU constitute a data management processor 18, a screen capture processor 19, and a screen comparison processor 20.

[0234] The data management processor 18 receives a variety of requests, including a connection request, a display request, an expansion display request, a request to switch to a single-window full screen, and an erase request through the user interface 14 or the communication unit 17, and performs processes responsive to each request. The data management processor 18 sends the captured image data, acquired by the image capture processor 19, to the display device 2 through the communication unit 17.

[0235] The communication unit 17 carries out a two-way communication with the network interactive display device 2. The communication protocol used here is the TCP/IP. The communication unit 17 has a protocol processing function for ARP/ICMP, IP, TCP, UDP, etc. required for the TCP/IP connection. This protocol processing function is carried out under the control of an OS.

[0236] FIG. 27 is a block diagram illustrating the structure of the network interactive display device 2 of the second preferred embodiment.

[0237] The display device 2 includes the display 21, a display control unit 22 which has a multi-window screen presentation function, an expansion display function, a function to switch to the single-window full screen, an insertion function, and an erase function, and controls the display screen to be presented on the display 21, an input section 23 including a remote controller, a mouse, or a keyboard, a user interface 24 for detecting an operational input from the input section 23 and for outputting the operational input to an arithmetic unit 27 to be discussed later, a program storage 25 for storing the display control program to provide the multi-window screen presentation function of the present invention, a data storage 26 for storing a variety of files and data required to carry out a control program, the arithmetic unit (CPU) 27 for generally controlling the display device 2, and a communication unit 28 for performing a two-way communication with each terminal 1.

[0238] The communication unit 28 carries out a two-way communication with the terminal 1. The communication protocol used here is the TCP/IP. The communication unit 28 has a protocol processing function for ARP/ICMP, IP, TCP, UDP, etc. required for the TCP/IP connection.

[0239] The display device 2 may be a plasma display, or a liquid-crystal display instead of the projector shown in FIG. 1. The display 21 is different depending on the type of the display device 2. Specifically, the display 21 is one of a liquid-crystal light valve, an LCoS light valve, or a DMD (Digital Micromirror Device) (Trademark of Texas Instruments) in the projector. The display screen of the video memory 12 becomes a projecting screen. The display 21 is a plasma display panel in the plasma display device, a liquid-crystal panel in the liquid-crystal display device, or an organic EL (Electroluminescent) panel in the organic EL display device.

[0240] Referring to FIG. 28, a variety of files stored in the data storage 25 are discussed.

[0241] The data storage 26 stores a permitted connection management file 31, a permitted display man-

agement file 32, a connection status management file 33, a display status management file 34, a tentative window area setting file 35, and a window area information file 36. The data storage 26 further includes a captured image data memory 37 for storing the captured image data sent from each terminal 1.

[0242] The permitted connection management file 31 registers a terminal name of a terminal 1 which is permitted for connection. The permitted display management file 32 registers a terminal name of a terminal 1 which is permitted for screen display.

[0243] The connection status management file 33 registers a terminal name of a terminal 1 which is currently connected to the display device 2.

[0244] The display status management file 34 manages a display status of the current display 21. The display status management file 34 manages, in a table form, terminal information relating to the terminal 1 that is a source of the captured image data currently presented on the display screen of the display 21. The display status management file 34 is updated each time the display screen of the display 21 is modified. For example, if the display screen is switched from a four-window screen to a three-window screen, terminal information of the terminal 1 corresponding to an erased window is deleted. If the display screen is switched from a four-window screen to a five-window screen, terminal information of the terminal 1 corresponding to an added window is newly registered.

[0245] FIG. 5 illustrates items of terminal information managed in the display status management file 34.

[0246] The display status management file 34 contains, as items thereof, a "terminal name", an "IP address", a "screen size", "color count information", "priority", a "capture area management flag", a "difference capture management flag", a "captured image size", a "difference captured image size 1", a "difference captured image size 2", a "difference capture origin 1", and a "difference capture origin 2".

[0247] The "terminal name" is a name provided beforehand to the terminal 1. The "screen size" is the number of pixels in the vertical and horizontal directions of the display screen of the display 11. For example, an SXGA terminal has 1280x1024 pixels, and an XGA terminal has 1024x768 pixels. The "color count information" represents the number of display colors of the display 11, and may be 256 colors, or 167,777,216 colors, for example. The terminal name, the IP address, the screen size, and the color count information are the items that must be stored in the display status management file 34 during a registration. Other items are set (updated) by the user as necessary.

[0248] The "priority" determines the size of the display size of each window assigned to the terminal 1 that is identified by the terminal name. The priority order takes "highest", "high" or "none". As will be discussed in detail, the display size having a high priority order becomes large. The "capture area management flag" manages the capture as to whether the screen of the terminal 1 identified by the terminal name is captured in a full-screen capture mode or a partial-screen capture mode. The capture area management flag is "0" in the full-screen capture mode, which is a standard mode, or "1" in the partial-screen capture mode.

[0249] The "difference capture management flag" manages the capture of whether the screen of the terminal 1 identified by the terminal name is captured in a normal capture mode or a change capture mode (hereinafter referenced to as a difference capture mode) for only a change on the display screen. The difference capture management file is "0" in the normal capture mode, or "1" in the difference capture mode.

[0250] The "captured image size" is the size of the captured image data (the number of pixels in the vertical and horizontal directions) when the capture area management flag is "1", i.e., in the partial-screen capture mode.

[0251] The "difference captured image size 1" and the "difference captured image size 2" represent the sizes of two different areas acquired in the difference capture when the difference capture management flag is "1". The "difference capture origin 1", and the "difference capture origin 2" are the origins of the two different areas acquired in the difference capture, and are the absolute coordinates within an area defined by the captured image size.

[0252] The tentative window area setting file 35 is a file in which information identifying a tentative window area assigned to the terminal 1 is set beforehand. The tentative window area setting file 35 contains a plurality of tables, each table prepared for the terminals. The table has a structure as shown in FIG. 11A and FIG. 16A. The table will be discussed later. The window area information file 36 will also be discussed later.

[0253] When a predetermined operation is performed on the input section 23, the display 21 displays the contents of the files 31, 32, 33, 34, 35, and 36. The user thus checks and modifies the data on the display screen at will.

[0254] Returning to FIG. 28, the display control unit 22 includes a window area information generator 41, an image synthesizer 42, and an image processor 43. The arithmetic unit 27 receives a variety of requests such as the connection request, the display request, the insertion display request, the erase request, etc., received through the user interface 24 or the communication unit 28. In response to these requests, under the control of the arithmetic unit 27, the processors 41, 42, and 43 respectively perform required processes while accessing necessary files in the data storage 26. The arithmetic unit 27 thus controls the display 21. A display control program, stored in the program storage 25, for providing a multi-window screen presentation function and the arithmetic unit (CPU) 27 constitute the display control unit 22.

[0255] From the display status management file 34,

the window area information generator 41 learns the number of terminals 1 to be presented, and the priority order and the screen size of each terminal 1. The window area information generator 41 splits the display screen size of the display 21 in accordance with the number of terminals 1 to be presented, and the priority order and the screen size of each terminal 1. The window area information generator 41 generates the window area information containing display size (hereinafter referred to as a window area size) of the window on the display 21 assigned to each terminal 1 to be displayed, and information identifying the display position of the window (the absolute coordinates at the top left corner of the window with respect to the display screen, hereinafter also referred to as an origin). The information is stored in the data storage 26 as the window area information file 36.

[0256] The image synthesizer 42 performs various processes including a contraction process, an expansion process, and a color conversion process on the captured image data stored in the captured image data memory 37, and then synthesizes the captured image data in accordance with the window area information file 36 generated in the window area information generator 41.

[0257] The image processor 43 performs a scanning frequency conversion process on a variety of pieces of image data such as the synthesized image data generated in the image synthesizer 42, and the display status management file 34 of the data storage 26 which is referenced using an OSD (on-screen display) function, thereby generating display image data and outputting the display image data to the display 21. The image processor 43 includes a scan converter, for example.

[0258] The operation of the second preferred embodiment of the present invention will now be discussed. FIG. 29 is a flow diagram illustrating the operation of the second preferred embodiment.

[0259] A predetermined operational input is entered in the input section 23 in the display device 2 in a preliminary step for multi-window screen presentation. Upon detecting the operational input through the user interface 24, the arithmetic unit 27 broadcasts a request to return a terminal name and an IP address together with the IP address of the display device 2 through the communication unit 28 and the network 3. When each terminal 1 receives the broadcast request to return the terminal name and the IP address, the terminal 1 returns own terminal name and IP address to the display device 2.

[0260] The display device 2 receives a reply (the terminal name and the IP address) from each terminal 1 through the communication unit 28, and determines whether each terminal is a connection permitted terminal. Specifically, the display device 2 determines whether the returned terminal name agrees with a terminal name registered in the permitted connection management file 31. If it is determined that the returned terminal name agrees with the registered terminal name, the display device 2 handles the terminal 1 as a connection permitted terminal.

[0261] The terminal names and the IP addresses of the terminals 1 determined as connection permitted terminals are successively registered in the connection status management file 33. The connection status management file 33 allows the display device 2 to learn how many terminals 1 are currently connected. Since the determination of whether the connection is permitted or not is based on the terminal name, the system works even if the IP address, provided to the terminal 1 using the DHCP, becomes different each time connection is made.

[0262] The display device 2 waits on standby for any request after the above preliminary step is complete. The display screens of the four terminals 1a-1d, out of the terminals 1 operated by conference participants, are presented on a multi-window display screen 50 of the display device 2. As for the resolutions thereof, the terminal 1a has an SXGA resolution (1280x1024 pixels), the terminal 1 has an SVGA resolution (800x600 pixels), the terminal 1c has an XGA resolution (1024x768 pixels), and the terminal 1d has a resolution of 480x640 pixels.

Multi-Window Screen Presentation Function

[0263] FIG. 8 illustrates the configuration of the display system in which display screens of four terminals 1a-1d are presented on the display screen of the display device 2.

[0264] The user operates the remote controller in the input section 23 to enter an operational input to display the screens of the terminals 1a-1d. Through the user interface 24, the arithmetic unit 27 is notified of the input information, namely, a request to display the screens of the terminals 1a-1d together with identification information of the terminals 1a-1d (step S1). When the request is placed, the priority order, the partial capture, and the difference capture may be designated. Here, no particular designation is performed.

[0265] Upon receiving the display request, the arithmetic unit 27 in the display device 2 performs processes in steps S3-S9 for each of the terminals 1a-1d to be displayed (step S2). The arithmetic unit 27 references the permitted connection management file 31 and the permitted display management file 32 according to the terminal name indicated by the identification information contained in the display request, thereby determining whether or not each terminal 1 is permitted for connection and whether or not each terminal 1 is permitted for display (step S3). If it is determined that each terminal 1 is permitted for both connection and display (step S4), the arithmetic unit 27 requests, through the communication unit 28, each terminal 1 to send the terminal information (the terminal name, the IP address, the screen size, and the color count information) (step S5). The

arithmetic unit 27 receives the terminal information which has been sent in response to the request (step S6), and registers the terminal information in the display status management file 34 (step S7). If the priority order, the partial capture, and the difference capture are designated during the placement of the display request, the priority order, the capture area management flag, and the difference capture management flag are also registered in the registration in step S7.

[0266] The arithmetic unit 27 sends the display status management file 34 and a screen capture start command to the terminal 1 which is permitted for connection and display (step S8). When any terminal 1 is not permitted for connection and display, the arithmetic unit 27 sends a notification to that effect to the terminal 1 (step S9).

[0267] If all four terminals 1a-1d are permitted for connection and display, the terminal information from the terminals 1a-1d is registered in the display status management file 34 in the processes in steps S2-S9. At the same time, the screen capture start command is sent together with the display status management file 34 to each of the terminals 1a-1d through the communication unit 28.

[0268] Subsequent to the above processes, the arithmetic unit 27 notifies the window area information generator 41 in the display control unit 22 of a window area split request. The display device 2 enters a window area information generation process (step S10). The operation of the terminal 1 having received the screen capture start command will be discussed later. Discussed first is the window area information generation process performed by the window area information generator 41 in response to the window area split request.

[0269] FIG. 9 is a flow diagram illustrating the flow of a window area information generation process. The operation of the window area information generator 41 is specifically discussed on the assumption that the display status management file 34 is constructed as shown in FIG. 10. As shown in FIG. 10, terminal names PC-1, PC-2, PC-3, and PDA-1 correspond to the terminals 1a, 1b, 1c, and 1d, respectively.

[0270] Upon receiving the window area split request from the arithmetic unit 27, the window area information generator 41 learns the number of the terminals 1 to be displayed (here, four terminals 1) referencing the display status management file 34. The user interface 14 also acquires the priority order of each of the terminals 1a-1d (step S21). The window area information generator 41 references the tentative window area setting file 35 according to the number of terminals 1 and the priority order of each of the terminals 1a-1d, and acquires a tentative size and a tentative origin of each tentative window area assigned to each of the terminals 1a, 1b, 1c, and 1d (step S22). As will be clarified later, the adjective "tentative" is used because the area window here assigned to the terminal 1 is updated in a later step to size convert the captured image data.

[0271] As shown in FIG. 10, the four terminals 1 are to be displayed here and no priority order is set to all of the four terminals 1. A tentative area setting table in the tentative window area setting file 35 is organized as shown in FIG. 11A. Here, the display screen of the display 21 has a resolution of 1280x1024 (SXGA), and the tentative area setting table shown in FIG. 11A is organized based on this display screen. FIG. 11B shows the tentative window area based on the table window area setting table shown in FIG. 11A.

[0272] The priority order shown in FIG. 11A is determined based on the "priority" item in the display status management file 34, and the terminals 1 are first, second, third, and fourth in from the high order to the low order. The terminals 1 are assigned the "tentative size" and the "tentative origin" for the tentative window area in the lower table. All the terminals 1a-1d have "none" in the priority order row with no priority order set therefor (see FIG. 10). If no priority order is set, the order of assignment may be a predetermined one, or may be the order of registration to the display status management file 34. In the second preferred embodiment, the terminals 1a, 1b, 1c, and 1d (hereinafter referred to as the terminal names PC-1, PC-2, PC-3, and PDA-1 as appropriate) are assigned tentative window areas 50A, 50B, 50C, and 50D in that order.

[0273] The window area information generator 41 further acquires the screen sizes of the PC-1, PC-2, PC-3, and PDA-1 from the display status management file 34 (see FIG. 10), and determines the sizes and origins of true windows respectively assigned thereto based on the acquired screen sizes (step S23).

[0274] FIG. 12 illustrates the true window area size and the true origin. As shown, 51A, 51B, 51C, and 51D represent the true window areas assigned to the PC-1, PC-2, PC-3, and PDA-1, respectively. The captured image data to be displayed on the tentative window area is size converted with the aspect ratio thereof maintained. The true window areas are display areas of the tentative window areas 50A, 50B, 50C, and 50D in which the converted images are respectively displayed with the centers thereof aligned to be centered on the respective tentative window areas. The PC-2 is now specifically discussed in connection with the true window area size to determine the true window area. The screen size of the PC-2 is 1024x768 pixels (see FIG. 10). The image data of this size is contracted with the aspect ratio thereof (namely, the aspect ratio of the display screen of the display 11) maintained so that the image data is displayed within the window area 50B having the size of 640x512 pixels assigned to the PC-2. The contracted size is thus the true window area size. The true origin is used to place the window of that size at the center of the window area 50B as shown in FIG. 12, and is represented in pixel coordinates at the top left corner of the window (the absolute coordinates with respect to the entire display screen).

[0275] The window area information generator 41 de-

termines the above-referenced true window area sizes and true origins for the PC-1, PC-2, PC-3, and PDA-1, and generates window area information containing the terminal name item, the window area item, and the origin item as shown in FIG. 13, and then stores the window area information in the data storage 26 as the window area information file 36 (step S24). The window area information generation process thus ends. The window area information file 36 is tagged with processing date (May 21, 2002, 17:00:32, for example).

[0276] Returning to FIG. 29, the arithmetic unit 27 in the display device 2 performs processes in steps S12-S14 to each of the terminals 1a, 1b, 1c, and 1d to be displayed (step S11) when the window area information generator 41 completes the window area information generation process (step S10). More specifically, the arithmetic unit 27 places a request to send the captured image data (step S12). Each of the terminals 1a, 1b, 1c, and 1d has already started the image capture process after receiving the capture start command transmitted from the display device 2 in step S8. The captured image data acquired in the screen capture process and the image size (in the partial capture process) are sent to the display device 2 in response to the request to send the captured image data in step S11

[0277] The display device 2 receives the reply from the terminal 1 (step S13). If the rely is the captured image data, the display device 2 determines that the screen capture performed by the terminal 1 is the full-screen capture (step S14), and the received captured image data is written onto the captured image data memory 37 (step S16).

[0278] If the reply from the terminal 1 received in step S13 contains the captured image data and the image size, the arithmetic unit 27 determines the screen capture performed by the terminal 1 is a partial-screen capture (step S14). The captured image size in the display status management file 34 is updated with the received image size. The arithmetic unit 27 regenerates the window area information (the true window area size and the true origin) based on the received image size (step S15). The arithmetic unit 27 writes the received captured image data together with the image size on the captured image data memory 37 (step S16).

[0279] The above process is performed for each of the terminals 1a-1d. When the captured image data is received from the terminals 1a-1d the arithmetic unit 27 sends an image synthesis command to the image synthesizer 42. The display device 2 enters the image synthesis process (step S17).

[0280] Upon receiving the image synthesis command, the image synthesizer 42 performs the size conversion process and the color conversion process on the captured image data stored in the captured image data memory 37 based on the window area information in the window area information file 36 and the color count information in the display status management file 34. The image synthesizer 42 then the captured image data into a single screen image data, thereby generating the synthesized image data. The synthesized image data is then output to the image processor 43.

[0281] The image processor 43 converts the synthesized data from the image synthesizer 42 in display image data having a scanning frequency of the display 21. The display image data is then output to the display 21. As shown in FIG. 8, a multi-window display is thus present on the display screen 50 in which the captured image data (display screen) of the terminals 1a, 1b, 1c, and 1d is presented on the true window areas (hereinafter also referred to as window screens) of 51A, 51B, 51C, and 51D (step S18).

[0282] The operation of the terminal 1 having received the capture start command and the display status management file 34 from the display device 2 is discussed below.

[0283] FIG. 30 is a flow diagram of an operation of the terminal 1 which has received the capture start command and the display status management file 34 from the display device 2. The terminal 1 is here 1a (PC-1).

[0284] The data management processor 18 in the terminal 1a receives, through the communication unit 17, the capture start command and the display status management file 34 sent from the display device 2 (step S31). The data management processor 18 references the capture area setting flag in the terminal 1a in the display status management file 34 (step S32). Since the capture area setting flag is "0" (step S33), the full-screen capture is determined to be activated. The data management processor 18 sends a full-screen capture command to the screen capture processor 19. In response to the full-screen capture command, the screen capture processor 19 stores the content of the video memory 12 (i.e., the content currently displayed on the display screen of the display 11) in the storage 15 in a bit-map format (the full-screen capture process) (step S34). The image capture processor 19 notifies the data management processor 18 of the completion of the screen capture process.

[0285] If the capture area setting flag is "1" in step S33, a partial capture is determined to be activated. A capture area designation screen indicating a message saying "designate a capture area" is presented on the display 11 (step S35), and a partial capture command is sent to the screen capture processor 19. When the user, who reads the message on the capture area designation screen, selects a window or encloses a desired area using the input section 13, the screen capture processor 19 recognizes the user operation through the user interface 14. The image data on the video memory 12 corresponding to the designated area and the image size is stored in the storage 15 (the partial capture process) (step S36). The image capture processor 19 notifies the data management processor 18 of the completion of the screen capture process.

[0286] Upon receiving the capture start command, the terminal 1a performs the screen capture process. Mean-

while, the display device 2 performs the window area information generation process as already described. The terminal 1a sends the captured image data and the image size (in the partial capture) to the display device 2 through the communication unit 17 (step S38) after the screen capture processor 19 completes the screen capture process and the request to send the captured image data is received from the display device 2 (step S37).

[0287] The above-referenced process is similarly performed on each of the remaining terminals 1b 1c, and 1d in addition to the terminal 1a. As a result, the display device 2 receives, from each of the terminals 1a, 1b 1c, and 1d, the captured image data and the image size (in the partial capture process).

[0288] Each terminal 1 receives the display status management file 34 from the display device 2. The display status management file 34 is used to check the status of the capture area setting flag of own terminal 1. Furthermore, the content of the file may be displayed on the display 11 by performing a predetermined operation on the input section 13. The permitted connection management file 31, the permitted display management file 32, and the connection status management file 33 may also be acquired from the display device 2 as necessary to be presented on the display 11. In this way, the user may learn what terminals are displayed other than own terminal operated by the user himself and the range of authority granted to own terminal 1.

Expansion Display Function

[0289] The expansion display function for expanding any one of a plurality of currently presented windows is discussed below. The expansion display function is performed by updating the priority order in the above-referenced arrangement.

[0290] FIG. 15 diagrammatically illustrates the display system to explain the expansion display function. The screen of the terminal 1a is expanded by heightening the priority order of the terminal 1a.

[0291] The screen of the terminal 1a is designated by operating the remote controller. If the terminal 1a is assigned any key in the remote controller, the user designates the terminal 1a by pressing that key. If no particular key is assigned, the user may operate the remote controller to select the terminal 1a on a menu screen on the display 21, or may click the screen of the terminal 1a with a pointer on the display screen using the remote controller.

[0292] Designation information input in this way, i.e., the expansion display request containing the identification information of the terminal 1a, is sent to the arithmetic unit 27 through the user interface 24. The arithmetic unit 27 identifies the terminal 1a based on the identification information contained in the expansion display request. The arithmetic unit 27 sets the priority order of the terminal 1a (PC-1) in the display status management file 34 to be "highest", and sends a window area split request to the window area information generator 41.

[0293] The window area information generator 41 generates the window area information file 36 as already described. The tentative window area setting table, which is referenced in the generation of the window area information file 36, is organized as illustrated in FIG. 16A. FIG. 16B shows tentative window areas based on the tentative window area setting table. The priority order illustrated in FIG. 16B is determined based on the priority order in the display status management file 34. The priority order of the terminal 1a is higher than those of the remaining terminals 1b 1c, and 1d. The terminal 1a is thus assigned the tentative window area 52A (the window area for the first terminal) having the first priority in FIG. 16B. The assignment of the window areas to the remaining terminals 1b, 1c, and 1d having no priority order set therefor is arbitrary. For example, the terminals 1b, 1c, and 1d are now assigned the window areas 52B, 52C, and 52D, respectively. As already described, the true window areas to be assigned to the terminals 1b, 1c, and 1d are determined.

[0294] FIG. 17 illustrates the true window areas. The terminals 1a, 1b, 1c, and 1d are assigned the true window areas 53A, 53B, 53C, and 53D, respectively. The window area information file 36 is then organized as illustrated in FIG. 18.

[0295] As already described, the captured image data (display screen) of the terminals 1b, 1c, and 1d appears on the true window areas 53A, 53B, 53C, and 53D, respectively. The designated window 53A is shown in the expanded state on the multi-window screen 50 as shown in FIG 15.

Function to Switch to Single-Window Screen

[0296] One of the plurality of multi windows is shown on a single-window screen as shown in FIG. 19. The user operates the remote controller to enter an operational input for the function to switch to a single-window screen. More specifically, the arithmetic unit 27 is notified of the input information, namely, the single-window display request containing the identification information of the terminal 1c corresponding to the window 51C to be displayed on the single-window screen, through the user interface 24. The arithmetic unit 27 identifies the terminal 1c based on the identification information contained in the single-window display request. The arithmetic unit 27 sets the priority order item of the terminal 1c (PC-3) in the display status management file 34 to be the highest, thereby sending a window area split request to the window area information generator 41.

[0297] As a result, the multi-window screen is replaced with the single-window screen as shown in FIG. 19. The user may return to the multi-window screen by performing a predetermined operation on the remote controller to set the priority order to "none".

[0298] The switching to the single-window screen allows the user to recognize details, which are not visible in the contracted scale on the window. The ease of use is assured because the predetermined operation quickly returns the screen to the multi-window screen.

Insertion Function

[0299] As shown in FIG. 20, a new screen may be inserted into a currently presented multi-window screen. Such an insertion corresponds to a display request subsequent to the display of a multi-window screen. The screen insertion is thus performed in the same process as in the display request process.

Erase Function

[0300] As shown in FIG. 21, one of the plurality of currently presented windows may be erased. The user operates the remote controller to enter an operational input for the erase function. More specifically, the input information, namely, an erase request containing the identification information of the terminal 1d corresponding to the window 51D to be erased is sent to the arithmetic unit 27 through the user interface 24. The arithmetic unit 27 identifies the terminal 1d based on the identification information contained in the erase request. The arithmetic unit 27 deletes the terminal information of the terminal 1d from the display status management file 34, and sends a window area split request to the window area information generator 41. The subsequent process remains identical to the one already discussed. The window 50D designated for erasure is erased as shown in FIG. 21. The multi-window screen is reorganized so that a plurality of windows corresponding to the number of terminals subsequent to the erasure are presented. Alternatively, the window 51D designated for erasure may be merely erased.

[0301] In accordance with the second preferred embodiment, the screens respectively presented on the plurality of terminals 1 connected to the network 3 are presented on the display of the display device 2 having the multi-window screen presentation function.

[0302] Since the expansion display function, the switching function to the single-window screen, the insertion function, and the erase function are available in addition to the multi-window screen presentation function, a sophisticated display device 2 is provided.

[0303] The size conversion is performed with the aspect ratio of the captured image data maintained when a multi-window screen is presented. The display device 2 thus presents a display screen free from discordance.

[0304] Rather than updating the display screen each time the conference participant (the user) places the display request through the input section 23, the display device 2 itself updates the display screen thereof every three seconds, for example. In this case, the arithmetic unit 27 in the display device 2 controls timings, thereby performing subsequent processes as described above at regular intervals. The display screen of each terminal 1 is constantly updated.

Difference Capture Function

[0305] The full-screen capture method and the partial-screen capture method have been described. The display system 100 also provides a method in which a change in the display screen on the terminal 1 is detected and image data obtained by capturing the change only is sent.

[0306] The user operates the remote controller of the input section 23 to enter an operational input to perform a difference capture on each of the terminals 1a-1d. More specifically, the difference capture management flag in the display status management file 34 is set to be "1".

[0307] For a first cycle of process subsequent to the setting of the difference capture management flag to "1", steps S1-S18 are performed as described above to present the multi-window screen.

[0308] After the completion of the multi-window presentation, the arithmetic unit 27 in the display device 2 sends a difference capture start command together with the display status management file 34 to the terminal 1, having the difference capture management flag set to "1", through the communication unit 28 and the network 3.

[0309] The operation of the terminal 1 having received the difference capture start command and the display status management file 34 from the display device 2 will be discussed below.

[0310] FIG. 22 is a flow diagram illustrating the operation of terminal which has received the difference capture start command and the display status management file 34 from the display device 2. Here, the terminal is the terminal 1a (PC-1).

[0311] The data management processor 18 in the terminal 1a receives, through the communication unit 17, the difference capture start command and the display status management file 34 sent by the display device 2 (step S41). The terminal 1a thus performs a subsequent full-screen capture process. More specifically, the screen capture processor 19 stores the content of the video memory 12 in the storage 15 (step S42). The image data obtained here is referred to as pre-full-screen data.

[0312] The screen comparison processor 20 references the difference capture management flag in the display status management file 34, received by the data management processor 18, at any regular intervals set (once every 0.5 second, for example) (step S43). If the difference capture management flag is "1" (step S44), a subsequent difference capture operation is performed.

[0313] To quit the difference capture operation, the user simply sets the difference capture management flag to "0" in the same way the display status manage-

ment file 34 is modified. The screen comparison processor 20 determines whether or not the capture operation is suspended, by referencing the difference capture management flag.

[0314] After performing the full-screen capture process, the screen capture processor 19 stores the content of the video memory 12 in the storage 15 (step S45). The image data obtained here is referred to as post-full-screen data. The screen comparison processor 20 in the controller 16 compares the pre-full-screen data with the post-full-screen data (step S46).

[0315] A screen comparison process is discussed in which a mouse pointer is moved (see FIG. 23). The mouse pointer changes the position thereof from pre-full-screen data 60 and post-full-screen data 61. As shown in FIG. 24, two areas 70 and 71 are recognized as being changed. The screen comparison processor 20 detects a change. If it is determined that there has been a change in the screen (step S47), the screen comparison processor 20 acquires image data of an area that has undergone a change, a size of the image data (the number of pixels in vertical and horizontal directions), and coordinates of an origin of the image data (absolute coordinates within the area defined by the captured image size in the display status management file 34).

[0316] In this case, the screen comparison processor 20 acquires, with respect to the area 70, captured image data of the area 70 (hereinafter referred to difference captured image data 1), a difference captured image size 1, and a difference capture origin 1, and with respect to the area 71, captured image data of the area 71 (hereinafter referred to difference captured image data 2), a difference captured image size 2, and a difference capture origin 2. The screen comparison processor 20 then stores these pieces of information in the storage 15 while notifying the data management processor 18 that the difference captured image data has been acquired (step S48). The difference captured image size 1, the difference captured image size 2, the difference capture origin 1, and the difference capture origin 2 are written on the respective portions thereof in the display status management file 34.

[0317] The data management processor 18 sends these pieces of data to the display device 2 through the communication unit 17 and the network 3 (step S49). The difference capture function is different from the full-screen capture and the partial-screen capture. More specifically, the difference capture function is performed not in response to the request to send received from the display device 2 but in response to the change in the screen detected by the screen comparison processor 20. The transmission operation of the captured image data is then performed.

[0318] The post-full-screen data is set to be pre-full-screen data for a subsequent screen comparison process (step S50).

[0319] The display device 2 then receives the difference captured image data 1, the difference captured image data 2, and the display status management file 34 from the terminal 1a. The operation of the display device 2 subsequent to the reception of these pieces of data will now be discussed.

[0320] Upon receiving the difference captured image data 1, the difference captured image data 2, and the display status management file 34 from the terminal 1a at the communication unit 28, the arithmetic unit 27 transfers an image synthesis command to the image synthesizer 42. The display device 2 enters the image synthesis process in the difference capture function.

[0321] Upon receiving the image synthesis command, the image synthesizer 42 rewrites portions of the captured image data stored in the captured image data memory 37 corresponding to the difference captured image data 1 and the difference captured image data 2, based on the window area information file 36 corresponding to the image displayed on the display 21 and the display status management file 34 (the difference captured image size 1, the difference captured image size 2, the difference capture origin 1, and the difference capture origin 2) received from the terminal 1a. The process subsequent to this operation are identical to those in steps S17 and S18.

[0322] The amount of image data transmitted over the network 3 is smaller in the difference capture process than in the full-screen capture (or the partial-screen capture) process. The workload on the network 3 is thus reduced. The user constantly monitors an updated image of the terminal 1.

[0323] The above description of the difference capture process is based on the assumption that a dedicated program installed on the terminal 1 is used to capture the screen. If a driver for directly detecting a difference in the content of the video memory is available on the operating system (OS), such a driver may be used.

[0324] The image data may be exchanged in a compression standard format (such as JPEG) between the terminal 1 and the display device 2 to reduce the workload on the network 3.

[0325] In the above description, a variety of requests such as the display request and the single-window screen presentation request is performed by operating the input section 23 on the display device 2. In other words, the display device 2 has the initiative in the organization of the screen. Alternatively, each terminal 1 may have the initiative. The conference participant (the user) enters a desired operational input by operating the input section 13 on own terminal 1. The input information is transferred to the data management processor 18 through the user interface 14. The data management processor 18 in turn sends the request, including the terminal name and the IP address of own terminal 1, responsive to the input information to the display device 2 via the communication unit 17 and the network 3. The request is received by the communication unit 28 in the display device 2 through the network 3. The request is

then transferred to the arithmetic unit 27. The operation subsequent thereto remains the same as those already discussed. In this way, a variety of requests may be placed on the terminal 1.

[0326] The terminal 1 may designate the capture area by containing information, which designates the full-screen capture or the partial-screen capture, in the variety of requests.

[0327] The priority order may be designated by the user as necessary as described above. Alternatively, a plurality of terminals 1 which are scheduled to be connected to the display device 2 may be assigned beforehand priority order. If the terminals 1 are assigned beforehand the priority order, the priority assigned to each terminal 1 is automatically set in the priority item of the display status management file 34 when the terminal information is registered in the display status management file 34.

[0328] In the second preferred embodiment, the tentative window area is determined based on the tentative window area setting file 35. Alternatively, the tentative window area may be determined through calculation each time.

Claims

1. A display system comprising:

a plurality of terminals, each terminal having a screen capture function, and sending image data, captured using the screen capture function, over a network; and
a network interactive display device, including a display, receiving the captured image data transmitted from the terminal through the network, and having a multi-window screen presentation function for synthesizing the captured image data into single screen multi-window format data to be displayed on a display screen of the display,

wherein, as processes required to present the single screen multi-window format data on the display screen of the display of the network interactive display device, the terminal performs a size conversion process of an image size of the image data captured using the screen capture function and the network interactive display device acquires the captured image data subsequent to the size conversion thereof from the terminal, and synthesizes the received captured image data.

2. A display system according to claim 1, wherein the network interactive display device divides the display screen of the display into windows of the number equal to the number of terminals to be displayed, determines a display size of the window assigned to each terminal to be displayed, and sends information of the display size to the terminal, and wherein the terminal performs the size conversion process on the image size of the captured image data to the received display size when the terminal receives the display size.

3. A display system according to claim 1, wherein, in addition to the size conversion process on the image data captured using the screen capture function, the terminal further performs a color conversion process on the captured image data in accordance with a color count of the display of the network interactive display device before sending the captured image data to the network interactive display device.

4. A display system according to claim 3, wherein the network interactive display device also sends the color count of own display to the terminal when sending the display size to the terminal, while the terminal performs the color conversion process in response to the color count received from the network interactive display device.

5. A network interactive display device connected to each of a plurality of terminals through a network, each terminal having a screen capture function, the network interactive display device comprising:

a display;
a communication unit for communicating in a two-way fashion with each of the terminals; and
a display control unit,

wherein the communication unit receives the image data which has been captured by each terminal through the screen capture function thereof, and which has been size converted to a predetermined image size by each terminal, and the display control unit has a multi-window screen presentation function for synthesizing the captured image data received by the communication unit into single screen multi-window format data to be displayed on a display screen of the display.

6. A network interactive display device according to claim 5, wherein the display control unit has an insertion function for inserting a new window into a current display screen to display the new window.

7. A network interactive display device according to one of claims 5 and 6, wherein the terminal that provides the captured image data to be displayed on the display screen of the display is selected in a two-way communication of the communication unit by one of the network interactive display device and the terminal.

8. A network interactive display device according to one of claims 5, 6 and 7, wherein the display control unit has an expansion display function for expanding a predetermined window from among a plurality of windows forming a multi-window screen displayed on the display screen of the display.

9. A network interactive display device according to one of claims 5, 6 and 7, wherein the display control unit has a single-window screen selection function for switching the display screen from a predetermined window from among a plurality of windows forming a multi-window screen displayed on the display screen of the display to a single-window full screen.

10. A network interactive display device according to one of claims 5, 6 and 7, wherein the display control unit has an erase function for erasing a predetermined window from among a plurality of windows forming a multi-window screen displayed on the display screen of the display.

11. A network interactive display device according to claim 10, wherein the predetermined window is selected by one of the network interactive display device and the terminal in a two-way communication of the communication unit thereof.

12. A network interactive display device according to one of claims 5 to 11, wherein the image captured data received from the terminal is obtained by designating the whole or a portion of the display screen of the terminal.

13. A network interactive display device according to one of claims 5 to 11, wherein the captured image data received from the terminal is obtained by detecting and capturing only a change on the display screen of the terminal.

14. A network interactive display device according to one of claims 5 to 13, further comprising a display size determining unit that divides the display screen of the display into windows of the number equal to the number of terminals to be displayed, and determines a display size of the window to which the terminal to be displayed is assigned, and a controller that sends the display size determined by the display size determining unit to the corresponding terminal through the communication unit, wherein the controller receives, through the communication unit, the captured image data, having the converted size equal to the display size of the window assigned to the terminal, from the terminal to which the display size is sent, and controls the display control unit to synthesize the received captured image data into single screen multi-window format data to be displayed on the display screen of the display.

15. A network interactive display device according to claim 14, wherein an aspect ratio of the window assigned to the terminal to be displayed is equalized to an aspect ratio of the display screen of the display of the terminal.

16. A network interactive display device according to one of claims 5 to 15, wherein, through the communication unit, the controller also sends a display color count of the display to the terminal when sending the display size to the terminal, and receives the captured image data having the converted size equal to the display size of the window assigned to the terminal and having the display color count converted to the display color count of the display of the network interactive display device, from the terminal to which the display size and the display color count have been sent, and controls the display control unit to synthesize the received captured image data into single screen multi-window format data to be displayed on the display screen of the display.

17. A terminal connected to a network interactive display device according to one of claims 5 to 16 a network, the terminal comprising:

a display;
a communication unit that communicates in a two-way fashion with the network interactive display device;
a screen capture processor that captures the content displayed on the display screen of the display;
an image converter which converts the image data captured by the screen capture processor to data of a predetermined image size; and
a controller that sends the captured image data, size converted by the image converter, from the communication unit to the network interactive display device,

wherein the terminal generates the captured image data that is to be displayed on one of the multi windows displayed on the display screen of a display of the network interactive display device.

18. A terminal according to claim 17, wherein the display screen of the display of the network interactive display device is divided into windows of the number equal to the number of terminals to be displayed, a display size of the window assigned to each terminal to be displayed is determined, and the image converter converts the image data captured by the screen capture processor to data of the display size assigned to own terminal.

19. A terminal according to one of claims 17 and 18, wherein the image converter performs a color conversion process on the captured image data to match the display color count of the display of the network interactive display device in addition to the size conversion process, and the controller sends the captured image data, which has been subjected to the size conversion process and the color conversion process, from the communication unit to the network interactive display device.

20. A network interactive display device connected to each of a plurality of terminals through a network, each terminal having a screen capture function, the network interactive display device comprising:

a display;
a communication unit for communicating in a two-way fashion with each of the terminals; and
a display control unit,

wherein the display control unit has a multi-window screen presentation function for synthesizing the captured image data, captured by each terminal through the screen capture function and received by the communication unit, into single screen multi-window format data to be displayed on display screen of the display of the network interactive display device.

21. A network interactive display device according to claim 20, wherein the display control unit has an insertion function for inserting a new window into a current display screen to display the new window.

22. A network interactive display device according to one of claims 20 and 21, wherein the terminal that provides the captured image data to be displayed on the display screen of the display is selected in a two-way communication of the communication unit by one of the network interactive display device and the terminal.

23. A network interactive display device according to one of claims 20, 21 and 22 wherein the display control unit has an expansion display function for expanding a predetermined window from among a plurality of windows forming a multi-window screen displayed on the display screen of the display.

24. A network interactive display device according to one of claims 20, 21 and 22, wherein the display control unit has a single-window screen selection function for switching the display screen from a predetermined window from among a plurality of windows forming a multi-window screen displayed on the display screen of the display to a single-window full screen.

25. A network interactive display device according to one of claims 20, 21 and 22, wherein the display control unit has an erase function for erasing a predetermined window from among a plurality of windows forming a multi-window screen displayed on the display screen of the display.

26. A network interactive display device according to claim 25, wherein the predetermined window is selected by one of the network interactive display device and the terminal in a two-way communication of the communication unit thereof.

27. A network interactive display device according to one of claims 20 to 26, wherein the captured image data received from the terminal is obtained by designating the whole or a portion of the display screen of the terminal.

28. A network interactive display device according to one of claims 20 to 26, wherein the captured image data received from the terminal is obtained by detecting and capturing only a change on the display screen of the terminal.

29. A network interactive display device according to one of claims 20 to 28, wherein the display control unit comprises a window area information generator which divides the display screen of the display into windows of the number equal to the number of terminals to be displayed, and generates window area information containing a display size of the window to which the terminal to be displayed is assigned, and information identifying a display position of the window, an image synthesizer which synthesizes the captured image data from the terminals into single screen multi-window format data in accordance with the window area information generated by the window area information generator, thereby generating synthesized image data, and an image processor which processes the synthesized image data generated by the image synthesizer, thereby generating display image data and outputting the display image data to the display.

30. A network interactive display device according to claim 29, wherein the image synthesizer synthesizes the captured image data by contracting or expanding the captured image data from each terminal with an aspect ratio of the image size of the captured image data maintained.

FIG. 1

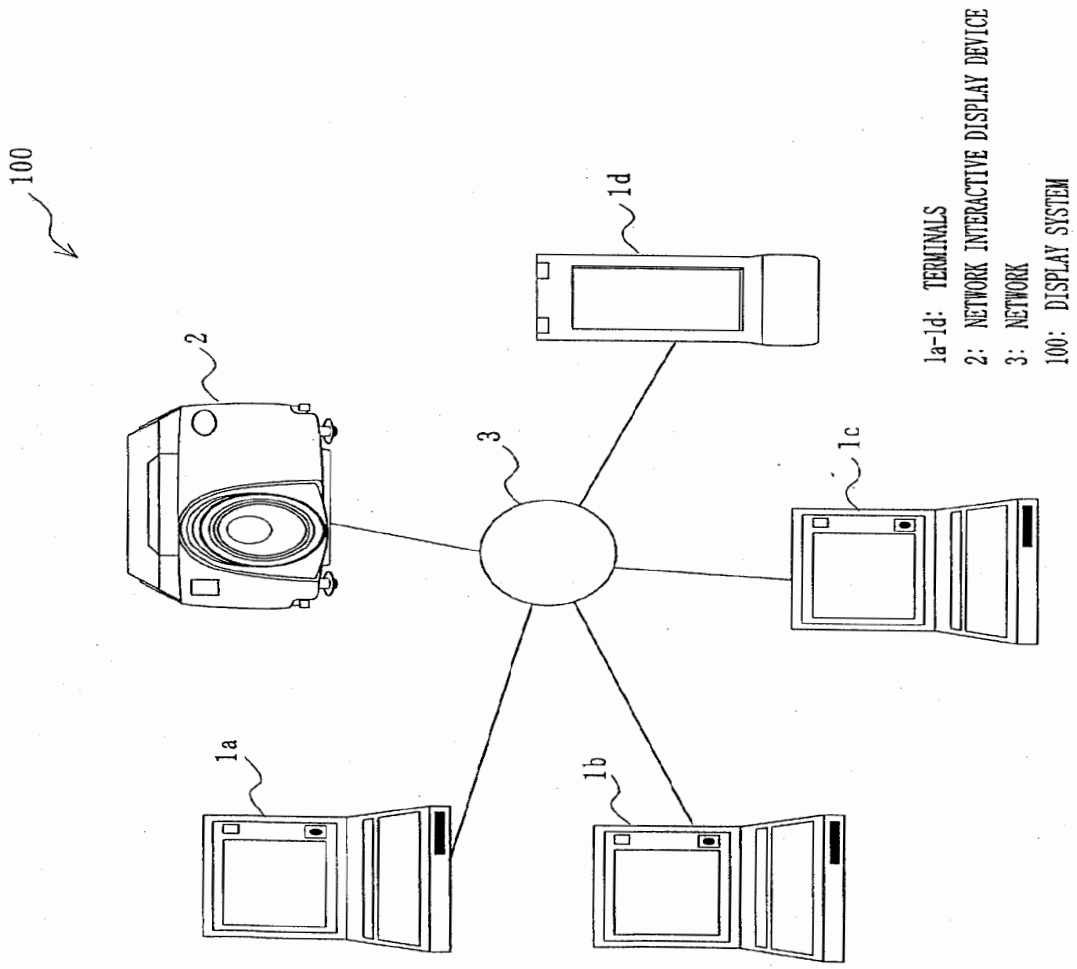

100
2
3
1a
1b
1c
1d
1a-1d: TERMINALS
2: NETWORK INTERACTIVE DISPLAY DEVICE
3: NETWORK
100: DISPLAY SYSTEM

FIG. 2

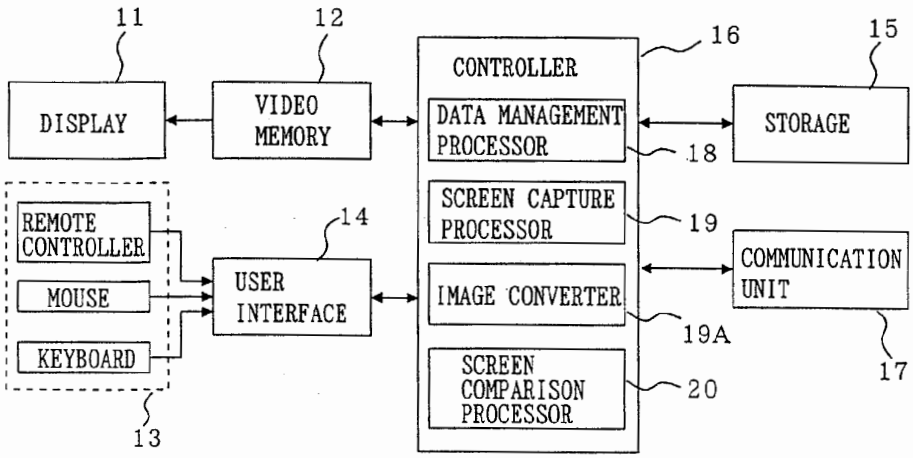

11
12
16
15
CONTROLLER
DISPLAY
VIDEO MEMORY
DATA MANAGEMENT PROCESSOR
STORAGE
18
REMOTE CONTROLLER
14
SCREEN CAPTURE PROCESSOR
19
MOUSE
USER INTERFACE
IMAGE CONVERTER
COMMUNICATION UNIT
19A
KEYBOARD
17
SCREEN COMPARISON PROCESSOR
20
13

FIG. 3

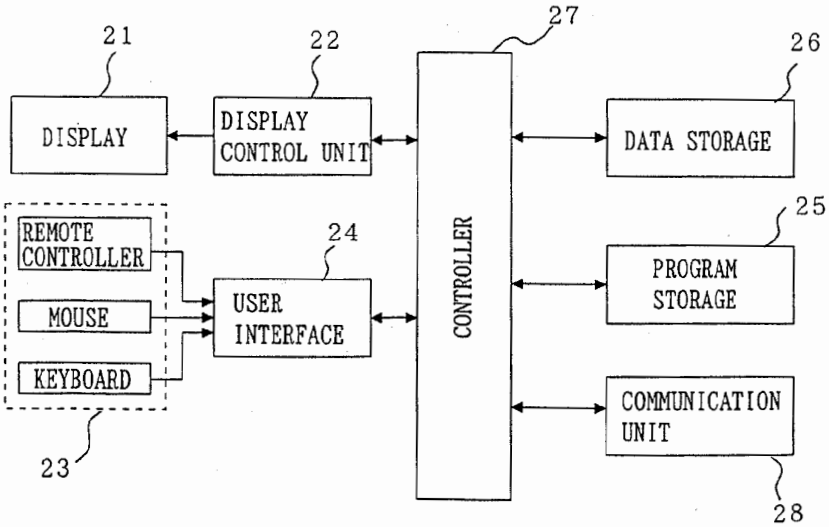

21
22
27
26
DISPLAY
DISPLAY CONTROL UNIT
DATA STORAGE
REMOTE CONTROLLER
24
25
MOUSE
USER INTERFACE
CONTROLLER
PROGRAM STORAGE
KEYBOARD
COMMUNICATION UNIT
23
28

FIG. 4

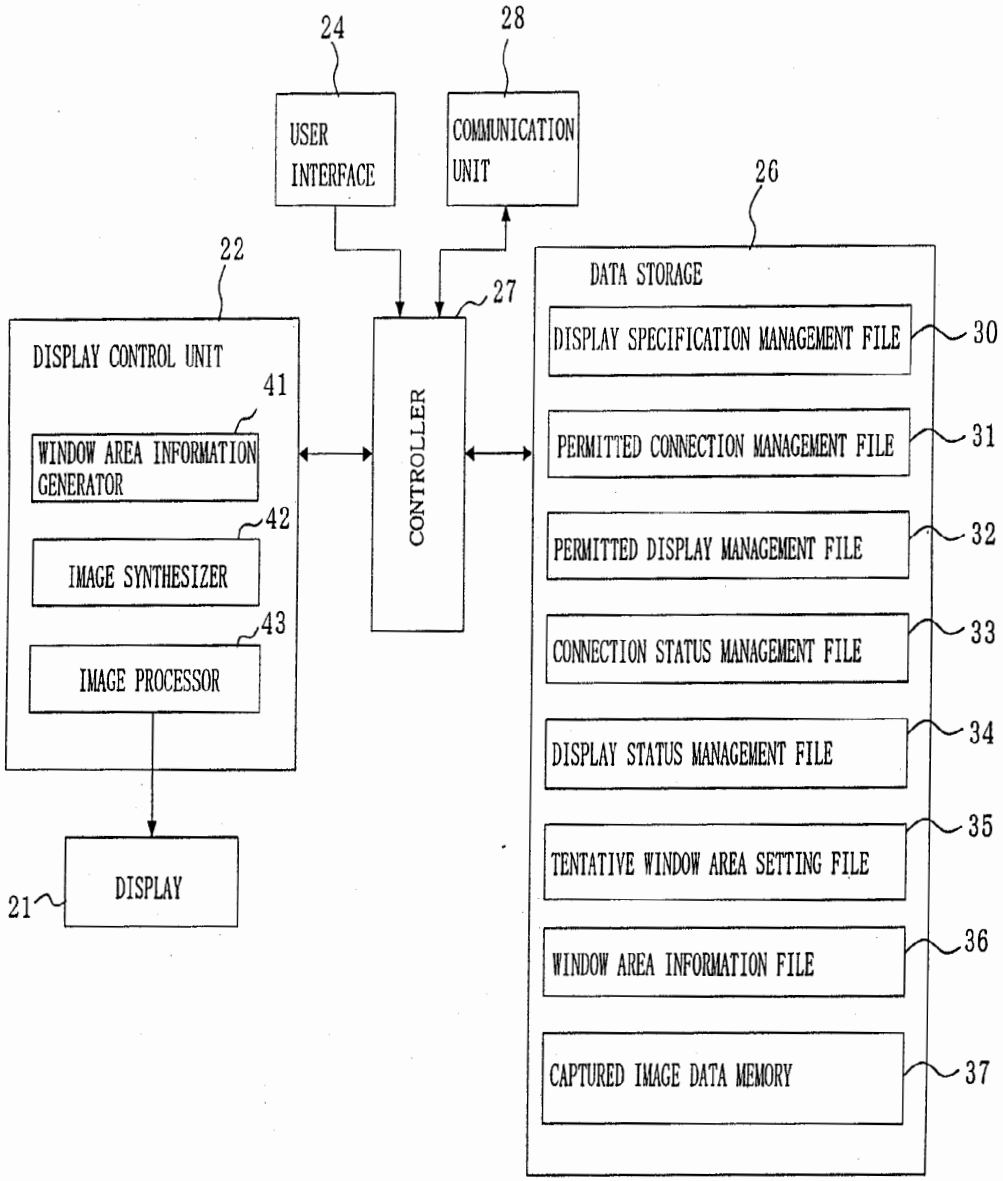

24
USER INTERFACE
28
COMMUNICATION UNIT
26
DATA STORAGE
22
DISPLAY CONTROL UNIT
41
WINDOW AREA INFORMATION GENERATOR
42
IMAGE SYNTHESIZER
43
IMAGE PROCESSOR
27
CONTROLLER
DISPLAY SPECIFICATION MANAGEMENT FILE
30
PERMITTED CONNECTION MANAGEMENT FILE
31
PERMITTED DISPLAY MANAGEMENT FILE
32
CONNECTION STATUS MANAGEMENT FILE
33
DISPLAY STATUS MANAGEMENT FILE
34
TENTATIVE WINDOW AREA SETTING FILE
35
WINDOW AREA INFORMATION FILE
36
CAPTURED IMAGE DATA MEMORY
37
DISPLAY
21

FIG. 5

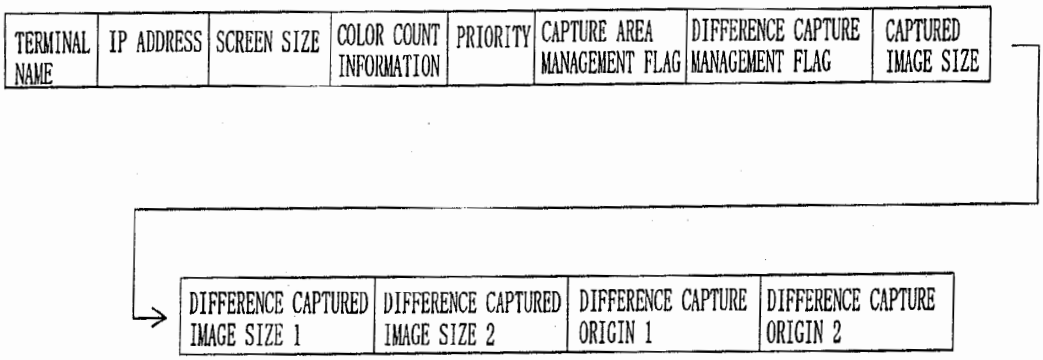

TERMINAL NAME
IP ADDRESS
SCREEN SIZE
COLOR COUNT INFORMATION
PRIORITY
CAPTURE AREA MANAGEMENT FLAG
DIFFERENCE CAPTURE MANAGEMENT FLAG
CAPTURED IMAGE SIZE
DIFFERENCE CAPTURED IMAGE SIZE 1
DIFFERENCE CAPTURED IMAGE SIZE 2
DIFFERENCE CAPTURE ORIGIN 1
DIFFERENCE CAPTURE ORIGIN 2

FIG. 6

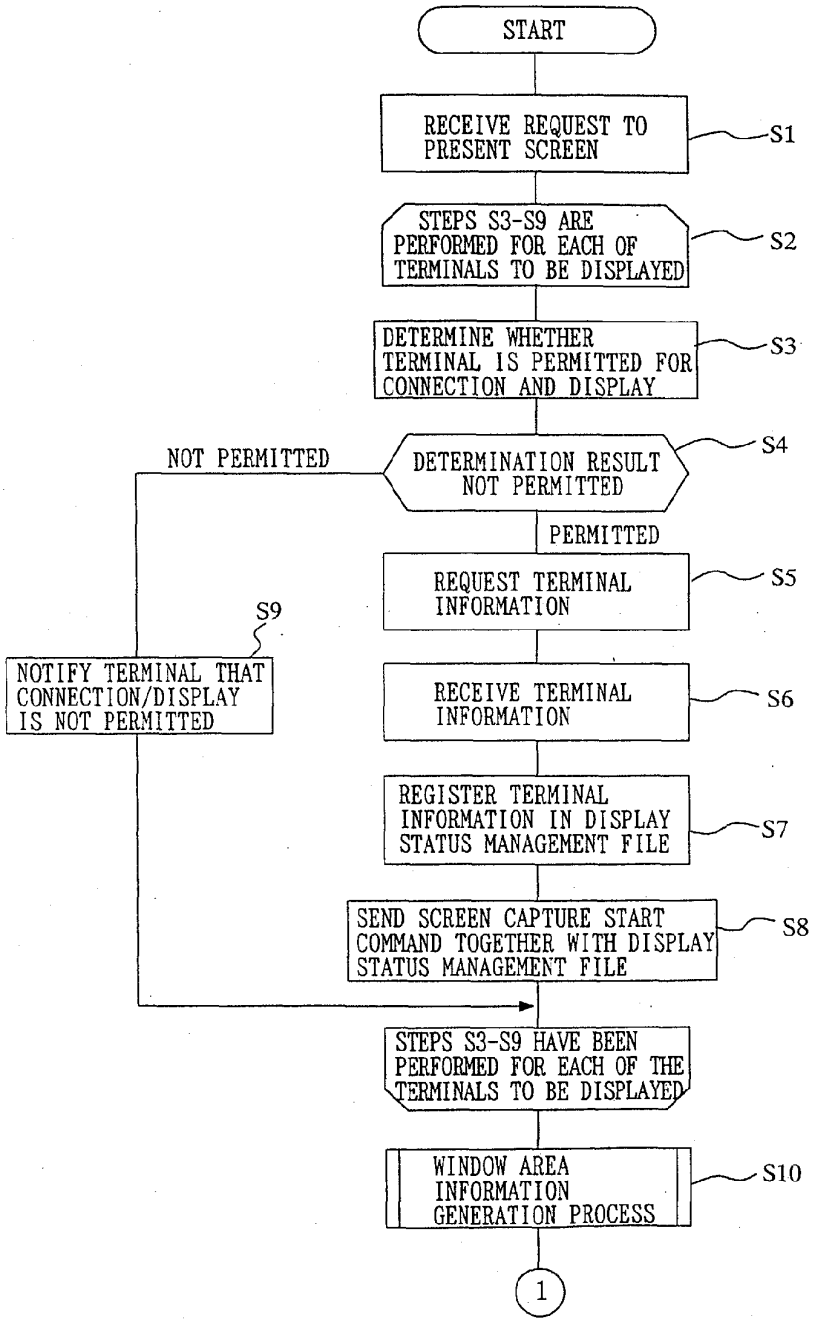

START
RECEIVE REQUEST TO PRESENT SCREEN
S1
STEPS S3-S9 ARE PERFORMED FOR EACH OF TERMINALS TO BE DISPLAYED
S2
DETERMINE WHETHER TERMINAL IS PERMITTED FOR CONNECTION AND DISPLAY
S3
NOT PERMITTED
DETERMINATION RESULT NOT PERMITTED
S4
PERMITTED
REQUEST TERMINAL INFORMATION
S5
S9
NOTIFY TERMINAL THAT CONNECTION/DISPLAY IS NOT PERMITTED
RECEIVE TERMINAL INFORMATION
S6
REGISTER TERMINAL INFORMATION IN DISPLAY STATUS MANAGEMENT FILE
S7
SEND SCREEN CAPTURE START COMMAND TOGETHER WITH DISPLAY STATUS MANAGEMENT FILE
S8
STEPS S3-S9 HAVE BEEN PERFORMED FOR EACH OF THE TERMINALS TO BE DISPLAYED
WINDOW AREA INFORMATION GENERATION PROCESS
S10
1

FIG. 7

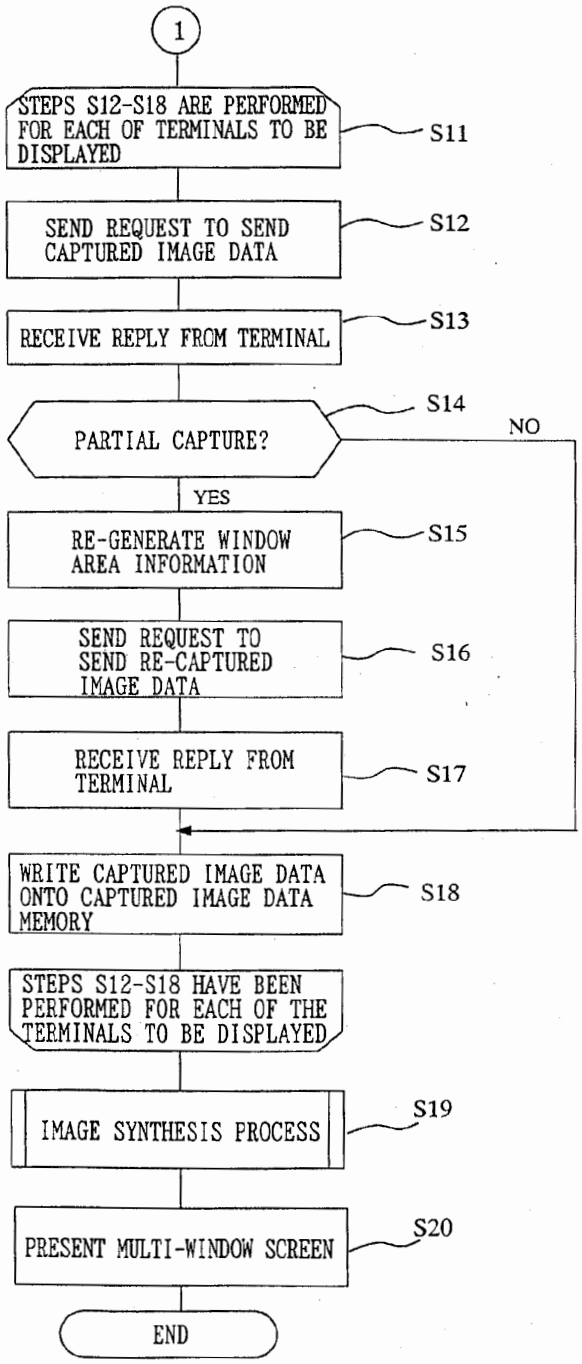

1
STEPS S12-S18 ARE PERFORMED FOR EACH OF TERMINALS TO BE DISPLAYED
S11
SEND REQUEST TO SEND CAPTURED IMAGE DATA
S12
RECEIVE REPLY FROM TERMINAL
S13
PARTIAL CAPTURE?
S14
NO
YES
RE-GENERATE WINDOW AREA INFORMATION
S15
SEND REQUEST TO SEND RE-CAPTURED IMAGE DATA
S16
RECEIVE REPLY FROM TERMINAL
S17
WRITE CAPTURED IMAGE DATA ONTO CAPTURED IMAGE DATA MEMORY
S18
STEPS S12-S18 HAVE BEEN PERFORMED FOR EACH OF THE TERMINALS TO BE DISPLAYED
IMAGE SYNTHESIS PROCESS
S19
PRESENT MULTI-WINDOW SCREEN
S20
END

FIG. 8

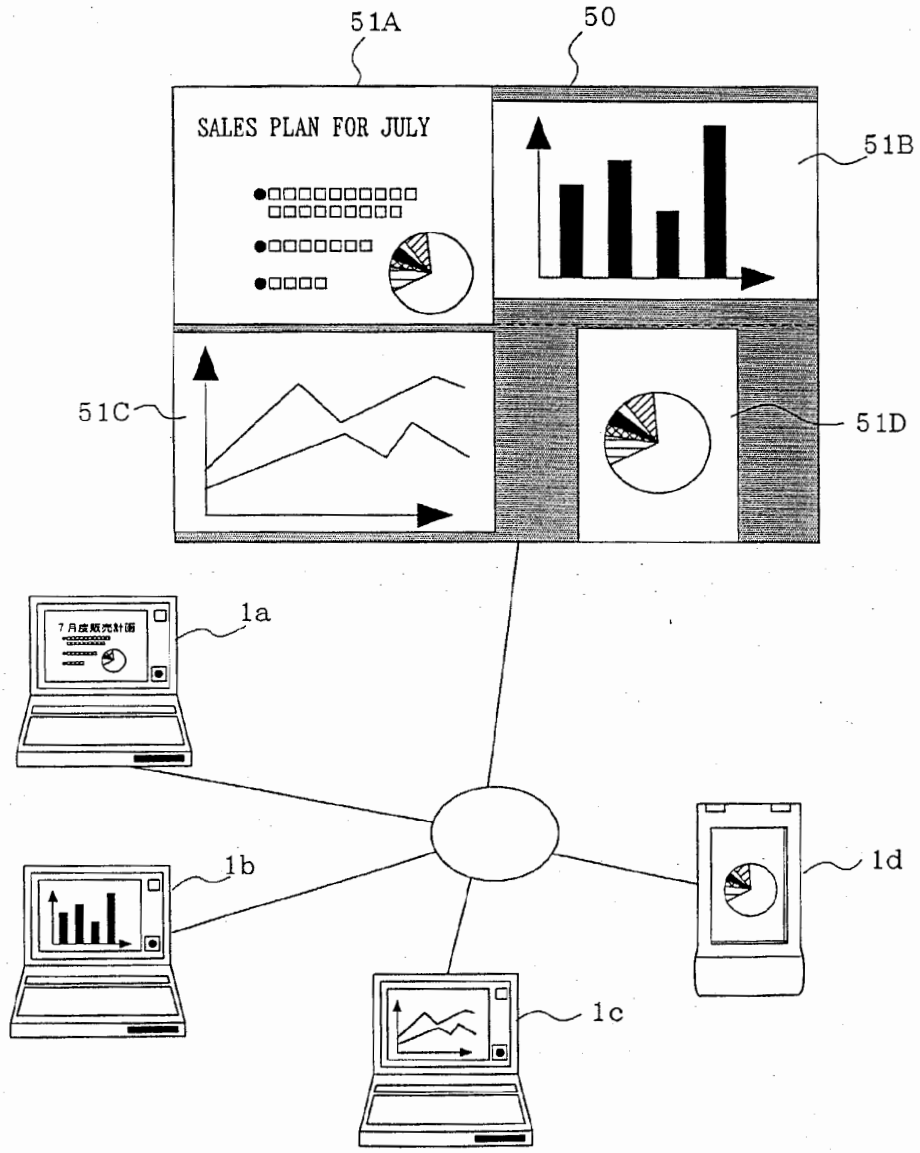


FIG. 9

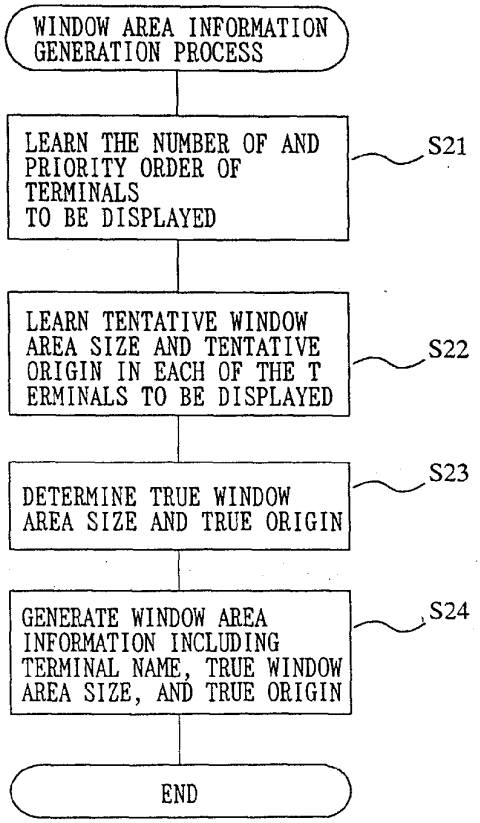

WINDOW AREA INFORMATION GENERATION PROCESS
LEARN THE NUMBER OF AND PRIORITY ORDER OF TERMINALS TO BE DISPLAYED
S21
LEARN TENTATIVE WINDOW AREA SIZE AND TENTATIVE ORIGIN IN EACH OF THE T ERMINALS TO BE DISPLAYED
S22
DETERMINE TRUE WINDOW AREA SIZE AND TRUE ORIGIN
S23
GENERATE WINDOW AREA INFORMATION INCLUDING TERMINAL NAME, TRUE WINDOW AREA SIZE, AND TRUE ORIGIN
S24
END

FIG. 10

	TERMINAL NAME	IP ADDRESS	SCREEN SIZE	COLOR COUNT INFORMATION	PRIORITY	CAPTURE AREA MANAGEMENT FLAG	DIFFERENCE CAPTURE MANAGEMENT FLAG	CAPTURED IMAGE SIZE
1a	PC-1	***.***.***.***	1280×1024(SXGA)	16777216	NONE	0		
1b	PC-2	***.***.***.***	800×600(SVGA)	16777216	NONE	0		
1c	PC-3	***.***.***.***	1024×768(XGA)	256	NONE	0		
1d	PDA-1	***.***.***.***	480×640	256	NONE	0		

DIFFERENCE CAPTURED IMAGE SIZE 1	DIFFERENCE CAPTURED IMAGE SIZE 2	DIFFERENCE CAPTURE ORIGIN 1	DIFFERENCE CAPTURE ORIGIN 2

FIG. 11A

NUMBER OF TERMINALS		FIRST	SECOND	THIRD	FOURTH
4	PRIORITY	NONE	NONE	NONE	NONE
		↓	↓	↓	↓
	TENTATIVE SIZE	640×512	640×512	640×512	640×512
	TENTATIVE ORIGIN	0, 0	640, 0	0, 512	640, 512

FIG. 11B

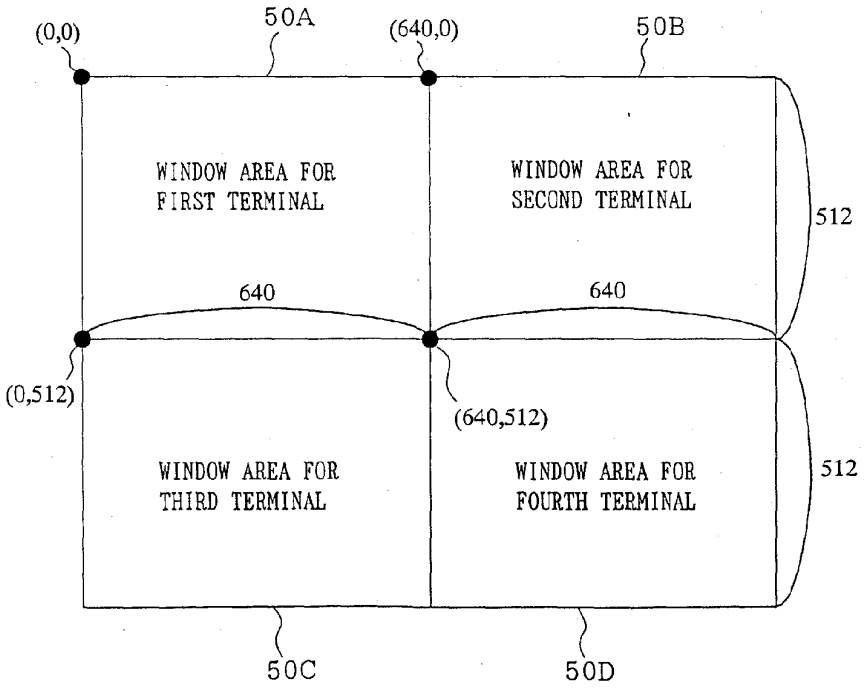


FIG. 12

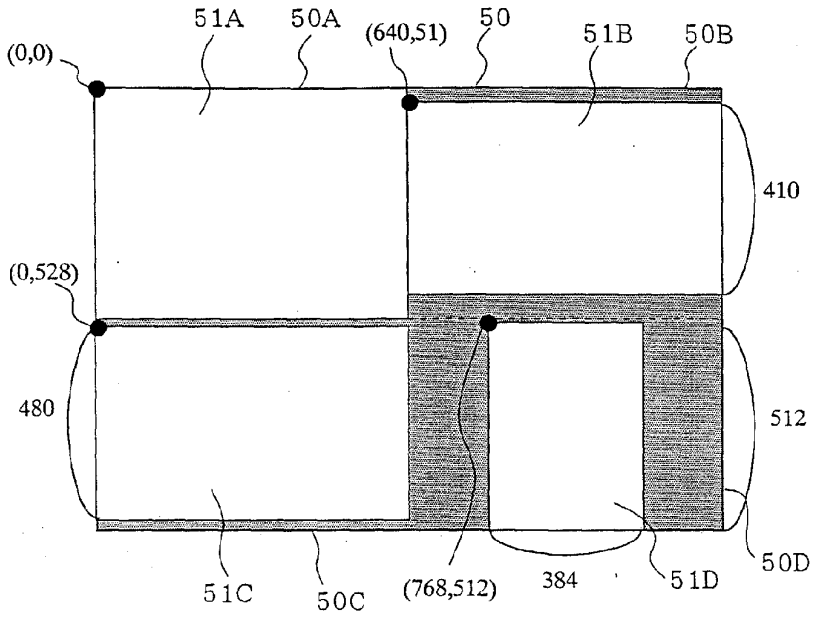


FIG. 13

TERMINAL NAME	PC-1	PC-2	PC-3	PDA-1
TRUE SIZE	640×512	640×410	640×480	384×512
TRUE ORIGIN	0,0	640,51	0,528	768,512

DATE AND TIME: MAY 21, 2002, 17:00:32

FIG. 14

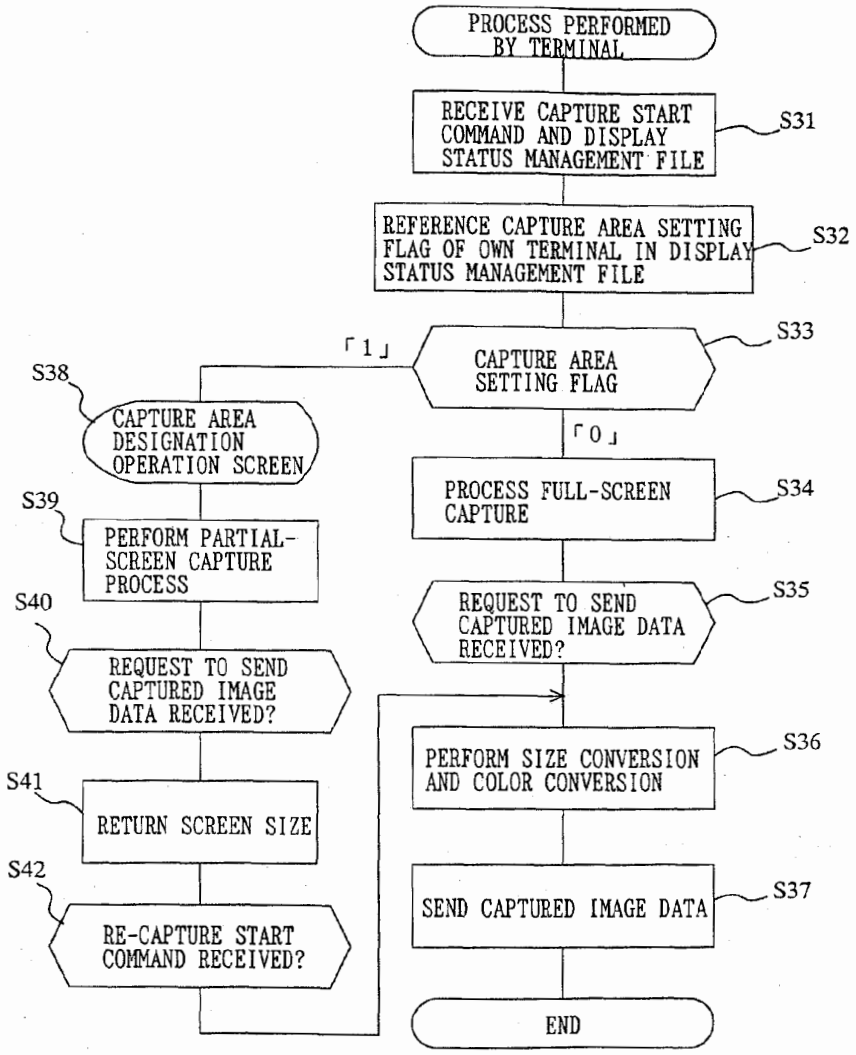

PROCESS PERFORMED BY TERMINAL
RECEIVE CAPTURE START COMMAND AND DISPLAY STATUS MANAGEMENT FILE
S31
REFERENCE CAPTURE AREA SETTING FLAG OF OWN TERMINAL IN DISPLAY STATUS MANAGEMENT FILE
S32
CAPTURE AREA SETTING FLAG
S33
「1」
「0」
S38
CAPTURE AREA DESIGNATION OPERATION SCREEN
S39
PERFORM PARTIAL-SCREEN CAPTURE PROCESS
S40
REQUEST TO SEND CAPTURED IMAGE DATA RECEIVED?
S41
RETURN SCREEN SIZE
S42
RE-CAPTURE START COMMAND RECEIVED?
PROCESS FULL-SCREEN CAPTURE
S34
REQUEST TO SEND CAPTURED IMAGE DATA RECEIVED?
S35
PERFORM SIZE CONVERSION AND COLOR CONVERSION
S36
SEND CAPTURED IMAGE DATA
S37
END

FIG. 15

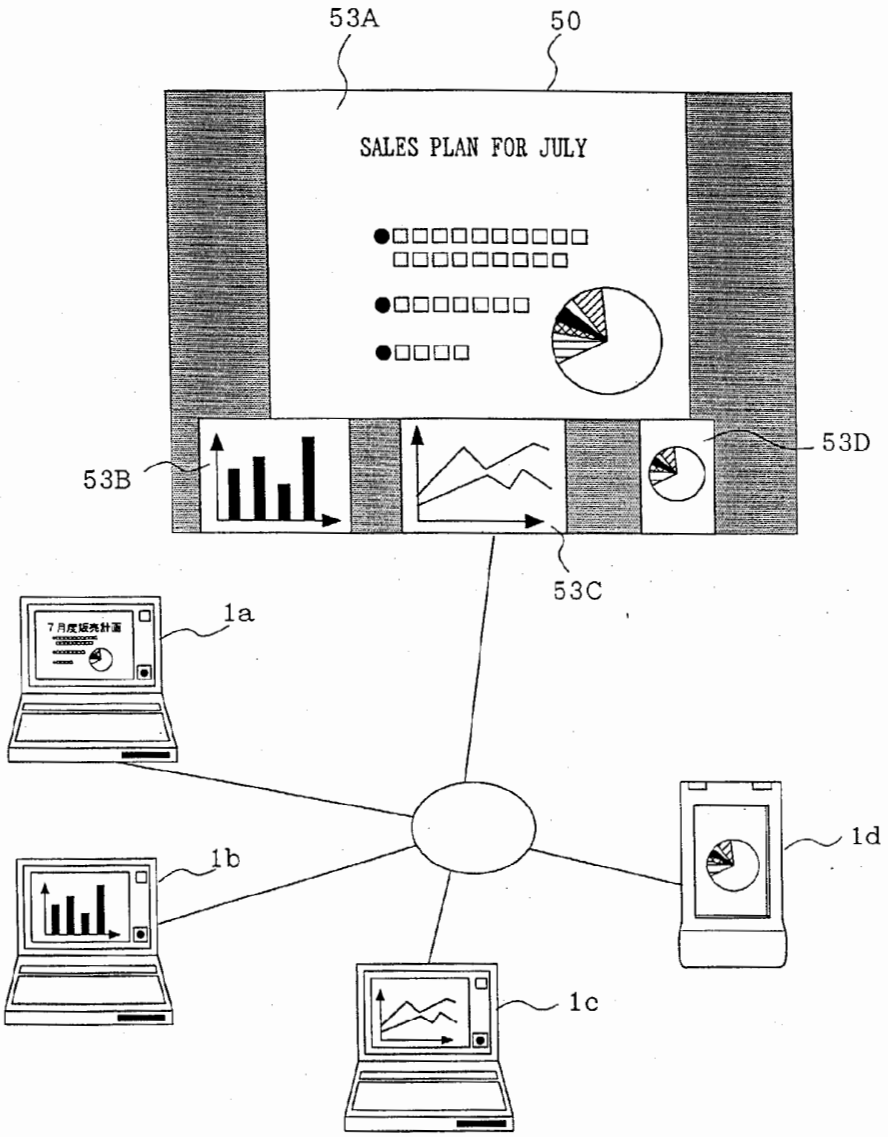


FIG. 16A

NUMBER OF TERMINALS		FIRST	SECOND	THIRD	FOURTH
4	PRIORITY	HIGH	NONE	NONE	NONE
		↓	↓	↓	↓
	TENTATIVE SIZE	1280×768	427×256	427×256	426×256
	TENTATIVE ORIGIN	0, 0	0,768	427,768	854,768

FIG. 16B

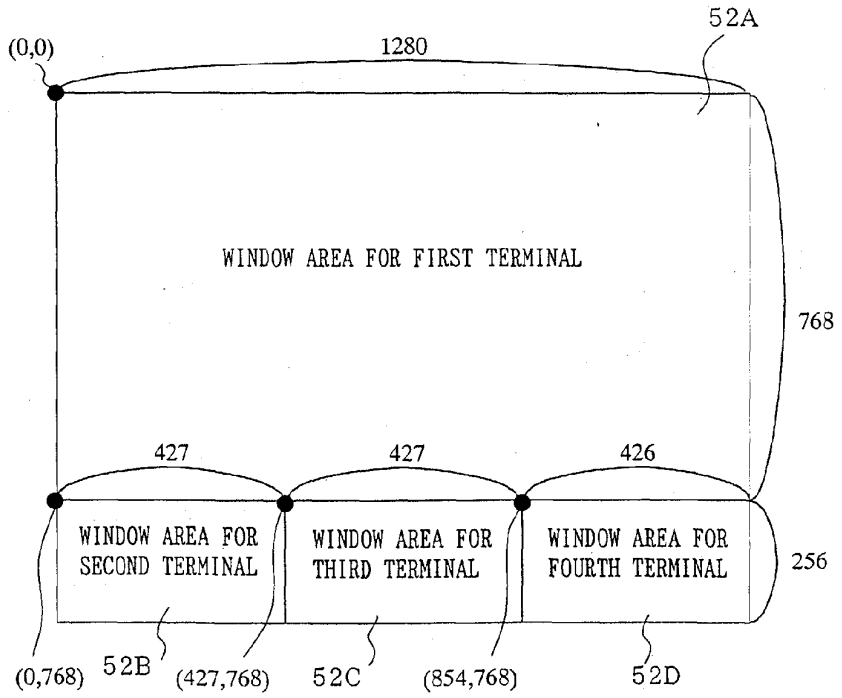


FIG. 17

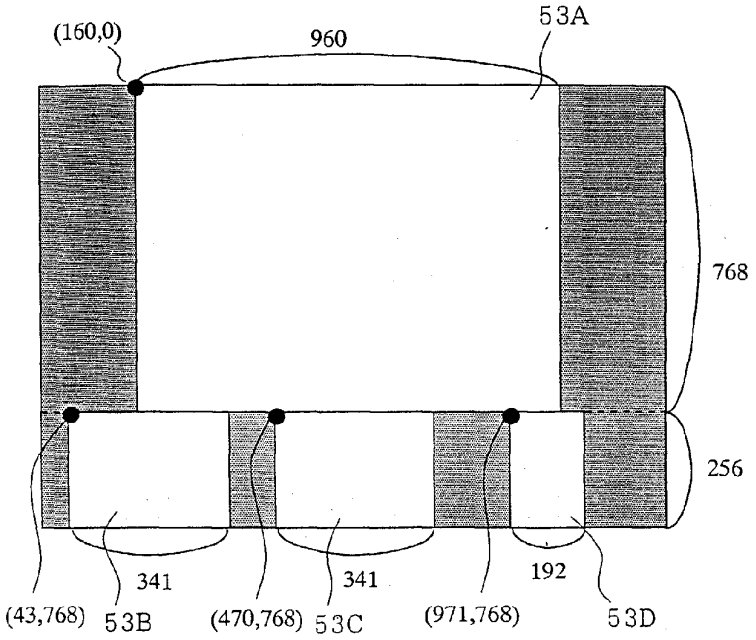


FIG. 18

TERMINAL NAME	PC-1	PC-2	PC-3	PDA-1
TRUE SIZE	960×768	341×256	341×256	192×256
TRUE ORIGIN	160,0	43,768	470,768	971,768

DATE AND TIME: MAY 21, 2002, 17:00:32

FIG. 19

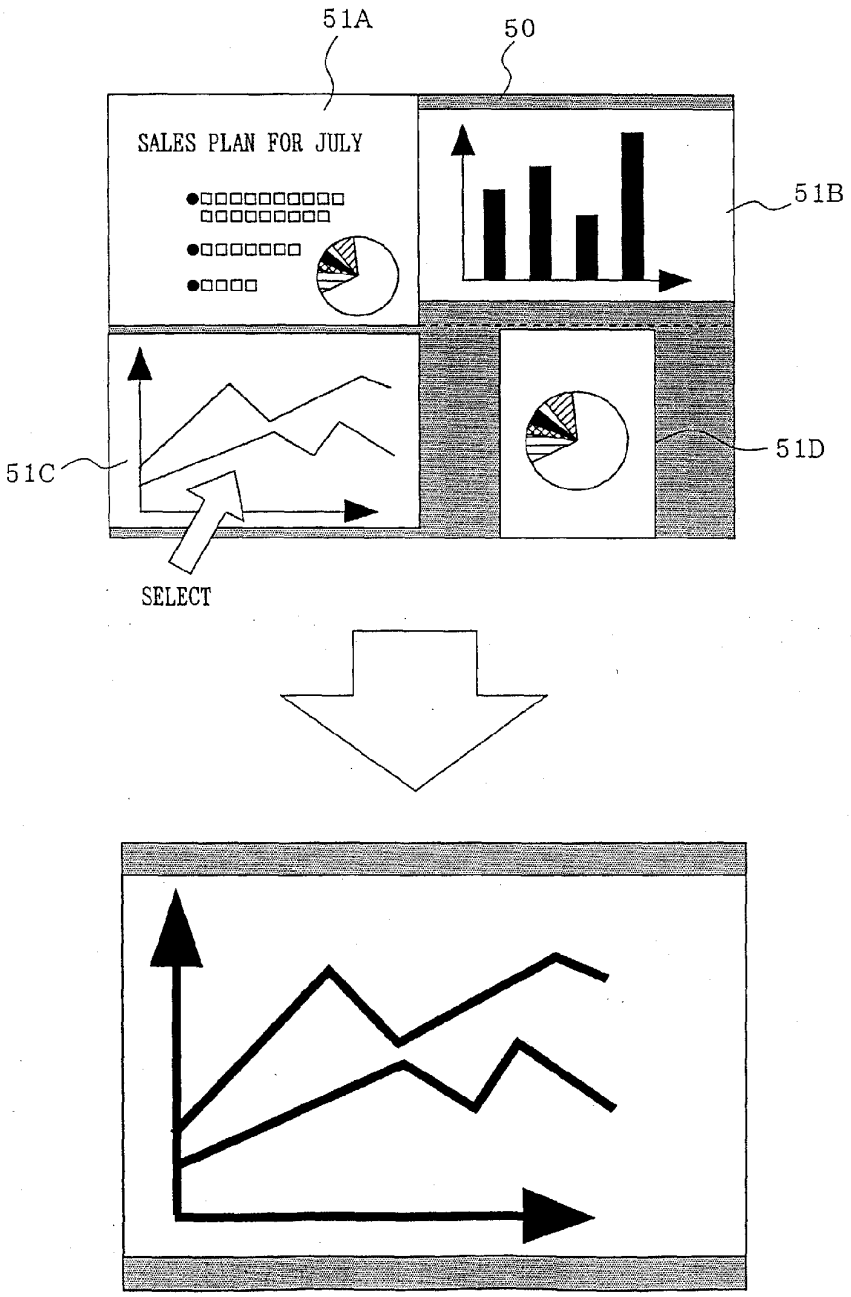


FIG. 20

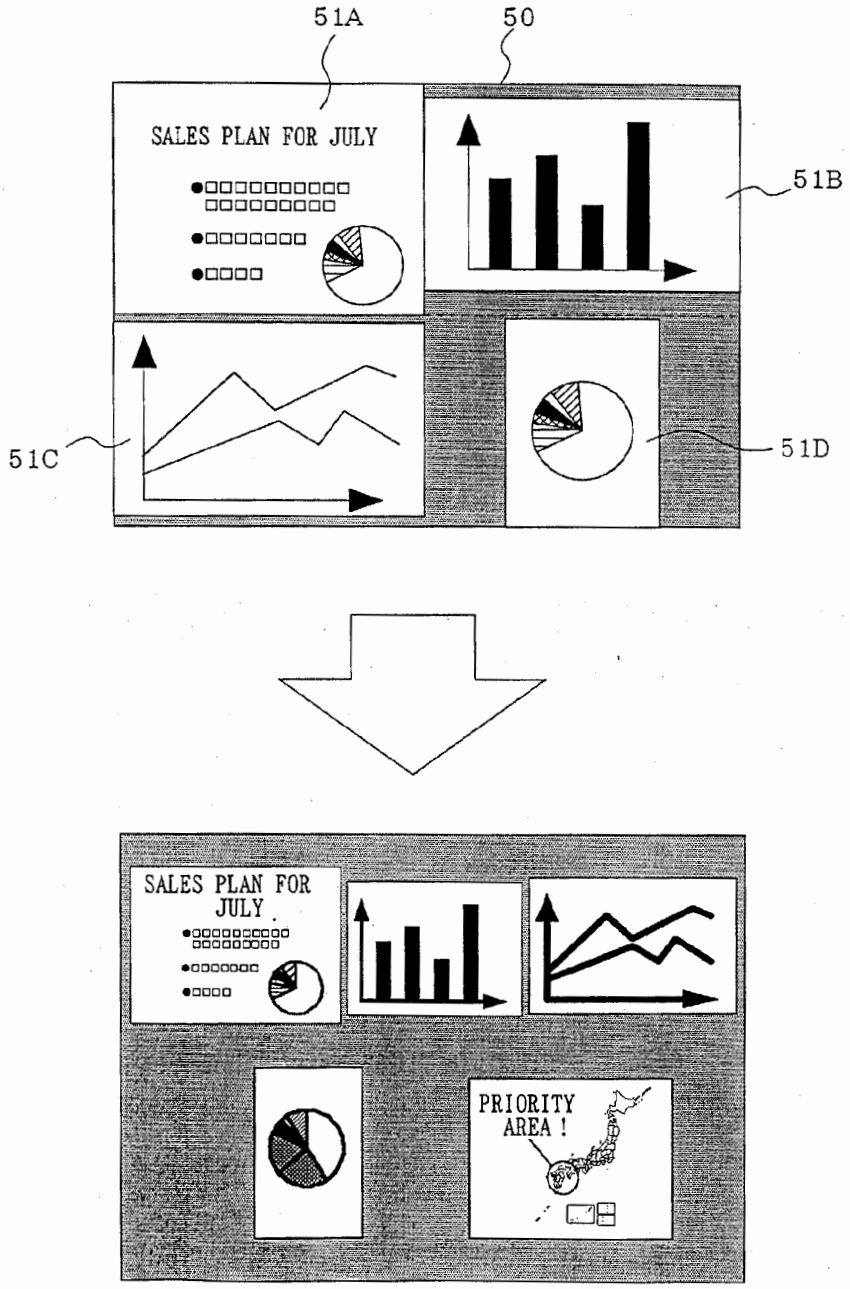

51A
50
SALES PLAN FOR JULY
51B
51C
51D
SALES PLAN FOR JULY
PRIORITY AREA !

FIG. 21

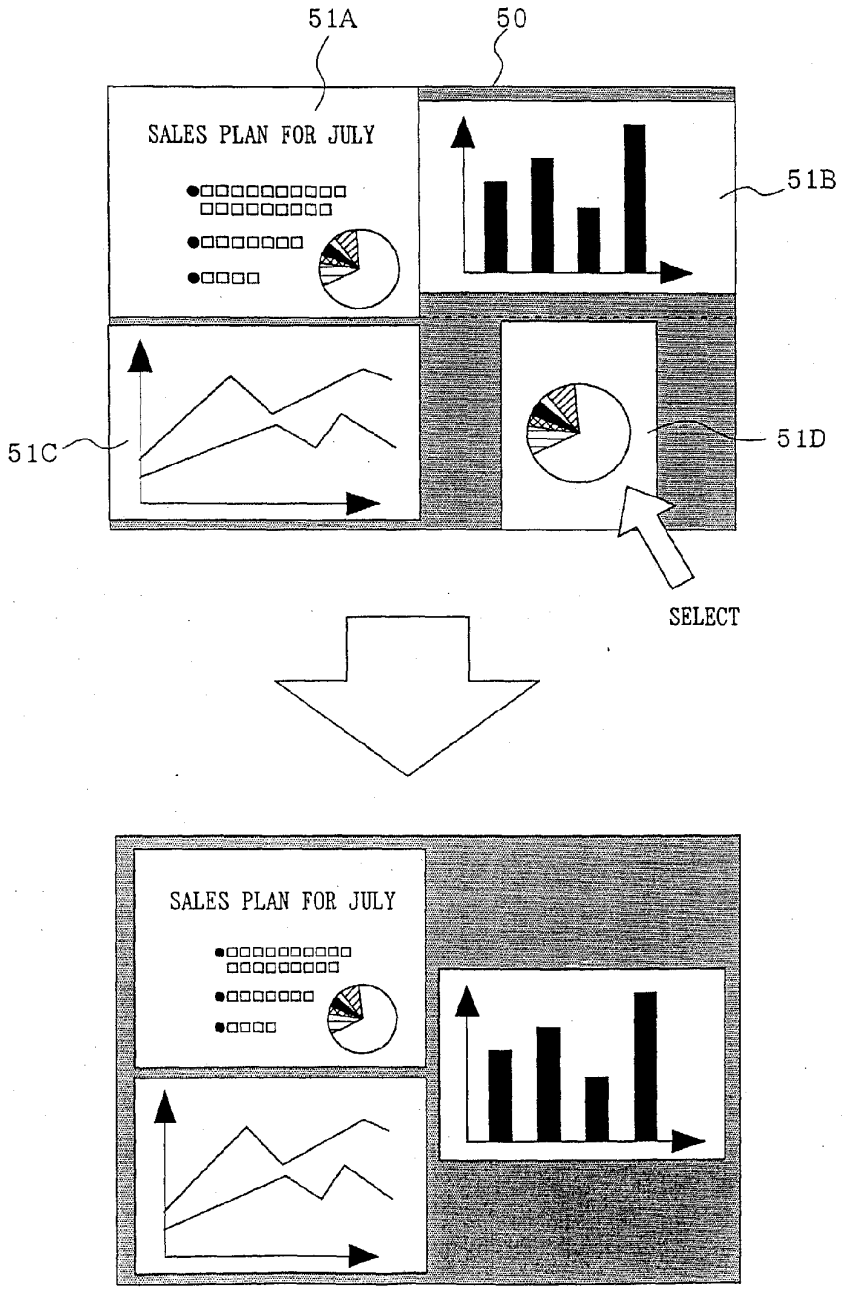

51A
50
SALES PLAN FOR JULY
51B
51C
51D
SELECT
SALES PLAN FOR JULY

FIG. 22

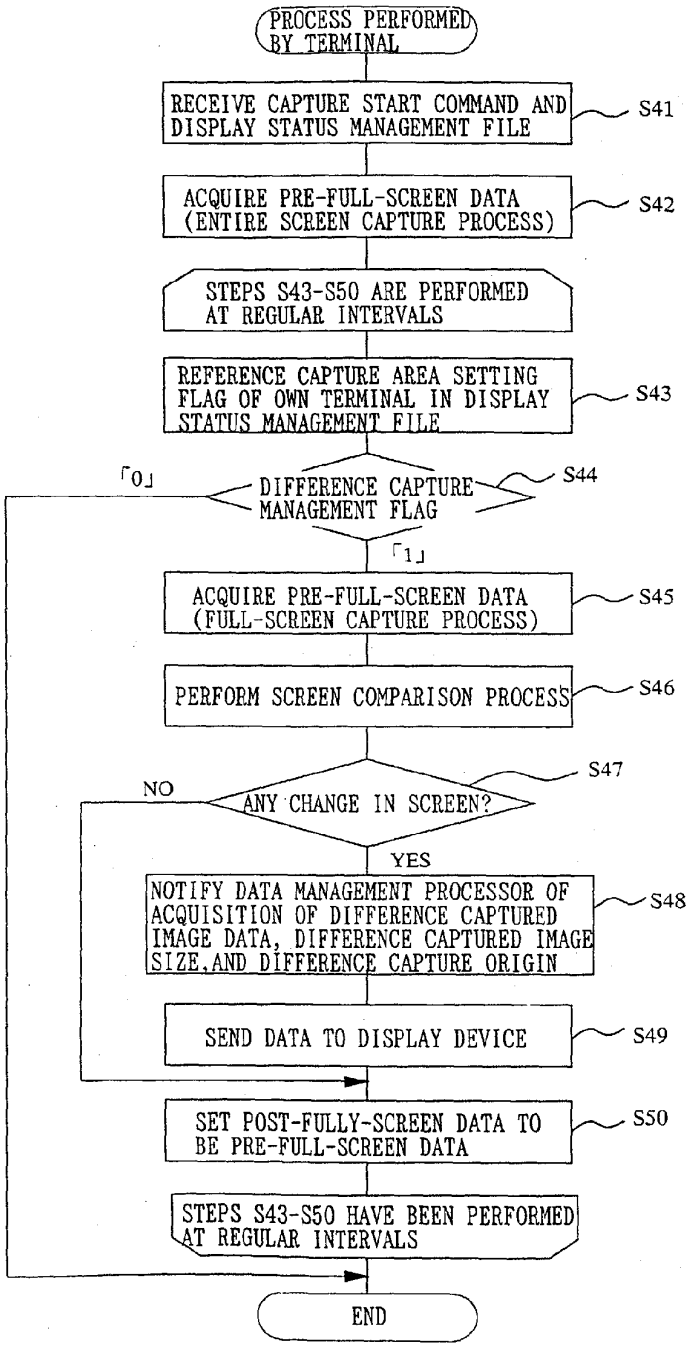

PROCESS PERFORMED BY TERMINAL
RECEIVE CAPTURE START COMMAND AND DISPLAY STATUS MANAGEMENT FILE
S41
ACQUIRE PRE-FULL-SCREEN DATA (ENTIRE SCREEN CAPTURE PROCESS)
S42
STEPS S43-S50 ARE PERFORMED AT REGULAR INTERVALS
REFERENCE CAPTURE AREA SETTING FLAG OF OWN TERMINAL IN DISPLAY STATUS MANAGEMENT FILE
S43
DIFFERENCE CAPTURE MANAGEMENT FLAG
S44
「0」
「1」
ACQUIRE PRE-FULL-SCREEN DATA (FULL-SCREEN CAPTURE PROCESS)
S45
PERFORM SCREEN COMPARISON PROCESS
S46
ANY CHANGE IN SCREEN?
S47
NO
YES
NOTIFY DATA MANAGEMENT PROCESSOR OF ACQUISITION OF DIFFERENCE CAPTURED IMAGE DATA, DIFFERENCE CAPTURED IMAGE SIZE, AND DIFFERENCE CAPTURE ORIGIN
S48
SEND DATA TO DISPLAY DEVICE
S49
SET POST-FULLY-SCREEN DATA TO BE PRE-FULL-SCREEN DATA
S50
STEPS S43-S50 HAVE BEEN PERFORMED AT REGULAR INTERVALS
END

FIG. 23

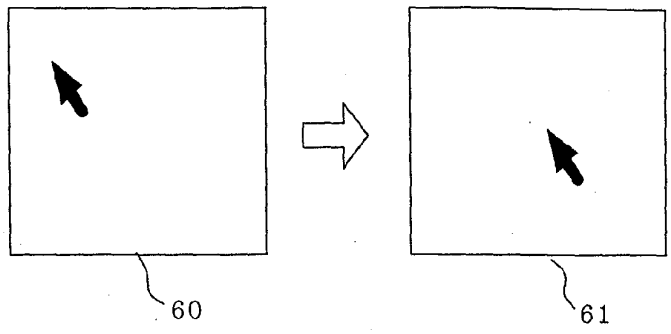


FIG. 24

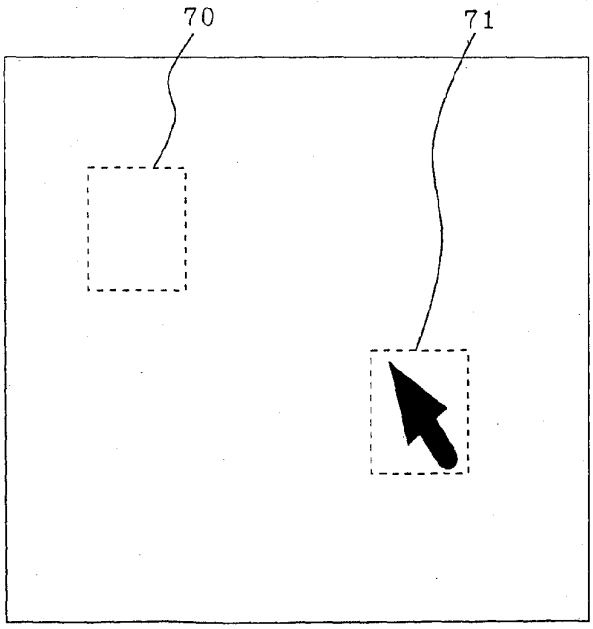


FIG. 25

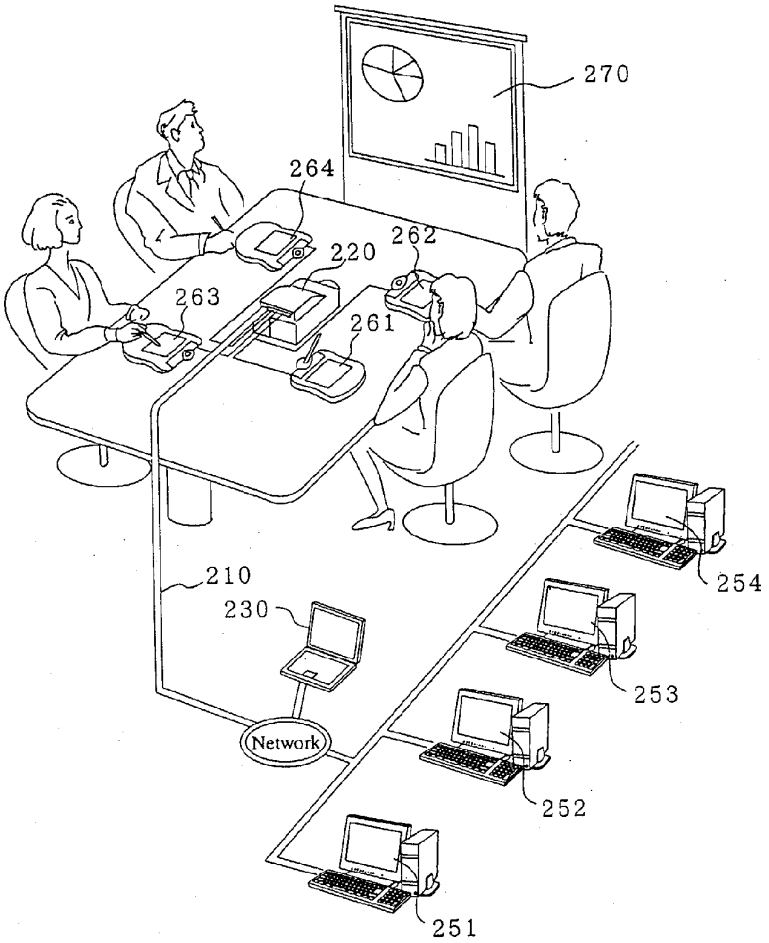


FIG. 26

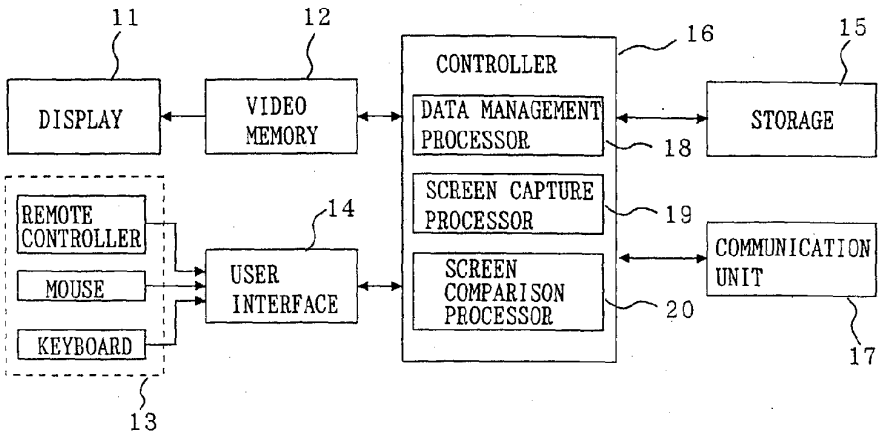

11
12
16
15
CONTROLLER
DISPLAY
VIDEO MEMORY
DATA MANAGEMENT PROCESSOR
STORAGE
18
SCREEN CAPTURE PROCESSOR
19
14
REMOTE CONTROLLER
MOUSE
KEYBOARD
USER INTERFACE
SCREEN COMPARISON PROCESSOR
COMMUNICATION UNIT
20
17
13

FIG. 27

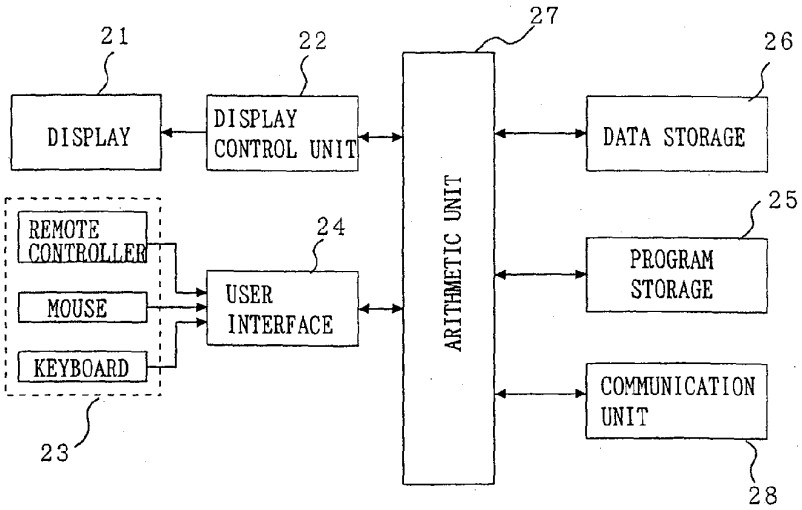

27
21
22
26
DISPLAY
DISPLAY CONTROL UNIT
DATA STORAGE
ARITHMETIC UNIT
25
24
REMOTE CONTROLLER
MOUSE
KEYBOARD
USER INTERFACE
PROGRAM STORAGE
COMMUNICATION UNIT
23
28

FIG. 28

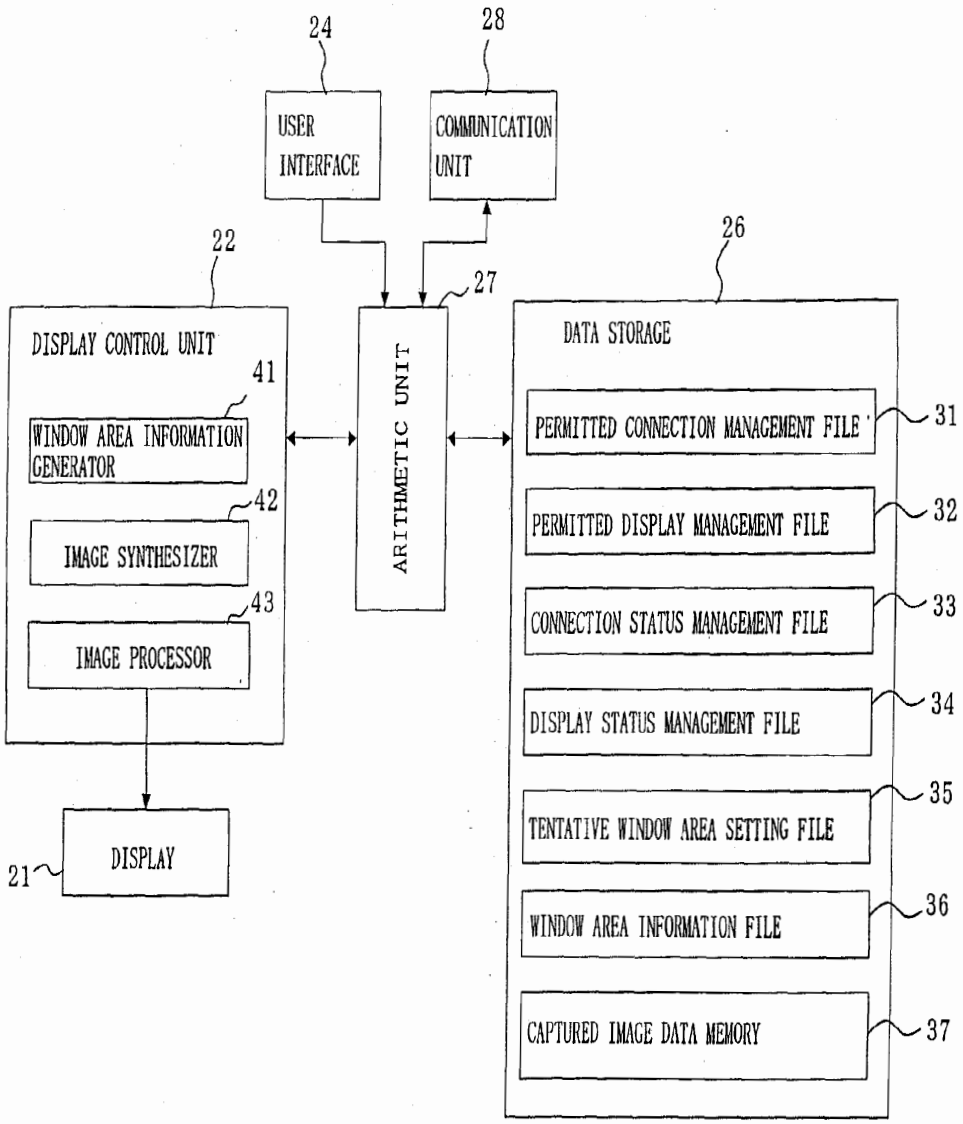

24
USER INTERFACE
28
COMMUNICATION UNIT
22
DISPLAY CONTROL UNIT
41
WINDOW AREA INFORMATION GENERATOR
42
IMAGE SYNTHESIZER
43
IMAGE PROCESSOR
21
DISPLAY
27
ARITHMETIC UNIT
26
DATA STORAGE
PERMITTED CONNECTION MANAGEMENT FILE
31
PERMITTED DISPLAY MANAGEMENT FILE
32
CONNECTION STATUS MANAGEMENT FILE
33
DISPLAY STATUS MANAGEMENT FILE
34
TENTATIVE WINDOW AREA SETTING FILE
35
WINDOW AREA INFORMATION FILE
36
CAPTURED IMAGE DATA MEMORY
37

FIG. 29

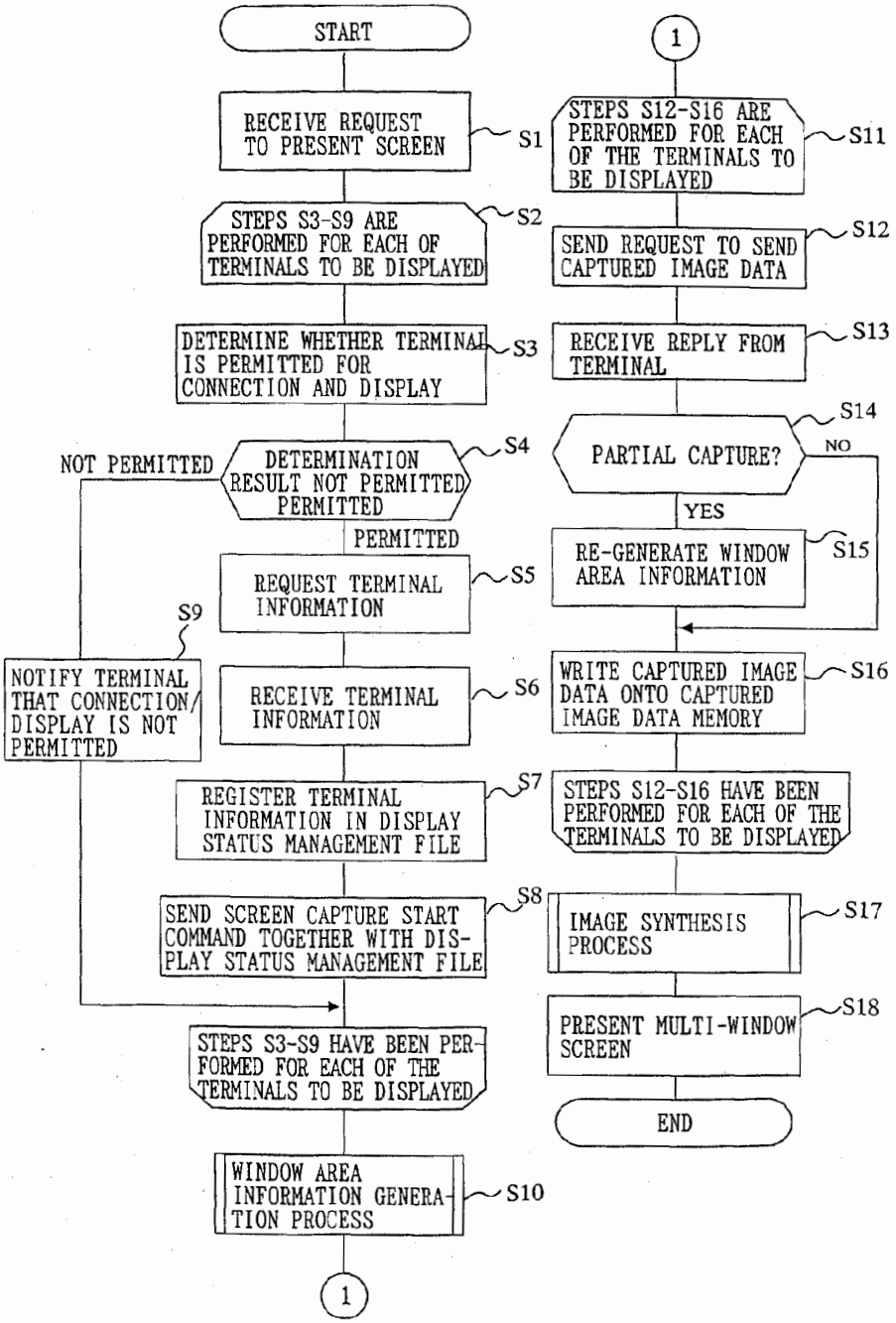
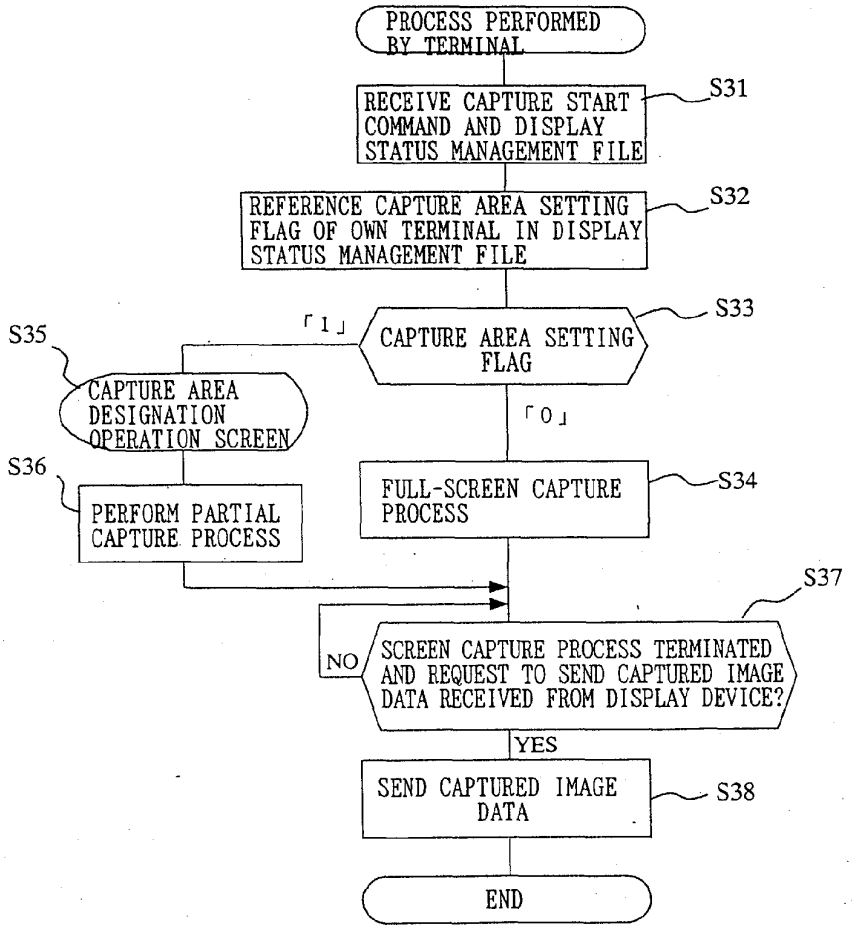

START
RECEIVE REQUEST TO PRESENT SCREEN
S1
STEPS S3-S9 ARE PERFORMED FOR EACH OF TERMINALS TO BE DISPLAYED
S2
DETERMINE WHETHER TERMINAL IS PERMITTED FOR CONNECTION AND DISPLAY
S3
DETERMINATION RESULT NOT PERMITTED PERMITTED
S4
NOT PERMITTED
PERMITTED
REQUEST TERMINAL INFORMATION
S5
RECEIVE TERMINAL INFORMATION
S6
NOTIFY TERMINAL THAT CONNECTION/DISPLAY IS NOT PERMITTED
S9
REGISTER TERMINAL INFORMATION IN DISPLAY STATUS MANAGEMENT FILE
S7
SEND SCREEN CAPTURE START COMMAND TOGETHER WITH DISPLAY STATUS MANAGEMENT FILE
S8
STEPS S3-S9 HAVE BEEN PERFORMED FOR EACH OF THE TERMINALS TO BE DISPLAYED
WINDOW AREA INFORMATION GENERATION PROCESS
S10
1
1
STEPS S12-S16 ARE PERFORMED FOR EACH OF THE TERMINALS TO BE DISPLAYED
S11
SEND REQUEST TO SEND CAPTURED IMAGE DATA
S12
RECEIVE REPLY FROM TERMINAL
S13
PARTIAL CAPTURE?
S14
NO
YES
RE-GENERATE WINDOW AREA INFORMATION
S15
WRITE CAPTURED IMAGE DATA ONTO CAPTURED IMAGE DATA MEMORY
S16
STEPS S12-S16 HAVE BEEN PERFORMED FOR EACH OF THE TERMINALS TO BE DISPLAYED
IMAGE SYNTHESIS PROCESS
S17
PRESENT MULTI-WINDOW SCREEN
S18
END

FIG. 30


PROCESS PERFORMED BY TERMINAL
RECEIVE CAPTURE START COMMAND AND DISPLAY STATUS MANAGEMENT FILE
S31
REFERENCE CAPTURE AREA SETTING FLAG OF OWN TERMINAL IN DISPLAY STATUS MANAGEMENT FILE
S32
CAPTURE AREA SETTING FLAG
S33
「1」
「0」
S35
CAPTURE AREA DESIGNATION OPERATION SCREEN
S36
PERFORM PARTIAL CAPTURE PROCESS
FULL-SCREEN CAPTURE PROCESS
S34
S37
NO
SCREEN CAPTURE PROCESS TERMINATED AND REQUEST TO SEND CAPTURED IMAGE DATA RECEIVED FROM DISPLAY DEVICE?
YES
SEND CAPTURED IMAGE DATA
S38
END

Espacenet

Bibliographic data: CN1476242 (A) — 2004-02-18

Display system, network answering display device, terminal apparatus and controlling program

Inventor(s): KAN CHONO [JP]; NORIHIRO YOSHIKUNI [JP] ± (CHONO KAN, ; YOSHIKUNI NORIHIRO, ; CHONO KAN,YOSHIKUNI NORIHIRO)

Applicant(s): SEIKO EPSON CORP [JP] ± (SEIKO EPSON CORP)

Classification: - **international:** ***G09F9/00; G09G3/36; G09G5/00; H04N5/74; H04N7/14;*** (IPC1-7): G09F9/00; G09G3/36; H04N5/74
- **cooperative:** **G06F3/0481**; **G06F3/0484**; **G06F3/1454**; **G06Q10/10**; **H04N21/4312**; **H04N21/4314**; **H04N21/4402**; **H04N21/64792**; **H04N7/15**

Application number: CN2003150183 20030718

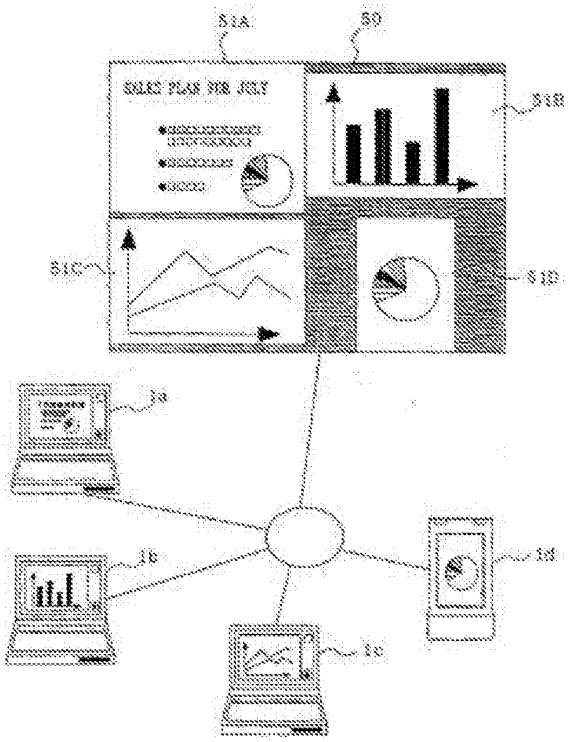
Priority number(s): JP20020214405 20020723 ; JP20020214406 20020723

Also published as: CN1268122 (C) EP1385336 (A2) EP1385336 (A3) EP1385336 (B1) US2014115528 (A1) more

Abstract not available for CN1476242 (A)
Abstract of corresponding document: EP1385336 (A2)

A technique for presenting display screens of a plurality terminals (1a - 1d) connected to a network (3) on a multi-window screen of a display screen of a display device (2). A communication unit (28) receives image data captured and then sent by each terminal having a screen capture function. A display control unit (22) controls an image synthesizer (42) to synthesize the captured image data into single screen multi-window format data. A multi-window screen is thus presented.

FIG. 8



[19] 中华人民共和国国家知识产权局

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H04N 5/74
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[32] 2002. 7. 23 [33] JP [31] 214406/2002

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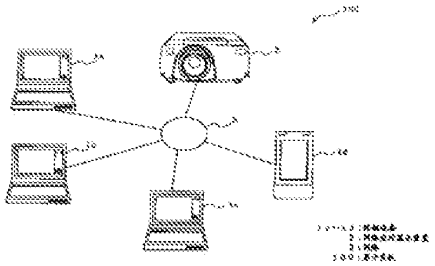
代理人 陈海红 段承恩

权利要求书 6 页 说明书 51 页 附图 25 页

[54] 发明名称 显示系统、网络应对显示装置、终端设备和控制程序

[57] 摘要

涉及可以在显示装置的 1 个画面上多画面显示进行网络连接的多个终端设备的显示画面的技术。用通信部分 28 接收从具有画面俘获功能的各个终端设备发送来的俘获图像数据。然后，在显示控制部分 22 中，借助于图像合成部分 42，借助于画面分割，把该各个俘获图像数据合成为 1 个画面的图像数据。借助于此，就可以进行多画面显示。



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1. 一种显示系统，其特征在于，具备：具有画面俘获功能，通过网络发送由该画面俘获功能取得的俘获图像数据的多个终端设备；和具有显示部分，并具有通过网络接收从上述终端设备发送来的上述俘获图像数据，借助于画面分割合成为1个画面的图像数据并在上述显示部分的显示画面上进行显示的多画面显示功能的网络应对显示装置，

作成为在上述终端设备侧进行作为用于向上述网络应对显示装置的上述显示画面上进行多画面显示所必须的处理的、用上述画面俘获功能取得的上述俘获图像数据的图像尺寸的尺寸变换处理，并在上述网络应对显示装置侧，从上述终端设备取得该尺寸变换后的俘获图像数据并进行上述合成。

2. 根据权利要求1所述的显示系统，其特征在于：上述网络应对显示装置，将上述显示部分的显示画面分割成要进行显示的终端设备的台数量，决定分配给要进行该显示的终端设备的分割画面的显示尺寸并发送给该终端设备，接收到该显示尺寸的终端设备，在进行上述尺寸变换处理时，把上述俘获图像数据的图像尺寸，尺寸变换成上述所接收到的上述显示尺寸。

3. 根据权利要求1或2所述的显示系统，其特征在于：上述终端设备，对用上述画面俘获功能取得的俘获图像数据，除了要进行上述尺寸变换处理之外，还要在进行向上述网络应对显示装置的上述显示部分的显示色数的色变换处理之后再将其向上述网络应对显示装置发送。

4. 根据权利要求3所述的显示系统，其特征在于：上述网络应对显示装置，在向上述终端设备发送显示尺寸时，也发送自身的上述显示部分的显示色数，上述终端设备，根据从上述网络应对显示装置接收到的上述显示色数，进行上述色变换处理。

5. 一种网络应对显示装置，是通过网络与分别具有画面俘获功能的多个终端设备连接的网络应对显示装置，其特征在于，具备：

显示部分，

可与上述各个终端设备之间进行双向通信的通信部分，

和显示控制部分，

在上述各个终端设备的每一个中，都用上述通信部分接收由上述画面俘获功能取得并已尺寸变换成规定的图像尺寸的俘获图像数据，上述显示控制部分，具有借助于画面分割把用上述通信部分接收到的上述各个俘获图像数据合成为 1 个画面的图像数据并使之在上述显示部分的显示画面上显示的多画面显示功能。

6. 根据权利要求 5 所述的网络应对显示装置，其特征在于：上述显示控制部分具有向当前的显示画面内嵌入新的画面以进行显示的嵌入功能。

7. 根据权利要求 5 所述的网络应对显示装置，其特征在于：借助于上述通信部分的双向通信，可从网络应对显示装置侧，也可从终端设备侧，进行在上述显示画面上显示俘获图像数据的终端设备的选择。

8. 根据权利要求 5 所述的网络应对显示装置，其特征在于：上述显示控制部分，具有从正在上述显示画面上显示的构成多画面的的多个分割画面中，放大显示规定的分割画面的放大显示功能。

9. 根据权利要求 5 所述的网络应对显示装置，其特征在于：上述显示控制部分，具有从正在上述显示画面上显示的构成多画面的多个分割画面中，把规定的分割画面切换成上述显示画面全体的显示的单画面切换功能。

10. 根据权利要求 5 所述的网络应对显示装置，其特征在于：上述显示控制部分，具有从正在上述显示画面上显示的构成多画面的的多个分割画面中，消去规定的分割画面的消去功能。

11. 根据权利要求 10 所述的网络应对显示装置，其特征在于：上述规定的分割画面，借助于上述通信部分的双向通信，可从网络应对显示装置侧，也可从终端设备侧进行选择。

12. 根据权利要求 5 所述的网络应对显示装置，其特征在于：从上述

终端设备接收到的上述俘获图像数据，是指定上述终端设备的显示画面的全部或一部分范围进行俘获而得到的图像数据。

13. 根据权利要求5所述的网络应对显示装置，其特征在于：从上述终端设备取得的俘获图像数据，是检测终端设备的显示画面上的变化，仅仅对画面上的变化部分进行俘获得到的图像数据。

14. 根据权利要求5所述的网络应对显示装置，其特征在于，具备：把上述显示部分的显示画面分割成要进行显示的终端设备台数量，决定要分配给该要进行显示的终端设备的分割画面的显示尺寸的显示尺寸决定部分，和用上述通信部分把用该显示尺寸决定部分决定的显示尺寸分别发送给相应的各个终端设备的控制部分，该控制部分用上述通信部分从发送了上述显示尺寸的各终端设备接收已尺寸变化成分配给该终端设备的分割画面的显示尺寸的俘获图像数据，把所接收到的各个俘获图像数据合成1个画面的图像数据在上述显示部分上进行显示那样地对上述显示控制部分进行控制。

15. 根据权利要求14所述的网络应对显示装置，其特征在于：使分配给要进行显示的终端设备的分割画面的纵横比，与该终端设备的显示部分的显示画面的纵横比相同。

16. 根据权利要求5所述的网络应对显示装置，其特征在于：上述控制部分对上述显示控制部分进行控制，使得在向终端设备发送显示尺寸时，也发送上述显示部分的显示色数，用上述通信部分，从发送了上述显示尺寸和上述显示色数的终端设备那里，接收已尺寸变换成分配给该终端设备的分割画面的显示尺寸，而且已变换成上述显示色数的俘获图像数据，并把所接收到的各个俘获图像数据合成1个画面的图像数据在上述显示部分上进行显示。

17. 一种终端设备，是通过网络连接在权利要求5到16中的任何一项所述的网络应对显示装置上的终端设备，其特征在于，具备：

显示部分；

与上述网络应对显示装置之间可进行双向通信的通信部分；

俘获在上述显示部分的显示画面上显示的内容的画面俘获处理部分;

把用上述画面俘获处理部分俘获到的俘获图像数据尺寸变换成规定的图像尺寸的图像变换部分;

和从上述通信部分把用该图像变换部分进行了尺寸变换后的俘获图像数据发送给上述网络应对显示装置的控制部分,

产生在要在上述网络应对显示装置的上述显示画面上显示的多画面中的1个分割画面上显示的俘获图像数据。

18. 根据权利要求17所述的终端设备,其特征在于:上述网络应对显示装置的上述显示画面,被分割成要进行显示的终端设备台数量,决定分配给要进行该显示的终端设备的分割画面的显示尺寸,上述图像变换部分,把用上述画面俘获处理部分取得的俘获图像数据尺寸变换成已分配给该终端设备的显示尺寸。

19. 根据权利要求17所述的终端设备,其特征在于:上述图像变换部分除了上述尺寸变换之外,还要对上述网络应对显示装置的上述显示部分的显示色数进行色变换,上述控制部分,从上述通信部分向上述网络应对显示装置发送已施行了上述尺寸变换处理和上述色变换处理的俘获图像数据。

20. 一种网络应对显示装置,是通过网络与分别具有画面俘获功能的多个终端设备连接的网络应对显示装置,其特征在于,具备:

显示部分,

可与上述各个终端设备进行双向通信的通信部分,

和显示控制部分,

上述显示控制部分,具有借助于画面分割,将在上述各个终端设备的每一者中通过上述画面俘获功能取得的,用上述通信部分接收到的各个俘获图像数据,合成为1个画面的图像数据并在上述显示部分的显示画面上显示的多画面显示功能。

21. 根据权利要求20所述的网络应对显示装置,其特征在于:上述显示控制部分,具有向当前的显示画面内嵌入新的画面以进行显示的嵌入

功能。

22. 根据权利要求 20 所述的网络应对显示装置，其特征在于：借助于上述通信部分的双向通信，可从网络应对显示装置侧，也可从终端设备侧进行在上述显示画面上显示俘获图像数据的终端设备的选择。

23. 根据权利要求 20 所述的网络应对显示装置，其特征在于：上述显示控制部分，具有从正在上述显示画面上显示的构成多画面的的多个分割画面中，放大显示规定的分割画面的放大显示功能。

24. 根据权利要求 20 所述的网络应对显示装置，其特征在于：上述显示控制部分，具有从正在上述显示画面上显示的构成多画面的的多个分割画面中，将规定的分割画面切换成上述显示画面全体的显示的单画面切换功能。

25. 根据权利要求 20 中的任何一项所述的网络应对显示装置，其特征在于：上述显示控制部分，具有从正在上述显示画面上显示的构成多画面的的多个分割画面中，消去规定的分割画面的消去功能。

26. 根据权利要求 25 所述的网络应对显示装置，其特征在于：上述规定的分割画面，借助于上述通信部分的双向通信，可从网络应对显示装置侧，也可从终端设备侧进行选择。

27. 根据权利要求 20 所述的网络应对显示装置，其特征在于：从上述终端设备取得的俘获图像数据，是指定上述终端设备的显示画面的全部或一部分范围进行俘获而得到的图像数据。

28. 根据权利要求 20 所述的网络应对显示装置，其特征在于：从上述终端设备取得的俘获图像数据，是检测终端设备的显示画面上的变化，仅仅对画面上的变化部分进行俘获而得到的图像数据。

29. 根据权利要求 20 所述的网络应对显示装置，其特征在于：上述显示控制部分，具备：把上述显示部分的显示画面分割成要进行显示的终端设备台数量，编制含有特定分配给该要进行显示的终端设备的分割画面的显示尺寸和该分割画面的显示位置信息的分割区域信息的分割区域信息编制部分，根据用该分割区域信息编制部分编制成的 分割区域信息把来自

终端设备的俘获图像数据合成为 1 个画面的图像数据，产生合成图像数据的图像合成部分，和对用该图像合成部分产生的上述图像合成数据进行处理产生显示图像数据并向上述显示部分输出的图像处理部分。

30. 根据权利要求 29 所述的网络应对显示装置，其特征在于：上述图像合成部分，在维持该图像尺寸的纵横比不变的状态下缩小或放大来自上述各个终端设备的俘获图像数据并进行合成。

显示系统、网络应对显示装置、终端设备和控制程序

技术领域

本发明涉及用来在显示装置的1个画面上多画面显示连接到网络上的多个终端设备的画面的技术。

背景技术

图25的构成图示出了现有的显示系统的一个例子。

在图25中，在网络210上，分别连接有作为网络应对显示装置的例如投影仪220、笔记本个人计算机230、台式个人计算机251、252、253、254，此外，在投影仪220上，直接连接有可直接向投影仪220输入图画等使之投影，或向正在投影的数据插入线图等的图形输入器261、262、263、264。另外，在笔记本个人计算机230和台式个人计算机251、252、253、254上已装进了画面俘获软件。

在像这样地构成的现有的显示系统中，采用用画面俘获软件俘获例如笔记本个人计算机230上的画面的内容，并通过网络210把所俘获的该俘获图像数据发送给投影仪220的办法，就可以用投影仪220投影正在笔记本个人计算机230上显示的画面。因此，采用用投影仪附属的遥控器等进行切换操作的办法，就可以把投影仪220的投影图像，从笔记本个人计算机230的画面切换成别的例如台式个人计算机251的画面的图像。

在上述现有的显示系统的情况下，如上所述，可以用投影仪220显示的图像，变成为已连接到投影仪220上的笔记本个人计算机230、台式个人计算机251、252、253、254中的任何一项的个人计算机的图像。为此，在要观看比较笔记本个人计算机230、台式个人计算机251、252、253、254的各个显示画面的内容以进行讨论的情况下等，就需要每次一个画面地进

行切换，出于这样的情况，近些年来，人们强烈要求一种可以用 1 个画面同时显示多个个人计算机的画面的功能。

此外，为了应对该要求，近些年来虽然一直在进行开发，但是现状是这样的功能尚不存在，此外，还存在着这样的情况：在要实现这样的显示系统时，如果或者因增加要用投影仪(网络应对显示装置)进行的处理量而对网络应对显示装置要求庞大的处理能力，或者招致网络的负荷的增加的话，那就成了问题。

发明内容

本发明就是有鉴于此而发明的，目的在于提供可在画面上多画面显示连接到网络上的多个终端设备的显示画面的网络应对显示装置和显示控制程序。

此外，目的还在于提供在不招致网络应对显示装置和网络负荷增大的情况下，可在显示画面上多画面显示连接到网络上的多个终端设备的显示画面的显示系统、网络应对显示装置、显示控制程序、网络应对投影仪、网络应对等离子体显示器、网络应对液晶监视器、终端设备和控制程序。

(1) 本发明的显示系统，是具备具有画面俘获功能，通过网络发送由画面俘获功能取得的俘获图像数据的多个终端设备；和具有具有显示部分，通过网络接收从终端设备发送来的俘获图像数据，借助于画面分割合成为 1 个画面的图像数据在显示部分的显示画面上进行显示的画面显示功能的网络应对显示装置，作成为使得在终端设备侧进行作为用来在网络应对显示装置的显示画面上进行多画面显示所必须的处理的、用画面俘获功能取得的俘获图像数据的图像尺寸的尺寸变换处理，在网络应对显示装置侧，作成为从终端设备取得该尺寸变换后的俘获图像数据并进行合成。

倘采用本发明，由于作成为使得在实现多画面显示功能时在终端设备一侧进行必要的尺寸变换处理，故可以得到可以在网络应对显示装置上多画面显示已连接到网络上的终端设备的显示画面，而不会招致网络应对显示装置和网络的负荷增大。

(2) 本发明的显示系统，在上述(1)中，网络应对显示装置，把显示部分的显示画面分割成要进行显示的终端设备的台数的量，决定要分配给要进行该显示的终端设备的分割画面的显示尺寸并发送给相应的终端设备，接收到该显示尺寸的终端设备，在进行尺寸变换处理时，把俘获图像数据的图像尺寸，尺寸变换成所接收到的显示尺寸。

倘采用本发明，则可以根据在网络应对显示装置一侧决定的显示尺寸在终端设备一侧进行尺寸变换处理。

(3) 本发明的显示系统，在上述(1)或(2)中，终端设备，对用画面俘获功能取得的俘获图像数据，除了要进行尺寸变换处理外，还要在进行了变换为网络应对显示装置的显示部分的显示色数的色变换处理之后向网络应对显示装置发送。

倘采用本发明，由于在终端设备一侧还进行了色变换处理之后把俘获图像数据发送给网络应对显示装置，故可以进一步减轻网络应对显示装置的负荷。

(4) 本发明的显示系统，在上述(3)中，网络应对显示装置，在向终端设备发送显示尺寸时，也发送自身的显示部分的显示色数，终端设备，根据从网络应对显示装置接收到的显示色数，进行色变换处理。

倘采用本发明，则可以根据网络应对显示装置所指定的、网络应对显示装置的显示部分的显示色数，在终端设备一侧，进行色变换处理。

(5) 本发明的显示系统，在上述(1)到(4)中的任何一项中，网络应对显示装置是投影仪。

倘采用本发明，则作为网络应对显示装置可以使用投影仪。

(6) 本发明的显示系统，在上述(1)到(4)中的任何一项中，网络应对显示装置是等离子体显示器。

倘采用本发明，则作为网络应对显示装置可以使用等离子体显示器。

(7) 本发明的显示系统，在上述(1)到(4)中的任何一项中，网络应对显示装置是液晶监视器。

倘采用本发明，则作为网络应对显示装置可以使用液晶监视器。

(8) 本发明的显示系统，在上述(1)到(4)中的任何一项中，网络应对显示装置是有机 EL 显示器。

倘采用本发明，则作为网络应对显示装置可以使用有机 EL 显示器。

(9) 本发明的显示系统，在上述(1)到(8)中的任何一项中，终端设备是个人计算机或 PDA。

倘采用本发明，则终端设备可以使用个人计算机或 PDA。

(10) 本发明的网络应对显示装置，是通过网络与分别具备画面俘获功能的多个终端设备进行连接的网络应对显示装置，具备显示部分、可与各个终端设备之间进行双向通信的通信部分、和显示控制部分，在各个终端设备的每一个设备中，都用通信部分接收用画面俘获功能取得并已尺寸变换成规定的图像尺寸的俘获图像数据，显示控制部分具有借助于画面分割把用通信部分接收到的各个俘获图像数据合成为 1 个画面的图像数据并使之在显示部分的显示画面上显示的多画面显示功能。

倘采用本发明，由于从终端设备一侧取得尺寸变换完毕的俘获图像数据并进行合成显示，故可以得到可以减轻因进行多画面显示而产生的负荷的网络应对显示装置。

(11) 本发明的网络应对显示装置，在上述(10)中，显示控制部分具有向当前的显示画面内嵌入新的画面以进行显示的嵌入功能。

倘采用本发明，则可以得到具有嵌入功能的网络应对显示装置。

(12) 本发明的网络应对显示装置，在上述(10)或(11)中，使用者可以从已连接到网络应对显示装置上的多个终端设备中任意选择在显示画面上显示俘获图像数据的终端设备。

倘采用本发明，则可以得到使用者可以从多个终端设备中，选择可以在网络应对显示装置上显示俘获图像数据的终端设备的网络应对显示装置。

(13) 本发明的网络应对显示装置，在上述(10)到(12)中的任何一项中，都可借助于通信部分的双向通信，从网络应对显示装置一侧，或从终端设备一侧，进行在显示画面上显示俘获图像数据的终端设备的选择。

倘采用本发明，则可以得到从网络应对显示装置一侧，或从终端设备一侧，都可以指定在网络应对显示装置上显示俘获图像数据的终端设备的网络应对显示装置。

(14) 本发明的网络应对显示装置，在上述(10)到(13)中的任何一项中，显示控制部分，具有从正在显示画面上显示的构成多画面的的多个分割画面中，放大显示规定的分割画面的功能。

倘采用本发明构，则可以得到具有放大显示规定的分割画面的放大显示功能的网络应对显示装置。

(15) 本发明的网络应对显示装置，在上述(10)到(13)中的任何一项中，显示控制部分，具有从正在显示画面上显示的构成多画面的的多个分割画面中，把规定的分割画面切换成显示画面全体的显示的单画面切换功能。

倘采用本发明，则可以得到把规定的分割画面切换成显示画面全体的显示的单画面切换功能的网络应对显示装置。

(16) 本发明的网络应对显示装置，在上述(10)到(13)中的任何一项中，显示控制部分，具有从正在显示画面上显示的构成多画面的的多个分割画面中，消去规定的分割画面的消去功能。

倘采用本发明，则可以得到具有消去规定的分割画面的的网络应对显示装置。

(17) 本发明的网络应对显示装置，在上述(14)到(16)中的任何一项中，规定的分割画面可根据使用者操作进行选择。

倘采用本发明，则可以得到使用者可以选择使之进行放大显示的分割画面、使之进行单画面显示的分割画面、和使之消去的分割画面的网络应对显示装置。

(18) 本发明的网络应对显示装置，在上述(17)中，规定的分割画面，借助于通信部分的双向通信，从网络应对显示装置一侧，或从终端设备一侧都可以进行选择。

倘采用本发明，则可以得到从网络应对显示装置一侧，或从终端设备一侧都可指定使之进行放大显示的分割画面、使之进行单画面显示的分割

画面、和使之消去的分割画面的网络应对显示装置。

(19) 本发明的网络应对显示装置，在上述(10)到(18)中的任何一项中，从终端设备接收到的俘获图像数据，是指定终端设备的显示画面的全部或一部分范围进行俘获而得到的图像数据。

倘采用本发明，则可以得到要在显示部分的显示画面上显示的俘获图像数据，是用全画面俘获得到的俘获图像数据、或部分俘获得到的俘获图像数据中的任何一方都可以显示的网络应对显示装置。

(20) 本发明的网络应对显示装置，在上述(10)到(18)中的任何一项中，从终端设备取得的俘获数据，是检测终端设备的显示画面上的变化，仅仅对画面上的变化部分进行俘获得到的图像数据。

倘采用本发明，由于仅仅对终端设备的显示画面上的变化部分进行俘获，故可以得到可以减轻对网络的负荷，并显示使之与已有的俘获数据进行合成后的图像数据的网络应对显示装置。

(21) 本发明的网络应对显示装置，在上述(10)到(20)中的任何一项中，具备：把显示部分的显示画面分割成要进行显示的终端设备台数量，决定要分配给该要进行显示的终端设备的分割画面的显示尺寸的显示尺寸决定部分，和用通信部分把用显示尺寸决定部分决定的显示尺寸分别发送给相应的各个终端设备的控制部分，控制部分使得用通信部分从发送显示尺寸的各终端设备接收已尺寸变化成分配给该终端设备的分割画面的显示尺寸的俘获图像数据，把所接收到的各个俘获图像数据合成1个画面的图像数据在显示部分上进行显示那样地对显示控制部分进行控制。

倘采用本发明，则可以把要在终端设备一侧进行尺寸变换处理时的显示尺寸，变成为用显示尺寸决定部分决定后的显示尺寸。

(22) 本发明的网络应对显示装置，在上述(21)中，使分配给要进行显示的终端设备的分割画面的纵横比，变成为与该终端设备的显示部分的显示画面的纵横比相同的纵横比。

倘采用本发明，则可以得到可以构成没有失调感的显示画面的网络应对显示装置。

(23) 本发明的网络应对显示装置，在上述(10)到(22)中的任何一项中，控制部分对控制显示控制部分进行控制，使得在向终端设备发送显示尺寸时，也发送显示部分的显示色数，用通信部分，从发送显示尺寸和显示色数的终端设备那里，接收已尺寸变换成分配给该终端设备的分割画面的显示尺寸，而且已变换成显示色数的俘获图像数据，并把所接收到的各个俘获图像数据合成1个画面的图像数据在显示部分上进行显示。

倘采用本发明，由于接收并合成显示在终端设备一侧除缩小变化之外还施行了色变换的俘获图像数据，故可以得到可以进一步减轻用来进行多画面显示的处理的负荷的网络应对显示装置。

(24) 本发明的网络应对显示装置，在上述(10)到(23)中的任何一项中，通信部分的通信协议是TCP/IP。

倘采用本发明，则作为通信部分的通信协议可以利用一般的TCP/IP。

(25) 本发明的网络应对显示装置，在上述(10)到(24)中的任何一项中，网络是LAN、无线LAN、近距离无线LAN中的任何一项。

倘采用本发明，则作为网络，可以利用 LAN、无线 LAN、近距离无线 LAN。

(26) 本发明的网络应对投影仪，装载有在上述(10)到(25)中的任何一项的网络应对显示装置。

倘采用本发明，则可以得到具备上述效果的投影仪。

(27) 本发明的网络应对投影仪，在上述(26)中，显示部分是液晶光阀、LCOS 光阀、DMD 中的任何一项。

倘采用本发明，则在显示部分使用液晶光阀、LCOS 光阀、DMD 的投影仪中可以得到上述效果。

(28) 本发明的网络应对等离子体显示器，装载有上述(10)到(25)中的任何一项的网络应对显示装置，并把显示部分变成为等离子体显示面板。

倘采用本发明，则可以得到具备上述效果的等离子体显示器。

(29) 本发明的网络应对液晶监视器，装载有上述(10)到(25)中的任何一项的网络应对显示装置，并把显示部分变成为液晶面板。

倘采用本发明，则可以得到具备上述效果的液晶监视器。

(30) 本发明的网络应对有机 EL 显示器，装载有上述(10)到(25)中的任何一项的网络应对显示装置，并把显示部分变成为有机 EL 面板。

倘采用本发明，则可以得到具备上述效果的网络应对有机 EL 显示器。

(31) 本发明的显示控制程序，可以用 CPU 实现上述(10)到(25)中的任何一项的网络应对显示装置的显示控制部分。

倘采用本发明，则可以得到可把上述效果提供给显示装置的显示控制程序。

(32) 本发明的终端设备，是通过网络连接到上述(10)到(25)中的任何一项的网络应对显示装置上的终端设备，具备：显示部分；与网络应对显示装置之间可进行双向通信的通信部分；俘获在显示部分的显示画面上显示的内容的画面俘获处理部分；把用画面俘获处理部分俘获到的俘获图像数据尺寸变换成规定的图像尺寸的图像变换部分；从通信部分把用图像变换部分进行了尺寸变换后的俘获图像数据发送给网络应对显示装置的控制部分，产生可以在要在网络应对显示装置的显示画面上显示的多画面中的 1 个分割画面上显示的俘获图像数据。

倘采用本发明，则在产生要在网络应对显示装置的显示画面上显示的多画面中的 1 个分割画面上显示的俘获图像数据时，采用承担多画面显示所需要的处理的一部分，具体地说，承担尺寸变换处理的办法，就可以得到可以对网络应对显示装置的负荷减轻作出贡献的终端设备。

(33) 本发明的终端设备，在上述(32)中，网络应对显示装置的显示画面，被分割成要进行显示的终端设备台数的量，决定要分配给要进行该显示的终端设备的分割画面的显示尺寸，图像变换部分，把用画面俘获处理部分取得的俘获图像数据尺寸变换成已分配给该终端设备的显示尺寸。

倘采用本发明，则可以根据在网络应对显示装置一侧决定的显示尺寸进行尺寸变换处理。

(34) 本发明的终端设备，在上述(32)或(33)中，图像变换部分除尺寸变换之外，还要对网络应对显示装置的显示部分的显示色数进行色变换，控

制部分，从通信部分向网络应对显示装置发送已施行了尺寸变换处理和色变换处理的俘获图像数据。

倘采用本发明，由于除去尺寸变换处理之外还进行色变换处理，故可以对网络应对显示装置的进一步的负荷减轻作出贡献。

(35) 本发明的控制程序，可以用 CPU 实现上述(32)到(34)中的任何一项的终端设备的各个处理部分。

倘采用本发明，则可以得到可以把上述效果提供给终端设备的控制程序。

(36) 本发明的网络应对显示装置，是通过网络与分别具备画面俘获功能的多个终端设备进行连接的网络应对显示装置，具备显示部分、可与各个终端设备进行双向通信的通信部分和显示控制部分，显示控制部分，具有借助于画面分割，把在各个终端设备的每一者中借助于画面俘获功能取得，用通信部分接收到的各个俘获图像数据，合成为 1 个画面的图像数据在显示部分的显示画面上显示的多画面显示功能。

倘采用本发明，则可以得到在显示装置的画面上多画面显示已进行了网络连接的多个终端设备的显示画面的网络应对显示装置。

(37) 本发明的网络应对显示装置，在上述(36)中，显示控制部分，具有向当前的显示画面内嵌入新的画面以进行显示的嵌入功能。

倘采用本发明则可以得到具有嵌入功能的网络应对显示装置。

(38) 本发明的网络应对显示装置，在上述(36)或(37)中，使用者可以从已连接到网络应对显示装置上的多个终端设备中任意选择在显示画面上显示俘获图像数据的终端设备。

倘采用本发明，则可以得到使用者选择在网络应对显示装置上显示俘获图像数据的终端设备的网络应对显示装置。

(39) 本发明的网络应对显示装置，在上述(36)到(38)中的任何一项中，都可借助于通信部分的双向通信，从网络应对显示装置一侧，或从终端设备一侧进行在显示画面上显示俘获图像数据的终端设备的选择。

倘采用本发明，则可以得到从网络应对显示装置一侧，或从终端设备

一侧，都可以指定在网络应对显示装置上显示停获图像数据的终端设备。

(40) 本发明的网络应对显示装置，在上述(36)到(39)中的任何一项中，显示控制部分，具有从正在显示画面上显示的构成多画面的的多个分割画面中，放大显示规定的分割画面的放大显示功能。

倘采用本发明构，则可以得到具有放大显示规定的分割画面的放大显示功能的网络应对显示装置。

(41) 本发明的网络应对显示装置，在上述(36)到(39)中的任何一项中，显示控制部分，具有从正在显示画面上显示的构成多画面的的多个分割画面中，把规定的分割画面切换成显示画面全体的显示的单画面切换功能。

倘采用本发明，则可以得到把规定的分割画面切换成显示画面全体的显示的单画面切换功能的网络应对显示装置。

(42) 本发明的网络应对显示装置，在上述(36)到(39)中的任何一项中，显示控制部分，具有从正在显示画面上显示的构成多画面的的多个分割画面中，消去规定的分割画面的消去功能。

倘采用本发明，则可以得到具有消去规定的分割画面的的消去功能网络应对显示装置。

(43) 本发明的网络应对显示装置，在上述(40)到(42)中的任何一项中，规定的分割画面可根据使用者操作进行选择。

倘采用本发明，则可以得到使用者可以选择使之进行放大显示的分割画面、使之进行单画面显示的分割画面、和使之消去的分割画面的网络应对显示装置。

(44) 本发明的网络应对显示装置，在上述(43)中，规定的分割画面，借助于通信部分的双向通信，从网络应对显示装置一侧，或从终端设备一侧都可以进行选择。

倘采用本发明，则可以得到从网络应对显示装置一侧，或从终端设备一侧都可指定使之进行放大显示的分割画面、使之进行单画面显示的分割画面、和使之消去的分割画面的网络应对显示装置。

(45) 本发明的网络应对显示装置，在上述(36)到(44)中的任何一项中，

从终端设备取得的俘获图像数据，是指定终端设备的显示画面的全部或一部分范围进行俘获而得到的图像数据。

倘采用本发明，则可以得到要在显示部分的显示画面上显示的俘获图像数据，是用全画面俘获得到的俘获图像数据、或部分俘获得到的俘获图像数据中的任何一方都可以显示的网络应对显示装置。

(46) 本发明的网络应对显示装置，在上述(36)到(44)中的任何一项中，从终端设备取得的俘获数据，是检测终端设备的显示画面上的变化，仅仅对画面上的变化部分进行俘获得到的图像数据。

倘采用本发明，由于仅仅对终端设备的显示画面上的变化部分进行俘获，故可以得到可以减轻对网络的负荷，并显示使之与已有的俘获数据进行合成后的图像数据的网络应对显示装置。

(47) 本发明的网络应对显示装置，在上述(36)到(46)中的任何一项中，显示控制部分，具备：把上述显示部分的显示画面分割成要进行显示的终端设备台数量，编制含有特定要分配给要进行该显示的终端设备的分割画面的显示尺寸和该分割画面的显示位置信息的分割区域信息的分割区域信息编制部分，根据用该分割区域信息编制部分编制成的分割区域信息把来自终端设备的俘获图像数据合成为 1 个画面的图像数据，产生合成图像数据的图像合成部分，和对用该图像合成部分产生的图像合成数据进行处理产生显示图像数据向上述显示部分输出的图像处理部分。

(48) 本发明的网络应对显示装置，在上述(47)中，图像合成部分，在维持该图像尺寸的纵横比不变的状态下缩小或放大来自各个终端设备的俘获图像数据并进行合成。

倘采用本发明，则可以得到可以构成没有失调感的显示画面的网络应对显示装置。

(49) 本发明的网络应对显示装置，在上述(36)到(48)中的任何一项中，通信部分的通信协议是 TCP/IP。

倘采用本发明，则作为通信部分的通信协议可以利用一般的 TCP/IP。

(50) 本发明的网络应对显示装置，在上述(36)到(49)中的任何一项中，

网络是 LAN、无线 LAN、近距离无线 LAN 中的任何一项。

倘采用本发明，则作为网络，可以利用 LAN、无线 LAN、近距离无线 LAN。

(51) 本发明的网络应对投影仪，装载有在上述(36)到(50)中的任何一项的网络应对显示装置。

倘采用本发明，则可以得到具备上述效果的投影仪。

(52) 本发明的网络应对投影仪，在上述(51)中，显示部分是液晶光阀、LCOS 光阀、DMD 中的任何一项。

倘采用本发明，则在显示部分使用液晶光阀、LCOS 光阀、DMD 的投影仪中可以得到上述效果。

(53) 本发明的网络应对等离子体显示器，装载有上述(36)到(50)中的任何一项的网络应对显示装置，并把显示部分变成为等离子体面板。

倘采用本发明，则可以得到具备上述效果的等离子体显示器。

(54) 本发明的网络应对液晶监视器，装载有上述(36)到(50)中的任何一项的网络应对显示装置，并把显示部分变成为液晶面板。

倘采用本发明，则可以得到具备上述效果的液晶监视器。

(55) 本发明的网络应对有机 EL 显示器，装载有上述(36)到(50)中的任何一项的网络应对显示装置，并把显示部分变成为有机 EL 面板。

倘采用本发明，则可以得到具备上述效果的网络应对有机 EL 显示器。

(56) 本发明的显示控制程序，可以用 CPU 实现上述(36)到(50)中的任何一项的网络应对显示装置的显示控制部分。

倘采用本发明，则可以得到可把上述效果提供给显示装置的显示控制程序。

附图说明

图 1 示出了具备本发明的实施方案 1 的网络应对显示装置的显示系统的网络构成。

图 2 的框图示出了实施方案 1 的终端设备的构成。

图 3 的框图示出了实施方案 1 的网络应对显示装置的构成。

图 4 示出了实施方案 1 的网络应对显示装置的功能上的构成。

图 5 示出了用显示状况管理文件管理的终端设备信息的各个项目。

图 6 的流程图(1/2)示出了实施方案 1 的本实施方案的工作的流程。

图 7 的流程图(2/2)示出了实施方案 1 的本实施方案的工作的流程。

图 8 的模式图示出了在显示装置的显示画面上多画面显示终端设备 1a 到 1d 这 4 台的显示画面的状态。

图 9 的流程图示出了分割区域信息编制处理的流程。

图 10 示出了显示状况管理文件的具体的构成。

图 11(a)示出了存放在假分割区域设定文件中的表的具体的构成的一个例子，(b)示出了以(a)的表为基础的假分割区域。

图 12 是真分割区域尺寸和真原点的说明图。

图 13 示出了分割区域信息文件的一个例子。

图 14 的流程图示出了从实施方案 1 的显示装置那里接收到俘获开始指令和显示状况管理文件后的终端设备一侧的工作。

图 15 是用来说明放大显示功能的模式图。

图 16(a)示出了在变更了优先级别的情况下要参照的假分割区域设定表的一个例子，(b)示出了以(a)的表为基础的假分割区域。

图 17 示出了在变更了优先级别的情况下的真分割区域的一个例子。

图 18 示出了在变更了优先级别的情况下要编制的分割区域信息文件的一个例子。

图 19 是用来说明单画面显示功能的模式图。

图 20 是用来说明嵌入功能的模式图。

图 21 是用来说明画面消去功能的模式图。

图 22 的流程图示出了从显示装置那里接收到差分俘获开始指令和显示状况管理文件后的终端设备一侧的工作。

图 23 作为画面比较处理的一个例子，示出了使鼠标指点器工作时的例子。

图 24 是图 23 的画面比较处理的说明图。

图 25 的构成图示出了现有的显示系统的一个例子。

图 26 的框图示出了实施方案 2 的终端设备的构成。

图 27 的框图示出了实施方案 2 的网络应对显示装置的构成。

图 28 的框图示出了实施方案 2 的网络应对显示装置的功能上的构成。

图 29 的流程图示出了实施方案 2 的本实施方案的工作的流程。

图 30 的流程图示出了从实施方案 2 的显示装置那里接收到俘获开始指令和显示状况管理文件后的终端设备一侧的工作。

具体实施方式

实施方案 1

图 1 示出了具备本发明的实施方案 1 的网络应对显示装置的显示系统的网络构成。

该显示系统 100，具备：多个终端设备 1(在图 1 中，仅仅画出了 1a、1b、1c、1d 这么 4 台)，具有本身为本发明的主要功能的多画面显示功能的网络应对显示装置 2(在图中示出的是投影仪的例子)(以下，简称为显示装置 2)，多个终端设备 1 和显示装置 2 通过网络 3，用 TCP/IP 等的通信协议连接为可进行双向通信。对各个终端设备 1 都分别预先给予固有的名称(以下，叫做终端名)。另外，网络 3，可以利用 LAN、无线 LAN、近距离无线 LAN 的蓝牙(Bluetooth,美国 Bluetooth SIG Inc.公司的注册商标)等的各种网络。

该显示系统 100，是借助于画面分割使在显示装置 2 的显示画面上同时显示在多个终端设备 1 中分别正在显示着的画面成为可能的系统，是例如在会议或演讲等时用之有效的系统。以下，对终端设备 1、显示装置 2 各自的构成详细地进行说明。

图 2 的框图示出了终端设备的构成。

终端设备 1，例如，可用个人计算机或 PDA(个人数字助理)等构成，具备用来显示演讲用的资料等的各种信息的显示部分 11，存储在该显示部

分 11 上要显示的内容的视频存储器 12、例如由图形输入器、鼠标、操作键盘构成的输入部分 13，检测来自该输入部分 13 的操作输入向后述的控制部分 16 输出输入信息的使用者接口部分 14、存放用来进行本发明的处理的应用(控制)程序或各种数据的存储部分 15、控制部分(CPU)16 和通信部分 17。

已存放在存储部分 15 内的控制程序，是用来实现下述功能的程序：用来实现在显示装置 2 中的多画面功能的终端设备一侧控制功能；可以俘获显示部分 11 的画面的全部或一部分的画面俘获功能；把借助于画面俘获功能取得的俘获图像数据变换成显示装置 2 的显示部分 21 的形式的图像变换功能，和为实现检测显示部分 11 的画面上的变化，用该控制程序和 CPU 构成数据管理处理部分 18、画面俘获处理部分 19、图像变换部分 19A 和画面比较处理部分 20。

控制部分 16，通过使用者接口部分 14 或通信部分 17，接受连接请求、放大显示请求、单画面切换请求、消去请求等的各种请求，并进行与该请求内容对应的处理，同时由图像变换部分 19A 对使用画面俘获处理部分 19 取得的俘获图像数据进行变换，从通信部分 17 向显示装置 2 发送变换后的俘获图像数据的处理等。

通信部分 17，是进行与显示装置 2 之间的双向通信的部分，在这里，通信协议是 TCP/IP,具有进行该 TCP/IP 连接所需要的 ARP、ICMP、IP、TCP、UDP 等的协议处理功能。另外，该功能也可以用 OS 实现。

另外，在图像变换部分 19A 中进行的变换处理，是由显示装置 2 进行多画面显示时必要的处理，虽然要在以下详述，但是，具体地说是这样的处理：向已分配给该终端设备 1 的分割画面的显示尺寸变化的尺寸变换处理、向显示装置 2 的显示部分 21 的显示色数变换的色变换处理。如上所述，在终端设备 1 的情况下，被构成为使得在对于用画面俘获处理部分 19 取得的俘获图像数据进行了为在显示装置 2 上进行的多画面显示所需要的变换处理之后，再发送给显示装置 2。

图 3 的框图示出了显示装置的构成。

显示装置 2，具备如下构成部分：显示部分 21；具有本发明的单画面显示功能、放大显示功能、单画面切换功能、嵌入功能和消去功能，进行要在显示部分 21 上显示的显示画面的控制的显示控制部分 22；例如由遥控器、鼠标、操作键盘构成的输入部分 23；检测来自输入部分 23 的操作输入并把输入内容输出给后述的控制部分 27 的使用者接口部分 24；存放提供本发明的多画面显示功能的显示控制程序的程序存储部分 25；存储在执行该显示控制程序时所必须的各种文件或各种数据的数据存储部分 26；进行显示装置 2 全体的工作控制的控制部分(CPU)27；和进行与终端设备 1 之间的双向通信的通信部分 28。

通信部分 28，是进行与终端设备 1 之间的双向通信的部分，在这里，通信协议是 TCP/IP,具有进行该 TCP/IP 连接所需要的 ARPICMP、IP、TCP、UDP 等的协议处理功能。

另外，该显示装置 2，具体地说，除图 1 所例示的投影仪之外，例如，还可用等离子体显示器、液晶监视器等构成。图 3 仅仅示出了与本发明的宗旨有关的主要部分，至于在投影仪、等离子体显示器、液晶监视器中分别特有的其它的机构，虽然由于与本发明的宗旨没有关联性而被省略，但是，采用在已有的投影仪、等离子体显示器、液晶监视器分别具备图 3 所示的各个处理部分的办法，就可以实现网络应对投影仪、网络应对等离子体显示器、网络应对液晶监视器。此外，显示部分 21，是随着这些显示装置 2 的种类不同而不同的显示要素，具体地说，如果是投影仪，则将变成为液晶光阀、LCOS 光阀、DMD(数字微型反射镜器件，美国德州仪器公司的商标)，在该情况下，显示部分 21 的显示画面将变成为投影面。此外，如果是等离子体显示器，则显示部分 21 将变成为等离子体显示面板，如果是液晶监视器则将变成为液晶面板，而如果是有机 EL 显示器，则将变成为有机 EL 面板。

其次，参看图 4 对存放在数据存储部分内的各种文件等进行说明。

在数据存储部分 26 内，存放有显示部分规范管理文件 30、连接许可管理文件 31、显示许可管理文件 32、连接状况管理文件 33、显示状况管

理文件 34、假分割区域设定文件 35、分割区域信息文件 36，此外，还具备用来存储从各个终端设备 1 发送过来的俘获图像数据的俘获图像数据存储部分 37。

显示部分规范管理文件 30，是注册有表明显示部分 21 的显示画面的纵横的像素个数的画面尺寸、和表明显示部分 21 的显示色数的色数信息的文件。另外，在本例中，画面尺寸定为 1280×1024 (SXGA)，色数则定为是 1677 万 7216 色。

连接许可管理文件 31，是注册有允许进行连接的终端设备 1 的终端名的文件，显示许可管理文件 32，是注册有允许进行画面显示的终端设备 1 的终端名的文件。

连接状况管理文件 33，是注册当前正连接到显示装置 2 上的终端设备 1 的终端名的文件。

显示状况管理文件 34，是管理当前的显示部分 21 的显示状况的文件，以表格形式对与正在当前的显示部分 21 的显示画面上显示的俘获图像数据发送处的终端设备 1 有关的终端设备信息进行管理。该显示状况管理文件 34，每当变更显示部分 21 的显示画面时都要更新，例如，在从 4 分割画面变更为 3 分割画面的情况下，与被消去的分割画面对应的终端设备 1 的终端设备信息就从该表中消去，反之，当从 4 分割画面变更为 5 分割画面的情况下，就要重新注册与该追加的画面对应的终端设备 1 的终端设备信息。

图 5 示出了要用显示状况管理文件管理的终端设备信息的各个项目。

显示状况管理文件 34，由‘终端名’、‘IP 地址’、‘画面尺寸’、‘色数信息’、‘优先级别’、‘俘获范围管理标志’、‘差分俘获管理标志’、‘俘获图像尺寸’、‘差分俘获图像尺寸 1’、‘差分俘获图像尺寸 2’、‘差分俘获原点 1’、‘差分俘获原点 2’这些项目构成。

‘终端名’是已预先赋予终端设备 1 的名字，‘画面尺寸’是显示部分 11 的显示画面的纵横像素个数，例如，如果是 SXGA 的终端设备，析像度则为 1280×1024，如果是 XGA 则为 1024×768。‘色数信息’是显示部分

11 的显示色数，例如为 256 色、1677 万 7216 色等。以上的‘终端名’、‘IP 地址’、‘画面尺寸’、‘色数信息’，是向该显示状况管理文件 34 进行注册时必须要存放的数据，其它的项目，则是可根据使用者操作等适宜设定(更新)的数据。

‘优先级别’，是左右要分配给用‘终端名’特定的终端设备 1 的分割画面的显示尺寸的大小的优先级别，可选用‘最高’、‘高’、‘无’等的值，将在以下详述，但是，在本例中，其构成为使得被分配为优先级别高的显示尺寸变大。‘俘获范围管理标志’是管理在用‘终端名’特定的终端设备 1 中的画面俘获究竟是全画面还是部分俘获的标志，通常示出的是表明全画面俘获的‘0’，在是部分俘获的情况下则被设定为‘1’。

‘差分俘获管理标志’是管理在用‘终端名’特定的终端设备 1 中的画面俘获究竟是通常的俘获还是仅仅画面上的变化部分的俘获(以后，叫做差分俘获)的标志，在是通常俘获的情况下，就表示‘0’，在是差分俘获的情况下就被设定为‘1’。

‘俘获图像尺寸’是在‘俘获范围管理标志’为‘1’的情况下，就是说在部分俘获的情况下的俘获图像数据的尺寸(纵横的像素个数)。

‘差分俘获图像尺寸 1’和‘差分俘获图像尺寸 2’，是‘差分俘获管理标志’为‘1’的情况下的、在差分俘获中取得的 2 个不同的范围的区域的尺寸。‘差分俘获图像原点 1’和‘差分俘获图像原点 2’，是在差分俘获中取得的 2 个不同的范围的区域的原点，用在‘俘获图像尺寸’中规定的区域内的绝对坐标表示。

假分割区域设定文件 35，为预先设定用来特定分配给各个终端设备 1 的假的分割区域的信息的文件，由为每一台终端设备准备好的多个表构成。该表的构成示于后述的图 11(a)、图 16(a)，对于其详细情况决定在以下的相应的地方进行说明。另外，对于分割区域信息文件 36，也在以下进行详述。

以上的各个文件 30、31、32、33、34、35、36，当用输入部分 23 进行规定的操作时，就会在显示部分 21 上显示文件的内容，可以自由地在显

示画面上进行确认和数据变更。

在这里，返回到图 4 的说明。

显示控制部分 22，具备作为显示尺寸决定部分的分割区域信息编制部分 41、图像合成部分 42 和图像处理部分 43，在控制部分 27 中根据通过来自使用者接口部分 24 或通信部分 28 接收到的来自使用者的连接请求、显示请求、嵌入显示请求、消去请求等的各种请求内容，边对各个处理部分 41、42、43 适宜存取数据存储部分 26 内的必要的文件边实施必要的处理，进行显示部分 21 的显示控制。显示控制部分 22，则可用提供已存放在程序存储部分 25 内的多画面功能的显示控制程序和控制部分(CPU)27 实现。

分割区域信息编制部分 41，在根据显示状况管理文件 34 把握显示对像的终端设备 1 的台数的同时，还取得显示对像的各个终端设备 1 中的每一者的优先级别和画面尺寸。然后，根据这些显示对像的终端设备 1 的台数、显示对像的各个终端设备 1 中的每一者的优先级别和画面尺寸，进行显示部分 21 的显示画面尺寸的分割，编制包括要分配给显示对像的各个终端设备 1 中的每一者的显示部分 21 上的分割画面的显示尺寸(以下，叫做分割区域尺寸)、和特定该分割画面的显示位置的信息(是对显示画面的分割画面的左上的绝对坐标，以下，叫做原点)在内的分割区域信息，进行作为分割区域信息文件 36 存放到数据存储部分 26 内的工作。

在分割区域信息编制部分 41 中编制成的分割区域信息文件 36 中，已分配给显示对像的各个终端设备 1 中的每一者的分割画面的分割区域尺寸，与已存放在显示部分规范管理文件 30 中的显示部分 21 的显示色数一起，借助于控制部分 27 从通信部分 28 发送给显示对像的各个终端设备 1 中的每一者，把从接收到这些数据的各个终端设备 1 返送回来的俘获图像数据，就是说，已根据所发送的分割区域尺寸和显示色数施行了前边所说的尺寸变换处理和色变换处理的俘获图像数据写入到俘获图像数据存储部分 37 内。另外，现在被叫做分割区域尺寸的信息，与在以下被叫做真分割区域尺寸的信息是相同的。

图像合成部分 42，根据分割区域信息编制部分 41 中编制成的分割区

域信息文件 36，对已存放在俘获图像数据存储部分 37 中的来自各个终端设备 1 的尺寸变换处理和色变换处理完毕的俘获图像数据进行合成，产生合成图像数据。

图像处理部分 43，是对用在图像合成部分 42 中产生的合成图像数据，或 OSD(on screen display，在画面上显示)功能等进行参照的数据存储部分 26 的显示状况管理文件 34 等的各种图像数据，进行扫描频率变换处理以产生显示图像数据，并向显示部分 21 输出的部分，例如可用扫描变换器构成。

以下，说明本实施方案的工作。图 6、图 7 的流程图示出了本实施方案的工作。

首先，在显示装置 2 一侧，作为用来进行多画面显示的准备阶段，用输入部分 23 进行规定的操作输入，当控制部分 27 通过使用者接口部分 24 检测到该操作输入后，就通过通信部分 28 和网络 3，与显示装置 2 的 IP 地址一起，同时通知终端名和 IP 地址的信息返送请求。该同时通知的终端名和 IP 地址的信息返送请求，被网络 3 上的各个终端设备 1 接收，各个终端设备 1 中的每一者，把自身的终端名和 IP 地址返送给显示装置 2。

显示装置 2，通过通信部分 28 接收来自各个终端设备 1 的返送信息(终端名和 IP 地址)，判定是否连接许可终端。具体地说，核查被返送的终端名是否与已注册在连接许可管理文件 31 中的终端名一致，如果一致，就判定为连接许可终端。

依次把来自已判定为连接许可终端的终端设备 1 的终端名和 IP 地址注册到连接状况管理文件 33 内。借助于该连接状况管理文件 33，在显示装置 2 一侧，就可以把握当前究竟已连接上多少台终端设备 1。此外，由于还作成为根据终端名判断连接许可和不许可，故结果就变成为例如即便是在借助于 DHCP，把 IP 地址提供给终端设备 1，在该要提供的 IP 地址在每一次连接时都不同的情况下等，也可以应对。

在以上的准备作业结束后，显示装置 2，就以各种请求等待的状态进行等待。现在，考虑在各个会议出席者所操作的各个终端设备 1 中，如图

所示，想要在显示装置 2 的显示画面 50 上多画面显示终端设备 1a 到 1d 这 4 台的显示画面的情况。在这里把每一个终端设备 1 的分辨率定为终端设备 1a 为 SXGA(1280×1024 像素)，终端设备 1b 为 SVGA(800×600 像素)，终端设备 1c 为 XGA(1024×768 像素)，终端设备 1d 为 480×640 像素的例子进行说明。

<多画面显示功能>

图 8 的模式图示出了在显示装置的显示画面上多画面显示终端设备 1a 到 1d 这 4 台的显示画面的状态。

首先，操作输入部分 23 的例如遥控器输入终端设备 1a 到 1d 的多画面显示的意图。这样一来，该输入信息，就是说包括终端设备 1a 到 1d 各自的识别信息在内的显示请求，就通过使用者接口部分 24 通知给控制部分 27(S1)。另外，在通知该显示请求时，虽然也可以指定优先级别或部分俘获或差分俘获，但是在这里假定未进行任何指定。

接收到显示请求的显示装置 2 的控制部分 27，对于显示对像的各个终端设备 1a 到 1d 中的每一者都要进行以下的步骤 S3 到 S9 的处理(S2)。就是说，根据由含于显示请求内的识别信息特定的终端名，参照连接许可管理文件 31、显示许可管理文件 32，分别判定究竟是连接许可终端，还是显示许可终端(S3)，在连接、显示都已许可的情况下(S4)，就通过通信部分 28 对该终端设备请求终端设备信息(终端名、IP 地址、画面尺寸、色数信息)(S5)。然后，接收对该请求进行应答返送回来的终端设备信息(S6)，并注册到显示状况管理文件 34 内(S7)。另外，在该显示请求时，在已进行了优先级别或部分俘获的指定、差分俘获的指定的情况下，在该步骤 S7 的注册时，也同样要注册‘优先级别’、‘俘获范围管理标志’、‘差分俘获管理标志’。

接着，对连接、显示都已许可的终端设备 1，与显示状况管理文件 34 一起，发送画面俘获开始指令(S8)。另外，对于未许可连接、显示的终端设备 1，就通过通信部分 28 通知该意思(S9)。

在这里，若设终端设备 1a 到 1d 全部都是连接、显示都已许可的终端

设备 1，则借助于步骤 S2 到步骤 S9 的处理，则结果就变成为把来自各个终端设备 1a 到 1d 的终端设备信息注册到显示状况管理文件 34 内，同时，对于各个终端设备 1a 到 1d，通过通信部分 28，与显示状况管理文件 34 一起发送画面俘获开始指令。

当以上的处理结束后，控制部分 27 就把区域分割请求通知给显示控制部分 22 的分割区域信息编制部分 41。借助于此，显示装置 2 就将进入分割区域信息编制处理(S10)。接收到画面俘获开始指令的终端设备 1 一侧的工作在后边讲述，以下，对用已接收到区域分割请求的分割区域信息编制部分 41 进行的分割区域信息编制处理，进行说明。

图 9 的流程图示出了分割区域信息编制处理的流程。在这里，设显示状况管理文件 34 是如图 10 那样地构成的文件，以下，具体地声明分割区域信息编制部分 41 的工作。另外，在图 10 中，设终端名 PC-1、PC-2、PC-3、PDA-1 分别与终端设备 1a、1b、1c、1d 对应。

分割区域信息编制部分 41，当从控制部分 27 接收到区域分割请求后，就参照显示状况管理文件 34 把握显示对像的终端设备 1 的台数(在这里为 4 台)，同时，取得各个终端设备 1a、1b、1c、1d 各自的优先级别(S21)。然后，根据这些终端设备 1 的台数，和各个终端设备 1a 到 1d 各自的优先级别，参照假分割区域设定文件 35，取得应分配给各个终端设备 1a、1b、1c、1d 每一者的假的分割区域的假的尺寸和假的原点(S22)。另外，至于要作成为‘假’的理由，是因为在这里要分配的分割区域，规定为在后边的步骤中，在对俘获图像数据进行尺寸变换时要进行变更的缘故，虽然这会在以下的说明弄得明白。

在这里，如图 10 所示，显示对像的终端设备台数为 4 台，由于在其全部中都没有优先级别设定，故在该情况下，在假分割区域设定文件 35 中要参照的相应的假分割区域设定表，例如，可像图 11(a)那样地构成。另外，在本例中，显示部分 21 的显示画面的画面尺寸定为 1280×1024(SXGA)，图 11(a)的假分割区域设定表，是该情况下的一个例子。此外，图 11(b)示出的是以(a)的假分割区域设定表为基础的假分割区域。

在这里，图 11(a)的所谓优先顺序，是根据显示状况管理文件 34 的‘优先级别’的项目决定顺序附加，从优先级别高的设备开始，依次定为第 1 台、第 2 台、第 3 台、第 4 台。然后对其每一者，把可以用在该下边的表中所示的‘假尺寸’、‘假原点’特定的区域作为假分割区域进行分配。在这里，在全部的显示对像的全部终端设备 1a、1b、1c、1d 中由于都是‘无’(参看图 10)，故实质上没有优先顺序。在像这样地没有优先级别的设定的情况下的分配顺序，虽然既可以定为预先决定好的规定的顺序，也可以定为要向显示状况管理文件 34 中注册的注册顺序等是任意的，但是，在本例中，定为对各个终端设备 1a、1b、1c、1d(以下决定适宜叫做终端名 PC-1、PC-2、PC-3、PDA-1)，分别按照顺序分配假分割区域 50A、50B、50C、50D，并在以下继续进行说明。

分割区域信息编制部分 41，还从显示状况管理文件 34(参看图 10)中取得各个 PC-1、PC-2、PC-3、PDA-1 每一者的画面尺寸，并根据这些所取得的信息决定要分配给每一者的真的分割区域尺寸和真的原点(S23)。

图 12 是真的分割区域的说明图。另外，在图 12 中，51A、51B、51C、51D，分别示出了分别分配给 PC-1、PC-2、PC-3、PDA-1 的真的分割区域。所谓真的分割区域，就是用来把在假的分割区域内应在该假的分割区域内显示的俘获图像数据，维持纵横比完全不变地进行尺寸变换，而且，使该变换后的图像，在假的分割区域 50A、50B、50C、50D 每一者的中心部分上显示的显示区域。在这里，若用 PC-2 的例子具体地对用来特定该真分割区域的真分割区域尺寸进行说明，则 PC-2 的画面尺寸为 1024×768 个像素(参看图 10)，是为了在已分配给该 PC-2 的 640×512 个像素的假分割区域 50B 内显示该尺寸的图像数据，维持原来的图像的纵横比(就是说相当于显示部分 11 的显示画面的纵横比)不变地进行缩小时的尺寸。此外，所谓真的原点，如图 12 所示，是用来使该尺寸的分割画面位于假分割区域 50B 的中心部分上的原点，是分割画面的左上的像素的坐标(对显示画面全体的绝对坐标)。

分割区域信息编制部分 41，对 PC-1、PC-2、PC-3、PDA-1 每一者决

定以上那样的真分割区域尺寸和真原点，编制成由终端名、分割区域、原点的项目构成的图 13 所示的那样的内容的分割区域信息后，作为分割区域信息文件 36 存储到数据存储部分 26 内(S24)。借助于此，分割区域信息编制处理结束。另外，在该分割区域信息文件 36 中，要附加上编制日时(2002 年 5 月 21 日，17:00:32)。

在这里返回图 6。

显示装置 2 的控制部分 27，当在分割区域信息编制部分 41 中进行的分割区域信息编制处理(S10)结束后，就对显示对像的各个终端设备 1a、1b、1c、1d，进行步骤 S12 到步骤 S14 的处理(S11)。就是说，发送俘获图像数据发送请求(S12)。采用在该俘获图像数据发送请求中，含有已存放在分割区域信息文件 36 内的、已分配给该请求的发送目的地的终端设备 1 的真的分割区域尺寸、和已存放在显示部分规范管理文件 30 内的该显示装置 2 的显示部分 21 的显示色数的办法进行发送。就是说，例如对于终端设备 1a(PC-1)来说，结果就变成为要发送含有真的分割区域尺寸 640×512(参看图 13)，和显示装置 2 的显示色数 1677 万 7216 色的俘获图像数据发送请求。

然而，在终端设备 1 一侧，在步骤 S8 中，在接收到从显示装置 2 发送出来的俘获开始请求后，就开始画面俘获，若在终端设备 1 中进行的画面俘获是全画面俘获，则对于该步骤 S12 的俘获图像数据发送请求，如后述那样，向显示装置 2 返送已根据含于该俘获图像数据发送请求中的真分割区域尺寸和显示色数施行了尺寸变换处理和色数变化处理后的俘获图像数据，若是部分俘获，则返送部分俘获图像的图像尺寸。

显示装置 2，接收来自终端设备 1 的返送信息(S13)，在返送内容是俘获图像数据时，就判断在终端设备 1 中进行的画面俘获是全画面俘获(S14)，把该接收到的俘获图像数据写入到俘获图像数据存储部分 37 内(S18)。

另一方面，在步骤 S13 中接收到的来自终端设备 1 的返送信息是图像尺寸时，就判断在该终端设备 1 中进行的画面俘获是部分俘获(S14)，用所接收到的图像尺寸更新显示状况管理文件 34 的‘俘获图像尺寸’，同时，根据所接收到的图像尺寸，用与上述同样的处理再次编制(S15)分割区域信

息(真分割区域尺寸和真的原点)以对分割区域信息文件36的相应的地方进行更新，发送包括再次编制成的真的分割区域尺寸和显示部分21的显示色数在内的再次俘获图像数据发送请求(S16)。该再次俘获图像数据发送请求如后所述被终端设备1接收，向显示装置2返送已根据含于再次俘获图像数据发送请求内的真的分割区域尺寸和显示装置2的显示色数施行了尺寸变换处理和色数变化处理后的俘获图像数据，显示装置2接收来自终端设备1的返送信息(S17)，写入到俘获图像数据存储部分37内(S18)。

分别对显示对像的各个终端设备1a到1d进行以上的处理，当来自显示对像的终端设备1a、1b、1c、1d的俘获图像数据完全齐备后，控制部分27就把图像合成指令通知给图像合成部分42。借助于此，显示装置2就进入图像合成处理(S19)。

图像合成部分42，在接受到图像合成指令后，就根据分割区域信息文件36的分割区域信息的真的原点特定合成部位，把已存放在俘获图像数据存储部分 37 内的尺寸变换处理完毕和色变换处理完毕的各个俘获图像数据的每一者，合成为1个画面的图像数据以产生合成图像数据，向图像处理部分43输出所产生的合成图像数据。

图像处理部分43，把来自图像合成部分42的合成图像数据变换成显示部分21的扫描频率产生显示图像数据，向显示部分21输出。借助于此，如图8所示，就可以在显示画面50上显示在真的分割区域(以下，有时候叫做分割画面)51A、51B、51C、51D 上分别显示的每一个终端设备 1a、1b、1c、1d的俘获图像数据(显示画面)的多画面(S20)。

其次，对已从显示装置2接收到俘获开始指令和显示状况管理文件34的终端设备1一侧的工作，进行说明。

图14的流程图示出了已从显示装置2接收到俘获开始指令和显示状况管理文件的终端设备一侧的工作。在这里，作为终端设备1a(PC-1)的工作进行说明。

终端设备1a的控制部分16，通过通信部分17接收从显示装置2发送来的俘获开始指令和显示状况管理文件 34(S31)，参照显示状况管理文件

34 的该终端设备 1a 的俘获范围指定标志(S32)。在这里，由于是 '0' (S33)，故判断为全画面俘获并对画面俘获处理部分 19 发出全画面俘获指令。接收到全画面俘获的指令的画面俘获处理部分 19，就以例如位映像等的形式把视频存储器 12 的内容(就是说，当前正在显示部分 11 的画面上显示着的内容)存放到存储部分 15 内(全画面俘获处理)(S34)。

然后，当从显示装置 2 接收到俘获图像数据发送请求后(S35)，就根据含于俘获图像数据发送请求中的真的分割区域尺寸，对在步骤 S34 的全画面俘获处理中取得的俘获图像数据，进行尺寸变换，同时根据俘获图像数据发送请求中所含的显示色数，进行色变换(S36)。在这里，由于终端设备 1a(PC-1)的画面尺寸为 1280×1024(参看图 10)，故要把该尺寸的俘获图像数据尺寸变换（缩小变换）成所分配的真的分割区域尺寸 640×512(参看图 13)。另外，显示色数由于是与显示装置 2 同样的 1677 万 7216 色，故虽然实际上不进行色变换，但是在比显示装置 2 的显示色数还多的情况下，结果就变成为与显示装置 2 的显示色数一致地进行减少色数变换。如上所述，通过通信部分 17 发送已进行了尺寸变换处理和色变换处理的俘获图像数据(S37)。

另一方面，在步骤 S33 中，在俘获范围管理标志为 '1' 的情况下，就判断为部分俘获在显示部分 11 上显示 '请指定俘获范围' 等的信息的俘获范围指定指示画面(S38)，同时，对画面俘获处理部分 19 发出部分俘获指示。然后，当由确认俘获范围指定指示画面后的使用者，通过输入部分 13 进行窗口的选择或把所希望的区域围起来的操作等后，画面俘获处理部分 19，就通过使用者接口部分 14 识别使用者操作，把与所指定的区域对应的视频存储器 12 上的图像数据及其图像尺寸存放到存储部分 15 内(部分俘获处理)(S39)。

然后，当从显示装置 2 接收到俘获图像数据发送请求后(S40)，就返送在步骤 S39 的部分俘获处理中取得的部分俘获图像的图像尺寸(S41)。该返送如上所述被显示装置 2 接收，借助于显示装置 2 根据在部分俘获中的图像尺寸再次编制真的分割区域尺寸，向终端设备 1a 发送包括该再次编制成

的真的分割区域尺寸和显示装置2的显示部分21的显示色数在内的再次俘获图像数据。终端设备1a接收这些数据，并根据含于再次俘获图像数据发送请求内的真的分割区域尺寸对在步骤S39中存放在存储部分15内的部分俘获图像数据进行尺寸变换，同时，根据含于俘获图像数据发送请求中的显示色数进行色变换(S36)，通过通信部分 17 发送像这样地进行了尺寸变换处理和色变换处理后的俘获图像数据(S37)。

在终端设备1a之外的终端设备1b、1c、1d中也同样地进行以上的处理。结果就变成为如上所述从各个终端设备1a、1b、1c、1d的每一者，向显示装置2，发送已尺寸变换成分配给每一者的真的分割区域尺寸，此外，还发送已色变换成显示装置2的显示部分21的显示色数的俘获图像数据。

然而，虽然从显示装置2向各个终端设备1发送来显示状况管理文件34，但是该显示状况管理文件34，如上所述，除去可在核查本终端设备1的俘获范围指定标志的设定状态时利用之外，还可以采用用输入部分 13 进行规定的操作的办法，在显示部分11上显示文件的内容。此外，对于连接许可管理文件 31、显示许可管理文件 32、连接状况管理文件 33，也可以从显示装置2适宜取得同样地在显示部分11上显示，借助于此，使用者就可以得知除去自身所操作的终端设备1之外还有哪一个终端设备正在进行显示，或给予自身的终端设备1的权限等。

<放大显示功能>

以下，对在当前正在显示的多个分割画面中放大显示任意的分割画面的放大显示功能进行说明。该放大显示功能，在上述的构成中，可以采用变更优先级别的办法进行应对。

图15是用来说明放大显示功能的模式图。在这里，示出的是采用提高终端设备1a的优先级别的办法进行放大显示的情况下的例子。

在该情况下，例如采用操作遥控器并指定终端设备1a的画面。该指定，在已把终端设备1分配给遥控器的情况下，可以采用按下其键的办法进行指定，此外，在未进行分配的情况下则可操作遥控器从在显示部分21上显示的菜单画面上进行选择，或者用遥控器使之在显示画面上显示光标，用

该光标指示终端设备 1a 的画面进行点击等的办法进行指定。

这样地指定的该指定信息，就是说，含有终端设备 1a 识别信息的放大显示请求，通过使用者接口部分 24 通知给控制部分 27，控制部分 27，根据含于放大显示请求内的识别信息特定终端设备 1a，把显示状况管理文件 34 的终端设备 1a(PC-1)的‘优先级别’的项目设定为‘高’，把区域分割请求通知给分割区域信息编制部分 41。

在分割区域信息编制部分 41 中，与上述同样地编制分割区域信息文件 36。在进行该编制时，要参照的假的分割区域设定表，例如像图 16(a) 那样地构成，图 16(b)示出了以该假的分割区域设定表为基础的假的分割区域。在这里，图 16(b)中的优先顺序，如上所述，根据显示状况管理文件 34 的‘优先级别’的项目决定顺序附加，在这里由于终端设备 1a 的优先级别为‘高’比别的终端设备 1b、1c、1d 都高，故分配优先顺序为第 1 号就是说图 16(b)的假的分割区域(第 1 台用的分割区域)52a。对于未设定优先级别的其它的终端设备终端设备 1b、1c、1d 的分割区域的分配，如上所述是任意的，在这里，给终端设备 1b、1c、1d 按照顺序分别分配假的分割区域 52B、52C、52D。然后，与上述同样地决定要分配给终端设备 1a、1b、1c、1d 的真的分割区域。

图 17 示出了该情况下的真的分割区域，分割区域 53A、53B、53C、53D 是分别分配给各个终端设备 1a、1b、1c、1d 的真的分割区域，这时的分割区域信息文件 36，构成为图 18 所示的那样的内容。

然后，进行与上述同样的工作，结果如图 15 所示，是在真的分割区域 53A、53B、53C、53D 上分别显示各个终端设备 1a、1b、1c、1d 的俘获图像数据(显示画面)，在显示画面 50 上显示在各个分割区域 53A、53B、53C、53D 中，被指定的分割画面 51A 被放大后的状态的多画面。

<单画面切换功能>

此外，如图 19 所示，还可以单画面显示多个分割画面中的任何一项。在该情况下，例如操作遥控器进行该意思的输入操作。把含有该输入信息，就是说含有与要进行单画面显示的分割画面 51C 对应的终端设备 1c 的识

别信息的单画面显示请求，通过使用者接口部分 24 通知给控制部分 27。控制部分 27 根据含于单画面显示请求中的识别信息特定终端设备 1c，把显示状况管理文件 34 的终端设备 1c(PC-3)的‘优先级别’的项目设定为‘最高’，把区域分割请求通知给分割区域信息编制部分 41。

接着，进行与上述同样的工作，其结果是如图 19 所示，从多画面变更为单画面。此外，例如，采用用遥控器进行规定的操作的办法，使‘优先级别’的项目返回到‘无’，借助于此，就变成为可以返回到原来的多画面的构成。

得益于这样的单画面切换功能，就可以确认因被缩小而看不见细节的分割画面的细节，此外，还可以借助于规定的操作返回到多画面，使用灵活性好。

<嵌入功能>

此外，如图 20 所示，也可以对当前正在显示着的多画面嵌入新的画面。该嵌入，相当于进行了多画面显示后的显示请求，可用与上述显示请求时同样的处理进行嵌入。

<消去功能>

此外，如图 21 所示，也可以在当前正在显示着的多个分割画面中消去任意的分割画面。在该情况下，要操作遥控器进行该意思的输入操作。通过使用者接口部分 24 把含有该输入信息，就是说把含有与要想消去的分割画面 51D 对应的终端设备 1d 的识别信息的消去请求通知给控制部分 27，控制部分 27 根据含于消去请求中的识别信息特定终端设备 1d，从显示状况管理文件 34 中消除该终端设备 1d 的终端设备信息，把区域分割请求通知给分割区域信息编制部分 41。之后的工作，与上述是同样的，借助于此，如图 21 所示，就可以消去指定的分割画面 50D，可以在消去后的台数量的多个分割画面上显示重新构成的多画面。另外，也可以采用单纯地仅仅消除消去指定的分割画面 51D 的构成。

如上所述，倘采用本实施方案，就可以得到具备借助于画面分割在显示装置 2 的显示画面上 1 个画面地显示正在已连接到网络 3 上的多个终端

设备 1 上显示着的画面的多画面显示功能的显示系统 100，而且，由于可以在终端设备 1 一侧进行在实现该多画面显示功能时所必要的处理，就是说上述的尺寸变换处理和色变换处理，故假定在显示装置 2 一侧对来自各个终端设备 1 的俘获图像数据中的每一者都进行同样的变换处理的情况下比较，可以显著地减轻显示装置 2 一侧的负荷。

此外，如上所述，由于作成为在终端设备 1 一侧进行了俘获图像数据的尺寸变换之后，再通过网络 3 发送给显示装置 2，故也可以减轻网络 3 的负荷。

此外，除去多画面显示功能之外，还具备放大显示功能、单画面切换功能、嵌入功能、消去功能，使用灵活性非常好。

此外，在各个终端设备 1 中取得的俘获图像数据，由于可维持其纵横比原状不变地在画面上的对应的分割画面上显示，故可以构成没有失调感的显示画面。

另外，也可以是这样的方法：在显示装置 2 主导下例如每 3 秒一次地不断更新显示画面而不是会议出席者(使用者)每当要观看显示时都通过输入部分输入显示请求。在该情况下，只要显示装置 2 的控制部分 27 管理时间，每当经过恒定的时间就与上述同样地进行之后的工作即可，因而总是可以得到最新的终端设备 1 的显示画面。

<差分俘获功能>

到现在为止说明的都是由全画面俘获(或部分俘获)进行的方法，以下，对检测终端设备的显示画面上的变化，发送用仅仅俘获变化部分的办法得到的图像数据的方法，进行说明。

首先，操作输入部分 23 的例如遥控器，输入想要进行对终端设备 1a 到 1d 的差分俘获的意图。就是说，把显示状况管理文件 34 的差分俘获管理标志设定为‘1’。

已把差分俘获管理标志设定为‘1’的第 1 次，如通常那样，进行上述步骤 S1 到 S20 的处理，进行多画面显示。

在多画面显示完成后，显示装置 2，就从控制部分 27 到通信部分 28，

通过网络3对差分俘获管理标志设定为‘1’的终端设备1，与显示状况管理文件34一起，发送差分俘获开始指令。

其次，对从显示装置2接收到差分俘获开始指令和显示状况管理文件的终端设备1一侧的工作，进行说明。

图22的流程图示出了从显示装置2接收到差分俘获开始指令和显示状况管理文件的终端设备1一侧的工作。在这里。作为终端设备1a(PC-1)的工作进行说明。

终端设备1a的数据管理处理部分18，通过通信部分17接收从显示装置2发送来的差分俘获开始指令和显示状况管理文件34(S41)。接受到它们后就执行以后的全画面俘获处理。就是说，画面俘获处理部分19把视频存储器12的内容存放到存储部分15内(S42)。把在这里得到的图像数据叫做前全画面数据。

画面比较处理部分20，每隔恒定的时间(例如每0.5秒1次等，设定是任意的)就参照数据管理处理部分18所接收到的显示状况管理文件34的差分俘获管理标志(S43)，如果差分俘获管理标志是‘1’(S44)，就进行以后的差分俘获工作。

此外，例如如果使用者要停止差分俘获工作那样地进行指示，则只要用变更显示状况管理文件34的方法把差分俘获管理标志改写成‘0’即可。采用画面比较处理部分20参照该标志的办法，判断俘获工作停止。

执行全画面俘获处理,画面俘获处理部分19把视频存储器12的内容存放到存储部分15内(S45)。把在这里得到的图像数据，叫做后全画面数据。其次，运算部分16的画面比较处理部分20进行前全画面数据和后全画面数据的比较(S46)。

作为画面比较处理的一个例子，用使鼠标光标动作时的例子(图 23)进行说明。在该图中，在前全画面数据60和后全画面数据61中鼠标光标的位置已发生变化。就是说，如图24所示， 2个区域(70、71)被识别为已发生了变化的区域。画面比较处理部分20虽然对之进行检测，但是，在这里在可以判断为有了画面的变化的情况下(S47)，画面比较处理部分 20 就取

得有了变化的区域的图像数据、图像数据的尺寸(纵×横像素)、用图像数据的原点坐标(显示状况管理文件 34 的‘俘获图像尺寸’规定的区域内的绝对坐标)。

在本例的情况下，就区域 70 来说，可以取得该区域 70 部分的俘获图像数据(以下，叫做差分俘获图像数据 1)、差分俘获图像尺寸 1、差分俘获原点 1，就区域 71 来说，可以取得该区域 71 部分的俘获图像数据(以下，叫做差分俘获图像数据 2)、差分俘获图像尺寸 2、差分俘获原点 2，在把这些信息存放到存储部分 15 内的同时，把已取得差分俘获图像数据等的信息通知给数据管理处理部分 18(S48)。另外，差分俘获图像尺寸 1、差分俘获图像尺寸 2、差分俘获原点 1，差分俘获原点 2，要写入到显示状况管理文件 34 的相应的部分内。

网络管理部分 18，通过通信部分 17 和网络 3，把这些数据发送往显示装置 2(S49)。另外，在该差分俘获功能的情况下，与上述全画面俘获(或部分俘获)的方法不同，不是每次都从显示装置 2 一侧接收 发送请求，而是用画面比较处理部分 20 检测到画面上的变换的情况下，这种变动成为要因而进行发送工作。

为了进行下一次的画面比较处理，要把后全画面数据变成为前全画面数据(S50)。

其次，对从终端设备 1a 接受到差分俘获图像数据 1、差分俘获图像数据 2 和显示状况管理文件 34 的显示装置 2 一侧的工作，进行说明。

当显示装置 2 用通信部分 28 从终端设备 1a 那里接收到差分俘获图像数据 1、差分俘获图像数据 2 和显示状况管理文件 34 后，控制部分 27 就把图像合成指令通知给图像合成部分 42。借助于此，显示装置 2 进入由差分俘获功能进行的图像合成处理。

图像合成部分 42，当接收到图像合成指令后，就根据相当于当前正在显示部分 21 上显示的图像的分离区域信息文件 36，在从终端设备 1a 接收到的显示状况管理文件 34(差分俘获图像尺寸 1、差分俘获图像尺寸 2、差分俘获原点 1、差分俘获原点 2)，改写已存放到俘获图像数据存储部分 37

内的俘获图像数据中，相当于差分俘获图像数据 1、差分俘获图像数据 2 的部分。之后的工作与上述的步骤 19、步骤 20 是同样的。

该方法，由于要用网络 3 发送的图像数据的量比上述的全画面俘获(或部分俘获)的方法少，故可以减轻施加给网络的负荷。另外总能得到最新的终端设备 1 的显示图像。

另外，在上述的说明中，在进行差分检测时，虽然设想为用已导入到终端设备 1 内的专用的程序进行俘获并进行处理，但是在可以直接检测视频存储器的内容差分的那样的驱动器，可以在 OS 上利用进行处理的情况下，也可以利用这种方式。

另外，上述图像数据，也可以采用用压缩图像形式(例如，JPEG 形式等)在终端设备 1 和显示装置 2 之间进行发送接收的办法，来减小施加给网络的负荷。

另外，在上述中，虽然一直以采用操作显示装置 2 一侧的输入部分 23 的办法进行显示请求或单画面显示请求等的各种请求的情况，就是说，以在显示装置 2 一侧主导下决定显示画面的构成的情况为例进行的说明，但是，从各个终端设备 1 一侧决定也是可能的。在该情况下，会议出席者(使用者)，从自身所操作的终端设备 1 操作输入部分 13 输入该意图。该输入信息，通过使用者接口部分 14 通知给控制部分 16，该控制部分 16，对显示装置 2，通过通信部分 17 和网络 3 发送与含有本终端设备 1 的终端名和 IP 地址的上述输入信息对应的请求。该请求通过网络 3 被显示装置 2 的通信部分 28 接收，通知给控制部分 27。之后的工作，与上述是同样的，如上所述。从各个终端设备 1 一侧决定各种请求也是可能的。

另外，采用在上述各种请求中含有指定是全画面俘获还是部分俘获的信息的办法，从各个终端设备 1 一侧决定俘获范围的指定也是可能的。

此外，优先级别，如上所述，既可以借助于使用者操作适宜指定，也可以对预定要连接到显示装置 2 上的多个终端设备 1 预先给定优先级别。在预先给定优先级别的情况下，要作成为这样的构成：在把终端设备信息注册到显示状况管理文件 34 内时，自动地把已给予该终端设备 1 的优先级

别设定到显示状况管理文件 34 的优先级别的项目内。

另外，在本实施方案中，虽然说明的是根据假分割区域设定文件 35 决定假分割区域，但是也可以作成为每次根据计算决定。

此外，在部分俘获的情况下，虽然例示的是从终端设备 1 向显示装置 2 返送图像尺寸，根据返送回来的图像尺寸在显示装置 2 一侧进行真的分割区域的再次编制的情况，但是也可以作成为在终端设备 1 一侧进行该再次编制处理。

实施方案 2

图 1 示出了具备本发明的实施方案 1 的网络应对显示装置的显示系统的网络构成。

该显示系统 100，具备：多个终端设备 1(在图 1 中，仅仅画出了 1a、1b、1c、1d 这么 4 台)，具有本身为本发明的主要功能的多画面显示功能的网络应对显示装置 2(在图中示出的是投影仪的例子)(以下，简称为显示装置 2)，多个终端设备 1 和显示装置 2 通过网络 3，用 TCP/IP 等的通信协议连接为可进行双向通信。对各个终端设备 1 都分别预先给予固有的名称(以下，叫做终端名)。另外，网络 3，可以利用 LAN、无线 LAN、近距离无线 LAN 的蓝牙(Bluetooth,美国 Bluetooth SIG Inc.公司的注册商标)等的各种网络。

该显示系统 100，是借助于画面分割使在显示装置 2 的显示画面上同时显示在多个终端设备 1 中分别正在显示着的画面成为可能的系统，是例如在会议或演讲等时用之有效的系统。以下，对终端设备 1、显示装置 2 各自的构成详细地进行说明。

图 26 的框图示出了终端设备的构成。

终端设备 1，例如，可用个人计算机或 PDA(个人数字助理)等构成，具备用来显示演讲用的资料等的各种信息的显示部分 11，存储在该显示部分 11 上显示的内容的视频存储器 12、例如由图形输入器、鼠标、操作键盘构成的输入部分 13，检测来自该输入部分 13 的操作输入向后述的运算部分 16 输出输入信息的使用者接口部分 14、存放用来进行本发明的处理

的应用(控制)程序或各种数据的存储部分 15、运算部分(CPU)16 和通信部分 17。

已存放在存储部分 15 内的控制程序，是用来实现在显示装置 2 中实现的多画面功能的终端设备一侧控制功能；可以俘获显示部分 11 的画面的全部或一部分的画面俘获功能；和检测显示部分 11 的画面上的变化的功能，故可用应用程序和 CPU 构成数据管理处理部分 18、画面俘获处理部分 19 和画面比较处理部分 20。

数据管理处理部分 18，通过通信部分 17 或使用者接口部分 14，接受连接请求、显示请求、放大显示请求、单画面切换请求、消去请求等的各种请求，并进行与该请求内容对应的处理，同时，通过通信部分 17 进行把用画面俘获处理部分 19 取得的俘获图像数据发送给显示装置 2 的处理等。

通信部分 17，是进行与显示装置 2 之间的双向通信的部分，在这里，通信协议是 TCP/IP,具有进行该 TCP/IP 连接所需要的 ARP、ICMP、IP、ARP、TCP、UDP 等的协议处理功能。另外，该功能也可以用 OS 实现。

图 27 的框图示出了显示装置的构成。

显示装置 2，具备如下构成部分：显示部分 21、具有本发明的多画面显示功能、放大显示功能、单画面显示功能、嵌入功能和消去功能，进行要在显示部分 21 上显示的显示画面的控制的显示控制部分 22；例如由遥控器、鼠标、操作键盘构成的输入部分 23；检测来自输入部分 23 的操作输入并把输入内容输出给后述的运算部分 27 的使用者接口部分 24；存放提供本发明的多画面显示功能的显示控制程序的程序存储部分 25；存储在执行该显示控制程序时所必须的各种文件或各种数据的数据存储部分 26；进行显示装置 2 全体的工作控制的运算部分(CPU)27；进行与终端设备 1 之间的双向通信的通信部分 28。

通信部分 28，是进行与终端设备 1 之间的双向通信的部分，在这里，通信协议是 TCP/IP,具有进行该 TCP/IP 连接所需要的 ARP、ICMP、IP、ARP、TCP、UDP 等的协议处理功能。

在这里，该显示装置 2，除图 1 所例示的投影仪之外，例如，还可用

等离子体显示器、液晶监视器等构成。显示部分21，是随着这些显示装置2的种类不同而不同的显示要素，具体地说，如果是投影仪，则将变成为液晶光阀、LCOS光阀、DMD(数字微型反射镜器件，美国德州仪器公司的商标)，在该情况下，显示部分21的显示画面将变成为投影面。此外，如果是等离子体显示器，则显示部分21将变成为等离子体显示面板，如果是液晶监视器则将变成为液晶面板，而如果是有机EL显示器，则将变成为有机EL面板。

其次，参看图28对存放在数据存储部分内的各种文件等进行说明。

在数据存储部分26内，存放有连接许可管理文件31、显示许可管理文件32、连接状况管理文件33、显示状况管理文件34、假分割区域设定文件35、分割区域信息文件36，此外，还具备用来存储从各个终端设备1发送过来的俘获图像数据的俘获图像数据存储部分37。

连接许可管理文件31，是注册有允许进行连接的终端设备1的终端名的文件，显示许可管理文件32，是注册有允许进行画面显示的终端设备1的终端名的文件。

连接状况管理文件33，是注册当前已连接到显示装置2上的终端设备1的终端名的文件。

显示状况管理文件34，是管理当前的显示部分21的显示状况的文件，以表格形式对与正在当前的显示部分21的显示画面上显示的俘获图像数据发送处的终端设备1有关的终端设备信息进行管理。该显示状况管理文件34，每当变更显示部分21的显示画面时都要更新，例如，在从4分割画面变更为3分割画面的情况下，与被消去的分割画面对应的终端设备1的终端设备信息就从该表中消去，反之，当从4分割画面变更为5分割画面的情况下，就要新注册与该追加的画面对应的终端设备1的终端设备信息。

图5示出了要用显示状况管理文件管理的终端设备信息的各个项目。

显示状况管理文件34，由‘终端名’、‘IP地址’、‘画面尺寸’、‘色数信息’、‘优先级别’、‘俘获范围管理标志’、‘差分俘获管理标志’、‘俘获

图像尺寸'、'差分俘获图像尺寸 1'、差分俘获图像尺寸 2'、'差分俘获原点 1'、'差分俘获原点 2' 这些项目构成。

'终端名'是已预先赋予终端设备 1 的名字，'画面尺寸'是显示部分 11 的显示画面的纵横像素个数，例如，如果分辨率是 SXGA 的终端设备，则为 1280×1024，如果是 XGA 则为 1024×768。'色数信息'是显示部分 11 的显示色数，例如为 256 色、1677 万 7216 色等。以上的'终端名'、'IP 地址'、'画面尺寸'、'色数信息'，是向该显示状况管理文件 34 进行注册时必须要存放的数据，其它的项目，则是可根据使用者操作等适宜设定(更新)的数据。

'优先级别'，是左右要分配给可用'终端名'特定的终端设备 1 的显示尺寸的大小的优先级别，可选用'最高'、'高'、'无'等的值，将在以下详述，但是，在本例中，其构成为使得被分配为优先级别高的显示尺寸变大。'俘获范围管理标志'是管理在可用'终端名'特定的终端设备 1 中的画面俘获究竟是全画面还是部分俘获的标志，通常示出的是表明全画面俘获的'0'，在是部分俘获的情况下则被设定为'1'。

'差分俘获管理标志'是管理在可用'终端名'特定的终端设备 1 中的画面俘获究竟是通常的俘获还是仅仅画面上的变化部分的俘获(以后，叫做差分俘获)的标志，在是通常俘获的情况下，就表示'0'，在是差分俘获的情况下就被设定为'1'。

'俘获图像尺寸'是在'俘获范围管理标志'为'1'的情况下，就是说在部分俘获的情况下的俘获图像数据的尺寸(纵横的像素个数)。

'差分俘获图像尺寸 1'和'差分俘获图像尺寸 2'，是'差分俘获管理标志'为'1'的情况下的、在差分俘获中取得的 2 个不同的范围的区域的尺寸。'差分俘获原点 1'和'差分俘获原点 2'，是在差分俘获中取得的 2 个不同的范围的区域的原点，用在'俘获图像尺寸'中规定的区域内的绝对坐标表示。

假分割区域设定文件 35，是预先设定用来特定分配给各个终端设备 1 的假的分割区域的信息的文件，由为每一台终端设备准备好的多个表构成。

该表的构成示于后述的图 11(a)、图 16(a)，对于其详细情况在以下的相应的地方进行说明。另外，对于分割区域信息文件 36，也在以下进行详述。

以上的各个文件 31、32、33、34、35、36，当用输入部分 23 进行规定的操作时，就会在显示部分 21 上显示文件的内容，可以自由地在显示画面上进行确认和数据变更。

在这里，返回到图 28 的说明。

显示控制部分 22，具备分割区域信息编制部分 41、图像合成部分 42 和图像处理部分 43，在运算部分 27 中根据通过来自使用者接口部分 24 或通信部分 28 接收到的来自使用者的连接请求、显示请求、嵌入显示请求、消去请求等的各种请求内容，边对各个部分 41、42、43 适宜存取数据存储部分 26 内的必要的文件边实施必要的处理，进行显示部分 21 的显示控制。显示控制部分 22，则可用提供已存放在程序存储部分 25 内的多画面功能的显示控制程序和运算部分(CPU)27 实现。

分割区域信息编制部分 41，在根据显示状况管理文件 43 把握显示对像的终端设备 1 的台数的同时，还取得显示对像的各个终端设备 1 中的每一者的优先级别和画面尺寸。然后，根据这些显示对像的终端设备 1 的台数、显示对像的各个终端设备 1 中的每一者的优先级别和画面尺寸，进行显示部分 21 的显示画面尺寸的分割，编制包括要分配给显示对像的各个终端设备 1 中的每一者的显示部分 21 上的分割画面的显示尺寸(以下，叫做分割区域尺寸)、和特定该分割画面的显示位置的信息(是对显示画面的分割画面的左上的绝对坐标，以下，叫做原点)在内的分割区域信息，进行作为分割区域信息文件 36 存放到数据存储部分 26 内的工作。

图像合成部分 42，对已存放在俘获图像数据存储部分 37 中的俘获图像数据，进行缩小、放大、色变换等的处理，根据在分割区域信息编制部分 41 中编制成的分割区域信息文件 36，产生合成图像数据。

图像处理部分 43，是对用在图像合成部分 42 中产生的合成图像数据，或 OSD(on screen display，在屏幕上显示)功能等进行参照的数据存储部分 26 的显示状况管理文件 34 等的各种图像数据，进行扫描频率变换处理以

产生显示图像数据，并向显示部分 21 输出的部分，例如可用扫描转换器构成。

以下，说明本实施方案的工作。图 29 的流程图示出了本实施方案的工作。

首先，在显示装置 2 一侧，作为用来进行多画面显示的准备阶段，用输入部分 23 进行规定的操作输入，当运算部分 27 通过使用者接口部分 24 检测该操作输入后，就通过通信部分 28 和网络 3，与显示装置 2 的 IP 地址一起，同时通知终端名和 IP 地址的信息返送请求。该同时通知的终端名和 IP 地址的信息返送请求，被网络 3 上的各个终端设备 1 接收，各个终端设备 1 中的每一者，把自身的终端名和 IP 地址返送给显示装置 2。

显示装置 2，通过通信部分 28 接收来自各个终端设备 1 的返送信息(终端名和 IP 地址)，判定是否连接许可终端。具体地说，核查被返送的终端名是否与已注册在连接许可管理文件 31 中的终端名一致，如果一致，就判定为连接许可终端。

依次把来自已判定为连接许可终端的终端设备 1 的终端名和 IP 地址注册到连接状况管理文件 33 内。借助于该连接状况管理文件 33，在显示装置 2 一侧，就可以把握当前究竟已连接上多少台终端设备 1。此外，由于还作成为根据终端名判断连接许可和不许可，故结果就变成为例如即便是在借助于 DHCP，把 IP 地址提供给终端设备 1，在该要提供的 IP 地址在每一次连接时都不同的情况下等，也可以应对。

以上的准备作业在已结束后，显示装置 2，就以各种请求等待的状态进行待机。现在，考虑在各个会议出席者所操作的各个终端设备 1 中，如下图所示，想要在显示装置 2 的显示画面 50 上多画面显示终端设备 1a 到 1d 这 4 台的显示画面的情况。在这里把每一个终端设备 1 的分辨率定为设终端设备 1a 为 SXGA(1280×1024 像素)，终端设备 1b 为 SVGA(800×600 像素)，终端设备 1c 为 XGA(1024×768 像素)，终端设备 1d 为 480×640 像素的例子进行说明。

<多画面显示功能>

图 8 的模式图示出了在显示装置的画面上多画面显示终端设备 1a 到 1d 这 4 台的显示画面的状态。

首先，操作输入部分 23 的例如遥控器输入终端设备 1a 到 1d 的多画面显示的意图。这样一来，该输入信息，就是说包括终端设备 1a 到 1d 各自的识别信息在内的显示请求，就通过使用者接口部分 24 通知给控制部分 27(S1)。另外，在通知该显示请求时，虽然也可以指定优先级别或部分俘获或差分俘获，但是在这里假定未进行任何指定。

接收到显示请求的显示装置 2 的运算部分 27，对于显示对像的各个终端设备 1a 到 1d 中的每一者都要进行以下的步骤 S3 到 S9 的处理(S2)。就是说，根据由含于显示请求内的识别信息特定的终端名，参照连接许可管理文件 31、显示许可管理文件 32，分别判定究竟是连接许可终端，还是显示许可终端(S3)，在连接、显示都已许可的情况下(S4)，就通过通信部分 28 对该终端设备请求终端设备信息(终端名、IP 地址、画面尺寸、色数信息)(S5)。然后，接收对该请求进行应答返送回来的终端设备信息(S6)，并注册到显示状况管理文件 34 内(S7)。另外，在该显示请求时，在已进行了优先级别或部分俘获的指定、差分俘获的指定的情况下，在该步骤 S7 的注册时，也同样要注册‘优先级别’、‘俘获范围管理标志’、‘差分俘获管理标志’。

接着，对连接、显示都已许可的终端设备 1，与显示状况管理文件 34 一起，发送画面俘获开始指令(S8)。另外，对于未许可连接、显示的终端设备 1，就通过通信部分 28 通知该意思（S9）。

在这里，若设终端设备 1a 到 1d 全部都是连接、显示都已许可的终端设备 1，则借助于步骤 S2 到步骤 S9 的处理，则结果就变成为把来自各个终端设备 1a 到 1d 的终端设备信息注册到显示状况管理文件 34 内，同时，对于各个终端设备 1a 到 1d，通过通信部分 28，与显示状况管理文件 34 一起发送画面俘获开始指令。

当以上的处理结束后，运算部分 27 就把区域分割请求通知给显示控制部分 22 的分割区域信息编制部分 41。借助于此，显示装置 2 就将进入分

割区域信息编制处理(S10)。接收到画面俘获开始指令的终端设备 1 一侧的工作在后边讲述，以下，对用已接收到区域分割请求的分割区域信息编制部分 41 进行的分割区域信息编制处理，进行说明。

图 9 的流程图示出了分割区域信息编制处理的流程。在这里，设显示状况管理文件 34 是如图 10 那样地构成的文件，以下，具体地说明分割区域信息编制部分 41 的工作。另外，在图 10 中，设终端名 PC-1、PC-2、PC-3、PDA-1 分别与终端设备 1a、1b、1c、1d 对应。

分割区域信息编制部分 41，当从控制部分 27 接收到区域分割请求后，就参照显示状况管理文件 34 把握显示对像的终端设备 1 的台数(在这里为 4 台)，同时，取得各个终端设备 1a、1b、1c、1d 各自的优先级别(S21)。然后，根据这些终端设备 1 的台数，和各个终端设备 1a 到 1d 各自的优先级别，参照假分割区域设定文件 35，取得应分配给各个终端设备 1a、1b、1c、1d 每一者的假的分割区域的假的尺寸和假的原点(S22)。另外，至于要作成为‘假’的理由，是因为在这里要分配的分割区域，规定为在后边的步骤中，在对俘获图像数据进行尺寸变换时要进行变更的缘故，虽然这会在以下的说明弄得明白。

在这里，如图 10 所示，显示对像的终端设备台数为 4 台，由于在其全部中都没有优先级别设定，故在该情况下，在假分割区域设定文件 35 中要参照的相应的假分割区域设定表，例如，可像图 11(a)那样地构成。另外，在本例中，显示部分 21 的显示画面的画面尺寸定为 1280×1024(SXGA)，图 11(a)的假分割区域设定表，是该情况下的一个例子。此外，图 11(b)示出的是以(a)的假分割区域设定表为基础的假分割区域。

在这里，图 11(a)的所谓优先顺序，是根据显示状况管理文件 34 的‘优先级别’的项目决定顺序附加，从优先级别高的设备开始，依次定为第 1 台、第 2 台、第 3 台、第 4 台。然后对其每一者，把可以用在其下边的表中所示的‘假尺寸’、‘假原点’特定的区域作为假分割区域进行分配。在这里，在全部的显示对像的全部终端设备 1a、1b、1c、1d 中由于都是‘无’(参看图 10)，故实质上没有优先顺序。在像这样地没有优先级别的设定的

情况下的分配顺序，虽然既可以定为预先决定好的规定的顺序，也可以定为要向显示状况管理文件 34 中注册的注册顺序等是任意的，但是，在本例中，定为对各个终端设备 1a、1b、1c、1d(以下决定适宜叫做终端名 PC-1、PC-2、PC-3、PDA-1)，分别按照顺序分配假分割区域 50A、50B、50C、50D，并在以下继续进行说明。

分割区域信息编制部分 41，还从显示状况管理文件 34(参看图 10)中取得各个 PC-1、PC-2、PC-3、PDA-1 每一者的画面尺寸，并根据这些所取得的信息决定要分配给每一者的真的分割区域尺寸和真的原点(S23)。

图 12 是真的分割区域的说明图。另外，在图 12 中，51A、51B、51C、51D，分别示出了分别分配给 PC-1、PC-2、PC-3、PDA-1 的真的分割区域。所谓真的分割区域，就是用来把在假的分割区域内应在该假的分割区域内显示的俘获图像数据，维持纵横比完全不变地进行尺寸变换，而且，使该变换后的图像，在假的分割区域 50A、50B、50C、50D 每一者的中心部分上显示的显示区域。在这里，若用 PC-2 的例子具体地对用来特定该真分割区域的真分割区域尺寸进行说明，则 PC-2 的画面尺寸为 1024×768 个像素(参看图 10)，是为了在已分配给该 PC-2 的 640×512 个像素的假分割区域 50B 内显示该尺寸的图像数据，维持原来的图像的纵横比不变地进行缩小时的尺寸。此外，所谓真的原点，如图 12 所示，是用来使该尺寸的分割画面位于假分割区域 50B 的中心部分上的原点，是分割画面的左上的像素的坐标(对显示画面全体的绝对坐标)。

分割区域信息编制部分 41，对 PC-1、PC-2、PC-3、PDA-1 每一者决定上述那样的真分割区域和真原点，编制成由终端名、分割区域、原点的项目构成的图 13 所示的那样的内容的分割区域信息后，作为分割区域信息文件 36 存储到数据存储部分 26 内(S24)。借助于此，分割区域信息编制处理结束。另外，在该分割区域信息文件 36 中，要附加上编制日时(2002 年 5 月 21 日，17：00；32)。

在这里返回图 29。

显示装置 2 的运算部分 27，当在分割区域信息编制部分 41 中进行的

分割区域信息编制处理(S10)结束后，就对显示对像的各个终端设备 1a、1b、1c、1d，进行步骤 S12 到步骤 S14 的处理(S11)。就是说，发送俘获图像数据发送请求(S12)。另外，在各个终端设备 1a、1b、1c、1d 中，在接收到借助于步骤 S8 的处理从显示装置 2 一侧发送过来的俘获开始指令后，如后所述开始画面俘获处理，借助于该画面俘获处理取得的俘获图像数据和图像尺寸(在部分俘获的情况下)，对步骤 S11 的俘获图像数据发送请求进行应答并返送到显示装置 2。

显示装置 2，接收来自终端设备 1 的返送信息(S13)，在返送内容是俘获图像数据时，就判断在终端设备 1 中进行的画面俘获是全画面俘获(S14)，把该接收到的俘获图像数据写入到俘获图像数据存储部分 37 内(S16)。

另一方面，在步骤 S13 中接收到的来自终端设备 1 的返送信息是俘获图像数据和图像尺寸时，就判断在该终端设备 1 中进行的画面俘获是部分俘获(S14)，用所接收到的图像尺寸更新显示状况管理文件 34 的‘俘获图像尺寸’，同时，根据所接收到的图像尺寸，用与上述同样的处理再次编制分割区域信息(S15) 。然后，将与图像尺寸同时接收到的俘获图像数据写入俘获图像数据存储部 37 中(S16)。

分别对显示对像的各个终端设备 1a 到 1d 进行以上的处理，当来自显示对像的终端设备 1a、1b、1c、1d 的俘获图像数据完全齐备后，运算部分 27 就把图像合成指令通知给图像合成部分 42。借助于此，显示装置 2 就进入图像合成处理(S17)。

图像合成部分 42，在接受到图像合成指令后，就根据分割区域信息文件 36 的分割区域信息和显示状况管理文件的‘色数信息’，对已存放在俘获图像数据存储部分 37 内的各个俘获图像数据的每一者，进行尺寸变换和色变换，合成为 1 个画面的图像数据以产生合成图像数据，向图像处理部分 43 输出所产生的合成图像数据。

图像处理部分 43，把来自图像合成部分 42 的合成图像数据变换成显示部分 21 的扫描频率产生显示图像数据，向显示部分 21 输出。借助于此，如图 8 所示，就可以在显示画面 50 上多画面显示在真的分割区域(以下，

有时候叫做分割画面)51A、51B、51C、51D 上分别显示每一个终端设备 1a、1b、1c、1d 的俘获图像数据(显示画面) (S18)。

其次，对已从显示装置 2 接收到俘获开始指令和显示状况管理文件 34 的终端设备 1 一侧的工作，进行说明。

图 30 的流程图示出了已从显示装置接收到俘获开始指令和显示状况管理文件的终端设备一侧的工作。在这里，作为终端设备 1a(PC-1)的工作进行说明。

终端设备 1a 的数据管理处理部分 18，通过通信部分 17 接收从显示装置 2 发送来的俘获开始指令和显示状况管理文件 34(S31)，参照显示状况管理文件 34 的该终端设备 1a 的俘获范围指定标志(S32)。在这里，由于是 '0' (S33)，故判断为全画面俘获并对画面俘获处理部分 19 发出全画面俘获指令。接收到全画面俘获的指令的画面俘获处理部分 19，就以例如位映像等的形式把视频存储器 12 的内容(就是说，当前正在显示部分 11 的画面上显示着的内容)存放到存储部分 15 内(全画面俘获处理)(S34)，把画面俘获已经结束的情况通知给数据管理处理部分 18。

另一方面，在俘获范围管理标志为 '1' 时，就判断为部分俘获，在显示部分 11 上显示 '请指定俘获范围' 等的信息的俘获范围指定指示画面(S35)，同时，对画面俘获处理部分 19 发出部分俘获指示。当由确认俘获范围指定指示画面后的使用者，通过输入部分 13 进行窗口的选择或把所希望的区域围起来的操作等后，画面俘获处理部分 19，就通过使用者接口部分 14 识别使用者操作，把与所指定的区域对应的视频存储器 12 上的图像数据及其图像尺寸存放到存储部分 15 内(部分俘获处理)(S36)，把画面俘获已经结束的情况通知给数据管理处理部分 18。

如上所述，在终端设备 1a 一侧，在接收到俘获开始指令后，就进行画面俘获处理。这期间，在显示装置 2 一侧，如上所述正在进行分割区域信息编制处理，因此，终端设备 1a，当在画面俘获处理部分 19 中进行的画面俘获处理结束，而且接收到来自显示装置 2 的俘获图像数据发送请求后(S37)，就通过通信部分 17 发送俘获图像数据和图像尺寸(在部分俘获的情

况下)(S38)。

在终端设备 1a 之外的终端设备 1b、1c、1d 中也同样地进行以上的处理。结果就变成为如上所述从各个终端设备 1a、1b、1c、1d，向显示装置 2，发送俘获图像数据和图像尺寸(在部分俘获的情况下)。

然而，虽然从显示装置 2 向各个终端设备 1 发送来显示状况管理文件 34，但是该显示状况管理文件 34，如上所述，除去可在核查该终端设备 1 的俘获范围指定标志的设定状态时利用之外，还可以采用用输入部分 13 进行规定的操作的办法，在显示部分 11 上显示文件的内容。此外，对于连接许可管理文件 31、显示许可管理文件 32、连接状况管理文件 33，也可以从显示装置 2 适宜取得并同样地在显示部分 11 上显示，借助于此，使用者就可以得知除去自身所操作的终端设备 1 之外还有哪一个终端设备正在进行显示，或给予自身的终端设备 1 的权限等。

<放大显示功能>

以下，对在当前正在显示的多个分割画面中放大显示任意的分割画面的放大显示功能进行说明。该放大显示功能，在上述的构成中，可以采用变更优先级别的办法进行应对。

图 15 是用来说明放大显示功能的模式图。在这里，示出的是采用提高终端设备 1a 的优先级别的办法进行放大显示的情况下的例子。

在该情况下，采用例如操作遥控器的办法指定终端设备 1a 的画面。该指定，在已把终端设备 1 分配给遥控器的情况下，可以采用按下其键的办法进行指定，此外，在未进行分配的情况下则可操作遥控器从在显示部分 21 上显示的菜单画面上进行选择，或者用遥控器使之在显示画面上显示光标，用该光标指示终端设备 1a 的画面进行点击等的办法进行指定。

像这样地指定的该指定信息，就是说，含有终端设备 1a 识别信息的放大显示请求，通过使用者接口部分 24 通知给运算部分 27，运算部分 27，根据含于放大显示请求内的识别信息特定终端设备 1a，把显示状况管理文件 34 的终端设备 1a(PC-1)的‘优先级别’的项目设定为‘高’，把区域分割请求通知给分割区域信息编制部分 41。

在分割区域信息编制部分 41 中，与上述同样地编制分割区域信息文件 36。在进行该编制时，要参照假的分割区域设定表，例如像图 16(a) 那样地构成，图 16(b)示出了以该假的分割区域设定表为基础的假的分割区域。在这里，图 16(b)中的优先顺序，如上所述，根据显示状况管理文件 34 的‘优先级别’的项目决定顺序附加，在这里由于终端设备 1a 的优先级别为‘高’比别的终端设备 1b、1c、1d 都高，故分配优先顺序为第 1 号就是说图 16(b)的假的分割区域(第 1 台用的分割区域)52a。对于未设定优先级别的其它的终端设备 1b、1c、1d 的分割区域的分配，如上所述是任意的，在这里，给终端设备 1b、1c、1d 按照顺序分别分配假的分割区域 52B、52C、52D。然后，与上述同样地决定要分配给各终端设备 1a、1b、1c、1d 的真的分割区域。

图 17 示出了该情况下的真的分割区域，分割区域 53A、53B、53C、53D 是分别分配给各个终端设备 1a、1b、1c、1d 的真的分割区域，这时的分割区域信息文件 36，构成为图 17 所示的那样的内容。

然后，进行与上述同样的工作，结果是如图 15 所示在真的分割区域 53A、53B、53C、53D 上分别显示各个终端设备 1a、1b、1c、1d 的俘获图像数据(显示画面)，在显示画面 50 上显示在各个分割画面 53A、53B、53C、53D 中，被指定的分割画面 51A 被放大后的状态的多画面。

<单画面切换功能>

此外，如图 19 所示，还可以单画面显示多个分割画面中的任何一项。在该情况下，例如操作遥控器进行该意思的输入操作。把含有该输入信息，就是说含有与要进行单画面显示的分割画面 51C 对应的终端设备 1c 的识别信息的单画面显示请求，通过使用者接口部分 24 通知给运算部分 27。运算部分 27 根据含于单画面显示请求中的识别信息特定终端设备 1c，把显示状况管理文件 34 的终端设备 1c(PC-3)的‘优先级别’的项目设定为‘最高’，把区域分割请求通知给分割区域信息编制部分 41。

接着，进行与上述同样的工作，其结果是如图 19 所示，从多画面变更为单画面。此外，例如，采用用遥控器进行规定的操作的办法，使‘优先

级别’的项目返回到‘无’，借助于此，就变成为可以返回到原来的多画面的构成。

得益于这样的单画面切换功能，就可以确认因被缩小而看不见细节的分割画面的细节，此外，还可以借助于规定的操作返回到多画面，使用灵活性好。

<嵌入功能>

此外，如图 20 所示，也可以对当前正在显示着的多画面嵌入新的画面。该嵌入，相当于进行了多画面显示后的显示请求，可用与上述显示请求时同样的处理进行嵌入。

<消去功能>

此外，如图 21 所示，也可以在当前正在显示着的多个分割画面中消去任意的分割画面。在该情况下，要操作遥控器进行该意思的输入操作。通过使用者接口部分 24 把含有该输入信息，就是说把含有与要想消去的分割画面 51D 对应的终端设备 1d 的识别信息的消去请求通知给运算部分 27，运算部分 27 根据含于消去请求中的识别信息特定终端设备 1d，从显示状况管理文件 34 中消除该终端设备 1d 的终端设备信息，把区域分割请求通知给分割区域信息编制部分 41。之后的工作，与上述是同样的，借助于此，如图 21 所示，就可以消去指定的分割画面 51D，在可以在消去后的台数量的多个分割画面上显示重新构成的多画面。另外，也可以采用单纯地仅仅消除消去指定的分割画面 51D 的构成。

如上所述，倘采用本实施方案，就可以得到具备借助于画面分割在显示画面上 1 个画面地显示已连接到网络 3 上的多个终端设备 1 上显示着的画面的多画面形式功能的显示装置 2。

此外，还可以得到除去多画面显示功能之外，还具备放大显示功能、单画面切换功能、嵌入功能、消去功能的高功能的显示装置 2。

此外，在构成多画面时，由于作成为使得可维持俘获图像数据纵横比原状不变地进行尺寸变换后进行合成，故可以得到可以构成没有失调感的显示画面的显示装置 2。

另外，也可以是这样的方法：在显示装置 2 主导下例如每 3 秒一次地不断更新显示画面而不是会议出席者(使用者)每当要观看显示时都通过输入部分 23 输入显示请求。在该情况下，只要显示装置 2 的运算部分 27 管理时间，每当经过恒定的时间就与上述同样地进行之后的工作即可，因而总是可以得到最新的终端设备 1 的显示画面。

<差分俘获功能>

到现在为止说明的都是由全画面俘获(或部分俘获)进行的方法，以下，对检测终端设备的显示画面上的变化，发送用仅仅俘获变化部分的办法得到的图像数据的方法，进行说明。

首先，操作输入部分 23 的例如遥控器，输入想要进行对终端设备 1a 到 1d 的差分俘获的意图。就是说，把显示状况管理文件 34 的差分俘获管理标志设定为‘1’。

已把差分俘获管理标志设定为‘1’的第 1 次，如通常那样，进行上述步骤 S1 到 S18 的处理，进行多画面显示。

在多画面显示完成后，显示装置 2，就从运算部分 27 通过通信部分 28、网络 3 对差分俘获管理标志设定为‘1’的终端设备 1，与显示状况管理文件 34 一起，发送差分俘获开始指令。

其次，对从显示装置 2 接收到差分俘获开始指令和显示状况管理文件的终端设备 1 一侧的工作，进行说明。

图 22 的流程图示出了从显示装置 2 接收到差分俘获开始指令和显示状况管理文件的终端设备 1 一侧的工作。在这里。作为终端设备 1a(PC-1)的工作进行说明。

终端设备 1a 的数据管理处理部分 18，通过通信部分 17 接收从显示装置 2 发送来的差分俘获开始指令和显示状况管理文件 34(S41)。接受到它们后就执行以后的全画面俘获。就是说，画面俘获处理部分 19 把视频存储器 12 的内容存放到存储部分 15 内(S42)。把在这里得到的图像数据叫做前全画面数据。

画面比较处理部分 20，每隔恒定的时间(例如每 0.5 秒 1 次等，设定是

任意的)就参照数据管理处理部分18所接收到的显示状况管理文件34的差分俘获管理标志(S43)，如果差分俘获管理标志是‘1’(S44)，就进行以后的差分俘获。

此外，例如如果使用者要停止差分俘获工作那样地进行指示，则只要用变更显示状况管理文件34的方法把差分俘获管理标志改写成‘0’即可。采用画面比较处理部分20参照该标志的办法，判断俘获工作停止。

执行全画面俘获处理,画面俘获处理部分19把视频存储器12的内存放到存储部分15内(S45)。把在这里得到的图像数据，叫做后全画面数据。其次，运算部分16的画面比较处理部分20进行前全画面数据和后全画面数据的比较(S46)。

作为该画面比较处理的一个例子，用使鼠标光标工作时的例子(图23)进行说明。在该图中，在前全画面数据60和后全画面数据61中鼠标光标的位置已发生变化。就是说，如图24所示，2个区域(70、71)被识别为已发生了变化的区域。画面比较处理部分20虽然对之进行检测，但是，在这里在可以判断为有了画面的变化的情况下(S47)，画面比较处理部分20就取得有了变化的区域的图像数据、图像数据的尺寸(纵×横像素)、用图像数据的原点坐标(显示状况管理文件34的‘俘获图像尺寸’规定的区域内的绝对坐标)。

在本例的情况下，就区域70来说，可以取得该区域70的俘获图像数据(以下，叫做差分俘获图像数据1)、差分俘获图像尺寸1、差分俘获原点1，就区域71来说，可以取得该区域71的俘获图像数据(以下，叫做差分俘获图像数据2)、差分俘获图像尺寸2、差分俘获原点2，在把这些信息存放到存储部分15内的同时，把已取得差分俘获图像数据等的信息通知给数据管理处理部分18(S48)。另外，差分俘获图像尺寸1、差分俘获图像尺寸2、差分俘获原点1，差分俘获原点2，要写入到显示状况管理文件34的相应的部分内。

网络管理部分18，通过通信部分17和网络3，把这些数据发送往显示装置2(S49)。另外，在该差分俘获功能的情况下，与上述全画面俘获(或部

分俘获)的方法不同，在不是每次都从显示装置 2 一侧接收发送请求，而是用画面比较处理部分 20 检测到画面上的变换的情况下，这种变动成为要因而进行发送工作。

为了进行下一次的画面比较处理，要把后全画面数据变成为前全画面数据(S50)。

其次，对从终端设备 1a 接受到差分俘获图像数据 1、差分俘获图像数据 2 和显示状况管理文件 34 的显示装置 2 一侧的工作，进行说明。

当显示装置 2 用通信部分 28 从终端设备 1a 那里接收到差分俘获图像数据 1、差分俘获图像数据 2 和显示状况管理文件 34 后，运算部分 27 就把图像合成指令通知给图像合成部分 42。借助于此，显示装置 2 进入由差分俘获功能进行的图像合成处理。

图像合成部分 42，当接收到图像合成指令后，就根据相当于当前正在显示部分 21 上显示的图像的分离区域信息文件 36，在从终端设备 1a 接收到的显示状况管理文件 34(差分俘获图像尺寸 1、差分俘获图像尺寸 2、差分俘获原点 1，差分俘获原点 2)，改写已存放到俘获图像数据存储部分 37 内的俘获图像数据中，相当于差分俘获图像数据 1、差分俘获图像数据 2 的部分。之后的工作与上述的步骤 17、步骤 18 是同样的。

该方法，由于要用网络 3 发送的图像数据的量比上述的全画面俘获(或部分俘获)的方法少，故可以减轻施加给网络的负荷。此外，还总是可以得到最新的终端设备 1 的显示画面。

另外，在上述的说明中，在进行差分检测时，虽然设想为用已导入到终端设备 1 内的专用的程序进行俘获并进行处理，但是可以直接检测视频存储器的内容的差分那样的驱动器可以在 OS 上利用进行处理的情况下，也可以利用这种方式。

另外，上述图像数据，也可以采用用压缩图像形式(例如，JPEG 形式等)在终端设备 1 和显示装置 2 之间进行发送接收的办法，来减小施加给网络的负荷。

另外，在上述中，虽然一直以采用操作显示装置 2 一侧的输入部分 23

的办法进行显示请求或单画面显示请求等的各种请求的情况，就是说，以在显示装置 2 一侧主导下决定显示画面的构成的情况为例进行的说明，但是，从各个终端设备 1 一侧决定也是可能的。在该情况下，会议出席者(使用者)，从自身所操作的终端设备 1 操作输入部分 13 输入该意图。该输入信息，通过使用者接口部分 14 通知给数据管理处理部分 18，该数据管理处理部分 18，对显示装置 2，通过通信部分 17 和网络 3 发送与含有本终端设备 1 的终端名和 IP 地址的上述输入信息对应的请求。该请求通过网络 3 被显示装置 2 的通信部分 28 接收，通知给运算部分 27。之后的工作，与上述是同样的，这样，从各个终端设备 1 一侧决定各种请求也是可能的。

另外，采用在上述各种请求中含有指定是全画面俘获还是部分俘获的信息的办法，从各个终端设备 1 一侧指定俘获范围也是可能的。

此外，优先级别，如上所述，既可以借助于使用者操作适宜指定，也可以对预定要连接到显示装置 2 上的多个终端设备 1 预先给定优先级别。在预先给定优先级别的情况下，要作成为这样的构成：在把终端设备信息注册到显示状况管理文件 34 内时，自动地把已给予该终端设备 1 的优先级别自动设定到显示状况管理文件 34 的优先级别的项目内。

另外，在本实施方案中，虽然说明的是根据假分割区域设定文件 35 决定假分割区域，但是也可以作成为每次根据计算决定。

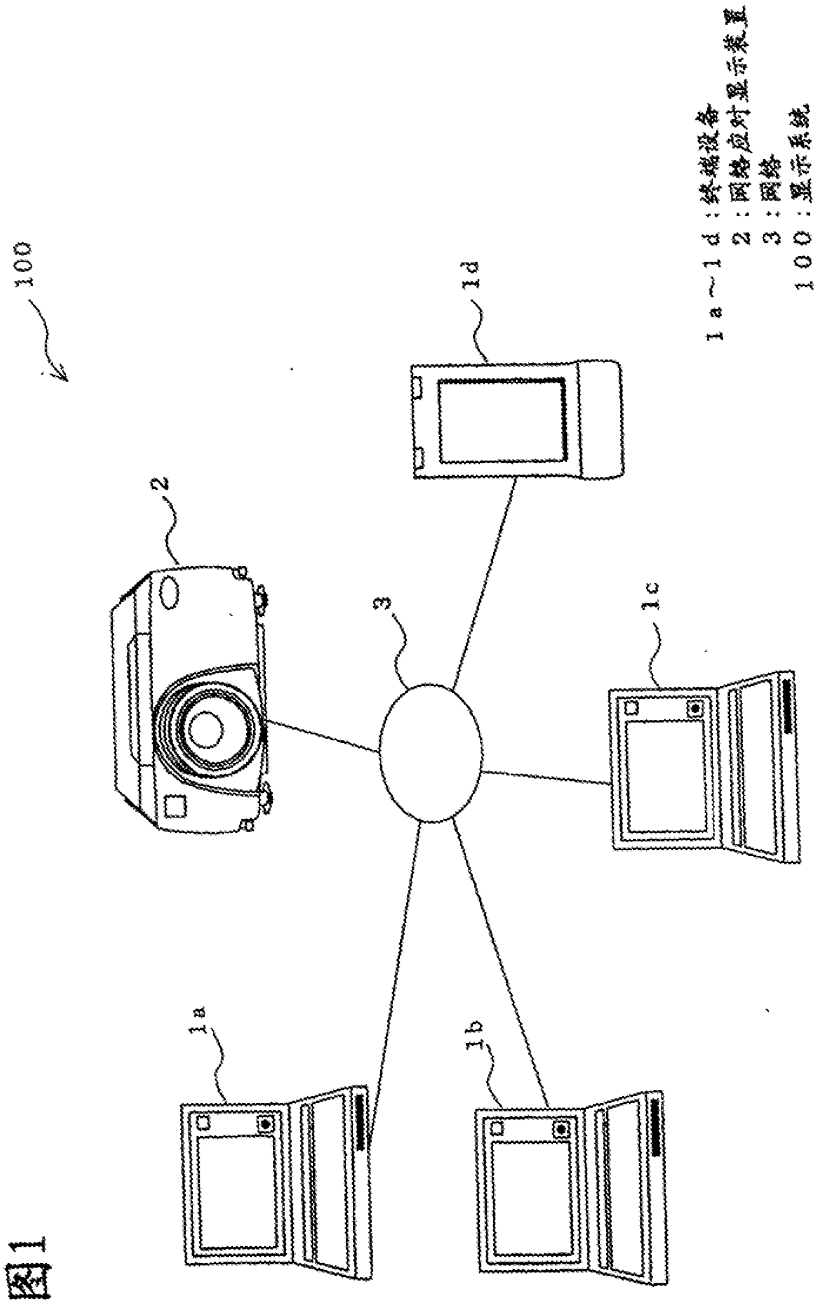


图1

图2

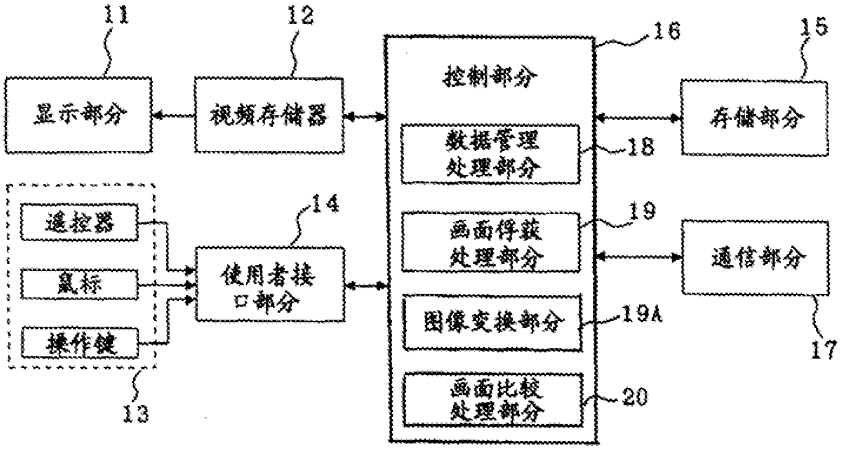
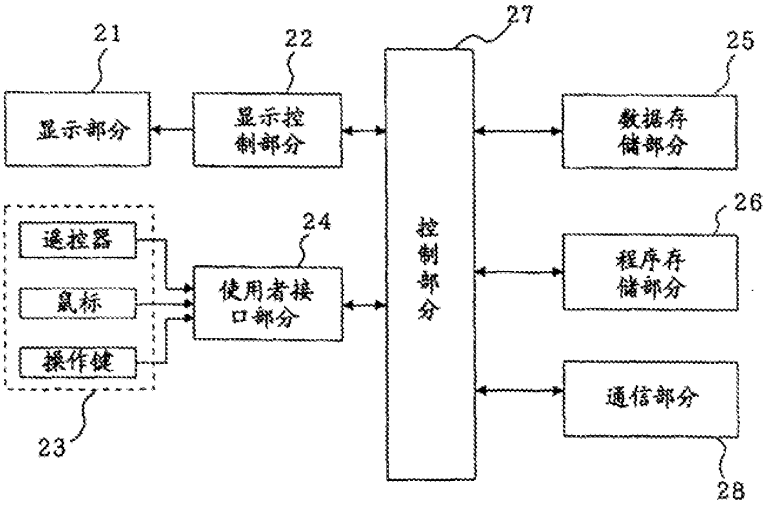

11
12
16
15
显示部分
视频存储器
控制部分
存储部分
数据管理
处理部分
18
14
19
遥控器
画面俘获
处理部分
通信部分
鼠标
使用者接
口部分
图像变换部分
19A
操作键
17
画面比较
处理部分
20
13

图3


27
21
22
25
显示部分
显示控
制部分
数据存
储部分
26
24
遥控器
控
制
部
分
程序存
储部分
鼠标
使用者接
口部分
操作键
通信部分
23
28

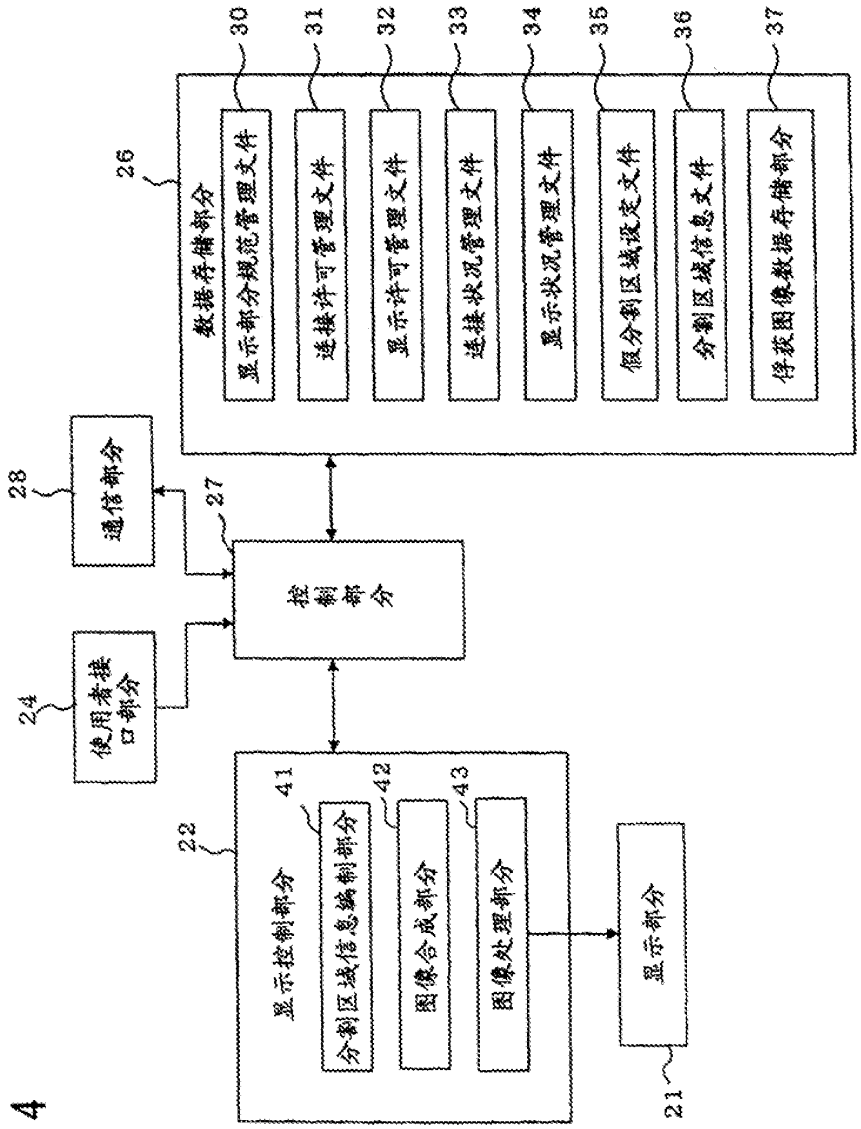

26
数据存储部分
30
显示部分规范管理文件
31
连接许可管理文件
32
显示许可管理文件
33
连接状况管理文件
34
显示状况管理文件
35
假分割区域设定文件
36
分割区域信息文件
37
存获图像数据存储部分
28
通信部分
27
控制部分
24
使用者接口部分
22
显示控制部分
41
分割区域信息编制部分
42
图像合成部分
43
图像处理部分
21
显示部分

图4

图5

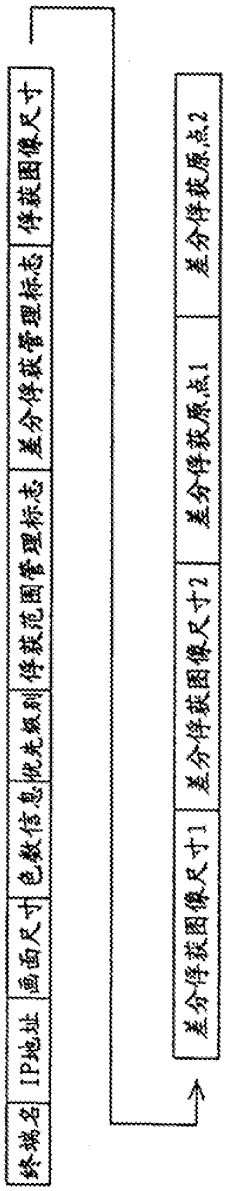

终端名
IP地址
画面尺寸
色数信息
优先级别
停获范围管理标志
差分停获管理标志
停获图像尺寸
差分停获图像尺寸1
差分停获图像尺寸2
差分停获原点1
差分停获原点2

图6

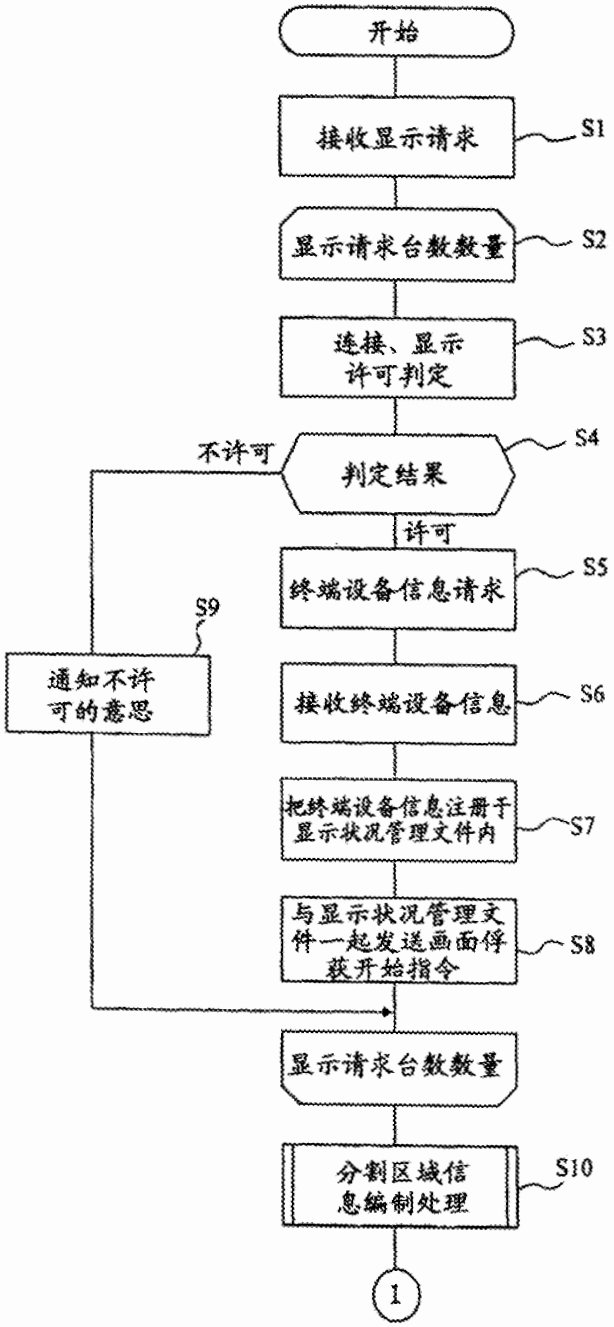

开始
接收显示请求
S1
显示请求台数数量
S2
连接、显示
许可判定
S3
不许可
判定结果
S4
许可
终端设备信息请求
S5
S9
通知不许
可的意思
接收终端设备信息
S6
把终端设备信息注册于
显示状况管理文件内
S7
与显示状况管理文
件一起发送画面俘
获开始指令
S8
显示请求台数数量
分割区域信
息编制处理
S10
1

图7

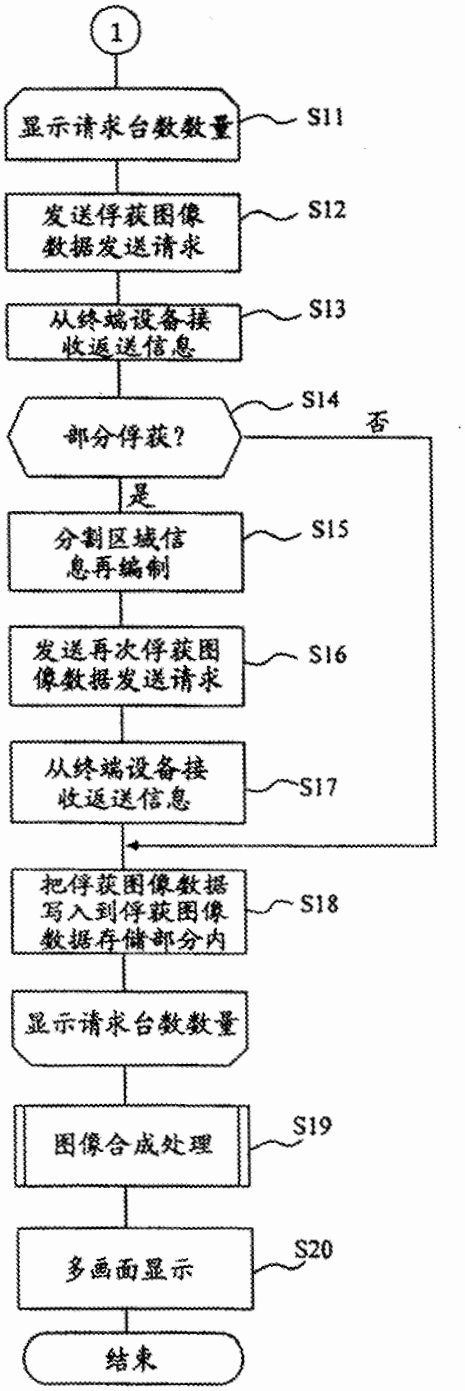

1
显示请求台数数量
S11
发送俘获图像数据发送请求
S12
从终端设备接收返送信息
S13
部分俘获?
S14
否
是
分割区域信息再编制
S15
发送再次俘获图像数据发送请求
S16
从终端设备接收返送信息
S17
把俘获图像数据写入到俘获图像数据存储部分内
S18
显示请求台数数量
图像合成处理
S19
多画面显示
S20
结束

图8

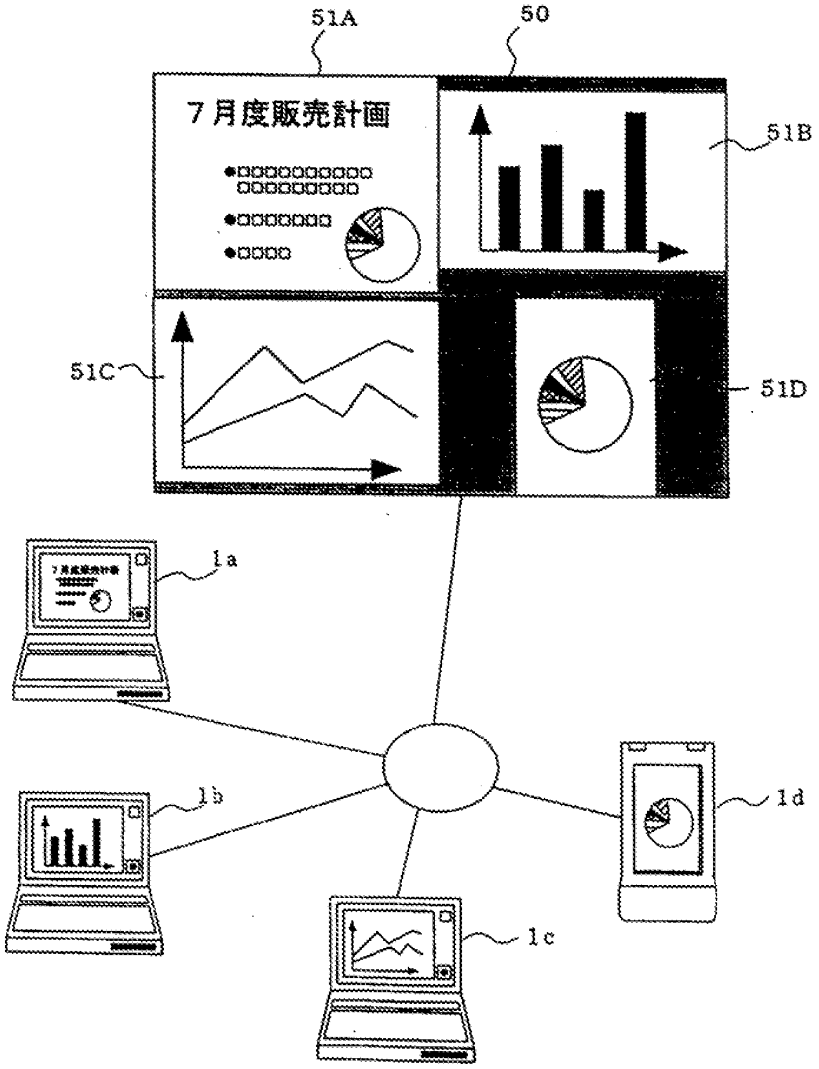


图9

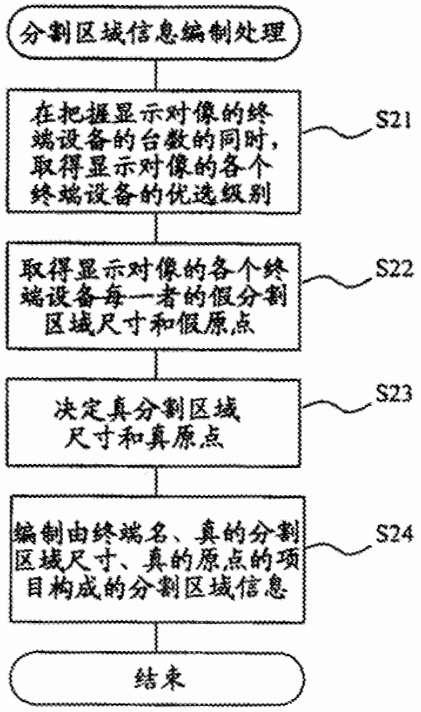

分割区域信息编制处理
在把握显示对像的终端设备的台数的同时，取得显示对像的各个终端设备的优选级别
S21
取得显示对像的各个终端设备每一者的假分割区域尺寸和假原点
S22
决定真分割区域尺寸和真原点
S23
编制由终端名、真的分割区域尺寸、真的原点的项目构成的分割区域信息
S24
结束

图10

	终端名	IP地址	画面尺寸	色数信息	优先级别	俘获范围设定标志	差分俘获管理标志	俘获图像尺寸
1a	PC-1	***.***.***.***	1280×1024(SXGA)	16777216	无	0		
1b	PC-2	***.***.***.***	800×600(SVGA)	16777216	无	0		
1c	PC-3	***.***.***.***	1024×768(XGA)	256	无	0		
1d	PDA-1	***.***.***.***	480×640	256	无	0		

差分俘获图像尺寸1	差分俘获图像尺寸2	差分俘获原点1	差分俘获原点2

图11

(a)

台数		第1台	第2台	第3台	第4台
4	优先顺序	无	无	无	无
		↓	↓	↓	↓
	假尺寸	640×512	640×512	640×512	640×512
	假原点	0, 0	640, 0	0, 512	640, 512

(b)

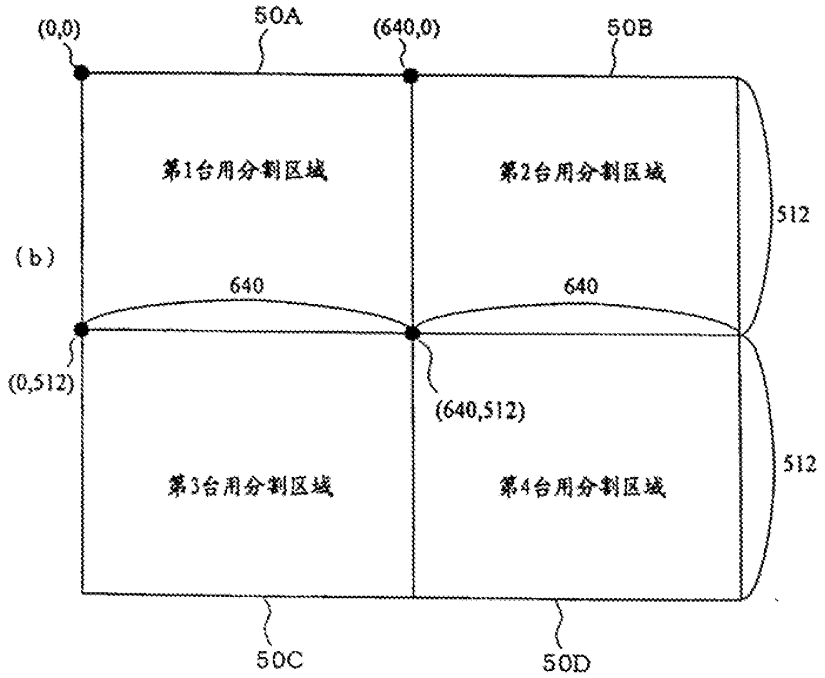


图12

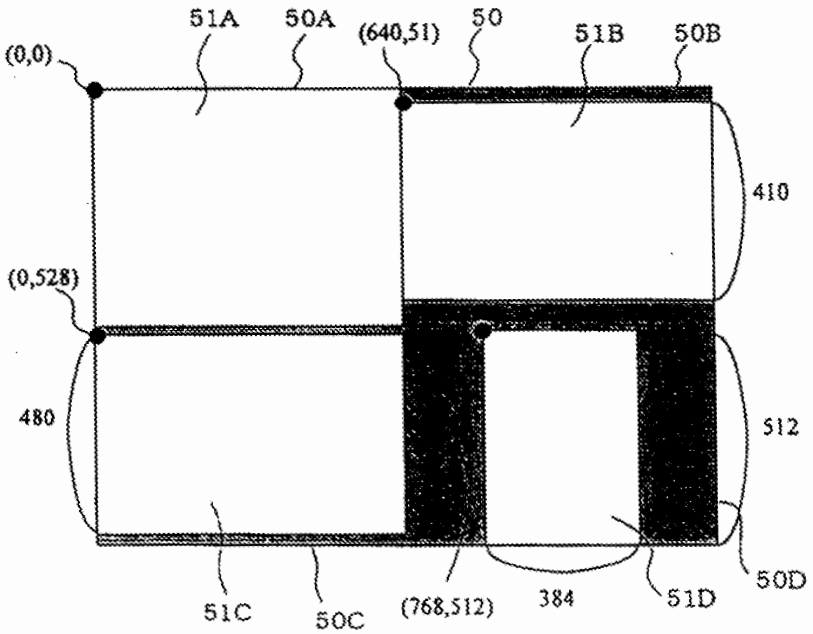


图13

终端名	PC-1	PC-2	PC-3	PDA-1
真尺寸	640×512	640×410	640×480	384×512
真原点	0,0	640,51	0,528	768,512

日期时间：2002年5月21日 17：00：32

图14

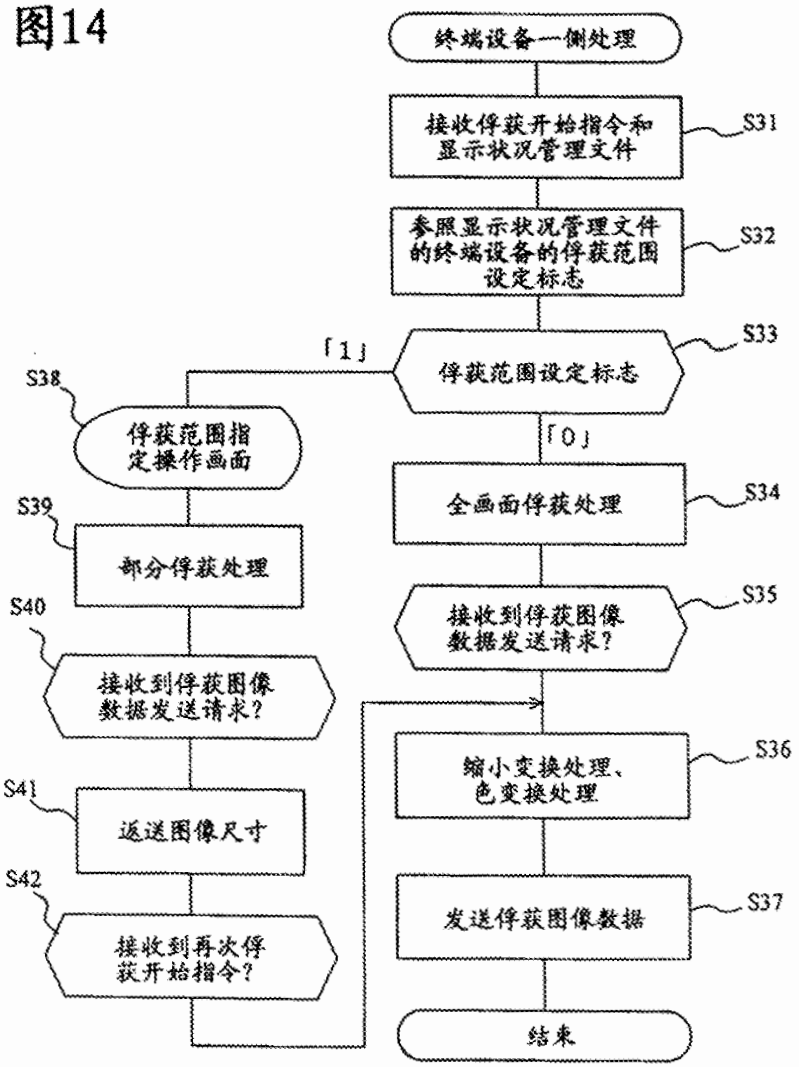

终端设备一侧处理
接收俘获开始指令和显示状况管理文件
S31
参照显示状况管理文件的终端设备的俘获范围设定标志
S32
俘获范围设定标志
S33
「1」
「0」
S38
俘获范围指定操作画面
全画面俘获处理
S34
S39
部分俘获处理
接收到俘获图像数据发送请求?
S35
S40
接收到俘获图像数据发送请求?
缩小变换处理、色变换处理
S36
S41
返送图像尺寸
S42
接收到再次俘获开始指令?
发送俘获图像数据
S37
结束

图15

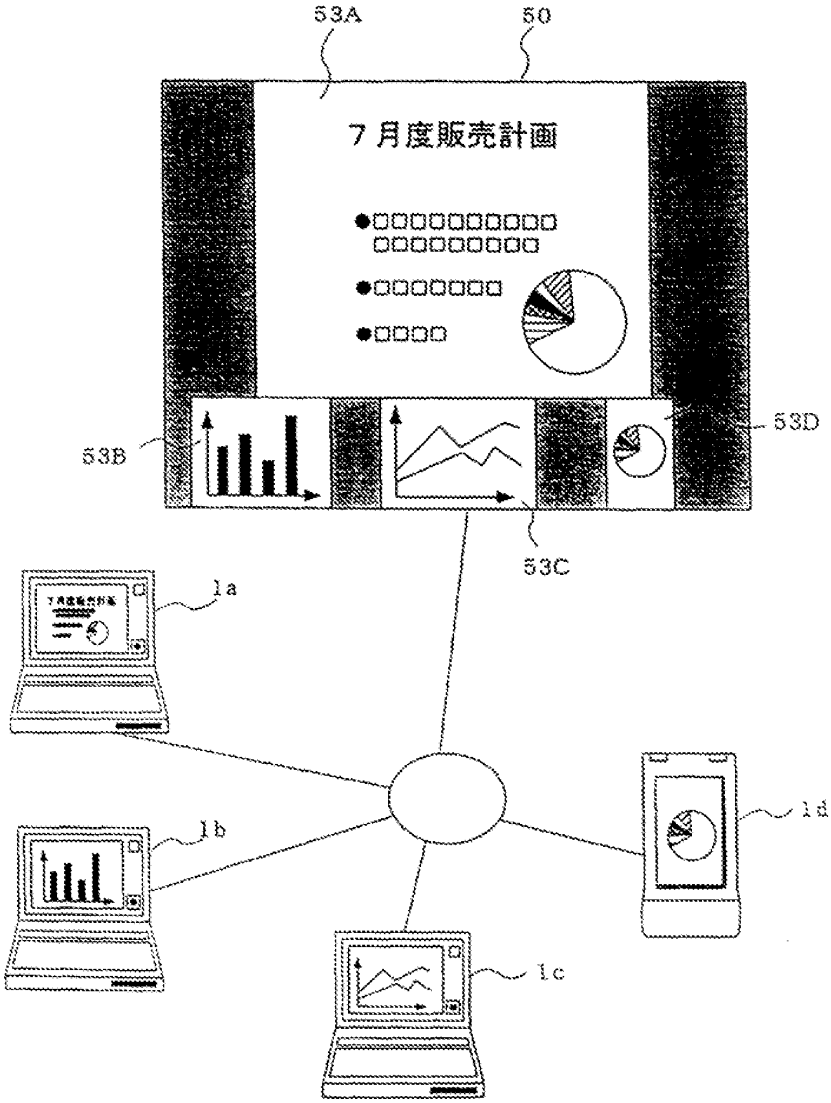


图16

(a)

台数		第1台	第2台	第3台	第4台
4	优先顺序	高	无	无	无
	假尺寸	1280×768	427×256	427×256	426×256
	假原点	0, 0	0,768	427,768	854,768

(b)

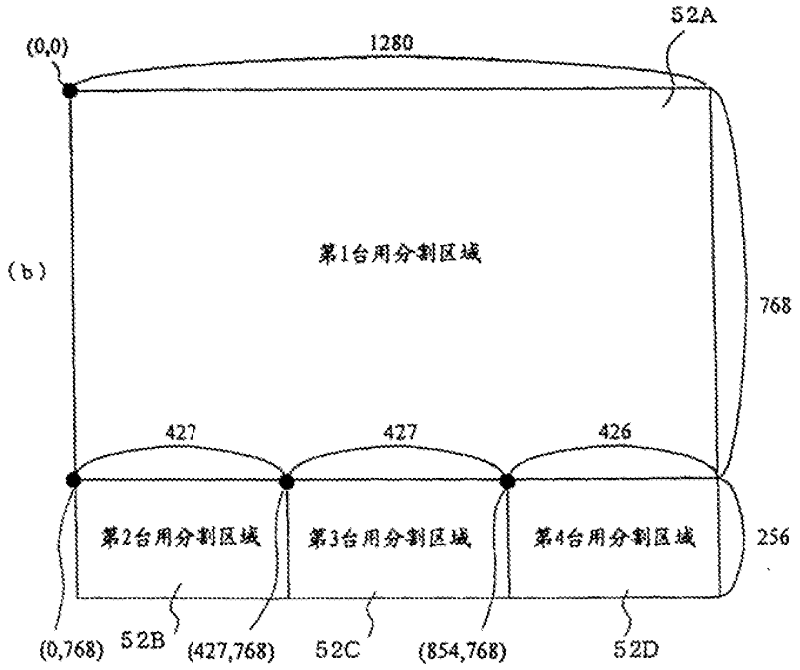


图17

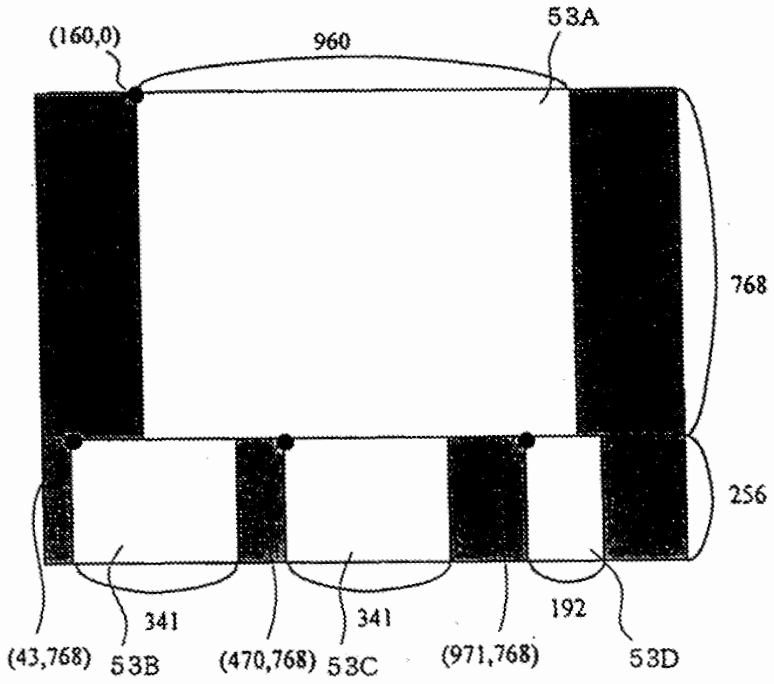


图18

终端名	PC-1	PC-2	PC-3	PDA-1
真尺寸	960×768	341×256	341×256	192×256
真原点	160,0	43,768	470,768	971,768

日期时间：２００２年5月２１日１７：００：３２

图19

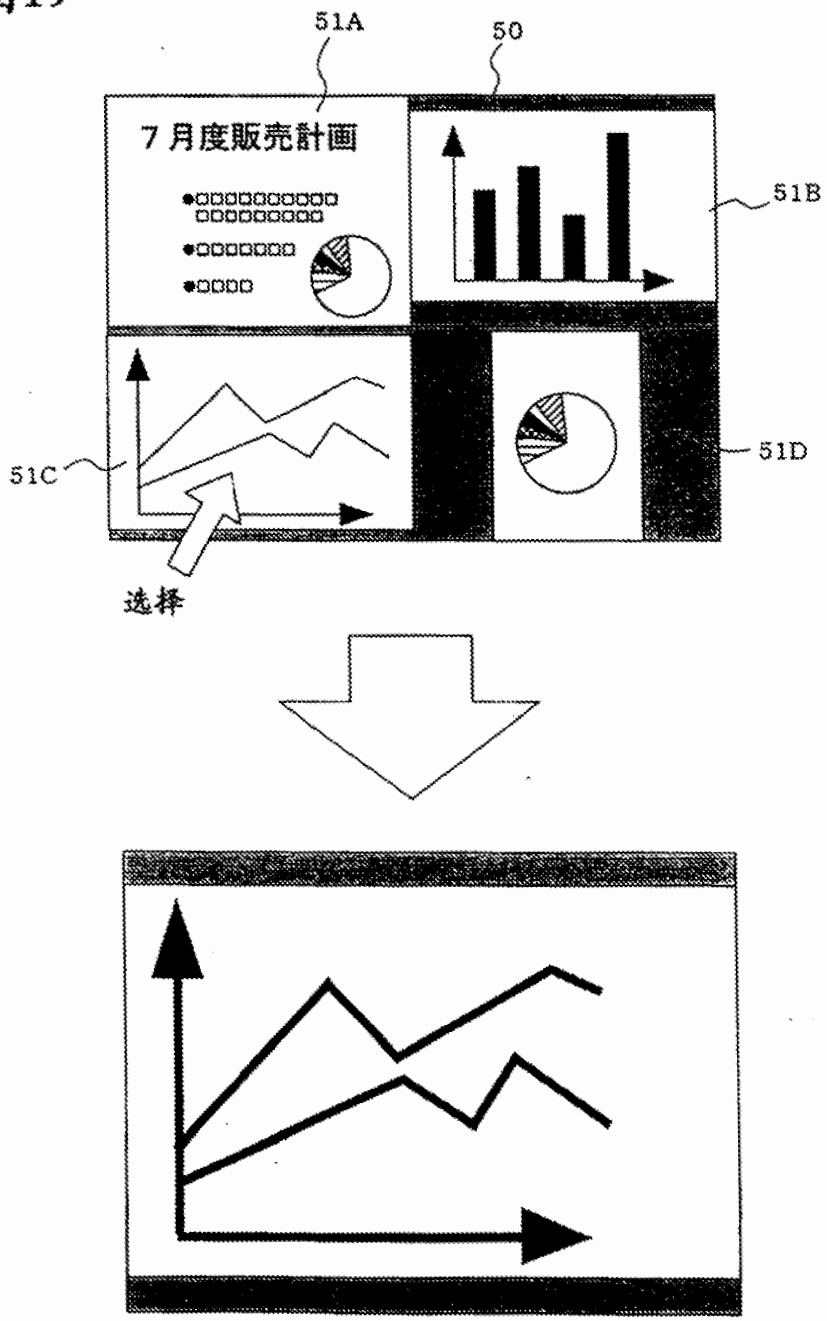


图20

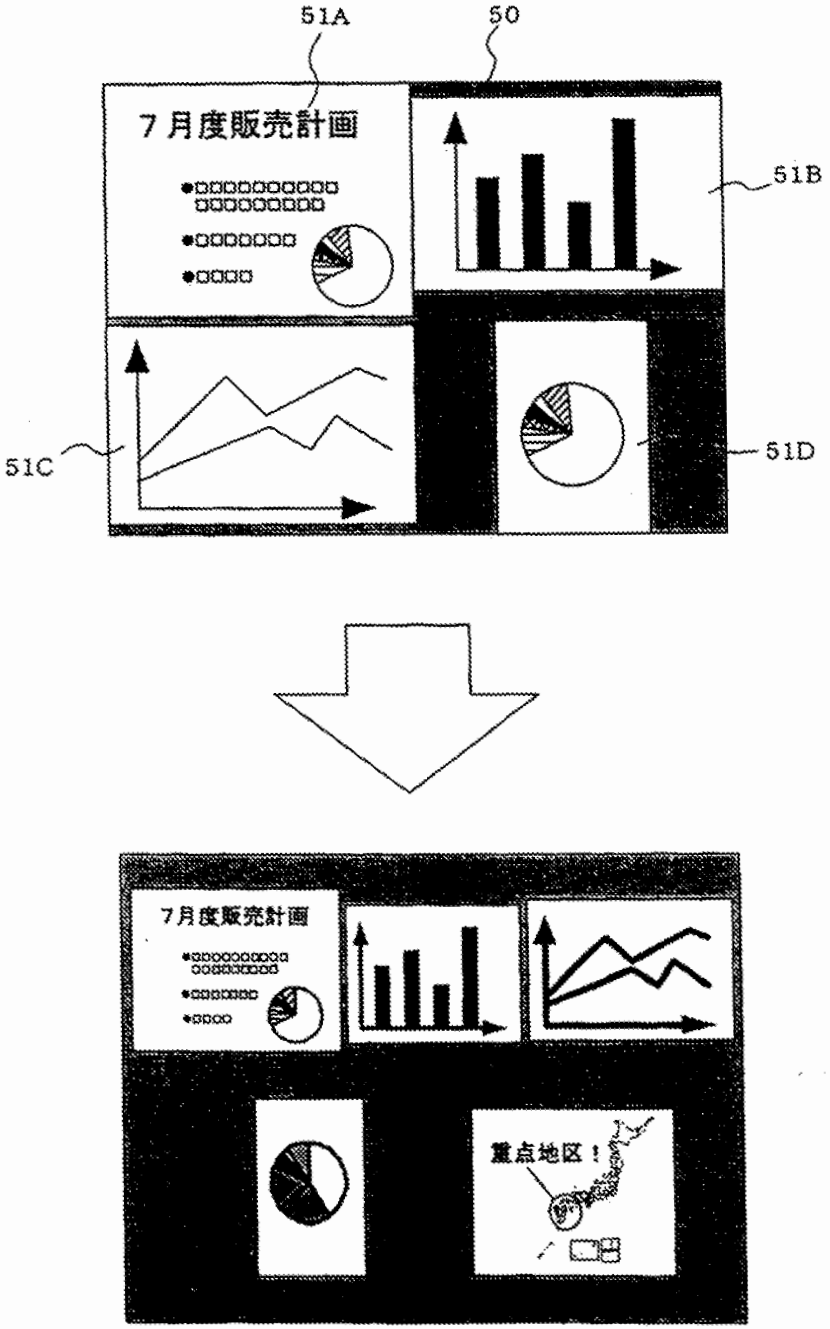


图21

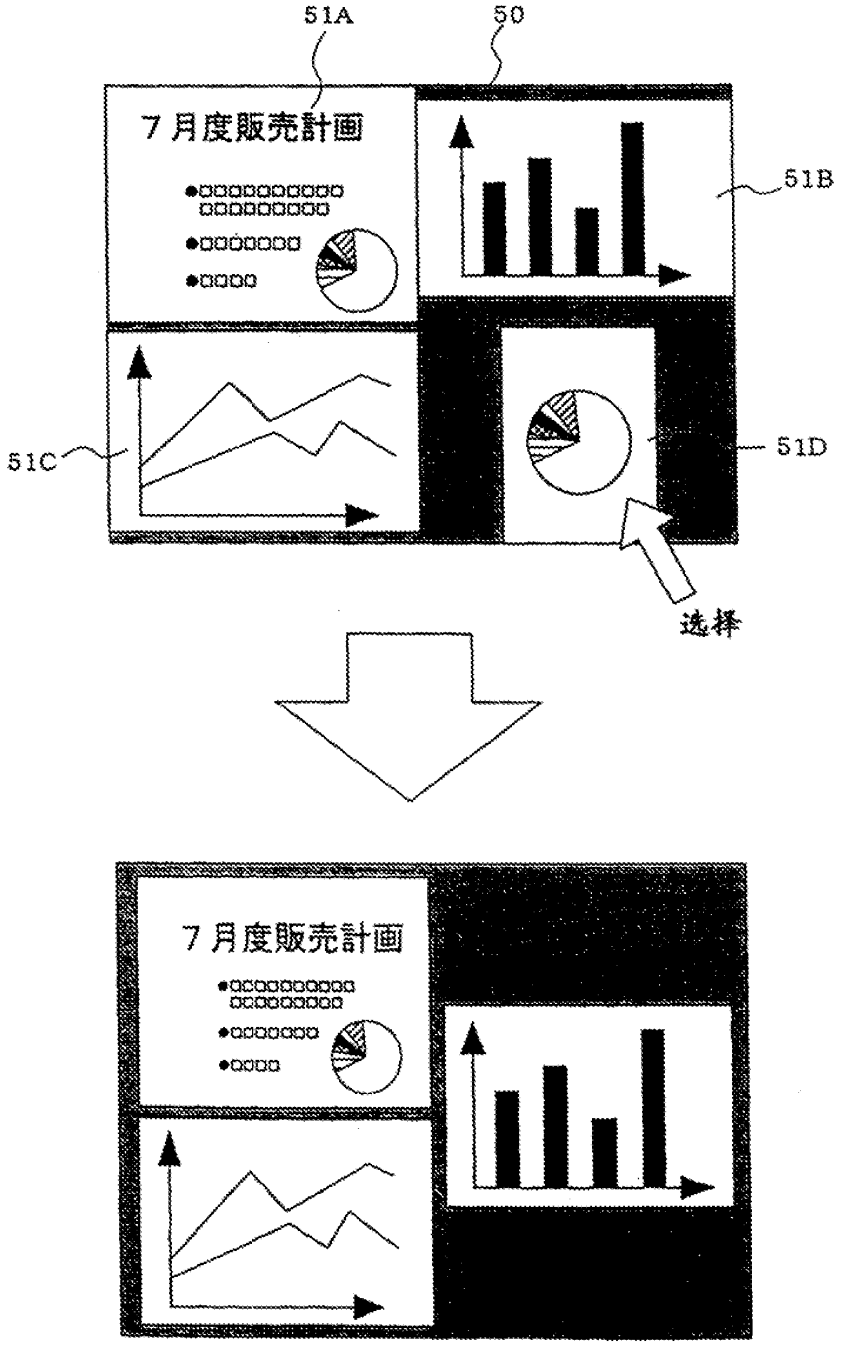


图22

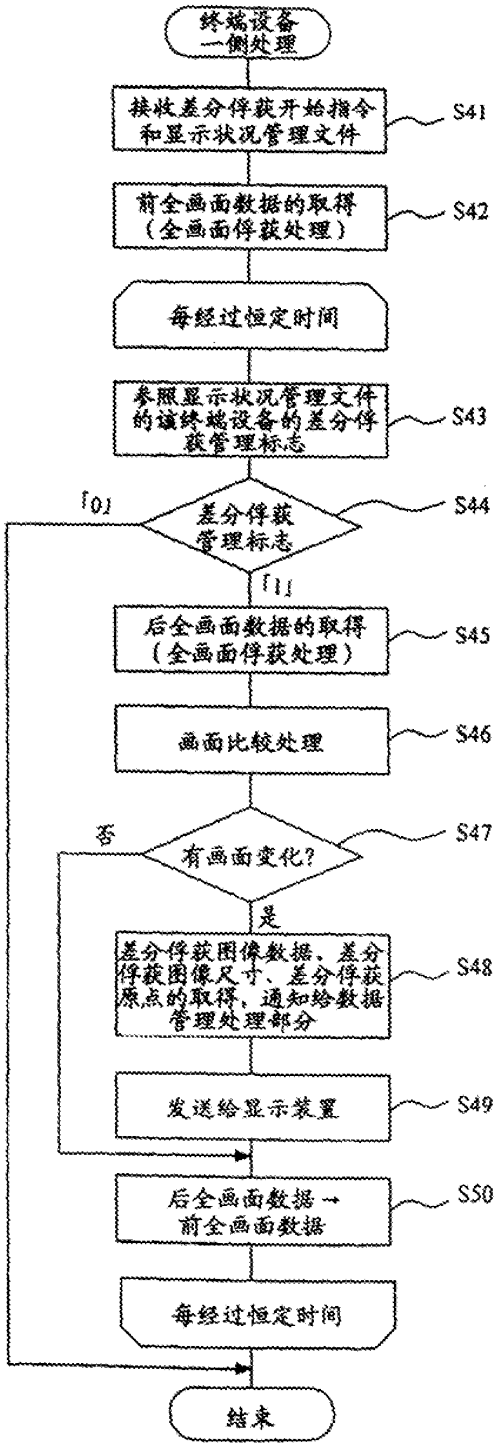

终端设备
一侧处理
接收差分俘获开始指令
和显示状况管理文件
S41
前全画面数据的取得
（全画面俘获处理）
S42
每经过恒定时间
参照显示状况管理文件
的该终端设备的差分俘
获管理标志
S43
「0」
差分俘获
管理标志
S44
「1」
后全画面数据的取得
（全画面俘获处理）
S45
画面比较处理
S46
否
有画面变化?
S47
是
差分俘获图像数据、差分
俘获图像尺寸、差分俘获
原点的取得，通知给数据
管理处理部分
S48
发送给显示装置
S49
后全画面数据→
前全画面数据
S50
每经过恒定时间
结束

图23

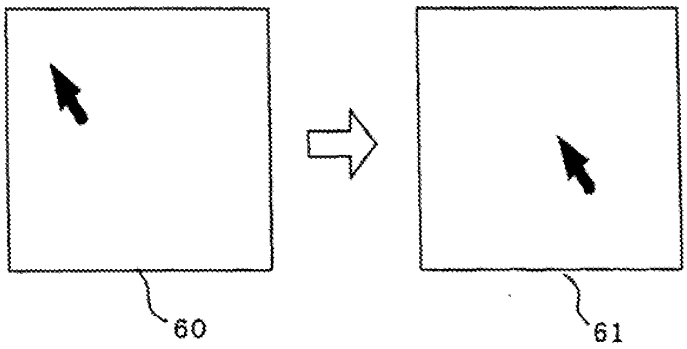


图24

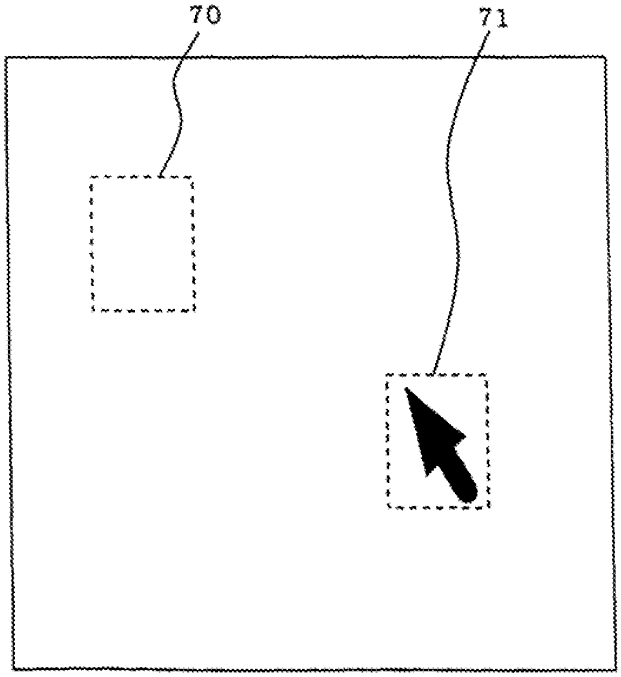


图25

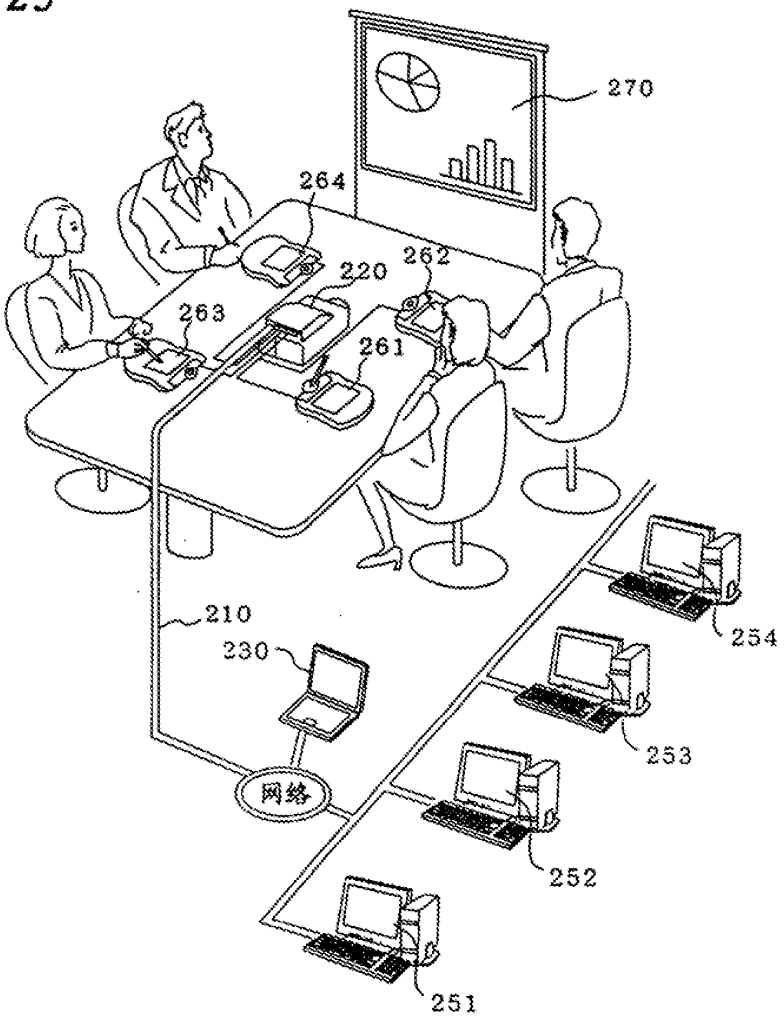


图26

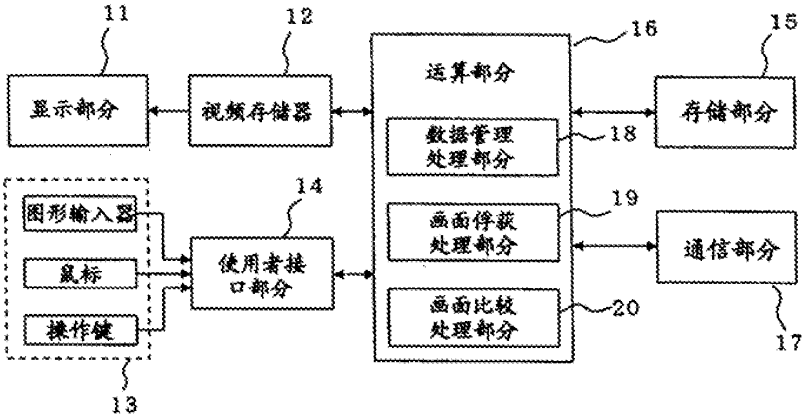
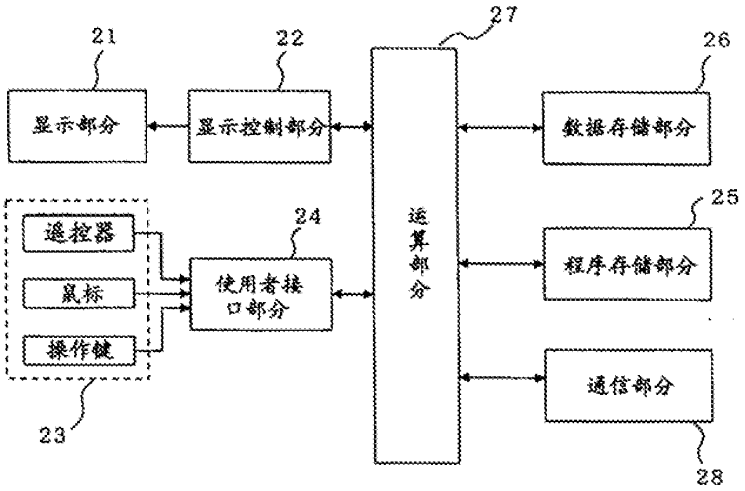

11
12
16
15
显示部分
视频存储器
运算部分
存储部分
数据管理
处理部分
18
14
19
图形输入器
画面存获
处理部分
通信部分
鼠标
使用者接
口部分
画面比较
处理部分
20
操作键
17
13

图27


27
21
22
26
显示部分
显示控制部分
数据存储部分
25
24
遥控器
运算部分
程序存储部分
鼠标
使用者接
口部分
操作键
通信部分
23
28

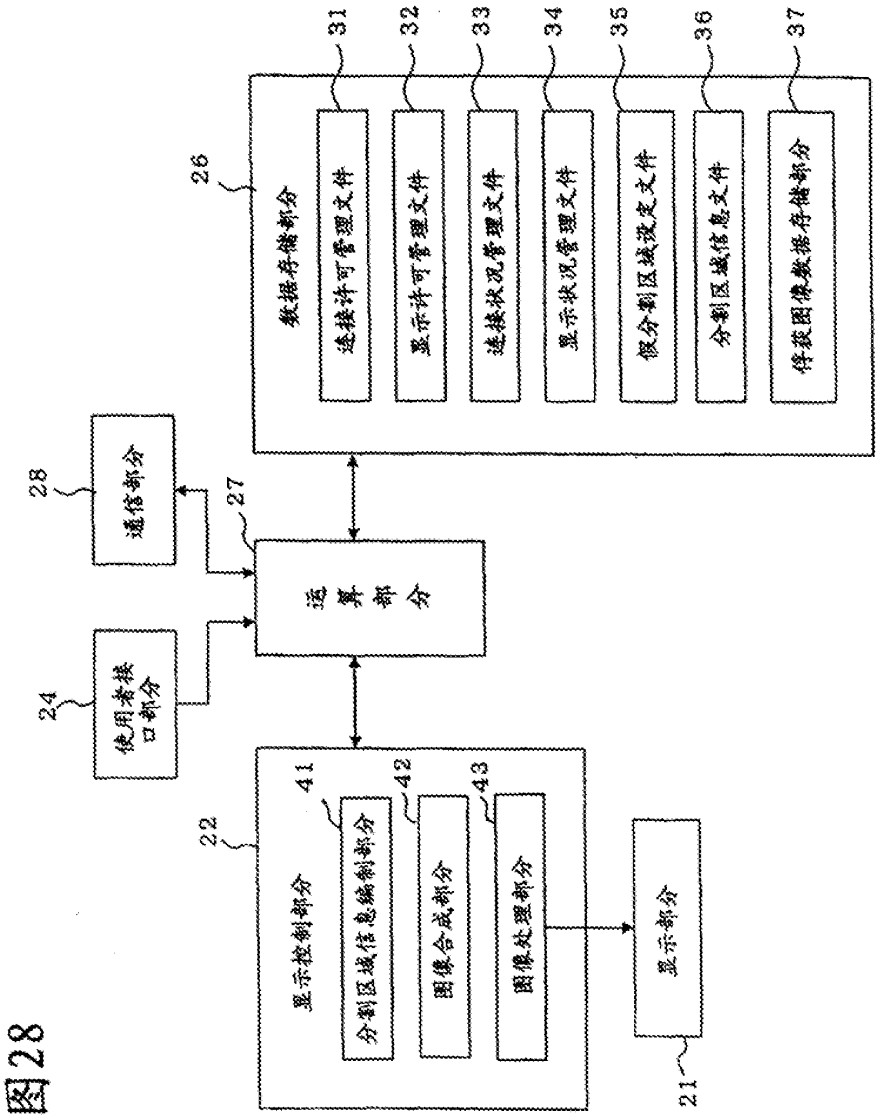

26
数据存储部分
31
连接许可管理文件
32
显示许可管理文件
33
连接状况管理文件
34
显示状况管理文件
35
假分割区域设定文件
36
分割区域信息文件
37
伴随图像数据存储部分
28
通信部分
27
运算部分
24
使用者接口部分
22
显示控制部分
41
分割区域信息编制部分
42
图像合成部分
43
图像处理部分
21
显示部分

图28

图29

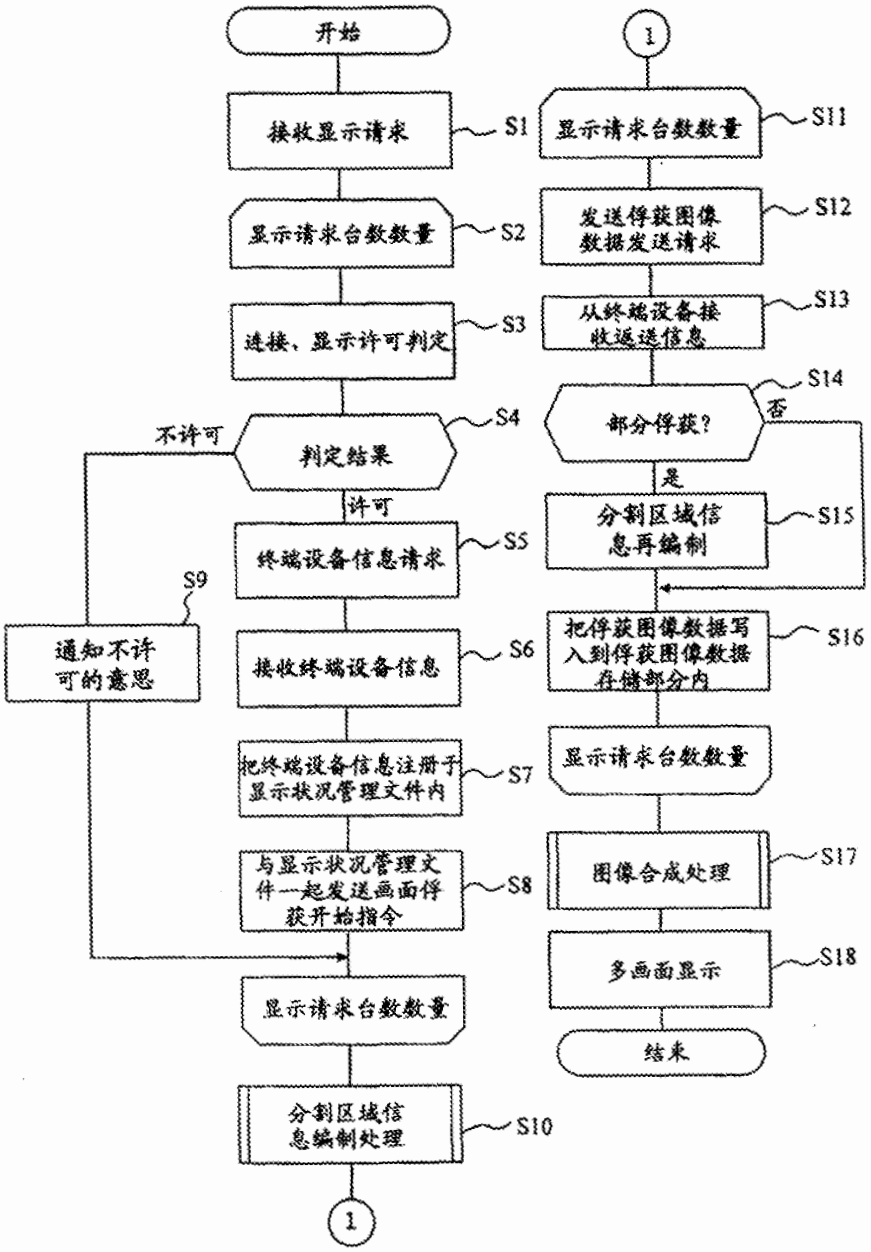
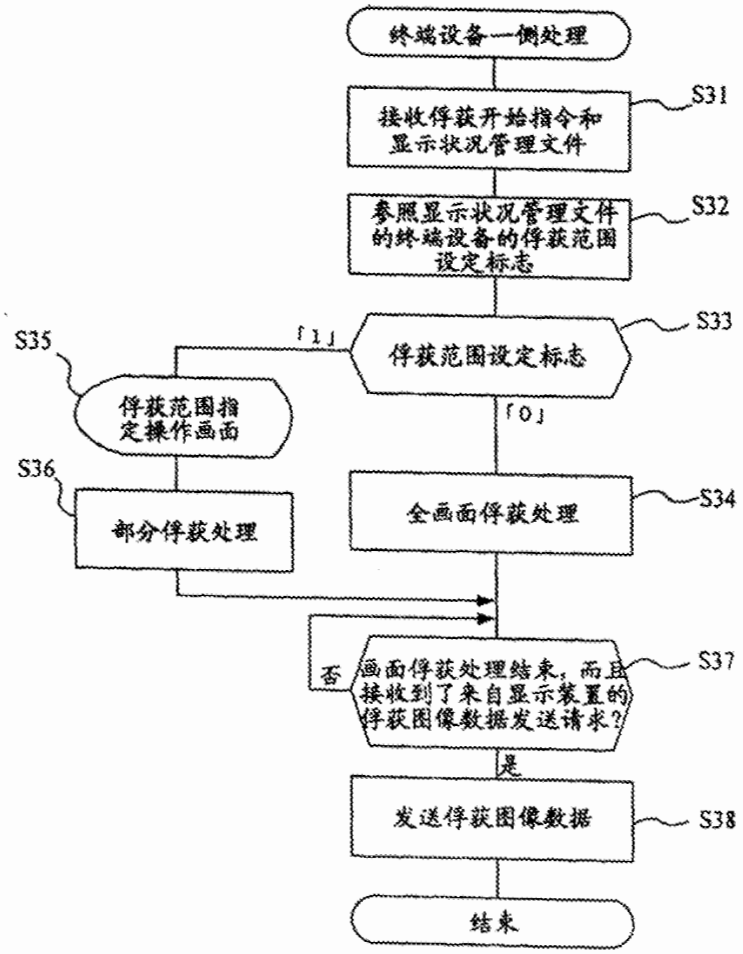

开始
接收显示请求
S1
显示请求台数数量
S2
连接、显示许可判定
S3
判定结果
S4
不许可
许可
终端设备信息请求
S5
S9
通知不许可的意思
接收终端设备信息
S6
把终端设备信息注册于显示状况管理文件内
S7
与显示状况管理文件一起发送画面俘获开始指令
S8
显示请求台数数量
分割区域信息编制处理
S10
1
1
显示请求台数数量
S11
发送俘获图像数据发送请求
S12
从终端设备接收返送信息
S13
部分俘获?
S14
否
是
分割区域信息再编制
S15
把俘获图像数据写入到俘获图像数据存储部分内
S16
显示请求台数数量
图像合成处理
S17
多画面显示
S18
结束

图30


终端设备一侧处理
接收俘获开始指令和显示状况管理文件
S31
参照显示状况管理文件的终端设备的俘获范围设定标志
S32
俘获范围设定标志
S33
「1」
「0」
S35
俘获范围指定操作画面
S36
部分俘获处理
全画面俘获处理
S34
画面俘获处理结束，而且接收到了来自显示装置的俘获图像数据发送请求？
S37
否
是
发送俘获图像数据
S38
结束

Espacenet

Bibliographic data: CN1550996 (A) — 2004-12-01

Image-display system and method, image-display program, projector and projector-control method, and projector-control program

Inventor(s): TORU KARASAWA [JP]; SHINJI KUBOTA [JP]; MINORU SATO [JP] ± (KARASAWA TORU, ; KUBOTA SHINJI, ; SATO MINORU, ; KARASAWA TORU,KUBOTA SHINJI,SATO MINORU)

Applicant(s): SEIKO EPSON CORP [JP] ± (SEIKO EPSON CORP)

Classification:
- **international:** ***G03B21/00; G03B21/14; G03B21/26; G06F13/00; G06F3/14; G06F3/153; G09B5/06; G09G5/00; H04N7/173;*** (IPC1-7): G03B21/00; G06F13/00; G09B5/06
- **cooperative:** **G06F21/84**; **G06F3/1431**; **H04N21/25875**; **H04N21/4122**; **H04N21/4143**; **H04N21/43632**; **H04N21/4753**; **H04N7/17318**; G06F21/606; G06F21/82

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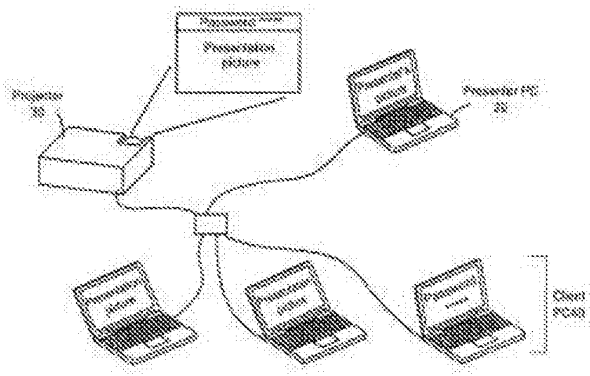
Priority number(s): JP20030080030 20030324

Also published as: CN1304969 (C) US2004227900 (A1) US2014298425 (A1) US9305188 (B2) US2012274865 (A1) more

Abstract not available for CN1550996 (A)
Abstract of corresponding document: US2004227900 (A1)

With a conventional image-display system, a presenter sometimes has difficulty in providing every viewer with an easy-to-see picture. When projecting an image transmitted from a computer operated by the presenter and enabling the viewer to watch the image projected by the projector, the projector receives image data transmitted through two-way



communication from the computer operated by the presenter, projects an image represented by the received image data and transmits the received image data to a client computer operated by the viewer through the two-way communication, and the client computer receives the image data transmitted through the two-way communication and displays the image represented by the received image data on its display.

[19] 中华人民共和国国家知识产权局

[51] Int. Cl⁷
G06F 13/00
G09B 5/06 G03B 21/00

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[32] 2003. 3.24 [33] JP [31] 080030/2003

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地址 日本东京都
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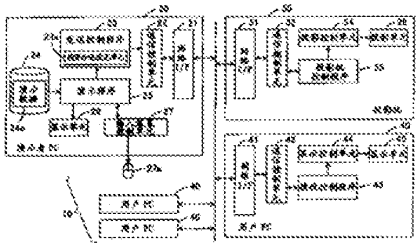
代理人 陈海红 段承恩

权利要求书 3 页 说明书 13 页 附图 5 页

[54] 发明名称 图像显示系统、方法、程序，投影机及其控制方法、程序

[57] 摘要

在以往的图像显示系统中，有时难以提供所有的视听者易于观看的画面，本发明在于当用投影机投影从演示者操作的计算机发送的图像的同时使得视听者能够视认该投影机的投影图像时，在上述投影机中通过双向通信接收上述演示者操作的计算机发送的图像数据，投影该接收的图像数据表示的图像的同时对于视听者操作的用户计算机通过双向通信发送该接收的图像数据，在上述用户计算机中通过双向通信接收上述发送的图像数据，在画面上显示该接收的图像数据表示的图像。



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1．一种图像显示系统，该图像显示系统用投影机投影从演示者操作的计算机发送的图像的同时使得视听者能够视认该投影机的投影图像，其特征在于：

上述投影机具备

与外部计算机进行双向通信的投影机通信控制单元；

经过该投影机通信控制单元接收上述演示者操作的计算机发送的图像数据的投影机图像数据接收单元；

投影该接收的图像数据表示的图像的投影单元；

经过上述投影机通信控制单元把上述接收的图像数据发送到视听者操作的用户计算机的图像数据发送单元，

上述用户计算机具备

与上述投影机进行双向通信的用户通信控制单元；

经过该用户通信控制单元取得上述发送来的图像数据的用户图像数据接收单元；

在画面上显示该接收的图像数据表示的图像的显示单元。

2. 根据权利要求1所述的图像显示系统，其特征在于：

上述投影机通信控制单元与上述演示者操作的计算机进行双向通信，接收该计算机发送的表示能否分送上述图像数据的数据，当接收了表示允许分送上述图像数据的数据时，上述图像数据发送单元把该图像数据发送给上述用户计算机。

3. 根据权利要求2所述的图像显示系统，其特征在于：

上述图像数据接收单元通过上述用户通信控制单元进行对于上述投影机的连接请求，当接收了表示允许分送上述图像数据的数据时，上述图像数据发送单元通过上述投影机通信控制单元对于上述连接请求进行连接允许，发送上述图像数据。

4. 根据权利要求3所述的图像显示系统，其特征在于：

上述图像数据接收单元具备接受只有上述投影机的投影图像的视听者

能够视认的口令的输入的口令输入单元，

当上述连接请求时发送该接受的口令，上述图像数据发送单元具备接收该发送来的口令并且判别是否是正确口令的口令判别单元，当判别为是正确的口令时发送上述图像数据。

5. 根据权利要求1－4的任一项所述的图像显示系统，其特征在于：

上述图像数据发送单元原样地把上述接收的图像数据发送给上述用户计算机，上述显示单元根据与上述投影单元相同的算法展开图像数据，在画面上显示图像。

6. 一种投影机，该投影机投影从演示者操作的计算机发送的图像的同时使得视听者能够视认该投影图像，其特征在于：

具备

与外部计算机进行双向通信的投影机通信控制单元；

通过该投影机通信控制单元接收上述演示者操作的计算机发送的图像数据的投影机图像数据接收单元；

投影该接收的图像数据表示的图像的投影单元；

通过上述投影机通信控制单元把上述接收的图像数据发送给视听者操作的用户计算机的图像数据发送单元。

7. 一种图像显示方法，该图像显示方法用投影机投影从演示者操作的计算机发送的图像的同时使得视听者能够视认该投影机的投影图像，其特征在于：

在上述投影机中通过双向通信接收上述演示者操作的计算机发送的图像数据，投影该接收的图像数据表示的图像的同时对于视听者操作的用户计算机通过双向通信发送该接收的图像数据，

在上述用户计算机中通过双向通信接收上述发送来的图像数据，在画面上显示该接收的图像数据表示的图像。

8. 一种投影机控制方法，该投影机控制方法投影从演示者操作的计算机发送的图像的同时使得视听者能够视认该投影图像，其特征在于：

通过双向通信接收上述演示者操作的计算机发送的图像数据，投影该

接收的图像数据表示的图像的同时对于视听者操作的用户计算机通过双向通信发送该接收的图像数据。

9. 一种图像显示程序，该图像显示程序用投影机投影从演示者操作的计算机发送的图像的同时使得视听者能够视认该投影机的投影图像，其特征在于：

使上述投影机实现

与外部计算机进行双向通信的投影机通信控制功能；

通过该投影机通信控制功能接收上述演示者操作的计算机发送的图像数据的投影机图像数据接收功能；

投影该接收的图像数据表示的图像的投影功能；

通过上述投影机通信控制功能向视听者操作的用户计算机发送上述接收的图像数据的图像数据发送功能，

使上述用户计算机实现

与上述投影机进行双向通信的用户通信控制功能；

通过该用户通信控制功能取得上述发送来的图像数据的用户图像数据接收功能；

在画面上显示该接收的图像数据表示的图像的显示功能。

10. 一种投影机控制程序，该投影机控制程序投影从演示者操作的计算机发送的图像的同时使得视听者能够视认该投影图像，其特征在于：

使投影机的控制计算机实现

与外部计算机进行双向通信的投影机通信控制功能；

通过该投影机通信控制功能接收上述演示者操作的计算机发送的图像数据的投影机图像数据接收功能；

投影该接收的图像数据表示的图像的投影功能；

通过上述投影机通信控制功能向视听者操作的用户计算机发送上述接收的图像数据的图像数据发送功能。

图像显示系统、方法、程序，投影机及其控制方法、程序

技术领域

本发明涉及图像显示系统，投影机，图像显示方法，投影机控制方法，图像显示程序以及投影机控制程序。

背景技术

以往，在这种图像显示系统中，经过网络把演示者操作的计算机连接到投影机上，向投影机发送显示该计算机的画面的图像数据，投影机把该画面投影到屏幕上。（例如，参照特开 2001－14135 号公报。）

在上述以往的图像显示系统中，有时难以向所有的视听者提供易于观看的画面。即，在很大的演示会场中位于远离屏幕位置的视听者大多难以观看到屏幕，特别是在文字或者图面小的情况下将产生视听者不能够专注于演示等的不理想状况。

发明内容

本发明是鉴于上述课题而产生的，目的在于提供能够向视听者提供易于观看的画面的图像显示系统，投影机，图像显示方法，投影机控制方法，图像显示程序以及投影机控制程序。

为了达到上述目的，在本发明中，向视听者操作的用户计算机发送演示者操作的计算机发送的图像数据。由于该图像数据是显示投影机的投影图像的数据，因此通过由用户计算机显示该图像数据表示的图像，视听者能够在手头的用户计算机的画面上视认投影图像。从而，即使在由于远离投影机的投影屏幕，或者投影会场大的原因等视听者难以视认投影图像的场所，视听者也能够在手头可靠地视听图像。

这里，演示者操作的计算机只要能够发送显示投影图像的图像数据即可，而最好是演示者进行演示时使用的计算机。在该意义下最好是发送用于显示包括演示者的操作（鼠标指示器的操作等）的计算机画面的图像数据。作为图像数据的形式并没有特别限定，能够采用影像信号或者 RGB 信号，MPEG 等的压缩数据等各种形态。

在投影机通信控制装置以及用户通信控制装置中，只要能够连接成可以把上述演示者操作的计算机以及视听者能够操作的用户计算机进行双向通信，则就不限定通信线路或者协议、标准等。例如，既可以是有线网、无线网的任一种，也能够采用 TCP、UDP 等各种协议，即使是以太网（以太网是富士施乐有限公司的注册商标）的各标准或者 IEEE1394，USB 等各种标准也能够实现。

在投影装置中，只要能够投影图像数据表示的图像即可，只要能够把图像数据表示的图像显示在屏幕上即可。从而，当图像数据压缩了等时，进行展开，显示图像。虽然图像数据发送装置对于用户计算机传送上述接收的图像数据，但是如果在从图像数据进行用于显示图像的图像处理（例如展开等）以后传送图像数据，则由于图像数据的容量增大，在展开等处理方面增加负担，因此在传送之前需要花费时间。

从而，在图像数据发送装置中最好是直接传送上述接收的图像数据。另外，通过从投影机向用户计算机传送该图像数据，图像数据对于多台用户计算机的传送不需要涉及上述演示者操作的计算机，通信控制的负荷仅是投影机单体。由于在演示者操作的计算机中演示者在进行各种说明时执行种种操作等，因此通过抑制多余的负荷，即使是低规格的计算机也能够舒适地进行演示。

在用户计算机的显示装置中，只要能够在画面上显示从投影机接收的图像数据表示的图像即可，如果在投影机中实施上述的图像处理或者展开等，则最好是用相同的算法实施图像处理或者展开等。其结果，能够在用户计算机的画面上显示与投影机的投影图像相同的图像。另外，在用户计算机中如果在硬盘或者 RAM 等中存储图像数据，则视听者既能够在任意

的阶段重新观看演示的图像，也能够在演示的行进速度不能够继续下去时暂时停止，然后在任意的阶段再次开始图像行进，能够提供更便利的功能。

如以上那样，在本发明中通过投影机对于用户计算机传送显示投影图像的投影图像数据，能够在用户计算机中视认图像，而根据演示的内容或者演示者的意图有时希望禁止用户计算机中的视认。这种情况下作为理想的结构例，能够采用从演示者操作的计算机发送表示是否分送上述图像数据的数据，在投影机的图像数据发送装置中根据表示该能否分送的数据决定是否发送上述图像的结构。能够采用在可以分送时，对于向投影机进行了连接请求的所有的用户计算机进行连接允许，发送图像数据的结构。

即，通过采用从演示者操作的计算机取得表示能否分送的数据的结构，能够根据演示者的意图决定允许或者不允许分送。另外，由于根据表示能否分送的数据决定允许或者不允许图像数据分送，因此能够仅根据该数据决定是否对于多台用户计算机进行分送，不需要控制对于多台用户计算机的每一台的允许以及不允许，能够通过非常简单的处理控制能否分送。

这种能否分送的控制在演示会场内的图像数据分送中特别方便。即，在演示会场中由于通常大多数视听者实际上视听图像，因此考虑对于各用户计算机的分送允许以及不允许毕竟大多是无意义的。从而，通过采用在演示者一侧具有分送允许以及不允许的主动权的结构，在大多数情况下能否分送的控制是非常充分的。

另外，用于发送表示能否分送的数据的结构可以采用各种形态，还可以构成为如果演示者预先注册能否分送，则对于来自投影机的查询，从演示者操作的计算机自动地发送表示能否分送的数据。除此以外，还能够采用当有来自投影机的能否分送的查询时在演示者操作的计算机的画面上显示查询能否分送的上托菜单等各种结构。

进而，作为控制能否分送的结构例，能够采用由用户计算机利用所输入的口令的结构。即，由用户图像数据接收装置接受只有上述投影机的投影图像的视听者能够视认的口令的输入，在从用户计算机对于投影机进行连接请求时发送口令。而且，如果接收由投影机一侧的图像数据发送装置

发送来的口令，由口令判别单元判别为是正确的口令，则能够仅对于输入了正确口令的用户计算机发送图像数据。

这种情况下，能够对于多台用户计算机的每一台决定是否分送图像数据。另外，由于这里的口令是只有投影机的投影图像的视听者能够视认的口令，因此能够把分送目标限定于只是投影机的投影图像的视听者操作的用户计算机。作为只有投影机的投影图像的视听者能够视认的口令能够采用各种口令，例如，能够采用在投影机的投影图像内预先记述口令的结构。如果依据该结构，则能够构成为使得仅对于处在演示者进行演示的会场内的视听者操作的用户计算机分送图像数据。除此以外，还能够采用仅对于在演示会场内正在入场的视听者分发记载了口令的入场券等各种结构。

这里，在上述的图像显示系统中，当然通过在投影机以及用户计算机中按照时间序列实施预定过程的方法也能够起到作用。从而，作为图像显示方法构成本发明，作为投影机控制方法也构成本发明。另外，既有这种图像显示系统单独存在的情况，也有在组装到某设备中的状态下利用的情况等，作为本发明的思想并不限定于这些，还包括各种形态。从而，无论是软件还是硬件等，都能够进行适当的变更。

作为本发明的思想的具体化例子，在构成图像显示系统或者投影机的控制软件的情况下，当然存在实现这种功能的程序。这是通过在投影机以及用户计算机中执行并且实现上述功能的图像显示程序以及投影机的程序。

附图说明

图 1 是本发明的图像显示系统的结构图。

图 2 是示出发送控制程序的处理的流程图。

图 3 是示出投影机控制程序的处理的流程图。

图 4 是示出接收控制程序的处理的流程图。

图 5 是示出其它实施例中的工作例的概略图。

具体实施方式

这里，按照以下的顺序说明本发明实施形态。

（1）图像显示系统的结构:

（2）演示者 PC 中的处理:

（3）投影机中的处理:

（4）用户 PC 中的处理:

（5）其它的实施形态:

（1）图像显示系统的结构:

图 1 是本发明的图像显示系统的结构图。该图中，图像显示系统 10 具备演示者 PC20，投影机 30 和多台客户 PC40，演示者 PC20，投影机 30 和用户 PC40 经过 UTP 线缆连接成 LAN，能够进行相互通信。投影机 30 取得演示者 PC20 输出的图像数据，投影其图像。另外，投影机 30 当进行了能够分送图像数据的设定时，直接把上述取得的图像数据发送到用户 PC40。用户 PC40 取得投影机 30 输出的图像数据，在自身的画面上进行显示。

另外，演示者 PC20，投影机 30 和用户 PC40 通过 TCP 协议相互通信，相互收发数据包确立连接，根据需要向数据包分割并发送各个图像数据。图 1 中，在框图中对于演示者 PC20，投影机 30 以及一台用户 PC40 示出其结构，而多台用户 PC40 能够通过与图示结构相同的结构实现。

演示者 PC20 以及用户 PC40 作为能够采用通用的计算机，在预定的 OS 的控制下控制预定的 I／F 或者记录媒体等，能够执行预定的程序。为了构成本发明的图像显示系统，演示者 PC20 具备网络 I／F21，通信控制单元 22，发送控制程序 23，硬盘驱动器（HDD）24，演示程序 25，显示单元 26 和输入装置控制单元 27。

演示者 PC20 是演示者操作的 PC，在利用投影机 30 实施演示时，起动演示程序 25。演示程序 25 是读出预先生成并保存在 HDD24 中的演示数据 24a，通过向显示单元 26 输出图像数据，按照预定的顺序或者任意的顺序显示演示画面的程序。

即，显示单元 26 控制对于未图示的液晶显示器等显示装置的图像显示，输入装置控制单元 27 接受鼠标 27a 等的操作输入，向演示程序 25 输出表示输入操作内容的数据。演示程序 25 根据来自该输入装置控制单元 27 的数据在显示单元 26 上切换演示画面，进行用于使鼠标移动等的处理。

发送控制程序 23 在演示程序 25 的执行下起动，为了由投影机 30 投影与上述显示单元 26 上的演示画面相同的画面，进行显示该演示画面的图像的图像数据的发送控制。另外，在演示者 PC20 中，由网络 I／F21 和通信控制单元 22 实现双向通信。即，通信控制单元 22 根据需要把从发送控制程序 23 传送来的图像数据分割到数据包中，进行添加表示适当发送目标的数据等处理，然后经过网络 I／F21 输出。另外，在该图像数据的发送时，为了确保网络的通信速度或者安全，也可以实施数据的压缩处理或者加密处理。

另外，发送控制程序 23 具备能否分送设定单元 23a，通过该能否分送设定单元 23a 的控制，在上述显示单元 26 和输入装置控制单元 27 中形成未图示的 UI，能够根据演示者的意志设定是否允许对于用户 PC40 的分送。显示该设定内容的数据保存在 HDD24 中，能够在任意的阶段参考。当然，还能够采用在与投影机 30 确立通信等时在 UI 中显示上托菜单，可以设定能否由演示者进行分送等各种结构。

在投影机 30 中，也能够在预定的 OS 的控制下控制预定的 I／F 或者记录媒体等，执行预定的程序。为了构成本发明的图像显示系统，投影机 30 具备网络 I／F31，通信控制单元 32，投影机控制程序 33，投影控制单元 34 和投影单元 35。在投影机 30 中通过网络 I／F31 和通信控制单元 32 实现双向通信，通信控制单元 32 把经过网络 I／F31 接收的数据包根据其标题进行结合生成图像数据的同时，传送到投影机控制程序 33 中。另外，根据需要把从投影机控制程序 33 传送来的图像数据分割到数据包中，进行添加表示适宜的接收目标的数据等处理，经过网络 I／F31 输出。

投影机控制程序 33 进行上述图像数据的收发和基于所接收的图像数据的图像投影的控制。在图像数据的收发中，进行是否能够对于用户 PC40

发送所接收的图像数据的判别或者与成为连接对象的用户 PC40 的双向通信的控制。另外，在图像投影时投影机控制程序 33 起动投影控制单元 34 传送上述接收的图像数据。投影控制单元 34 处理所接收的图像数据，控制在投影单元 35 中的图像投影。

即，投影控制单元 34 处理上述接收的图像数据，生成用于供给到投影单元 35 形成图像的数据。在实施了上述压缩处理或者加密处理的情况下，展开该数据。投影单元35具备经过未图示的透镜在外部的屏幕上投影RGB三色的光形成图像的结构，由上述处理后的数据在 RGB 各色的每个像素上发生光，在屏幕上形成图像。

在用户 PC40 中，也在预定的 OS 的控制下控制预定的 I／F 或者记录媒体等，能够执行预定的程序。为了构成本发明的图像显示系统，用户 PC40 具备网络 I／F41，通信控制单元 42，接收控制程序 43，显示控制单元 44 和显示单元 45。在用户 PC40 中通过网络 I／F41 和通信控制单元 42 实现双向通信，通信控制单元 42 把经过网络 I／F41 接收的数据包根据其标题进行结合，生成图像数据的同时传送到接收控制程序 43。

接收控制程序 43 进行上述图像数据的收发和基于所接收的图像数据的图像显示的控制。在图像数据的收发中，控制与成为连接对象的投影机 30 的双向通信。另外，在进行图像显示时，接收控制程序 43 起动显示控制单元 44，传送上述接收的图像数据。显示控制单元 44 处理接收的图像数据，控制显示单元 45 中的图像显示。即，显示控制单元 44 处理上述接收的图像数据，生成用于供给到显示单元 45 形成图像的数据。显示单元 45 具备未图示的液晶显示器等显示装置等，由上述处理后的数据使 RGB 各色的像素发光，在画面上形成图像。

另外，上述显示控制单元 44 中的处理是与上述投影控制单元 34 同样的处理。在实施上述压缩处理或者加密处理的情况下，通过与上述投影控制单元 34 相同的算法展开该数据。在投影机 30 和用户 PC40 中，由于图像的显示对象在是对于屏幕的投影或者是画面上的显示这一点上不同，因此投影控制单元 34 和显示控制单元 44 为了使得在这些机构上显示图像而

起动各部分时的驱动方法不同。但是，在本实施形态中，在用 RGB 各色成分的像素显示图像的意义上是相同的，作为对于图像数据的处理可以是相同的处理。从而在搭载到投影机 30 和用户 PC40 的模块中有很多共同部分，能够容易地形成本发明的系统。

（2）演示者 PC 中的处理:

以下，说明上述结构中的处理以及工作。首先，根据图 2 所示的流程详细地叙述演示者 PC20 中的发送控制程序 23 的处理。在本实施形态中，演示者 PC20 与投影机 30 进行通信，与用户 PC40 不进行通信。在步骤 S100 中，发送控制程序 23 对于通信控制单元 22 进行对于投影机 30 的连接请求。这时通信控制单元 22 经过网络 I／F21 发送表示连接请求的数据包。在步骤 S110 中经过通信控制单元 22 监视网络 I／F21，判别是否能够从投影机 30 发送表示连接允许的数据包。

如果通信控制单元 22 接收了表示连接允许的数据包，则在步骤 S110 中判定为发送控制程序 23 允许连接，经过通信控制单元 22 进一步监视网络 I／F21，在步骤 S120 判别是否进行分送请求。即，判别是否从投影机 30 发送来表示分送请求的数据包。当在步骤 S120 中没有判别为进行了分送请求时，在步骤 S125 中判别是否成为超时，反复进行步骤 S120 以后的处理直到判别为超时为止。

在没有判别为进行了分送请求的状态下在步骤 S125 中判别为超时的情况下，在步骤 S140 中能否分送设定单元 23a 进行不能分送的设定，向上述通信控制单元 22 发送表示不能分送的数据。另一方面，当在步骤 S120 中判别为进行了分送请求时，在步骤 S130 中判别在能否分送设定单元 23a 中是否已经设定了允许分送的信息。在该步骤 S130 中判别为没有设定允许分送的信息时，在步骤 S140 中向上述通信控制单元 22 发送表示不能分送的数据。

在步骤 S130 中判别为设定了允许分送的信息时，在步骤 S135 中，向上述通信控制单元 22 发送表示允许分送的数据。而且，在步骤 S150 中根据上述演示程序 25 的控制发送表示在显示单元 26 上显示演示画面的图像

数据。这时，根据需要进行适当的压缩处理或者加密处理。在步骤 S160 判断是否结束了演示，反复进行步骤 S150 以后的处理直到在该步骤 S160 判别为结束了演示为止。

通过以上的处理，在演示者 PC20 中，输出用于显示在投影机 30 中投影的演示图像的图像数据。另外，由演示者 PC20 设定能否从投影机 30 对于用户 PC40 分送图像数据，对于投影机 30 发送表示该设定内容的数据。在演示者 PC20 中，虽然发送表示该设定内容的数据，但是该数据仅发送一次就很充分，作为通信的负荷，实质上的负荷仅是图像数据的发送负荷。从而，演示者在操作演示者 PC20 的同时实施演示时，能够防止减少演示者 PC20 的资源，能够非常流畅地进行演示。

（3）投影机中的处理:

其次，根据图 3 所示的流程详细地叙述投影机 30 中的投影机控制程序 33 的处理。在本实施形态中投影机 30 与演示者 PC20 和用户 PC40 双方进行通信。在步骤 S200 中，投影机控制程序 33 经过通信控制单元 32 判别是否接收了连接请求。即，经过通信控制单元 32 监视网络 I／F31，判别上述演示者 PC20 是否接收了在步骤 S100 中输出的表示连接请求的数据包。

在步骤 S200 中判别为接收了连接请求时，在步骤 S210 向通信控制单元 32 经过网络 I／F31 发送表示连接允许的数据包，进行对于上述演示者 PC20 的连接允许。在步骤 S220 中，为了判别是否允许对于用户 PC40 的图像数据的分送，经过网络 I／F31 向通信控制单元 32 发送表示分送请求的数据包。

对于该分送请求，演示者 PC20 判别在上述步骤 S120 中具有分送请求，在步骤 S135 或者步骤 S140 中发送表示分送允许或者不允许的数据。投影机 30 在步骤 S225 中经过通信控制单元 32 监视网络 I／F31，接收该数据的同时判别是否允许分送。当在步骤 S225 中判别为允许分送时在步骤 S230 中进行分送允许的设定，当在步骤 S225 中判别为不允许分送时在步骤 S235 中进行分送不允许的设定。分送允许或者不允许的设定能够采用各种结构，在未图示的 RAM 中预先存储表示分送允许或者不允许的标志等，能够与