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(54) APPARATUS AND METHOD FOR INCORPORATING VIRTUAL VIDEO CONFERENCING ENVIRONMENTS

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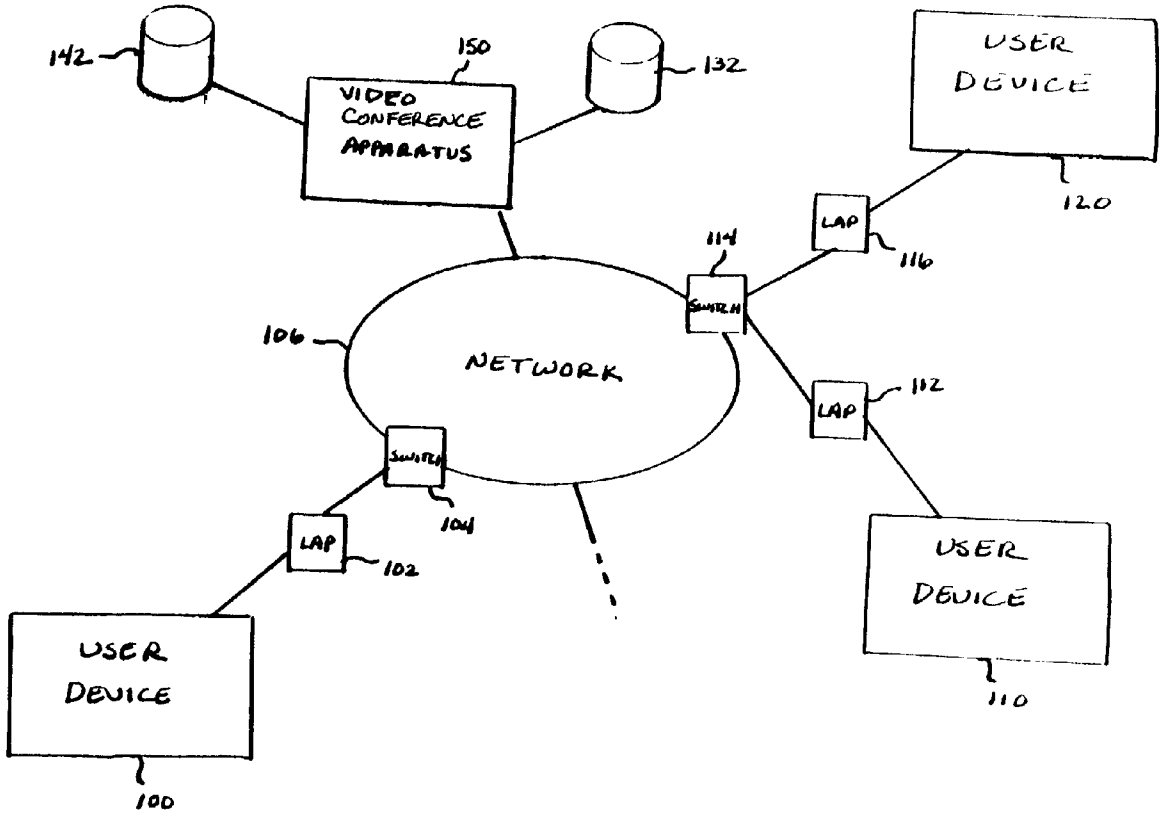
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(57) ABSTRACT

The present invention provides an apparatus and method for conducting a video conference. The video conference apparatus is connected to at least one network. The video conference apparatus includes a MCU, an environment processor, a user database interface and an environment database interface. When users log onto the video conference apparatus, it is determined whether each user has designated an alternative environment from that normally detected by the camera device during the video conference. If the user has designated an alternative environment, the environment processor obtains the environment from the environment database and the video conference apparatus uses the designated environment during the video conference. However, if the user has not designated an alternative environment, the environment processor sends a request message providing a listing of possible environments which may be used during the video conference. Thus, the user may select a desired environment from the listing and use it during the video conference. If the user does not wish to select an alternative environment, a default environment corresponding to the environment normally detected through the camera device is used during the video conference.



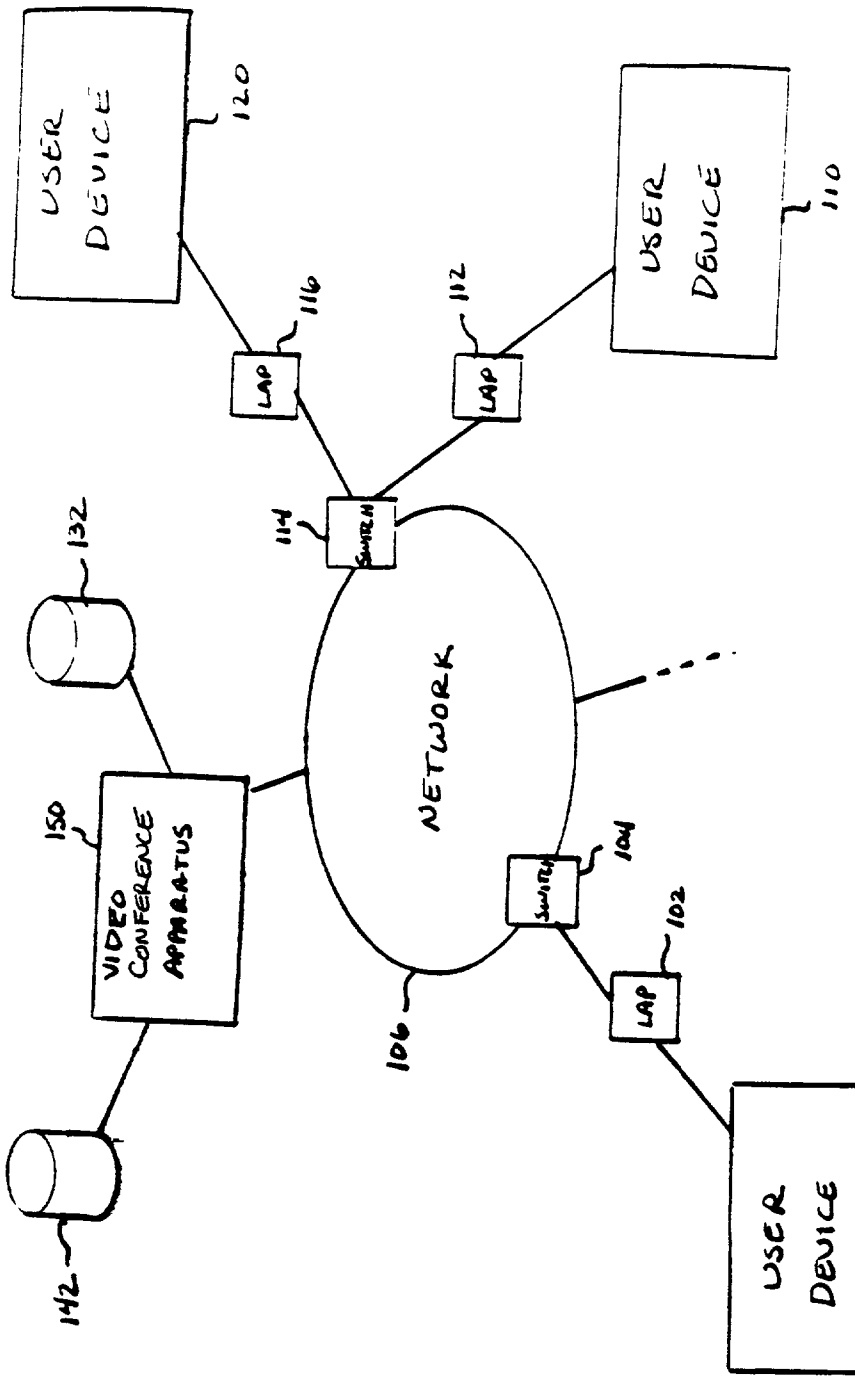

USER DEVICE
120
USER DEVICE
110
LAP
116
LAP
112
SWITCH
114
132
NETWORK
VIDEO CONFERENCE APPARATUS
150
SWITCH
104
LAP
102
106
USER DEVICE
100
142

Fig. 1

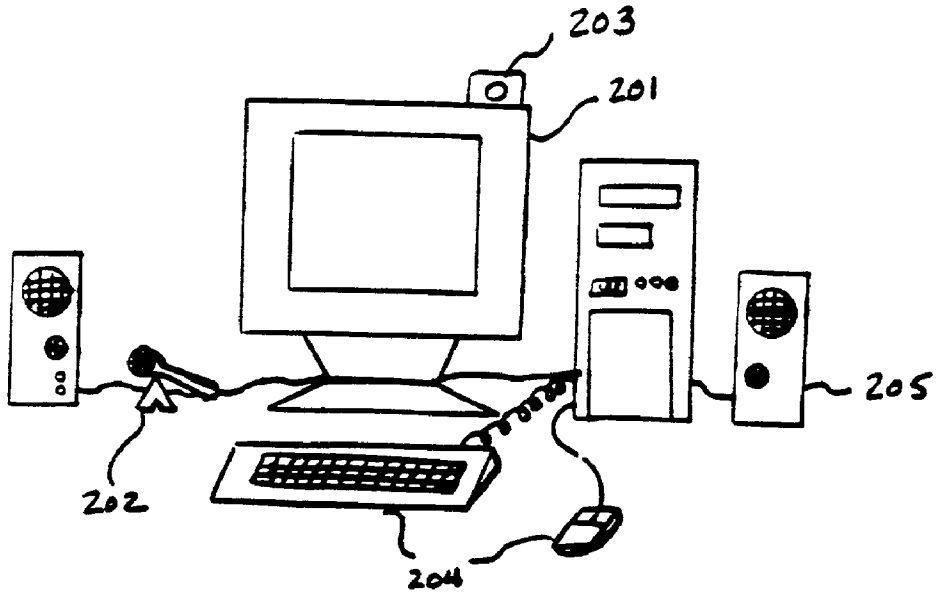


Fig. 2

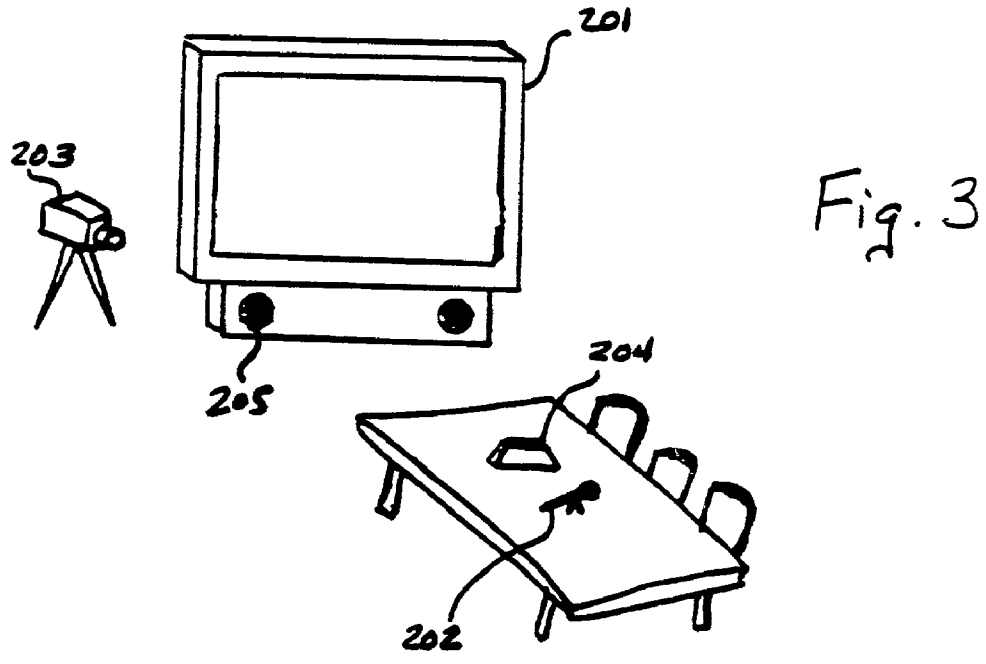


Fig. 3

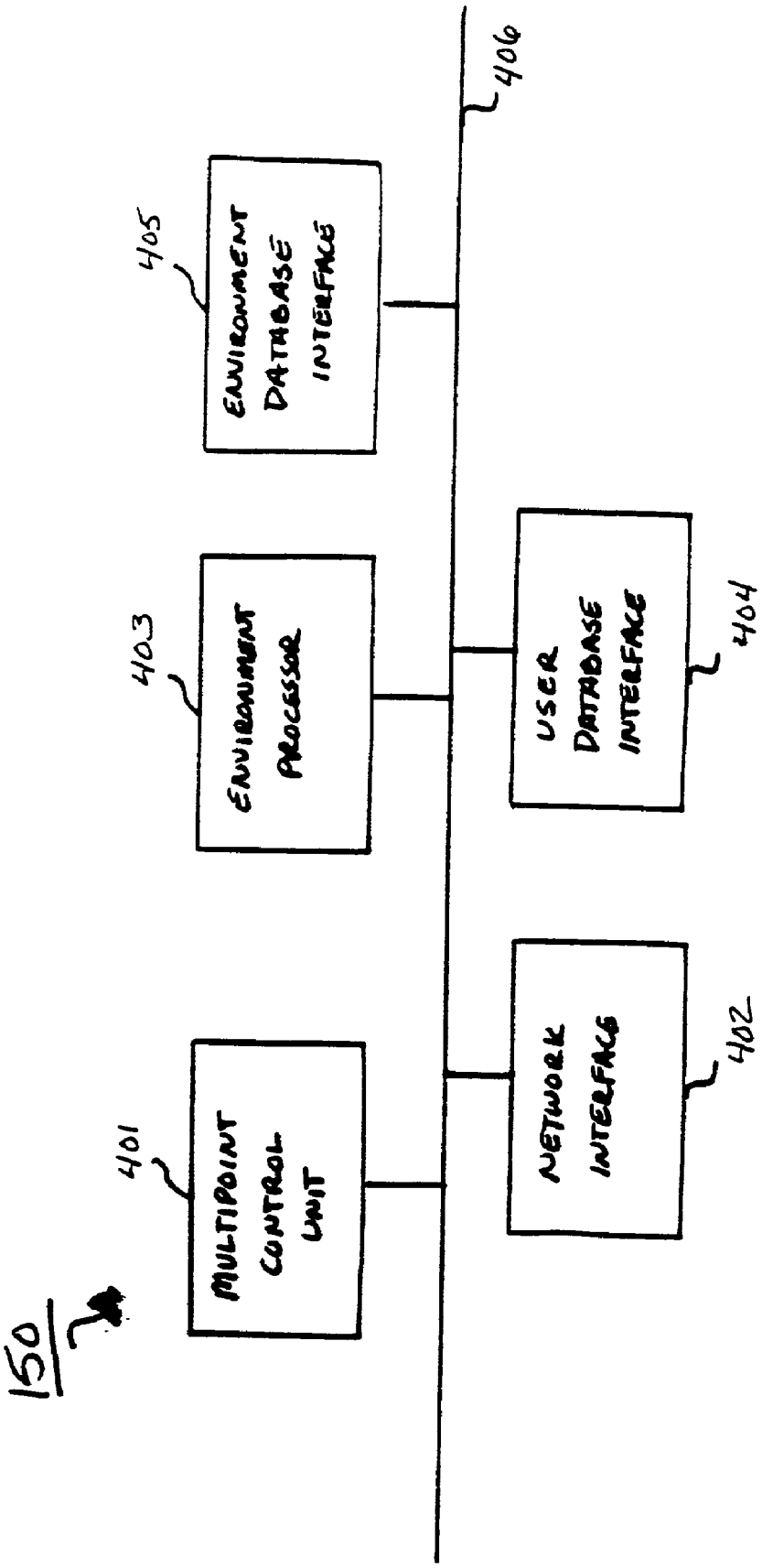

150
401
MULTIPOINT CONTROL UNIT
402
NETWORK INTERFACE
403
ENVIRONMENT PROCESSOR
404
USER DATABASE INTERFACE
405
ENVIRONMENT DATABASE INTERFACE
406

Fig. 4

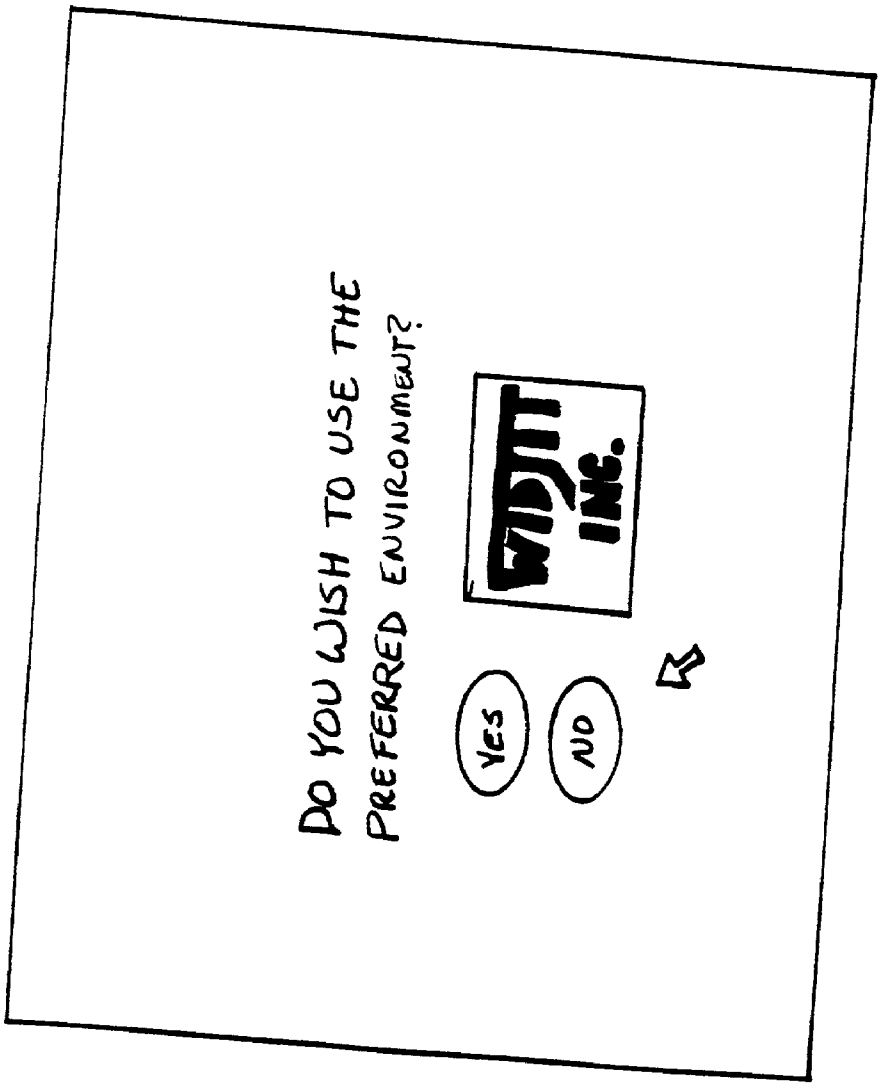

DO YOU WISH TO USE THE PREFERRED ENVIRONMENT?
YES
NO
WIDJIT INC.

Fig. 5

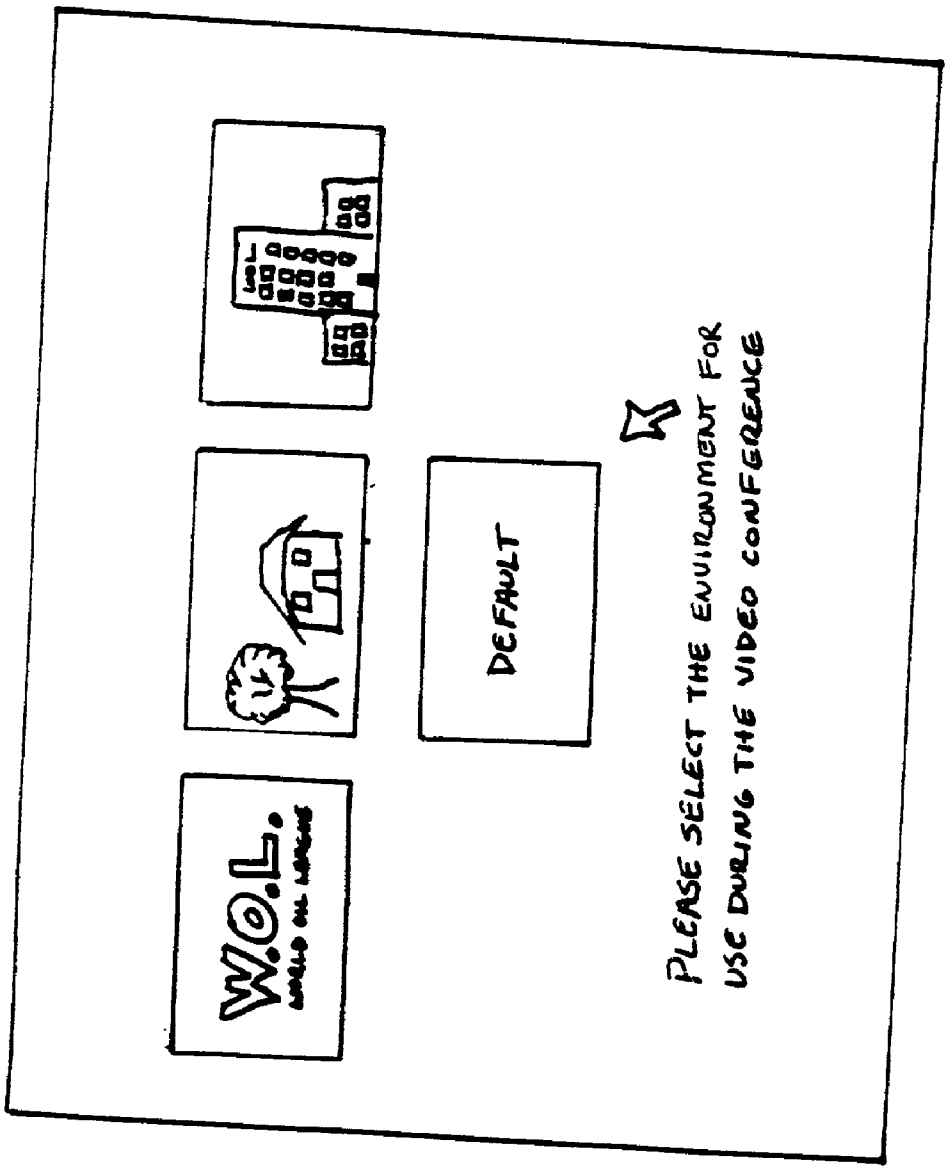
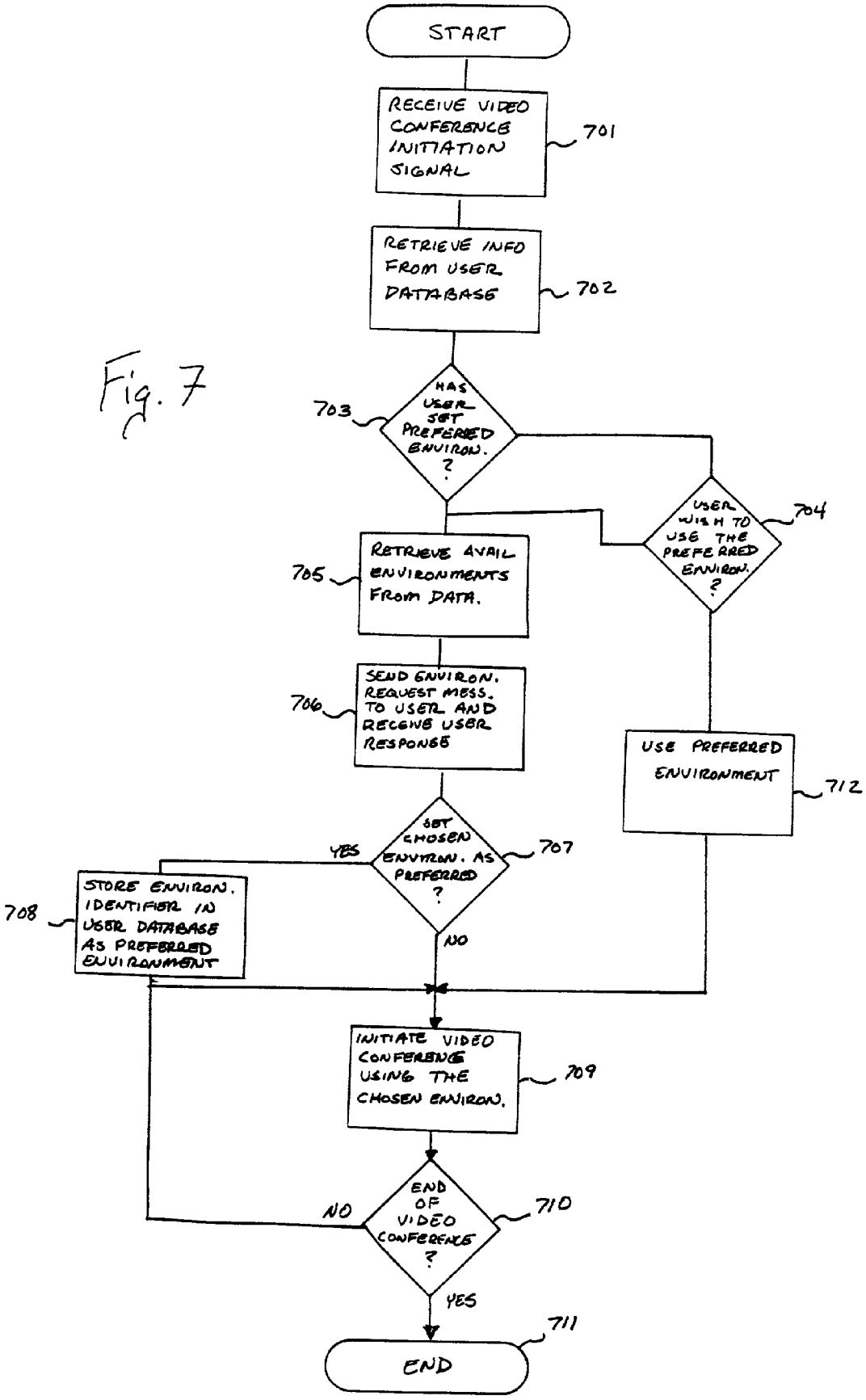

W.O.L.
DEFAULT
PLEASE SELECT THE ENVIRONMENT FOR
USE DURING THE VIDEO CONFERENCE

Fig. 6

Fig. 7


START
RECEIVE VIDEO CONFERENCE INITIATION SIGNAL
701
RETRIEVE INFO FROM USER DATABASE
702
HAS USER SET PREFERED ENVIRON. ?
703
USER WISH TO USE THE PREFERRED ENVIRON. ?
704
RETRIEVE AVAIL ENVIRONMENTS FROM DATA.
705
SEND ENVIRON. REQUEST MESS. TO USER AND RECEIVE USER RESPONSE
706
USE PREFERRED ENVIRONMENT
712
SET CHOSEN ENVIRON. AS PREFERRED ?
707
YES
NO
STORE ENVIRON. IDENTIFIER IN USER DATABASE AS PREFERRED ENVIRONMENT
708
INITIATE VIDEO CONFERENCE USING THE CHOSEN ENVIRON.
709
END OF VIDEO CONFERENCE ?
710
NO
YES
END
711

APPARATUS AND METHOD FOR INCORPORATING VIRTUAL VIDEO CONFERENCING ENVIRONMENTS

BACKGROUND OF THE INVENTION

[0001] 1. Field of Invention

[0002] The present invention provides an apparatus and method for conducting virtual meetings in which the environment for the virtual meeting may be chosen and specified by at least one of the participants in the virtual meeting.

[0003] 2. Description of Related Art

[0004] Video conference systems are generally known in the art which provide point to point video conferencing capability between parties in different locations. These systems include, for example, H.320 protocol based systems such as Intel's ProShare™. These systems use the H.320 protocol to deliver audio, video and data from one conferencing endpoint to another.

[0005] When more than two parties are going to participate in a conference call they commonly use a bridge known as a multipoint control unit (MCU). A known MCU based system is disclosed in U.S. Pat. No. 5,684,527 issued to Terui et al., which is hereby incorporated by reference. The MCU allows multiple parties to communicate over these systems and use various mechanisms, such as voice activation and motion detection, to determine which endpoint's picture to put on the screen at any moment in time.

[0006] These systems are limited to the use of video that is picked up by a camera device connected to the endpoint device. Thus, the user of the endpoint device has limited control over the environment in which his/her image is shown to the other participants in the video conference. Thus, there is a need for new technology that would allow the user to have increased control over the images which are transmitted to the other participants in a video conference.

SUMMARY OF THE INVENTION

[0007] In view of the above, the present invention provides an apparatus and method for conducting a video conference. The apparatus includes a video conference apparatus connected to at least one network. The video conference apparatus includes a MCU, an environment processor, a user database interface and an environment database interface. When users log onto the video conference apparatus, it is determined whether each user has designated an alternative environment for use during the video conference. If the user has designated an alternative environment, the environment processor obtains the environment from the environment database and the video conference apparatus uses the designated environment during the video conference.

[0008] However, if the user has not designated an alternative environment, the environment processor sends a request message providing a listing of possible environments which may be used during the video conference. Thus, the user may select a desired environment from the listing and use it during the video conference. If the user does not wish to select an alternative environment, a default environment corresponding to the environment normally detected through the camera device is used during the video conference.

[0009] These and other features and advantages of the present invention will be described in or are readily apparent from the following detailed description of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] The embodiments of the present invention will be described with reference to the following figures, wherein like numerals represent like elements, and wherein:

[0011] **FIG. 1** shows a video conferencing network according to the present invention;

[0012] **FIG. 2** is an example of a user device of **FIG. 1**;

[0013] **FIG. 3** is another example of a user device of **FIG. 1**;

[0014] **FIG. 4** is a block diagram of the video conference apparatus of **FIG. 1**;

[0015] **FIG. 5** is an example of a verification display according to the present invention;

[0016] **FIG. 6** is an example of a display of the available environments for selection by a user in accordance with the present invention; and

[0017] **FIG. 7** is a flowchart of the operation of the video conference apparatus according to the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0018] **FIG. 1** shows a video conferencing system according to the present invention. The system includes user devices **100**, **110** and **120** in connection with a network **106** through Local Access Providers (LAPs) **102**, **112** and **116**, and switches **104** and **114**. The user devices **100**, **110** and **120** communicate with one another via the network **106** and the video conference apparatus **150**.

[0019] When a number of parties wish to conduct a video conference using the user devices **100**, **110** and **120**, each user must first log onto the video conference apparatus **150** using their respective user devices **100**, **110** or **120**. The user devices **100**, **110** and **120** may be any such device that allows for the sending and receiving of video information and audio information. The user devices **100**, **110** and **120** may further be capable of sending and receiving data and receiving input of user commands. For example, the user devices **100**, **110** and **120** may include a video conferencing device, a personal computer, a video telephone, smart TV, and the like.

[0020] Once the user has logged onto the video conference apparatus **150**, the video conference apparatus **150** retrieves information from the user database **132**. The information retrieved may contain identifiers of preferred environments and a listing of identifiers of available environments. The environment may be a simple background, a virtual environment with which the user will interact, an animated environment, a moving background, and the like. For example, the environment may be a background depicting a company trademark or a virtual environment of an office in which the user sits behind a desk and interacts with virtual objects. Other types of environments may be used without departing from the spirit and scope of the present invention.

[0021] If the retrieved information includes a preferred environment, the user is asked whether they wish to use the

preferred environment. If the information does not include a preferred environment or the user does not wish to use the preferred environment, the user is presented with a list of available environments from which he/she can select the environment they wish to use during the video conference. The video conference apparatus **150** then uses the selected environment with the user's image during the video conference.

[**0022**] **FIGS. 2 and 3** show two examples of user devices that may be used with the present invention. **FIG. 2** is a personal computer and **FIG. 3** is a video conferencing device as is commonly known in the art. Each device includes a display **201**, an audio input device **202**, an image input device **203**, a user interface **204** and an audio output device **205**. The display **201** may include a computer monitor, television display, touchscreen display, LCD, and the like. The audio input device **202** may include, for example, a microphone, telephone receiver, and the like. The image input device **203** may be, for example, a video camera, digital still frame camera and the like. The user interface **204** may include, for example, a keyboard, pointing device, voice recognition device, and the like. The audio output device **205** may include, for example, speakers, subwoofers and the like.

[**0023**] The user logs onto the video conference apparatus **150** by inputting, through the user interface **204**, the address of the video conference apparatus **150**. The address may be, for example, a telephone number, a Universal Resource Locator (URL), TCP/IP address, Local Area Network (LAN) address, Wide Area Network (WAN) address, and the like. Upon entering the address of the video conference apparatus **150**, the video conferencing signals from the user device **100**, **110** or **120** are sent through the corresponding LAP **102**, **112** or **116** and switch **104** or **114** to the video conference apparatus **150** via the network **106**.

[**0024**] The LAPs **102**, **112** and **116** may be any system or device that allows access to the network **106**. The LAPs **102**, **112** and **116** may be, for example, an Internet Access Provider such as America On-Line™, a Local Exchange Carrier as is typically found in telecommunications systems, and the like. The owner of the user device **100**, **110** or **120** typically must subscribe to the provider of the LAP **102**, **112** or **116** in order to obtain access to the network **106**.

[**0025**] The switches **104** and **114** may be any system or device that facilitates the routing of signals through the network **106** from a source device to a destination device. The switches **104** and **114** may be, for example, Lucent Technologies Inc. **4**ESS and **5**ESS switches and the like.

[**0026**] The network **106** may be a single network or a plurality of networks of the same or different types. Thus, network **106** may be, for example, a single telecommunications network, a plurality of telecommunications networks, a data network, a plurality of data networks, or a combination of one or more data networks and telecommunications networks. The network **106** facilitates communication between the user devices **100**, **110** and **120**.

[**0027**] **FIG. 4** is a block diagram of the video conference apparatus **150** of **FIG. 1**. The video conference apparatus **150** includes a multipoint control unit (MCU) **401**, a network interface **402**, an environment processor **403**, a user database interface **404**, an environment database interface **405** and bus **406**. The MCU **401** controls the operation of the video conference apparatus **150**. The network interface **402** is used to pass signals between the video conference apparatus **150** and the network **106**. The environment processor **403** performs the processing of video conference environment selections by users. The user database interface **404** and the environment database interface **405** facilitate the transfer of data between the video conference apparatus **150** and the user database **132** and environment database **142**, respectively. Information is passed between the components of the video conference apparatus **150** via the bus **406**.

[**0028**] When a user initiates a video conference by inputting the address of the video conference apparatus **150**, the signals from the corresponding user device **100**, **110** or **120** are received at the conference processor **150** at the network interface **402** and are sent to the MCU **401**. The signals received from the user device **100**, **110** or **120** include information identifying the user device from which they originate. This information may be included, for example, in the signals themselves or may be a separate signal, such as a startup signal or a header to the signals being sent from the user device.

[**0029**] Based on the identification information received from the user device **100**, **110** or **120**, the MCU **401** retrieves information corresponding to the identification information from the user database **132** through user database interface **404**. The information retrieved from the user database **132** includes such information as the identity of the user device and various settings for the user device. These settings may include, for example, a list of environment identifiers for environments available to the user device identified by the identification information, a preferred environment for use with the video conference if the user has previously stored a preferred environment identifier in the user database **132**, and the like.

[**0030**] Based on the information retrieved from the user database **132**, the MCU **401** determines if a preferred environment has been set for the user device **100**, **110** or **120** from which the signals originate. If a preferred environment has been set, the MCU **401** instructs the environment processor **403** to retrieve the preferred environment from the environment database **142** via the environment database interface **405**.

[**0031**] The MCU **401** then sends a message to the user device **100**, **110** or **120** verifying that the user wishes to use the preferred environment. The message may be in the form of an audible message, text message or graphical display on the display **201**, a combination of audible message and text/graphic or the like. The audible message may be prerecorded or computer synthesized. For example, as shown in **FIG. 5**, the message may be a prerecorded message asking "Do you wish to use the preferred environment?" with a display of the environment identified by the environment identifier that has been set in the user database **132**.

[**0032**] If the user decides to use the preferred environment, this environment is selected for use during the video conference. However, if the user does not wish to use the preferred environment, or if a preferred environment has not been established, the MCU **401** instructs the environment processor **403** to retrieve information from the environment database **142**, via the environment database interface **405**, corresponding to a list of available environments from the

user database **132** for the user device **100**, **110** or **120** identified by the identification information.

[**0033**] The environment processor **403** then sends the information to the user device in the form of minimized displays, commonly known as thumbnail displays, of the available environments and a request message asking that the user choose one of the displayed environments for use with the video conference. This message may be audible, textual, graphical or a combination of any or all of these. For example, the message may be an audible or textual message stating "Please select the environment for use during the video conference." An example of this display is shown in **FIG. 6**.

[**0034**] The user may select the desired environment by, for example, clicking on a thumbnail display with a pointing device, entering a letter or number identifying the environment, speaking an identifier of the environment into the audio input device **202** (if the user device is equipped with voice recognition software), and the like. The list may also include the option for not choosing an alternative environment and thereby the video conference apparatus **150** would use a default environment such as the environment in which the user actually resides.

[**0035**] Alternatively, the default environment may be an environment provided to the video conference apparatus **150** from a location remote from both the video conference apparatus **150** and the user. For example, the environment may be obtained from an image pick-up device, such as a digital camera, video camera, and the like, in a location different from the user. In this way, the user may be seen as being in a different location from that in which he/she actually resides. The image pick-up device must be in communication with either the video conference apparatus **150** or the user device **100**, **110** or **120**.

[**0036**] Once the user has designated the environment which they wish to use, the video conference proceeds in a normal video conference mode using known head finding software to separate the talking head of the user from the environment. The talking head may then be superimposed on the alternative environment chosen by the user. In this way the user's image is displayed to the other participants in the video conference as being "in" the chosen environment.

[**0037**] Thus, a user may select an environment that is suitable for the video conference being conducted. For example, the user may select as an environment, the company trademark for a business meeting, household settings for family video conferences, and the like.

[**0038**] **FIG. 7** is a flowchart of the operation of the video conference apparatus **150**. In step **701**, the video conference apparatus **150** receives video conference initiation signals from at least one of the user devices **100**, **110** or **120** and goes to step **702**. The initiation signals include identifying information identifying the user device **100**, **110** or **120** from which they originate. In step **702**, based on the identifying information received, the video conference apparatus **150** retrieves information from the user database **132** corresponding to the identifying information and goes to step **703**. The information retrieved may include a preferred environment identifier previously set by the user.

[**0039**] In step **703**, the video conference apparatus **150** determines if the information retrieved from the user database **132** includes a preferred environment identifier. If there is a preferred environment identifier, the video conference apparatus **150** goes to step **704**; otherwise the video conference apparatus **150** goes to step **705**. In step **704**, the video conference apparatus **150** sends a message to the user device asking if the user wishes to use the preferred environment. If the user wishes to use the preferred environment, the video conference apparatus **150** goes to step **712**; otherwise the video conference apparatus **150** goes to step **705**. In step **712**, the video conference apparatus **150** designates the preferred environment as the environment for use during the video conference.

[**0040**] In step **705**, the video conference apparatus **150** retrieves available environments from the environment database **142** based on information retrieved from the user database **132** and goes to step **706**. In step **706**, the video conference apparatus **150** displays these environments to the user through the display **201** of the user device **100**, **110** or **120**, sends a request message asking the user to select the environment to use with the video conference, receives the user selection and goes to step **707**.

[**0041**] In step **707**, the video conference apparatus **150** sends a message to the user asking if the chosen environment is to be set as a preferred environment. If it is, the video conference apparatus **150** goes to step **708**; otherwise the video conference apparatus **150** goes to step **709**. In step **708**, the video conference apparatus **150** stores the environment identifier for the chosen environment in the user database **132** as a preferred environment identifier and goes to step **709**. In step **709**, the video conference apparatus **150** initiates the video conference using the chosen or preferred environment and goes to step **710**. In step **710**, the video conference apparatus **150** monitors for an end condition of the video conference. If an end condition is detected, the video conference apparatus **150** goes to step **711** and ends; otherwise the video conference apparatus **150** goes back to step **709**.

[**0042**] The video conference apparatus **150** may further send different alternative environments to the various parties involved in the video conference. When the user selects the alternative environment for use during the video conference, the user may also select, from a listing of the other parties or party locations involved in the video conference, the party or parties that are to receive that alternative environment. A different video conference data stream is provided to each of the parties receiving different alternative environments through the video conference apparatus **150** under the control of the multipoint control unit **401**. Thus, the video conference apparatus **150** may send an environment corresponding to an office setting to a first party and an environment corresponding to a vacation setting to a second party. The user will be perceived by the first and second parties as being located "in" the office environment and vacation environments, respectively.

[**0043**] While the above embodiments describe the present invention as having a separate environment processor **403** and a multipoint control unit **401**, it is apparent to those of ordinary skill in the art that the functions of the environment processor **403** may be performed by the multipoint control unit **401** without departing from the spirit and scope of the present invention. In such a case, there is no need to include the environment processor **403** and the video conference

apparatus **150** would include only the necessary interfaces and the multipoint control unit **401**.

[**0044**] Similarly, the above embodiments describe the present invention as having separate user and environment databases **132** and **142**. However, as is apparent to those of ordinary skill in the art, the information stored in the user and environment databases **132** and **142** may be combined into one database. Accordingly, there would be no need for both an environment database interface **405** and a user database interface **404** in the video conference apparatus **150**. Only a single database interface would be necessary.

[**0045**] Further, while the above embodiments describe the selection of an alternative environment using thumbnail displays, the selection of an alternative environment may be facilitated by other means. For example, the selection may be made from a directory listing of environment names. The selection may also be made by cycling through each of the environments as a full screen display. In short, any means that provides for the selection of alternative environments may be used without departing from the spirit and scope of the present invention.

[**0046**] As shown in **FIG. 4**, the method of this invention is preferably implemented on a programmed processor. However, the video conference apparatus **150** can also be implemented on a general purpose or special purpose computer, a programmed microprocessor or microcontroller and peripheral integrated circuit elements, an ASIC or other integrated circuit, a hardware electronic or logic circuit such as a discrete element circuit, a programmable logic device such as a PLD, PLA, FPGA or PAL, or the like. In general, any device on which a finite state machine capable of implementing the flowchart shown in **FIG. 7** can be used to implement the video conference apparatus functions of this invention.

[**0047**] While this invention has been described with specific embodiments thereof, it is evident that many alternatives, modifications, and variations will be apparent to those skilled in the art. Accordingly, the preferred embodiments of the invention as set forth herein are intended to be illustrative, not limiting. Various changes may be made without departing from the spirit and scope of the invention.

What is claimed is:

1. A method of processing a video conference image received from a user device over a network, comprising:

retrieving an environment from a database based on user video conferencing information; and

processing the video conference image using the retrieved environment for a video conference.

2. The method of claim 1, further comprising:

receiving video conference signals from the user device through the network, the video conference signals containing identifying information that identifies the user device; and

retrieving the user video conferencing information from the database based on the identifying information in the video conference signals.

3. The method of claim 2, wherein the user video conferencing information includes at least one of a preferred environment and a list of available environments.

4. The method of claim 3, further comprising sending signals for displaying the list of the available environments to the user device.

5. The method of claim 4, wherein the list of available environments displayed on the user device includes a thumbnail display of each of the available environments.

6. The method of claim 3, wherein if the user video conferencing information includes a preferred environment, then the method further comprises:

sending signals to the user device for displaying a verification request message requesting that the user device send verification to use the preferred environment.

7. The method of claim 6, wherein if verification is not received, the method further comprises:

retrieving the list of available environments from the database and sending signals to the user device to display the list of available environments.

8. The method of claim 4, further comprising:

receiving signals from the user device indicating a selected environment from the displayed list of environments; and

using the selected environment during the video conference.

9. The method of claim 8, further comprising:

receiving signals from the user device indicating a party with which the selected environment is to be used; and

using the selected environment with the indicated party during the video conference.

10. The method of claim 9, further comprising:

receiving signals from the user device indicating a second selected environment from the displayed list of environments;

receiving signals from the user device indicating a second party with which the second selected environment is to be used; and

using the second selected environment with the second party during the video conference.

11. A video conference apparatus that processes a video conference image received from a user device over a network, comprising:

a control unit; and

an environment processor, wherein the environment processor retrieves an environment from a database based on user information received and the control unit processes the video conference image for a video conference using the retrieved environment.

12. The video conference apparatus of claim 11, wherein the control unit receives video conference signals from the user device through the network, the video conference signals containing identifying information that identifies the user device, and wherein the control unit retrieves user video conferencing information from the database based on the identifying information in the video conference signals.

13. The video conference apparatus of claim 12, wherein the user video conferencing information includes at least one of a preferred environment and a list of available environments.

14. The video conference apparatus of claim 13, wherein the control unit sends signals to the user device for displaying the list of the available environments.

15. The video conference apparatus of claim 14, wherein the list of available environments displayed on the user device includes a thumbnail display of each of the available environments.

16. The video conference apparatus of claim 13, wherein if the user information includes a preferred environment, the control unit sends signals to the user device for displaying a verification request message requesting that the user device send verification to use the preferred environment.

17. The video conference apparatus of claim 16, wherein if the control unit does not receive verification, the environment processor retrieves the list of available environments from the database and the control unit sends signals to the user device to display the list of available environments.

18. The video conference apparatus of claim 15, wherein the control unit receives signals indicating a selected environment from the displayed list of environments and wherein the control unit uses the selected environment during the video conference.

19. The video conference apparatus of claim 18, wherein the control unit receives signals indicating a party with which the selected environment is to be used and the control unit uses the selected environment with the indicated party during the video conference.

20. The video conference apparatus of claim 19, wherein the control unit receives signals indicating a second selected environment from the displayed list of environments, receives signals indicating a second party with which the second selected environment is to be used, and wherein the control unit uses the second selected environment with the second party during the video conference.

* * * * *