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(57) Abstract

A system is provided that enhances the interactivity of multimedia information in a closed cable network such as a hotel system or the like when utilized in conjunction with on–line service. The system includes a multimedia processing plurality of multimedia processing system, a telephone switching system, a video control system, a service operations platform, and a plurality of interactive devices. This system has the advantage of providing compression and/or transmission algorithms to maximize enhancement of the multimedia information. The system allows for enhanced interactivity of multimedia information by a closed cable system while allowing for enhanced access to one or more one–line services with minimum modification to the existing network.

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INTERACTIVE SYSTEM FOR A CLOSED CABLE NETWORK THAT INCLUDES HIGH SPEED ACCESS TO AN ON-LINE SERVICE AND THE INTERNET

FIELD OF THE INVENTION

The present invention relates to a closed cable network and more particularly the present invention relates to the transfer of multimedia information within such a network and between such a network and one or more on-line services.

BACKGROUND OF THE INVENTION

There are many types of closed cable networks. What is meant by closed cable networks in the context of the present application are networks which are self-contained and the users are easily identified. For example, a multinational or corporate hotel chain provides such a network. In such networks there is typically a facility in each room, office or the like for the presentation of information to a user. Typically this presentation takes the form of multimedia information. Oftentimes, that is information that includes elements of graphics video information that is provided to a customer, employee or the like via a television or like display.

A critical characteristic of these types of networks is that there should be a path that provides the owner of the network with knowledge of the activities of a particular user on the network. For example, in the case of a hotel, if a customer orders a service, the owner of the hotel can identify that the service has been ordered by that particular customer. The major problem with existing closed cable networks is that they are not fully interactive. That is, it is oftentimes difficult to actively and efficiently access and transport information from and to the network in real time.

To efficiently access and transmit information outside the network takes on greater significance when interacting with on-line services and the like. Furthermore, as Internet access becomes more commonplace, it becomes equally important to develop ways for closed cable systems to efficiently and effectively transmit and receive information over such a network.

Accordingly what is needed is a system for providing efficient and effective access to multimedia information outside a closed network by a user who is inside such a network. The system should be one that is minimally intrusive to the network and should not affect its normal operation. The present invention addresses such a need.

SUMMARY OF THE INVENTION

A system is provided that enhances the interactivity of multimedia information in a closed cable network such as a hotel system or the like when utilized in conjunction with on-line service. The system includes a multimedia processing plurality of multimedia processing system, a telephone switching system, a video control system, a service operations platform, and a plurality of interactive devices. This system has the advantage of providing compression and/or transmission algorithms to maximize enhancement of the multimedia information. The system allows for enhanced interactivity of multimedia information by a closed cable system while allowing for enhanced access to one or more on-line services with minimum modification to the existing network.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a block diagram of a prior art closed cable network.

Figure 1A is a matrix of bandwidth to usage of information.

Figure 1B is a diagram of global distribution network.

Figure 2 is a block diagram of a general embodiment of an interactive multimedia system for use in a closed cable network.

Figure 2A is a first embodiment block diagram of a personal computer, network computer and an IMD utilized in the system of Figure 2.

Figure 2A' is a second embodiment block diagram of a personal computer, network computer and an IMD utilized in the system of Figure 2.

Figure 2B is a partial block diagram of a closed cable system.

Figure 2C is an overlay of the telephone keypad.

Figure 2D is a closed cable system for use with Internet access.

Figure 2E is a block diagram of a high speed hotel Internet access system service center.

Figure 2F is a diagram of a national satellite network.

Figure 2G is a display on a workstation in the service center of Figure 2E.

Figure 2H is a block diagram of a hotel intranet system in accordance with the present invention.

Figure 2I is a block diagram of a point to point system utilized in the system of Figure 2.

Figure 2J is a block diagram of a multimedia multiplexer coupled to an interactive multimedia decoder.

Figure 2K is a block diagram of a global multimedia decoder.

Figure 2L is a flow chart showing inbound phone calls on a system in accordance with the present invention.

Figure 2M is a flow chart of one embodiment of a system for directing a facsimile in a closed cable system.

Figure 2N is a second embodiment of a system for directing a facsimile in a closed cable system.

Figure 2O is a flow chart that shows one method for providing a distinguishing overlay on the first page of a facsimile.

Figure 2P is a screen which displays a variety of services.

Figure 2Q is a screen which displays a variety of email services.

Figure 2R is a flow chart for directing email messages in a closed cable system.

Figure 2S is a diagram of a system for displaying email messages on a TV.

Figure 2T is a flow chart of one embodiment of a system for directing a voice messaging in a closed cable system.

Figure 2U is a flow chart showing how a limited number of facsimile numbers can be circulated and accessed by a plurality of users.

Figure 2V is a block diagram of a multimedia processing center (MPC) in accordance with the system of Figure 2.

Figure 3 is a block representation of the multimedia processing system (MPS) in accordance with the present invention.

Figure 4 is a first specific embodiment of an interactive multimedia system for use in a closed cable network.

Figure 4A is a second specific embodiment of an interactive multimedia system for use in a closed cable network.

Figure 4B is an embodiment which utilizes an internet proxy server in accordance with the present invention.

Figure 4C a diagram of a wireless network controller utilized in accordance with the present invention.

Figure 4D is a diagram of an IMD-W in accordance with the present invention.

Figure 5 is a third specific embodiment of an interactive multimedia system for

use in a closed cable network.

Figure 6 is a flow chart of a first embodiment of the optimization method which is utilized in the closed cable network in accordance with the present invention.

Figure 7 is a representation of the separation of primary and secondary multimedia information.

Figure 8 is a flow chart of a second embodiment of the optimization method showing the cooperation of a compression algorithm with a transmission algorithm in accordance with the present invention.

Figure 9 is a block that shows the cooperation of a compression algorithm with a transmission algorithm in accordance with the present invention.

Figure 10 is a block representation of digital information of an image file and a MIDI file.

Figure 11 is a block diagram of a general embodiment of an interactive multimedia device (IMD) in accordance with the present invention.

Figure 12 is a representation of a remote control utilized in conjunction with the system architecture of the present invention.

Figure 13 is a flow chart of a reservation system that utilizes the interactive system in accordance with the present invention.

Figure 14 is a flow chart of a shopping system that utilizes the interactive system in accordance with the present invention.

Figure 14a is a flow chart of a portion of the shopping system of Figure 14.

Figure 15 is a flow chart of a movie review and ordering system that utilizes the interactive system in accordance with the present invention.

Figure 15A is a flow chart of a portion of the movie review and ordering system of Figure 15.

Figure 16 is a flow chart of a ticketing system that utilizes the interactive system in accordance with the present invention.

Figure 17 is a flow chart of a map generating system that utilizes the interactive system in accordance with the present invention.

Figure 18A is a block diagram of an electronic inventory control system utilized in the interactive system in accordance with the present invention.

Figure 18B is a block diagram of a physical inventory control system utilized in the interactive system in accordance with the present invention.

DETAILED DESCRIPTION OF THE INVENTION

The present invention relates to an interactive system for a closed cable network. The following description is presented to enable one of ordinary skill in the art to make and use the invention and is provided in the context of a patent application and its requirements. Various modifications to the preferred embodiment will be readily apparent to those skilled in the art and the generic principles and features described herein may be applied to other embodiments. Thus the present invention is not intended to be limited to the embodiment shown but is to be accorded the widest scope consistent with the principles and features described herein.

Referring now to Figure 1, what is shown in simple block diagram form is a prior art closed cable network. In the following discussion the present invention will be discussed in the context of a hotel system. It should be understood however that there are other types of closed cable networks such as hospitals, educational institutions and many conventional cable head end networks or the like where the principles of the present invention would apply.

The system 10 includes a hotel PBX system 12 for receiving and transmitting telephone calls, property management system 14 and a video control system 16 which could be used to access the pay per view movies or the like. The video control system 16 includes an in-room remote link and is connected to the services operation platform 14. The property management system (PMS) 14 keeps track of the users that order the movies.

The system 10 as above described is not fully interactive. In this type of system there are a number of video units or VCRs located within the system and they are switched in when the appropriate customer or client wants to use the video unit. One problem in this type of system is that these video units cannot be individualized to a particular user because there are simply not enough units. For example, there may be a bank of 64 VCRs which would service a 500 room hotel. Each of the VCRs would have a separate movie. Accordingly, in this case there is a possibility that a particular movie would not be available. In addition, this type of arrangement severely limits the number of choices available.

Another problem with the conventional system is that the users do not easily have access to information outside the system. More particularly, as the Internet and other on-line services become readily utilized it is important to provide the user with easier access

to such services. Although these services could be accessed by conventional methods (such as an individual bringing a computer into the hotel room or the like) this is not always possible and oftentimes the particular computer may not be fully equipped to provide such access in an efficient and time critical fashion.

In addition, there is a need to provide high speed access to multimedia information from an on-line service to provide quick retrieval and review of such information. A closed cable system provides the opportunity to develop such an environment. Finally such a system allows for the user to be easily identified for marketing and other purposes. In addition, it would be desirable to provide for a closed system which includes means for interactively accessing a variety of services which are outside the network.

The present invention is directed toward an improvement in a closed cable system which enhances interactivity, particularly for Internet applications. A system and method in accordance with the present invention includes the following elements: a software browser, which can be utilized with a closed cable system, a global distribution architecture, and a way to provide telephone print mapping to such an architecture. The system and method also includes methods for issuance of tickets or coupons in a credit card application. A system and method in accordance with the present invention can be used advantageously in a video game and network environment as well as other types of interactive environments.

A critical feature of the present invention is advertising in such a closed cable system because the user of the network can be easily identified. For example, in most on-line systems and particularly the Internet it is not possible, given the listing of the different passwords and names utilized by an individual, it is not necessarily possible to identify the user. However, in a closed cable system, such as a hotel or the like, you are able to identify a particular user. Accordingly, for these and the following reasons, this enhanced closed cable system has significant utility over prior art systems.

Global Distribution Architecture

One advantage of the present invention is that Internet access can be speeded by providing a high speed access conduit into the closed cable system. In so doing, an improved system can be provided. In a typical hotel system, for example, the bandwidth of the interconnect to the system is the limiting factor. What has been determined is that

by distributing the pieces of information throughout various sites, can provide high speed links to a particular site on the Internet, thereby allowing for quicker access thereto.

Before the present invention is described in detail certain information should be discussed to clarify the utility of the present invention in terms of existing closed cable networks. A multimedia system is a system which provides multimedia information to a user. In a multimedia system, various sensory information is provided to a receiver. In the case of video information, this information can take the form of foreground and background images that display a particular scene. In the case of audio information, the foreground and background signals could be such that the foreground information is speech and the background information is music.

Typically, multimedia systems in whatever form provide this information over a single transmission line. In so doing, the amount and quality of the multimedia information is severely limited by the bandwidth of the transmission line.

The present invention first differentiates between important and less important multimedia information by separating the information into primary and secondary layers through the use of a program model to minimize the bandwidth limitations. In such a system each layer will have its own set of parameters that are important psychographically, however, for example, the secondary layer may not vary as much as the primary layer.

What is meant by a program model refers to psychographic parameters within the multimedia system, that is parameters that relate to an individual's sensory perceptions when encountering multimedia information. These parameters comprise a set of unique and consistent elements for a particular class of multimedia information. In accordance with the present invention, the multimedia information is separated into different layers in accordance with the program model. Therefore, by way of example, in the instance of video images, the foreground and background information might be divided into different layers. Similarly, in the case of audio information, the news information, weather information, or the like may be one layer whereas the background music may be the other layer.

In the present invention, these layers will be divided into primary and secondary layers in accordance with the information's importance relative to the program model. The most important information is identified and enhanced to provide the best quality information to the receiver of the multimedia information.

In the preferred embodiment, the primary layers will be enhanced in such a way to provide a perceived improvement in quality of the multimedia information presented. In one embodiment the secondary layers are presented that may or may not be enhanced. Thereby the important information or the primary layers that are to be transmitted can be identified and selectively enhanced in accordance with the present invention.

In addition, the primary layers generally can be enhanced through critical psychographic parameters take the form of spatial, color, audio, and temporal variables that occur in the primary or secondary layers.

In a closed cable network such as a hotel system it is important that the multimedia information that is produced, transmitted and received is enhanced in some manner. This is necessary to ensure that high fidelity, high quality information is presented to the viewer. Therefore, it will be possible to bring a superior transmission into the network. It has been possible to provide video information over the telephone lines. However, it has typically been difficult to send high quality video information over the telephone lines due to the bandwidth requirements that are needed to provide such high quality video information.

The present invention is directed towards a method and apparatus for enhancing the interactive multimedia information that is utilized within a closed cable network, particularly information that is provided for a source that is outside of the network. In a preferred embodiment, as will be described in more detail later, a program model can be utilized to separate the information into a usage distribution in the primary and secondary layers. Accordingly, referring to Figure 1A, what is shown is a matrix of usage of the information to bandwidth of the system. The high use information can be stored in a local storage and high bandwidth information can be stored locally. Low use, low bandwidth information can be stored, for example, in a remote location. To more fully explain such a method and apparatus, refer now to Figures 2-5 which shows a block diagram of a general embodiment and block diagrams of two specific embodiments of the overall system architecture for an enhanced interactive multimedia system for a closed cable network. The overall architecture would be connected to the hotel PBX or the like so as to readily access the transmission lines located therein.

Referring first to Figure 2, the overall general architecture 100 includes a multimedia processing system (MPS) 102 which is coupled to receive information from and transmit information to a video control system 104, an account computer 106, a

service operations platform SOP 107, a telephony switching system 108, and an Internet data connection 195. The MPS 100 is also coupled to an interactive multimedia decoder (IMD) 110, a CD/I device 112, a laser disk 117, video camera 121, compact disk (CD) player 125, personal computer (PC) 119, video camera recorder (VCR) 123 and other devices 114. In this system each of these devices can be utilized to provide updatable multimedia information. For example, a compact disk player 125 can be utilized to jump to different places to provide multimedia information. It could be utilized in conjunction with an IMD to augment the fixed media with interactive material (updatable video source) material.

A personal computer 119 can be utilized in conjunction with the IMD 110 as shown in Figure 2A to mesh a composite signal (audio, video) utilizing a multimedia selection. Some examples for the use of such a system are on-line services, games or maps and the like.

The personal computer 119 could be utilized as a device in a room, or it could be in the basement of, for example, the hotel system to provide for access to different data.

Referring now to Figure 2A', the MPS 102 in one embodiment provides data to a network or personal computer (NC or PC) in the room. The NC or PC 119 could display the video information directly on the display 121 coupled to the NC or PC.

Referring now to Figure 2B, which is a partial block diagram of a closed cable system, what is shown is a data connection 195 coupled to the MPS. This data connection, for example, could be coupled to the Internet, via satellite, telephone or cable feed. This data connection 195 allows for access to the Internet and also allows for passing that connection to the PC 119 to provide a video output via converter 197. That video signal is then converted to be provided to the television. Once the video signal is provided, for example, there are several ways to control access to the Internet via that converted video signal. For example, a keyboard could be used which is directly wired to the cable. Also a keyboard could be used to provide an infrared connection to the TV or could provide a connection to the telephone. In addition, a remote control could be utilized which includes some type of mapping which would allow for the selection of materials such as an on screen typewriter template. In addition, another example would be a telephone keypad which would provide a DTMF tone that would combine with a translator to provide data string conversion. This in turn would drive the input to the Internet selection.

Finally, a laptop PC could be used that is connected to the telephone or cable. Software within the laptop PC could direct modem connections to the MPS to link the system to the MPS.

A return path must be provided through the network. One way to provide a return path is through the video cable system, either via an infrared connection or a direct data connection. Another means for a network which could be utilized to provide the return path for a network is the telephone system via the PBX.

The different in-room devices can interact with either of the networks in a variety of fashions. For example, the keyboard and mouse could be used to provide a direct cable box to the video cable system or could be by wire directly coupled to the video cable system to access and control access to the Internet from the room.

The keyboard/mouse that is wired could also be directly coupled to the telephone system. An infrared keyboard/mouse could be attached through a cable box to access the video cable system or could be coupled to the telephone system or PBX.

In an example, the keyboard/mouse could have an infrared emitter which provides signals directly to the cable box for controlling the cable system directly. In another embodiment the remote control utilized for the television in the hotel room could be utilized within a hotel room, for example, to access the cable system as well as making selections on the cable system through the keypad and a mapping arrangement, e.g., on screen keyboard or hot area, cursor selection.

The telephone keypad can also directly access the MPS through a key data string conversion to drive the input for the Internet selection. The telephone keypad could be utilized as a device that could mimic the point and click motions necessary to access the Internet.

Referring now to Figure 2C, an overlay of the telephone keypad could allow certain keypads to mimic the point and click characteristics of the typical Internet access. By using the overlay to indicate that certain keys are for up, down, left and right notions, the telephone keypad could be utilized advantageously to access the Internet.

This type of system can be utilized advantageously to provide high speed access in a closed cable system, such as a hotel or the like, service center for the Internet.

Referring now to Figure 2D which is a closed cable system for use with Internet access, what is provided is a dish 196 that receives a satellite feed which can provide information to a server 199 via a PMS 207. The server 199 is connected to a direct

outside telephone line for transmitting calls and can receive in-bound phone calls via a PBX system 211. It is also coupled to a video network 213 in the hotel environment which in turn is coupled to individual work stations 215. Finally, the network includes a printer coupled to the server 199. This system could be utilized to provide high speed Internet access.

To provide a more detailed view of a high speed hotel Internet access system service center 285, refer now to Figure 2E. In this Figure, what is shown is a plurality of Internet access workstations 215 which are coupled to a network 295 and a satellite communications controller 297 which is coupled to a high speed Internet access satellite dish 294. In addition, there is a server which is coupled to a printer. This service center will allow for high speed access through the satellite feed.

Figure 2F is a diagram of a national satellite network. In this environment workstations are the point of entry into the Internet access system. Outbound communications will take place over conventional telephone lines while inbound communications will be provided from remote web sites to be delivered to the workstations via the Internet control system. Through this asymmetrical provision of information communications, data can be provided in a more efficient manner.

Referring now to Figure 2G, what is shown is what would be displayed on a workstation in the service center. The user could access various areas either within the closed cable system or on the Internet using traditional keyboard mouse interactions. Hence, as is seen by clicking on "7" NETGATE could be entered to provide Internet access. Hotel guests could, for example, use workstations as a point of entry into the high speed Internet access system. Outbound communications will take place over conventional telephone lines while inbound communication from remote web sites will be delivered to the work station via the satellite system. Through this system, an improved speed of access is provided.

Generally, a remote control network for access to the Internet is provided. Through this system, an Internet session can be displayed via keypad, telephone set, or remote control. A PC application, for example, which would allow for access to a network is through the PC application of video games. Through this access the PC can be used to control access to the network. This system would allow for multiplayer games to be utilized, for example, over the Internet which will allow for multiple players to play, not only within the hotel system but also out to the Internet community.

One of the advantages of using this system in the Internet is that there is the ability to tag different demographics directly through the closed cable system. One of the weaknesses of the Internet is it is not easy to track the particular individuals using the Internet on a consistent basis. For example, typically on the Internet a user may have several different user names for performing certain searches or other requests. The system in accordance with the present invention provides advantages thereover such as, one could present to website certain information about a particular user. The website could then allow for a unique presentation to a user. For example, if a particular user is reviewing an automobile website, (i.e., Mercedes Benz), then links to that website can be customized for the particular user, such as to a top of the line car stereo system or the like. Through the use of this information, a tag can be provided to identify a user. This tag can be used in a variety of ways to provide demographic information to a particular advertiser. Hence that data could be encoded, packetized and then provided to the advertiser in a particular format so that the advertiser would know the buying patterns and other information about the particular user. This significantly enhances the value of the communications.

Referring now to Figure 2H, what is shown is a hotel intranet system. The system includes a Network Center 151 which receives and transmits information to a plurality of hotels 153a-153c. There is a common database 159 which includes a variety of value information. The value information might include billing information, profile information of the user. The system can also be linked to use databases, demographic client marketing databases. This system provides a clear mechanism for locating or establishing contact with a user. Through this system a network member program could be provided.

Network Members Program

The characteristics of such a program are described below. The program provides for a member number and password and allows for completion of a profile that provides demographic elements. The program establishes parameters for email including limitations on forwarding and corporate email, for example. It establishes for voice mail corporate and fax mail. The program also allows one to save Internet bookmarks, for example. The program establishes discount criteria. For example, the program could provide frequent flier credit and could act as a superset for automatic Internet

membership signups, e.g., if a user wanted to sign up for various computer trading, such as Dow Jones, Etrade, Backweb or the like. In addition, the program allows for automatic access to premium pay services. Finally, the program provides for linkages to other databases.

In an example, the user can check in to a hotel within the user system and be immediately identified by the hotel. A delivery cycle of a message to such a user might include turn-on in room message light on the telephone or the like. That in room message could be a voice mail message, email message, facsimile or some other type of message.

Accordingly, in one embodiment, the message would be to a user, "Hello 'user' (any name) you have five email messages, two outside voice mail messages, six facsimiles and five downloads of software." The user could attempt to access this information through a business center as before described, from an in-room TV (i.e., Internet, intranet or otherwise), through the telephone or through a printer or the like located either in the user room or at the hotel front desk. Through this hotel messaging interface there is provided the ability to provide synchronization between the PBX telephone and the Internet. By providing a connection to a website of, for example, an internet registration website such as AT&T, there is the ability to link through that website a PBX connection directly through a telemarketing or customer service group to serve the needs of a customer of AT&T or another long distance carrier. Since the hotel database includes a profile such as likes, bookmarks, setting of the television that allows the hotel to set up a custom interactive environment.

A VCR 123 or CD player 125 could be utilized in such a system, for example, for movie preview, catalog shopping, and a music listening system from the Internet. Through this system full interactivity could be obtained.

Video conferencing can be implemented for point to point or point to multiple point video conferencing. For example, referring now to Figure 2I, what is shown is a point to multiple point video conference system 500. In this type of system, a video conference room (VC) can be utilized to transmit to multiple sites. This system can be utilized with the IMD 110 to provide updatable multimedia information.

Similarly, a point to point system, in which there is a video camera in each guest's room, can be utilized. In this embodiment, a video multiplexer can be utilized to send updatable multimedia information from point to point (room to room) dependent on the

type of information presented.

An advantage of this system is to provide means for switching between alternate multimedia information at the head end. This allows for switching between analog and digital; data and graphics, music and video, etc. To more fully explain the advantage of this feature refer now to Figure 2J. Figure 2J shows a multimedia multiplexer (MM) 135 coupled to an IMD 110. In this embodiment the MM 135 can send information from a plurality multimedia sources to the IMD 110.

In a preferred embodiment to provide for maximum resource allocation refer now to Figure 2K which shows a global multimedia multiplexer (GMM) 137. The GMM 137 would typically include a plurality of multimedia lines (mm_0 - mm_n) for receiving multimedia source material. The GMM 137 receives information from a plurality of multimedia devices such as a PC, VCR, LD, CD-ROM, and CD/I devices. It can also be utilized as a network output of a PC or network access to the Internet. The output of the GMM 137 is provided to a plurality of IMDs 110 (IMD_0 - IMD_n). The GMM 137 receives signals from a control channel 139 either from a MPS or the IMDs or other outside source. Through this device any multimedia source or combination of sources (mm_0 - mm_n) can be directed to any decoder or interactive channel (IMD_0 - IMD_n). This GMM 137 can be implemented in a variety of ways, for example, it can be a digital crosspoint switch. Through such a device a combination of multimedia devices can be utilized to produce a composite signal. This type of system can also be described to separate the information into primary and secondary layers as applied to a network. Accordingly, some of the information can be stored in the IMDS locally, for example, and some information can be stored remotely, dependent upon the bandwidth usage configuration of Figure A.

Referring now to Figure 1B, the GMM can be utilized to control the network pieces such as the video conference (VC), a personal computer (PC) and/or an IMD such that an integrated composite website can be created which can provide efficient access to critical information.

Referring back to Figure 2, the cable feed line in turn is coupled to the video control system 104. The account computer 106 and the SOP 107 are also directly coupled to the telephone switching system 108 via line 120. The telephone switching system 108 is capable of sending and receiving outside calls. The video control system 104 is capable of sending and receiving a remote signal from a cable system,

telecommunication system or the like.

Another portion of the invention is an interactive voice response system 111. This system includes a telephone 113 which connects to the telephony switching 108 via telephone links. The telephone 113 also could include a credit card slot. There is also included within the system 111, a remote control 900 which will be described in detail later and a television 115 which is coupled to the cable 116.

In this general embodiment, the multimedia processing system (MPS) 102 receives program source material from the SOP 107 and from the control system 104. The control system 104 can be a pay per view system such as a On-Command™ Video or a different type of service, such as a shopping, buying movie or airline tickets, or the like. The MPS can also operate an interactive voice response program independently or integrated into other interactive multimedia programs.

The SOP 107 is utilized for receiving e-mail, facsimile and voice messages. The SOP 107 can also be utilized in conjunction with pagers and the like to relay messages. By linking the account computer 106 to MPS 102 messages can be displayed on a monitor within the guest room. In addition, faxes and email messages can be displayed on the television and could be forwarded to other locations. In a preferred embodiment, a typical sequence in a voice response program would be that an operator at the hotel would be called. The operator would then forward the voice mail message, email message, internet information or facsimile to the room. Such receipt could be indicated by a message light being turned on the MB through its PBX connection. Subsequently the voice mail message or facsimile is provided such that it be accessed by the user on the television in the room. Referring now to Figure 2L, what are shown are guest voice mail messaging for in-bound phone calls. In this embodiment first a call is directed to the MPS 102. The MPS 102 will enter a voice prompt, such as enter 1 to leave a voice mail message, 2 to send a fax, 0 to speak with an operator or to hang up to quit. As is seen, this type of system will allow a caller to leave a message, speak with an operator or send a facsimile dependent upon the options. To more fully describe the use of the directing of voice mail messages, email messages or facsimile in the above-described system, refer to the following discussion.

Fax Direction

In this embodiment, Figure 2M is a flow chart of one embodiment of a system for

directing a fax in a closed cable system, a facsimile can be received by the MPS 102 via step 205. At MPS 102 the facsimile is assigned a FAX Ref number (for example #0012) via step 207. Thereafter a CRT at the MPS will display a listing of all the facsimiles received at the MPS 102 via step 209. Thereafter, the particular facsimile associated with FAX reference number can then be displayed on the CRT, via step 211. The fax can be provided to the PMS account computer which determines which room in the closed cable system it is to be sent to, via steps 213 and 215.

Figure 2N is a second embodiment of a system for directing a fax in a closed cable system when no initial CRT is available in the MPS. In this embodiment, the first page of each facsimile received at the MPS can be printed on the hotel fax machine or on a special printer in the hotel in a distinguishing manner, via step 309. Referring now to Figure 2O, it is seen, for example, that initially an overlay of the FAX REF. NO. can be placed on the first page and the printer can then print the overlay out in a distinguishing manner such as printing the overlay in a gray pattern such that the operator can quickly determine the FAX REF. NO. Referring again back to Figure 2N, the assigned FAX REF number is printed on the facsimile cover sheet via step 309. Thereafter, this sheet is then sent to the hotel operator via step 311. The hotel operator can then review the cover sheets and from the FAX REF number determine which room the facsimile is to be sent via the PMS via step 313.

Email Message Direction

Referring now to Figure 2P, what is shown is a screen which displays a variety of services 1-7, voice mail, and email services. The email service will provide significant utility for allowing an individual in a closed cable system to access his or her particular email service. Referring now to Figure 2Q, when email services are desired, there are a variety of email services. In this example, Compuserve 411, America Online 413 and other services 415 are the email services shown. Referring now to Figure 2R, what is shown is a flow chart for selecting and reviewing a particular email service. One of those email services is selected, via step 417, by selecting a particular icon. After that service is selected, then the user name and password is entered, via step 419. For example, a key could be displayed on the TV such as 12 for "A", 13 for "B", 14 for "C", etc., to allow the keys on the remote control to select identification sequence. Alternatively, an on-screen typewriter template then could be used that could be toggled

or scrolled through to select the appropriate alphanumeric characters. In another embodiment, it could be entered with a keyboard directly wired to the TV or use an infrared keyboard/mouse. In another example, the information can be accessed via a computer database, through use of individuals make a reservation to include an encrypted password. One would enter a member number and have this cross-referenced to a data base.

In this embodiment, MPS 102 provides a customer designated on-line service. Referring back to Figure 2R, the connection is made either using the telephone line or a direct connection through a satellite to the email service, via step 421. Thereafter, the email service is entered, via step 423. The email service or email description is downloaded, via step 423 wherein the appropriate user name, password and key sequence is presented in order to download the email message to the user. Then the email messages are received by the MPS, via step 425. The email messages can then be displayed on a TV, via step 427.

In a preferred embodiment, the on-line service is provided on the TV screen taking ASCII text and video technology and providing it on the TV screen via step 425.

Referring now to Figure 2S, the MPS 102 receives the email and provides email message text to a television compatible font converter 513 and provides graphics images to a TV graphics converter 515 utilizing the psychographics techniques described in the context of the present invention. Thereafter, the two layers of information are combined at combiner 517 and then provided to the TV for display.

Voice Mail Message Direction

For example, in this embodiment, Figure 2T is a flow chart of one embodiment of a system for directing a voice messaging in a closed cable system. Accordingly, a voice mail associated with a specific room can be received by the MPS 102 via step 405. At MPS 102 the voice mail is assigned a Ref number (for example #0012), via step 407. Thereafter a CRT at the MPS will display a listing of all the voice mail received at the MPS 102 via step 409. Thereafter, the particular voice mail associated with the reference number can then be displayed on the CRT via step 411. The voice mail can then be provided to the specified room in the closed cable system to which the voice mail is to be sent to via the IMD connection to the television via steps 413 and 415.

Fax Number Circulation and Access

Figure 2U is a flow chart showing how a limited number of facsimile numbers can be circulated and accesses by a plurality of users. A plurality of facsimile numbers can be circulated and accessed through a plurality of users via the interactive voice response system 111. Accordingly, by providing a plurality of facsimile numbers which can be used on a random basis by the users, the number of required faxes is substantially reduced. This feature takes advantage of the fact that the frequency of usage of facsimiles in a closed cable system is determinable over time. Therefore, the number of lines necessary for fax transmission are also determinable, given that usage. Accordingly, through this system, a facsimile telephone system can be efficiently provided for a user.

In a preferred embodiment, referring again to Figure 2U, a sender prompt is provided via the voice response system 111 via step 505. Next a determination is made as to whether the facsimile is to be sent manually, via step 507. If the facsimile is to be sent manually, a pin number is entered via step 509. Thereafter, the send button on the facsimile is pressed when one of the facsimile/telephones is available, via step 511. On the other hand, if the facsimile is to be sent automatically, a first indication is provided that the fax is to be sent automatically is provided via step 513. For example, the # sign on the keyboard is pressed. Next, the pin number is entered and the appropriate fax number to send the facsimile is provided to the user via steps 515 and 517. Thereafter, the number is entered and the facsimile is sent automatically.

Referring back to Figure 2, a master multimedia processing center (MPC) 109 is also coupled to the closed cable system 100 via connection to the MPS 102. The MPC 109 is coupled to a plurality of closed cable systems to provide enhanced interactivity thereto. What is shown is a block diagram of the MPC 109. The MPC 109 comprises an interactive multimedia mastering system 111 which receives program source material from various outside sources and a MPS 102 which receives source material from the IMM 111 and can also receive data information over a program port 113 and an auxiliary port 115.

Referring back to Figure 2, a critical portion of the system 100 is the telephone switching system 108 interface to an outside source of information. Through the use of this architecture the switching system 108 can be controlled to provide the appropriate information to the user. Through the use of the interface devices (IMD 110, CD/I 112

and the other device 114) and the MPS 102, the switching system 108 can be controlled in such a manner that the user doesn't have to remember a telephone number to obtain the desired information. This control can be accomplished through either a digital link that is directly interfaced to the telephone switching system 108 or through an analog link where only a normal phone connection to the system. Through either of the systems an emulation of the customer actions would be undertaken.

In a typical example, a call is made by the user to order a service. The MPS 102 places call to the room through control of the system 108. The room telephone will ring and the MPS 102 will send a message to the switching system 108 that the customer would like to access a service, in this case, a restaurant where the customer would like to make reservations. It should be understood in the alternative to the above that the restaurant could be called first via the system 108 and then the MPS 102 would call the customer back. The switching system 108 will then call the restaurant, introduce the caller and then the restaurant will be linked to the room. All of these activities are done transparently to the user. Through the use of this system 100 it is also possible to print out faxes and or receipts directly at the front desk of a hotel or the like.

The system 100 is capable of transaction processing via the multimedia in a variety of ways. For example, transactions can be processed by posting billing information to a computer within the closed cable system, a facsimile ordering system within the system or through a voice order processing.

The MPS 102 will provide and receive information relating to movies and other services from and to interface devices 110, 112, and 114. The interface devices 110, 112, and 114 are in the hotel facilities connected either to the hotel video cable system through use of the video/audio outputs or connected via digital links from interface devices 110, 112 and 114 in each guest's room.

Referring now to Figure 3 what is shown is the preferred embodiment of a MPS 102. The MPS 102 comprises a distributed computing architecture. The distributed computing architecture includes a master node 200 that has, in this case, three server nodes 204, 206, and 208 for the IMD, CD/I and the other devices respectively. The other devices that could be coupled to MPS 102 are,for example, but not limited to video games, a CD ROM device, a personal computer, or a specialty device such as a translator or gaming device such as a video slot machine or the like.

Each of the server nodes 204, 206 and 208 have client nodes 210, 212, 214, 216,

218, and 220 connected to the respective interactive devices. Attached to each of the clients nodes 210, 212, 214,216, and 218 ports 220. When connected via the existing networks or the MPC 109 (Figure 2a) and then on to connection to the interactive devices 110, 112, and 114 (Figure 2) which has its own processing storage and computing structure the entire network can be operated as a massive distributed computing environment.

This environment shares all dimensions of computing, storage, transmission and peripheral resources (printing, product ordering, mailing functions, etc.). This type of computing architecture would include dynamic port allocation and would include incremental failure characteristics to allow for robustness of the MPS 102.

In addition through the use of this interactive system 100 of the present invention a multiplicity of different interactive devices can be utilized and no modification to the device need be made to allow for devices' use within the system. Accordingly the link between the MPS 102 and the interactive devices can be a serial link, a CD/I link, a cable link such as ethernet or telephone connection via a simple infrared relay control link. Since the MPS 102 can transmit and receive data as well as control information it can operate utilizing a wide range and types of interactive devices such as video games, CD ROM, personal computer or specialty instruments such as translators via an Internet or other on-line services means.

In a first more specific embodiment shown in Figure 4, the multimedia processing system (MPS) 102 receives program source material from the services operation platform (SOP) 107' and from a pay video control system 104'. The control system 104' can be a pay per view system such as a On-Command TM Video or a different type of service, such as a shopping, buying movie or airline tickets, or the like.

The SOP 107' is utilized for receiving e-mail, facsimile and voice messages. The SOP 107' can also be utilized in conjunction with pagers and the like to relay messages. By linking the SOP 107' to MPS 102 messages can be displayed on a monitor within the guest room. In addition, faxes can be displayed on the television and could be forwarded to other locations.

The multimedia processing system 102 will provide and receive information relating to movies and other services from to interactive devices 110' and 112'. The interactive devices 110' and 112' will be located in the hotel facilities connected either to the hotel video cable system through use of the video/audio outputs or connected via

digital links from interactive devices 110' and 112' in each guest's room.

In a preferred embodiment, the MPS 102 could also be used as an internet proxy server. The proxy server would operate such that it could cache certain information and exchange that information. Referring now to Figure 4A, what is shown is a system which would use an internet proxy server. As is seen, many of the elements are very similar to those shown in Figure 4, except that there is a communication network system 129' that can be accessed by each room. Within each room could be a personal computer, network computer or television to receive the information from the communication network 129'. This system is what would be used, for example, with an overall system shown in Figure 2H which would allow for a distributed communication system utilizing the internet facilities.

Figure 4B shows another embodiment of an internet proxy server 102' coupled to a main switch. The proxy server 102' would receive data from the PMS and PBX. A message light in the telephone can be turned on in the room after receipt of certain internet information such as e-mail received. A router 81 also is coupled to the main switch 83. As seen, there are a switches 85 on each floor of a hotel or the like. Each of those switches 85 would be coupled to a plurality of hub units 87. Each hub unit 87 is in turn coupled to a plurality of internet access units 89. Each of the internet access units would have the capability of laptop, PC, NC or set top box interface.

In one embodiment the network shown in Figures 4A and 4B could be wireless utilizing a portable personal computer, network computer or a set top box controller or a cable modem. A wireless network controller 90 is shown in Figure 4D which has a video input and which receives an RF signal. The controller 90 would include a keyboard 92, an antenna 94 which could be utilized to control a TV (not shown) or the like, an RF channel indication 96, as well as an activation light 97. The TV could have a descrambler; however, it is possible to utilize a limited power RF signal so that a particular controller would affect the operation of the display within the room, but would have no effect on displays in other rooms. The internet activities could then be isolated from other rooms. In a preferred embodiment, the video signal would be transitted via the RF antenna to the televsion via a particular channel. for example, channel 3 or channel 33. This system could be utilized with a microwave transmission as well as cellular or other types of network transmissions.

Another way to provide for transmission is through a wireless keyboard as an

input device, and then through a wireless LAN network which would includes a network or personal computer (NC or PC) which would provide the video output. In a preferred embodiment, an external input would be provided that includes a PCMCIA card which would allow for the transmission of video signals.

Through this system, voicemail, faxmail and e-mail could be optionally provided through the TV. Referring now to Figure 4D, an IMD-W which could include a network or personal computer receives video in and interacts with a wireless keyboard to provide video to the television.

In a third more specific embodiment shown in Figure 5 the architecture is similar except that there is an IMD 110 in each guest room. The IMD 110 can also be used within an interactive voice response system 119 to provide a more complete interactive system. In this embodiment, the IMDs 110" can be utilized to provide the interactivity for each room. The structure of the IMDs 110" will be described in detail later in this specification.

The IMDs 110 can take on many different forms dependent upon how much intelligence is located in an IMD 110 relative to the system architecture 100. The system architecture 100 shown in different aspects in Figures 2-5 provides program material which will enhance the interactivity of information that is transmitted along the video network. Accordingly, what the system architecture 100 represents, in fact, is an additional network which would receive information from the program source which would also be part of the existing closed cable system could receive information outside of the cable network through the Internet or other on-line services system. The system architecture 100 will then be utilized to provide for enhanced multimedia information through psychographic manipulations or other enhancements to the systems to provide for an improved interactive closed cable system.

Within each of the IMDs 110 of the system 100 is an optimization technique for enhancing the quality of the multimedia information that is present. To more specifically describe this optimization technique, refer now to Figure 6 which is a block diagram of an optimization method in accordance with the present invention. This optimization technique has been described in detail in U.S. Patent Application Number 07/976,941, entitled "*Method for the Production and Transmission of Enhanced Multimedia Information*," filed on November 16, 1992, and assigned to the assignee of the present invention, and is incorporated by reference in this application. The following paragraphs

along with the accompanying figures will provide the details regarding the optimization method and how it will be used advantageously to provide an enhanced interactive multimedia system.

The purpose of the IMD 110 is to provide maximum interactivity while at the same time providing maximum retention of the program model. It is also important that there be minimum transit time for the interactivity while the information has maximum replication. Therefore, it is very important that the program model psychographic parameters be well described. For example, the spatial, color, temporal, audio response, material concept, contention perception all should be very well described and defined in the program model.

Referring again now to Figure 6 what is shown is a first embodiment of a flow chart for providing an enhanced interactive multimedia information that utilizes the principles of the present invention. The flow chart 300 comprises the steps of providing a program model to a separator. The separator 302 will divide the information into primary and secondary layers of interactive multimedia information. The separation is automatic and can be accomplished in a variety of ways. For example, the layers can be separated by production sources. In another example, separation can be accomplished through key coding the layers. As previously mentioned, the information with regard to Figure 1, the information can be separated in accordance with a matrix of bandwidth and used to provide storage either remotely or locally dependent upon the particular configuration. In yet a fourth example, the layers can be spatially separated or separated by the various colors. The layers would be separated in accordance with use and bandwidth requirements to provide enhanced interactivity. Finally, layers of information could be separated by a filtering process.

The primary layers are provided to the compression generation block 304. There are a variety of ways that the multimedia data can be changed or generated to use less bandwidth. For example, compression algorithms or their equivalents could be utilized to reduce the bandwidth used. In addition generators, such as in a tone generator system, could be utilized to reduce the bandwidth required. Finally, key coding systems could be utilized to reduce bandwidth use. Such systems will be discussed in more detail later in the specification.

In this embodiment, the primary layer is provided to an encoder where the primary layer is prepared for transmission (block 308). Thereafter the primary layer of

information is decompressed (block 110). The primary layer is then decoded and mixed with the secondary layer of data information (block 312) to provide an enhanced interactive multimedia image (motion, video or other) or data to a display.

Similarly, the secondary layer is compressed through block 314, encoded (block 316) and then transmitted to block 318 to decompress and mix block 310. The two signals (primary and secondary) are then sent to display 312.

In this embodiment, for example, for the optimization of video images, the primary layer can be the foreground image, the secondary layer can be a background image. Through the use of this type of optimization technique multimedia information can be enhanced while at the same time utilizing significantly less bandwidth. In addition, by optimizing both layers, full motion video is possible.

To more fully understand this feature refer now to the following discussion. In a typical interactive multimedia system the information is all sent along one layer. The information that can then be transmitted is limited by the bandwidth of that layer.

In the prior art, the interactive multimedia information that could be transmitted along typical networks or transmission paths that are very limited because, for example, in the case of video images the bandwidth is not adequate to provide a high quality image to a display.

Hence, in the present invention, by separating the multimedia information into primary and secondary layers and thereafter compressing the more important information utilizing well known compression algorithms, a system is described that can produce enhanced interactive multimedia information that easily be transmitted over existing networks.

To more fully describe the psychographic enhancement feature of the present invention refer now to Figure 7 which shown the various possibilities from a particular program model. What is meant by program model could be a specified modeling language, for example, HTML or VRML. The form of the various components of the modeling can be specified for the particular user. The program model is provided to the separator 302 of the multimedia system.

Psychographic enhancements are critical to the improvement in interactive multimedia transmission and reception enhancements in the context of the present application is information that is not transmitted but operates on, operates in conjunction with, or operates as a supplement to transmitted multimedia information. There are three

separate categories that will be described that relate to psychographic enhancements.

The first category will be described as a cross correlation between the information that is being transmitted and being enhanced due to the presence of information that is not transmitted. Dithering of image is an example of this in that dithering masks artifacts of images that are present and that improves the image quality. This type of system does not remove the artifacts but actually just masks imperfections. A second example in the audio arena where secondary audio materials such as a sound of an ocean or the like which might mask problems in the audio quality of the primary sound (voice, music or the like).

The second category is where the signal is actually changed without the use of any control signal; for example, through interpolation or some other technique. The typical example of that is a graphic equalizer in which certain frequencies are enhanced depending on the range of the particular device. Another example of the second category is to frequency or amplitude compress a certain signal so as to further enhance the frequencies that are being transmitted. It is also known to use various filters to sharpen or provide certain information that will actually modify the signal without controlling it per se.

Finally, the third category is using the primary and secondary information to drive the other generators that might be present within the multimedia system. This can be utilized to either enhance the multimedia information or enhance the program model. An example of this is the use of real-time graphics frequency spectrum displays to enhance a music juke box type of program model.

As is seen in Figure 7, the primary multimedia information layer can be compressed to reduce the bandwidth utilizing well known algorithms. It is also seen that the signal can be replaced by a generator that is responsive to the primary/secondary layers signals. Finally, a key code could be used to cause information to be provided from a look-up table or the like.

Although all of the above methods provide advantages in accordance with the present invention, key coding has some additional non-obvious advantages when utilized in the optimization system of the present invention. In the following paragraphs the use of various key coding systems will be described generally along with their attendant advantages.

Typically, when looking at an interactive multimedia information signal there are

several components of that information. The first component is the data or the multimedia information itself that is being conveyed. The second component is referred to as program model dynamics. That is the changes that occur in the interactive multimedia information due to, for example, a fade that allows for a transition from one scene in the graphics or video image to another. Conversely, if you want to wipe away an image there is information associated with the multimedia data that would call out for that transition to change efficiently.

Finally, the third category of interactive multimedia information is what will be referred to in this specification which will allow a particular device or system to go from one category to another. In a typical interactive multimedia information system all this information is required to adequately transmit such information.

In its simplest form, a key has an identifiable code which dictates the commands on the other side of the device. The clearest example of such a keying system would be the very simple dual tone multi-frequency (DTMF) signal. This type of signal can be used in the telecommunications area to provide keying for low bandwidth protocol. These keys would then command a code table on the side of the network to provide certain information about the multimedia information to be displayed without requiring actual transmission of the multimedia information.

A more specific version of this type of key coding is what will be referred to in this specification as control information keying. What is meant by controlled information keying is where a key code is utilized to access particular types of commands which can then be used to control other items on the other side of the network.

Such a table would then be utilized to access a certain set of multimedia information in the network. A final version of key coding will be called program branching keying is described by each of the keys representing a certain branch identification. Thus in this type of key coding the key is cross referenced to a particular branch of the interactive multimedia program where each of the branches allows plurality of functions or commands to be accessed in order to replicate the program model.

The important feature that is provided by all of these types of keying coding arrangements is that information already present on the network can be utilized. Therefore, the processing power inherent in the network or the system being accessed can be utilized rather than having to have to provide that processing power within the

optimization system itself.

It is also important to develop means to improve the transmission quality of the multimedia information, for example, the information may be transmitted utilizing a typical transmission algorithm with standard communication file data transfer protocols. The interactive multimedia information could also utilize specialized protocols that are optimized for the particular interactive multimedia information that is to be transmitted. In so doing the algorithm for the compression algorithm can be interactively matrixed with the transmission algorithm to provide the highest quality information with the maximum interactivity with the minimum transmission line.

Referring now to Figure 8, what is shown is a flow chart that shows the cooperation of the transmission algorithm with the compression algorithm to produce a high quality multimedia image. The flow chart comprises providing a program model in which the primary and secondary layers are separated (block 402). The primary layer is compressed and encoded (blocks 404 and 406).

A control element (block 410) is utilized to control a compression matrix and a transmission matrix. These two matrices comprise a plurality of compression algorithm and transmission algorithm respectively that are interactively controlled such that as the various algorithms are detected the quality of the multimedia information and the speed of the transmission are interactively determined.

The quality of the information could be determined manually or through the use of some control circuitry. It should be understood that these same matrices could also be used on the secondary layer. It was not shown or described for purposes of clarity and simplicity.

Referring now to Figure 9 what is shown is a block representation of a matrix of compression algorithm with transmission algorithm that could be utilized in accordance with the present invention. The circles 502 aligned in the vertical direction are the compression algorithms. The rectangles 504 aligned in the horizontal direction are the transmission algorithms.

For example the compression algorithms could be JPEG, a generator with MIDI, and a key for a weather map background. Similarly, the transmission algorithms could be optimized for JPEG, data compression for MIDI, or DTMF for key transmission type algorithms. To provide the highest quality multimedia information while at the same time utilizing minimum bandwidth the different algorithms can be selected in an

interactive manner.

Hence, a first compression algorithm could be selected along with the first transmission algorithm. The multimedia information is reviewed either for image or audio quality than a second compression algorithm is selected. The multimedia information is reviewed and if the quality is not acceptable then a second transmission algorithm is selected. The quality of the information is reviewed. This process is repeated until the highest or desired quality multimedia information and interactivity speed are provided.

The multimedia information derived from the compression/transmission algorithms can be analog or digital in nature. However, in a digital signal there are certain other features that can be taken to advantage that can be utilized in accordance with the present invention.

It is known that digital data information is typically sent in a file which specifies certain parameters of that data and the data information itself and within the data information itself is information which may not change for a certain set of files. In the case of an image file, the header information may specify the dimensions, pixel depth, and certain other features of the particular image. This file may take up a much as twenty percent of the data file.

Conversely, in a file such as MIDI music file which comprise a plurality or a series of music notes, the header may include instrument information, related information and characteristics of that particular file. In both of the above mentioned examples, the header information may not change, through the use of the optimization method the amount of information may be significantly reduced over time.

Hence, in the case of the image file, the header could be sent first with no compression or with lossless data compression as the secondary file because it will always remain the same. The data file itself can then be compressed down to its smaller size.

Another method for enhancing the psychographic parameters is to provide some form of error detection and adjustment. As has been mentioned before the detection and adjustment can be accomplished via interpolation of the error. An alternative method of error corrector is through an error correction/transmission algorithm. What is meant by this, is relating the transmission to the compression to enhance interactivity.

In this type of system before the file is sent the base file is compressed and then

decompressed. This decompressed file is called an expanded compressed base file. The expanded compressed base file is then compared to the original base file and an error file is then developed (the error file being the difference between the base file and the expanded compressed base file). The error file is compressed and sent along with the compressed version of the base file down the line. These files are then combined and decompressed to provide an enhanced image.

Referring now to Figure 10 it is seen that a data file utilizing this technique could initially be separated into primary and secondary layers. The primary layer could be compressed using a first compression algorithm, the header could be sent first along a first transmission path and the compression signal could be sent along a second transmission path.

Therefore, the amount of storage necessary for the file is significantly reduced through secondary compression techniques. This information can then be transmitted or stored across the network rather than having to have all the information stored within a particular device within the optimization system.

It should be understood by one of ordinary skill in the art will recognize that the number of algorithms is not limited to the number shown in the figures. In addition it should be recognized that the order or the selection of the algorithms could be changed and that would be within the spirit and scope of the present invention.

The present invention has been discussed in terms of compressing the primary layer or layer and by compressing and transmitting that primary layer in a particular way the interactivity of the system is enhanced. It should be understood that it may be equally important to enhance secondary layers to produce the same effect.

Therefore, it may be important to enhance the secondary layer, it may be important to enhance the primary layer or it may be important to enhance both. Therefore, the present invention through the use of compression and transmission algorithms and through the psychographic enhancement of the program model can enhance interactivity of a multimedia system.

It should also be understood that the function of the compression and transmission algorithms can also be done through other means; for example, a signal generator could be used to provide the same information. That is, a signal generator responsive to a particular layer or layer of information could be utilized to provide that information or some level of information that is representative of that layer. For

example, a tone generator responsive to a signal from the secondary layer to provide the tone that would be representative of that secondary layer.

Conversely, some type of graphics generator could be utilized to respond to that same type of signal to provide a certain type of graphic image in a video system. Finally, it should also be understood that the psychographic parameters can be adjusted by human operator or in the alternative can be adjusted or modified by an automatic means.

As has been before mentioned, it also is very important in this system architecture to have an interactive multimedia device 110 which will allow for the receipt of high quality multimedia information from the system architecture. The IMDs 110 can be either located in the facility in the basement or are utilized with each of the television monitors within the hotel or hospital room to provide enhanced audio, video and graphic information within the closed cable system.

Figure 11 is a preferred embodiment of an interactive multimedia decoder (IMD) 110. The IMD 110 comprises several components. The cable or telephone line is coupled to a multimedia modem 1102. The multimedia modem 1102 is coupled to a multimedia memory 1104 which can be an expandable dynamic random access memory (DRAM) 1104. The multimedia modem chip 1102 provides data to a multimedia decompressor device 1106. The multimedia memory 1104 provides data to graphics/character generator 1108, speech generator 1110 and music synthesizer 1112. In addition, the output of the generators 1108, 1110, and 1112 are provided to a video control chip 1114. Video control chip 1114 provides signals to a standard television display and receives signals from a standard television source. The multimedia modem 1102, the multimedia memory 1104, the multimedia decompressor 1106, the multimedia digital/audio control 1108, the video control chip 1114 and music synthesizer 1112 are all ultimately controlled by an interactive control interface 1116 which manages the operation of all of the above elements. The video control chip 1114 is coupled to a standard telephone keypad input or for a television remote-type device or a special IMD remote can be utilized in a variety of ways which will be discussed in detail hereinafter.

Personalized and Demographic information can be stored on the IMD 110, the MPS, or the PMS including age, sex of the user alone with technical information (IMD serial no, generators available). Therefore, upon connecting to the MPS 102, the IMD 110, or PMS can both forward this stored information either at the beginning of the session or anytime afterwards. This information can then be updated through the MPS

102 or directly at the IMD 110 through selection using the keypad or outside dialing or remote or by receiving the data from the MPS 102.

Accordingly this information provides the basis for highly accurate market research and commercial monitoring. Through the IMDs and MPS real time information can be provided to the supplier of the information. This information can also be utilized to provide interactive advertising based on the choice of the advertiser as well as the demographics of the viewer. The type of information that could be useful for example would be the logging of each key stroke made on a remote control thereby monitoring the "browsing" or viewing habits of the customer in response to either interactive material supplied by the IMD or synchronized material from the cable head-end 122.

In the case of room shopping, a guest can select information for presentation and then can choose items and then bill items to the room via the Internet or other means using the previously mentioned high speed access Internet system. As an alternative, the MPS 102 can allow for the use of a credit card to forward information on to an automated order system or to an operator. In addition, this type of system could allow for a facsimile receipt to be sent back to guest via the television monitor within the room.

Another mode of operation is the delivery of multimedia information during the period that the communication network is not in use. In this way large amounts of multimedia information can be efficiently transmitted and stored in the IMD for later review and enhanced interactivity.

The function of each of the different components in a preferred embodiment is described in a summary fashion below.

Multimedia Modem 1102

A. Responsible for all communications between cable or phone line, optional serial port, interface to multimedia memory, multimedia decode, audio control, and processor control modules.

B. Supports standards protocol for half-duplex, full duplex, and half-duplex high speed operation.

C. On-chip encode/decode capability, D/A, A/D for voice, facsimile, and data functions.

D. Dual tone multi-frequency (DTMF) detect and generation.

E. Auto-detect voice/facsimile/data switch for transparent mode transition.

F. Incorporates controller unit with binary file transfer, facsimile, data, and voice modes, and optional proprietary multimedia processor control optimized protocol firmware.

G. Firmware allows IMD to use multimedia modem to perform call processing function including telephone call dialing and connection, unattended receipt of data and fax among other functions.

H. Include ability to decode data from video cable signal including VBI encoded data or data encoded in the video signal itself outside the VBI.

Multimedia Memory 1104

A. Nominal DRAM or VRAM for image mixing/processing, and auxiliary multimedia data store.

B. Nominal ROM for resident IMD control program.

C. Optional co-resident DRAM for multimedia data store and program/data store.

D. Optional non-volatile storage (extendible).

E. Memory control unit for VRAM/ROM/DRAM and non-volatile storage.

Multimedia Decode 1106

A. Responsible for real-time decompression of images transferred to or stored in the IMD 110.

B. On chip inverse discrete cosine transform processor.

C. Reverse quantizer decoder/tables.

D. Built-in zoom, pan, chroma key, mix from compressed data incorporates interfaces to video data bus, multimedia memory, multimedia modem, video control, and microprocessor control sections.

Video Control 1114

A. Responsible for all IMD 110 video mixing, enhancements, and display functions.

B. Pixel processor for mix, zoom, pan, chroma key, transform on pixel data, transitions.

C. Graphics processor for figures (e.g., rectangles with color fill) generation, sprites, text with foreign characters, and scrolling.

D. Digital to analog conversion, analog to NTSC, NTSC video plus stereo audio to

RF.

Graphics/Character, Speech Generator, Music Synthesizer 1108, 1110, and 1112

A. Responsible for enhancing received analog/digital audio, music synthesis generation, and overall analog mixing and audio effects.

B. Incorporates decoding burden.

C. Sampled instrument synthesis from compressed MIDI input.

D. Built-in micro-controller for multi-task generation.

E. Dual analog source mix, digital audio and synthesizer mix, analog audio control (volume, bass, treble, balance) for output to analog left/right audio.

Interactive Multi-Task Processor 1116

A. Responsible for multi-task execution of resident and downloaded IMD code for operation in conjunction or independently of the MCPS.

B. Master/slave microcontroller architecture for multi-task control of communications, multimedia memory, multimedia decode, digital video control, digital audio/synthesis, and interface management.

In a preferred embodiment, the IMD 110 will be utilized with a television monitor to transmit and receive multimedia information. Hence, the IMD 110 can be utilized in the case of movie for access and to transmit an almost unlimited number of movies to a particular user. Therefore through the use of the IMDs in the system a more fully interactive system is possible. In addition, through this system a variety of other services can be provided for the user such as advertisements, shopping, airline ticketing, entertainment and the like.

Another critical feature of the IMD 110 is to have a remote control that will work in conjunction with the television or other display to provide enhanced multimedia information from the Internet or other on-line services. To more fully explain this feature refer now to Figure 12. The remote control 900 looks much like a telephone keypad. It has the numerals (0-9) and symbols (*-#) that are part of an ordinary telephone keypad. It includes an enter key 902 that is typically utilized to change information or change channels in the case of a television set. The control 900 would also include a volume key 904 and a channel or memory select key 906, a connect key 908, a telephone call key 909 and a multimedia toggle button 910. The telephone call

key 909 is utilized to place a call to a designated telephone number or to a number associated with the multimedia information being viewed. The remote control 900 also includes a keys 911, 913, 915 that will control the fast forward, reverse, and slow motion of the display device.

The remote control 900 could also include a credit card slot 912. This credit card slot 912 would be utilized by the viewer to allow for the purchase of certain items directly while viewing the television screen. The credit card slot 912 could also be utilized as an indicator that a certain room is being occupied by a particular person. This indication would preclude the need for a separate inputting of the relevant user information for billing information. The credit card information could also be accessed by a credit card slide that is physically connected to the television by passing the information through the remote control cable back channel.

Finally, the control 900 includes special effect keys 916, for example, for allowing for the browsing of a multimedia directory while simultaneously displaying a picture in the picture of the current broadcast TV channel. The remote control 900 can operate in an emulated keystroke mode in which pressing one key may be utilized to emulate a combination of keystrokes. In addition a call button may be provided which would allow for sending valid numbers to another location. The remote control 900 also has the capability of emulating other remote controls. For example, through the MPS different types of signals can be mapped with the remote control. The MPS provides the translation of the signals of a CD/I device for example.

The remote control 900 could utilize a radio frequency signal or audio signal to interact with the receiver and/or IMD 110 for the control of the IMD 110, control the selection of multimedia information, and for the control of other devices. It is also known that a more conventional remote control could be utilized such as one that controls a VCR or a television and its use would be within the spirit and scope of the present invention. The remote control 900 also includes a positioning function. Accordingly, a motion detector or the like can be utilized within the remote to allow for pointing the remote at the television monitor to transmit certain information.

Another feature of the above-identified system architecture is that the program information can be linked to the network to provide for enhanced interactivity and program quality. This has particular advantages when utilized with on-line services. For example, the program source can follow or be synchronized with the cable or broadcast

feed to provide for enhanced distribution of program information. One specific example of this to take a new program, like CNN broadcasting, which consists of several short news items. For each news there could be stored large archives or program material related to a particular story. Hence, through multimedia interaction with for, example, the remote control 900 the stored program material can be accessed. This would allow the user to review the material in whatever detail was desired.

Another example, is in an advertising feed if a particular item was advertised, there would be the ability to refer to more detailed information about the product via the Internet or other on-line services.

Yet another example of such a system is to have one service linked to another. An advertisement could be linked to a means for ordering the particular product being advertised including the placement of a phone call by the IMDs to the desired telephone number. In so doing, the linked system allows for additional services to be accessed.

The important requirements for this linked feature is that there is a knowledge of the contents of the system program requirements and there is a knowledge of where the user is in the program. For example, an IMD could be used for channel program identification in which the telephone call is linked to a particular channel that has been selected. Another example is link demographics for targeted interactive advertising. Hence, in an advertisement for a diaper, for example, there would be the facility to access advertisements for related items such as baby powder, baby oil or the like through the use of this linked approach. Accordingly, this feature of the system can be utilized advantageously with the high speed Internet access described above to provide for enhanced interactivity. To more particularly describe these advantages refer now to the following examples.

Reservation System

A first example of this feature is a reservation system. Referring to Figure 13 which is a flow chart of such a system is selections can be reviewed via step 1302, then the customer can make a selection via step 1304 by reviewing the multimedia information on the television. If the selection is not available via step 1306 then the user can review selections and make another choice. However, if the selection is available then the telephone system within the hotel is contacted by the MPS 102 via step 1308 so that the reservation can be made. Thereafter the reservation is made via step 1310.

An example of this could be the linking of an interactive voice response system to a multimedia system. In a preferred embodiment, a call can be linked to a particular website in the Internet. For example, this system could be linked to a "900" number for the Wall Street Journal stock information. Thereafter, credit card verification can be entered by hand and/or by a credit card slot on the phone or the remote. More information could then be displayed, such as stock price graphs, on the TV synchronized with the latest news and price for the particular stock. Finally, system could allow for a voice annotated facsimile that could be printed at the front desk of a hotel or the like. Alternatively the call and print synchronization could be accomplished by using a Web telephone connection through the Internet. This provides a connection from a website to a telemarketing group such as AT&T via the PBX.

Catalog Shopping

Another example of the use of this system is illustrated by catalog shopping. Referring now to Figure 14 in such a system there is updatable multimedia information that is viewed by a customer via step 1402 on the television monitor. Thereafter the customer can select from a number of shopping sources via step 1404. Whether the interactive devices are in a central location or in a each room the customer can order by the device interacting with a catalog order desk located in the facility which then bills the customer via step 1406. The billing can occur directly through the account computer of the facility or on the other hand can charged through a credit card transaction.

That transaction can be completed step via the credit card slot on the remote control 900, a credit card slot that may be located on the monitor or interactive device or telephone or finally the numbers on the credit card could be entered utilizing a remote control or the like. The MPS 102 can then generate a mail order facsimile directly to cataloger facsimile telephone line via step 1408. The MPS 102 then sends the order to the source via step 1410.

A customer receipt can then be printed at the front desk through a special printer and then the goods can then be delivered via steps 1412 and 1414. The goods could be delivered either to the hotel facilities, to the customers home or to her place of business. Finally, there could be variety of methods of delivery and there use would be within the spirit and scope of the present invention.

Accordingly, this system can be utilized effectively in a voice response system.

Through the present invention a voice response can activate or operate in conjunction with a multimedia program to provide a fully interactive communication system. For example a facsimile message can be displayed on a television screen based on the voice response system.

Referring now to Figure 14a what is shown is an automated call processing system of Figure 14. In this embodiment the system places a call to the telephone number of the catalog source via step 1408-1, then the MPS 102 connects to the catalog source via step 1408-2 and send, an automated message such as "You have reached the cable network for ABC hotel, press 1 to confirm." After the connection is confirmed the MPS 102 it will then send order information to the catalog source via step 1410-1. The source will then acknowledge the order via step 1410-2. The source could for example confirm credit card information and the like during this step.

Video Reservation

Another example of the utility of the present invention is its use in a video reservation system within a hotel system or the like as shown in Figure 15. Through this system even those movies being viewed can be reviewed via step 1502. The customer can also determine when the video will be available via step 1504. The customer can the reserve the movie at a later time based upon the reviewed information via steps 1508 and 1510.

A variation on this type of system is illustrated in Figure 15a which is an allocated movie selection system. In this system movies could be viewed within a certain margin of time such as within 15 minutes after the hour step 1508-1. If the customer does want to see the movie, step 1510-1 then the movie is selected to be seen at the allocated time, if not the other choices can be viewed step 1508-1.

Ticket or Coupon Printing

Referring now to Figure 16 in a ticket or coupon printing system there is updatable multimedia information that is viewed by a customer via step 1602 on the television monitor. Thereafter the customer can select from a number of ticketing or couponing sources via step 1604 including on-line services. In a preferred embodiment, the customer could use an appropriate website for ticketing and various other information. This system can also be based upon demographic data to drive the coupon

or ticket choices or attributes presented to the customer. Whether the interactive devices are in a central location or in a each room the customer can order by the device interacting with an on-line service or the like through a high speed service center which then bills the customer via step 1606. The billing can occur directly through the account computer of the facility or on the other hand can charged through a credit card transaction.

In an Internet example, for ticketing, that transaction can be completed step via the credit card slot on the remote control 900, a credit card slot that may be located on the monitor or interactive device or telephone or finally the numbers on the credit card could be entered utilizing a remote control or the like. The MPS 102 can then generate a mail order facsimile directly to telephone line via step 1608. The MPS 102 then sends the order to the source via step 1610.

A customer receipt can then be printed at the front desk through a special printer. Then the tickets or coupons can then be delivered via steps 1612 and 1614. The tickets or coupons could be delivered either to the hotel facilities, to the customers home or to her place of business. Finally, there could be variety of methods of delivery and there use would be within the spirit and scope of the present invention.

This system would have particular utility in conjunction with multimedia yellow pages. Hence, the customer can review through advertising typical vendor information as found in the yellow pages except now this information is reviewed from a television. Selections can be made using the remote control 900 to obtain certain information and thereby causing several related actions to occur. By placement of the telephone call a vendor could issue a ticket or coupon for a product or a service. An important feature for the printing of documents is the need for an inventory control system in which the customer can gain access to information that pertains to her transactions.

Map Printing

Referring now to Figure 17 in a map printing system there is updatable multimedia information that is viewed by a customer via step 1702 on the television monitor. Thereafter the customer can select from a number of mapping sources via step 1704. Whether the interactive devices are in a central location or in a each room the customer can order by the device interacting with a catalog order desk located in the facility which then bills the customer via step 1706. The billing can occur directly

through the account computer of the facility or on the other hand can charged through a credit card transaction.

That transaction can be completed step via the credit card slot on the remote control 900, a credit card slot that may be located on the monitor or interactive device or finally the numbers on the credit card could be entered utilizing a remote control or the like. The MPS 102 can then generate a mail order facsimile directly to telephone line via step 1708. The MPS 102 then sends the order to the source via step 1710.

A customer receipt can then be printed at the front desk through a special printer and then the maps can then be delivered via steps 1712 and 1714. The maps could be delivered either to the hotel facilities, to the customers home or to her place of business. Finally, there could be variety of methods of delivery and there use would be within the spirit and scope of the present invention.

Inventory Control System

Referring now to Figures 18a and 18b what are shown is an electronic inventory control system 1800 and a physical inventory control system 1800'. Referring first to Figure 18A the electronic control system includes a personal computer 1802 with an associated display in this case a CRT display 1806. Also coupled to the personal computer is a keypad 1808 and a printer 1804. The printer in turn is coupled to an output device 1810. In such a system the keypad 1808 can be utilized by the customer in much the same way as an automatic teller machine (ATM) in which the customer has a security code through the use of a room key to allow the customer to order tickets or make reservations via the personal computer 1802. The computer is linked to the MPS 102 to allow for secure access to the various sources of information. The display 1806 can be utilized to interactively operate with the personal computer to cause the printing out of the appropriate transactions via the printer 1804. The printer 1804, typically a laser printer or specialized ticket printing machine prints the information and provides that printed information or ticket to a secure output device 1810.

Figure 18B has similar elements to Figure 18a, however the physical system includes a tray for receiving the transactional information. Therefore each customer can have access to an individual tray of information by using their hotel key or the like. Through the inventory control systems shown in Figures 18a and 18b the customer has secure access to interactive multimedia transactions.

In yet a final example, the system can be configured for play along games. Accordingly, an interactive game could be provided which would allow for an individual to play a game such as chess, with another guest in the hotel or against a machine as in the case of a video game or the games could be played with sources outside the network through the on-line service.

It should be understood that the IMD 110 itself could be utilized as a call processing system. Finally, it should be understood that there could be multiple MPS 102 to provide for very large scale call processing through the MPC 109.

Although the present invention has been described in accordance with the embodiments shown in the figures, one of ordinary skill in the art recognizes there could be variations to the embodiments and those variations would be within the spirit and scope of the present invention. Accordingly, many modifications may be made by one of ordinary skills in the art without departing from the spirit and scope of present invention, the scope of which is defined solely by the appended claims.

CLAIMS

WHAT IS CLAIMED IS:

1. An interactive system for a closed cable network, the closed cable network including a plurality of rooms comprising :

means for processing multimedia information received from an on-line service;

means coupled to the multimedia processing means for controlling transmission of the multimedia information of the on-line service to the multimedia processing means; and

a plurality of computers located within the closed cable system, at least one of the computers coupled to the multimedia processing means to provide updatable multimedia information from the on-line service.

2. The system of claim 1 wherein the closed cable network comprises a wireless network.

3. The system of claim 2 wherein at least one room includes a television and a controller for the television.

4. The system of claim 2 wherein the controller comprises a wireless controller.

5. The system of claim 4 wherein the wireless controller comprises a set top box.

6. The system of claim 4 wherein the wireless controller comprises a cable modem.

7. The system of claim 4 wherein the wireless controller comprises a PC.

8. The system of claim 4 wherein the wireless controller comprises a network controller.

9. The system of claim 3 wherein the controller includes a keyboard, and channel display for controlling the television.

10. The system of claim 1 wherein the multimedia processing device comprises an internet proxy server.

11. The system of claim 1 including means coupled to the multimedia processing means for directing messages in the closed cable system.

12. The system of claim 6 in which the directing means further comprises:

means for receiving a plurality of messages in the multimedia processing means;

means coupled to the receiving means for assigning each of the plurality of messages a reference number;

means for listing the plurality of messages including their respective reference number;

means for displaying the listed plurality of messages; and

means for determining the appropriate receiver of the message in the closed cable system.

13. The system of claim 6 wherein the plurality of messages includes email messages.

14. The system of claim 6 wherein the plurality of messages includes voice mail messages.

15. The system of claim 6 wherein the plurality of messages includes fax mail messages.

16. The system of claim 6 wherein the plurality of messages includes internet information.

17. The system of claim 11 in which the determining means includes:

means for receiving an indication that an message is to be sent; and

means for forwarding the message to a particular user.

18. The system of claim 1 in which the plurality of multimedia devices includes a CD player.

19. The system of claim 1 in which the plurality of multimedia devices includes a personal computer.

20. The system of claim 1 in which the plurality of multimedia devices includes a video camera.

21. The system of claim 1 in which the plurality of multimedia devices includes a laser disk player.

22. The system of claim 1 in which the plurality of multimedia devices includes interactive multimedia decoder (IMD).

23. The system of claim 1 in which the plurality of multimedia devices includes at least one interactive multimedia device and at least one video camera to provide a point to point video system.

24. The system of claim 1 in which the plurality of multimedia devices includes at least one interactive multimedia device (IMD) and at least one video camera to provide a point to point video system.

25. The system of claim 1 which further includes coupled to a multiplexer means coupled to an Interactive Multimedia Decoder (IMD), the multiplexer means for receiving inputs from the plurality of multimedia devices and for selecting from the plurality of multimedia devices to provide a multimedia output signal to the IMD.

26. The system of claim 1 which further includes a global multimedia multiplexer (GMM), the GMM further including means for receiving inputs from the plurality of multimedia devices, and for selecting from the plurality of multimedia

devices to provide a composite multimedia output signal to a plurality of interactive multimedia decoders.

27. The system of claim 1 in which the plurality of multimedia devices includes at least one interactive multimedia device (IMD) and at least one video camera to provide a multipoint to point video system.

28. The system of claim 1 in which the system is utilized with a voice response system.

29. The system of claim 28 in which the voice response system provides a facsimile image on a display.

30. The system of claim 1 in which the controlling means comprises:

means for transmitting the multimedia information, the multimedia information including multiple layers,

means for separating the multiple layers of information into primary and secondary layers based upon a program model,

means for enhancing the primary layers through psychographic parameters in accordance with the program model,

means for providing the secondary layers through alternate psychographic parameters, and

means for combining the enhanced primary layers and the secondary layers to provide multimedia information that is a perceived improvement in quality.

31. The system of claim 1 in which the separating means further comprises means for interactively separating the layers based upon the program model into primary and secondary layers.

32. The system of claim 1 in which the primary layers are high bandwidth/high use information and secondary layers are low bandwidth/low use information.

33. The system of claim 1 in which the enhancing means further comprises means for encoding the primary layers in accordance with a first compression algorithm.

34. The system of claim 1 in which the enhancing means further comprises means for encoding the primary layers in accordance with a first transmission algorithm.

35. The system of claim 1 in which the enhancing means further comprises means for encoding the secondary layers in accordance with a second transmission algorithm.

36. The system of claim 1 in which the enhancing means further comprises:

means for encoding the primary layers in accordance with a first compression algorithm;

means for encoding the primary layers in accordance with a first transmission algorithm;

means for determining the perceived quality of the multimedia information; if the perceived quality of the multimedia information is not acceptable;

means for encoding the primary layers in accordance with another compression algorithm;

means for encoding the primary layers in accordance with another transmission algorithm; and

means for repeating the encoding until the perceived quality of the multimedia information is acceptable.

37. The system of claim 36 in which the providing means further comprises means for encoding the secondary layers in accordance with a second algorithm.

38. The system of claim 37 which includes means for decoding the primary and secondary layers.

39. The system of claim 1 in which the psychographic parameters include color, temporal, audio, spatial, and material content.

40. The system of claim 1 in which the separating means is automatic.

41. The system of claim 40 in which the automatic separating means is accomplished via separate sources for the production of the primary and secondary layers.

42. The system of claim 40 in which the automatic separating means is accomplished via keying the primary and secondary layers to a the interactive multimedia information.

43. The system of claim 40 in which the automatic separating means is accomplished by spatially separating the primary and secondary layer.

44. The system of claim 40 in which the automatic separating means is accomplished by filtering the primary and secondary layers.

45. The system of claim 1 in which the controlling means comprises the steps of:

means for separating the multimedia information into separate layers with each layer having a particular psychographic parameter information composition for a particular program model,

means for applying a separate encoding for each of the separate layers of multimedia information which maximizes the perceived quality of the multimedia information,

means for transmitting the separate encoded layers along different transmission mediums,

means for decoding the separate encoded layers, and

means for recombining the separate layers of multimedia information at a transmission end to provide an improved quality multimedia information.

46. The system of claim 45 in which the separating means comprises means for automatically separating the layers such that the psychographic parameters are interactively enhanced.

47. The system of claim 46 in which the automatic layers separation comprises providing the layers by separated production sources.

48. The system of claim 46 in which the automatic layers separation comprises keying the layers to the psychographic parameters.

49. The system of claim 46 in which the automatic layers separation comprises spatially separating the layers in accordance with the psychographic parameter.

50. The system of claim 46 in which the automatic layers separation comprises filtering the layers in accordance with the psychographic parameters.

51. The system of claim 45 in which the separating means comprises interactively separating the layers for highest program model quality and maximum interactivity.

52. The system of claim 50 in which the separating means further comprises means for interactively separating the layers into primary and secondary layers, the primary layers including the most important multimedia information to be transmitted.

53. The system of claim 52 in which the applying means further comprises means for encoding the primary layers in accordance with a first compression algorithm.

54. The system of claim 50 in which the psychographic parameter information includes spatial, temporal, audio and material content perception.

55. The system of claim 52 in which the applying means further comprises means for encoding the primary layers in accordance with a first transmission algorithm.

56. The system of claim 52 in which the applying means further comprises means for encoding the secondary layers in accordance with a second compression algorithm.

57. The system of claim 52 in which the applying means further comprises means for encoding the secondary layer in accordance with a second transmission algorithm.

58. A system for interactively providing enhanced information related to a closed cable network, the closed cable network including a plurality of rooms, the system comprising:

means for linking an on-line service to a telecommunications service; and

means for synchronizing call and print information from the on-line service and telecommunications service and providing the information to a computer in at least one of the rooms in the closed cable network.

59. The system of claim 58 including means for synchronizing the call and print information through a web site provided on the on-line service.

60. The system of claim 58 in which the linking can be provided through a hotel messaging system.

61. The system of claim 58 which further comprises:

means for separating the information into primary and secondary layer based on a program model;

means for storing the primary information locally; and

means for storing the secondary information remotely.

62. The system of claim 61 in which the program model could be a specified modeling language such as HTML.

63. The system of claim 61 in which the program model could be a specified modeling language such as VRML.

64. The system of claim 61 which includes means for controlling information via a keyboard via an infrared connection.

65. The system of claim 61 which includes means for controlling information via a telephone.

66. The system of claim 64 in which couponing or ticketing are linked via the Internet.

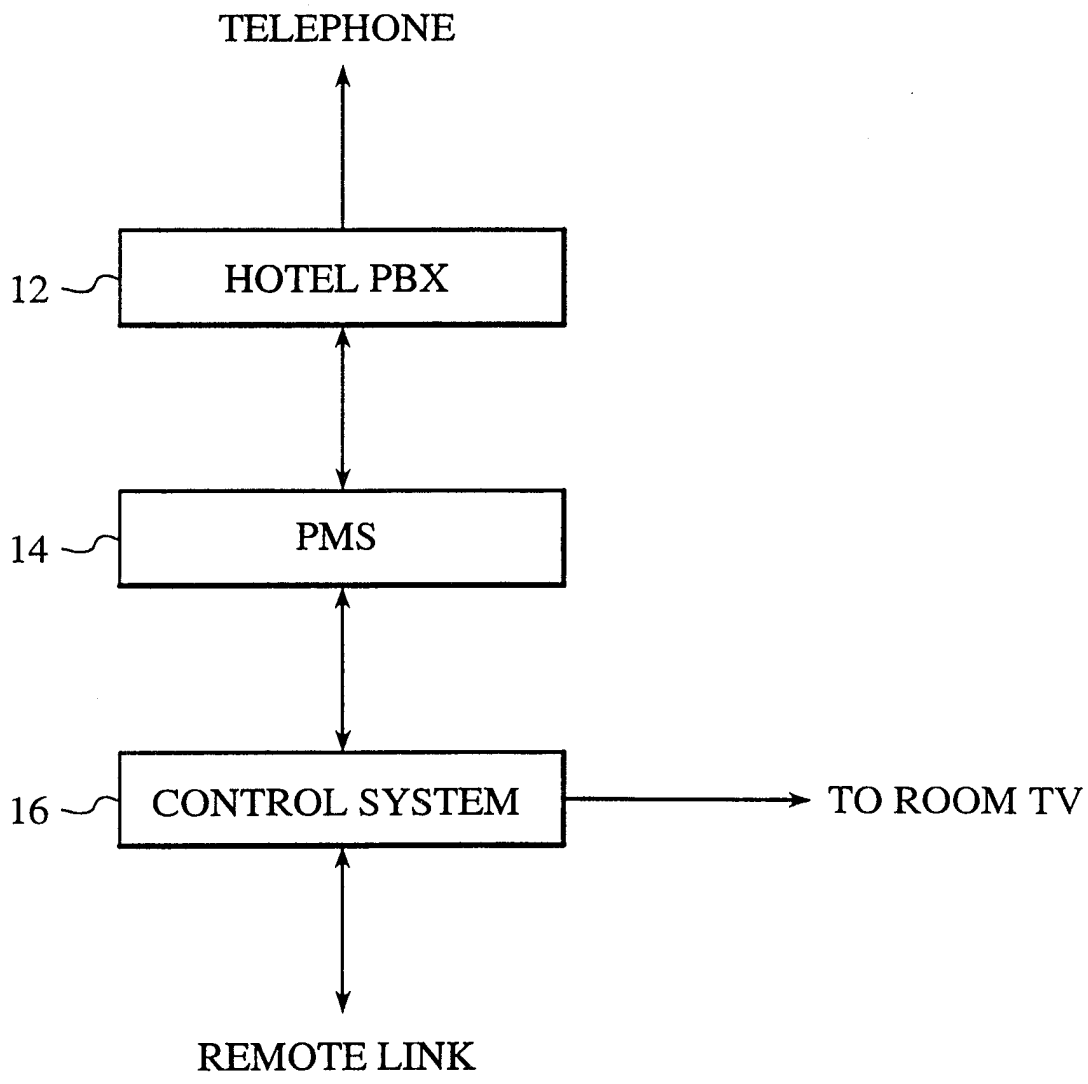


FIG. 1
(PRIOR ART)

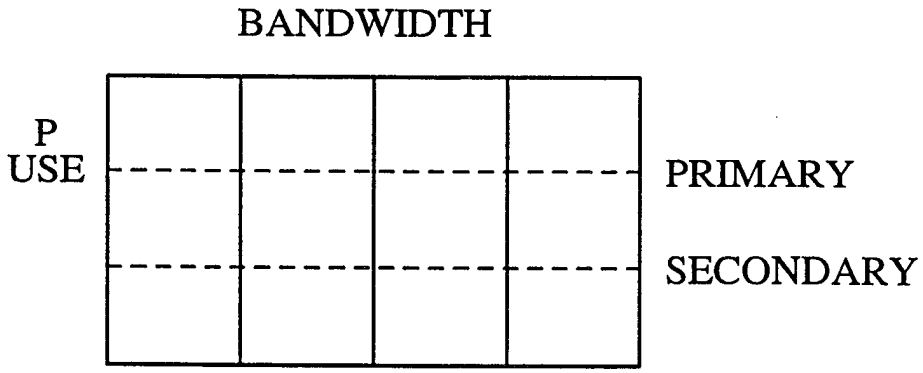


FIG. 1A

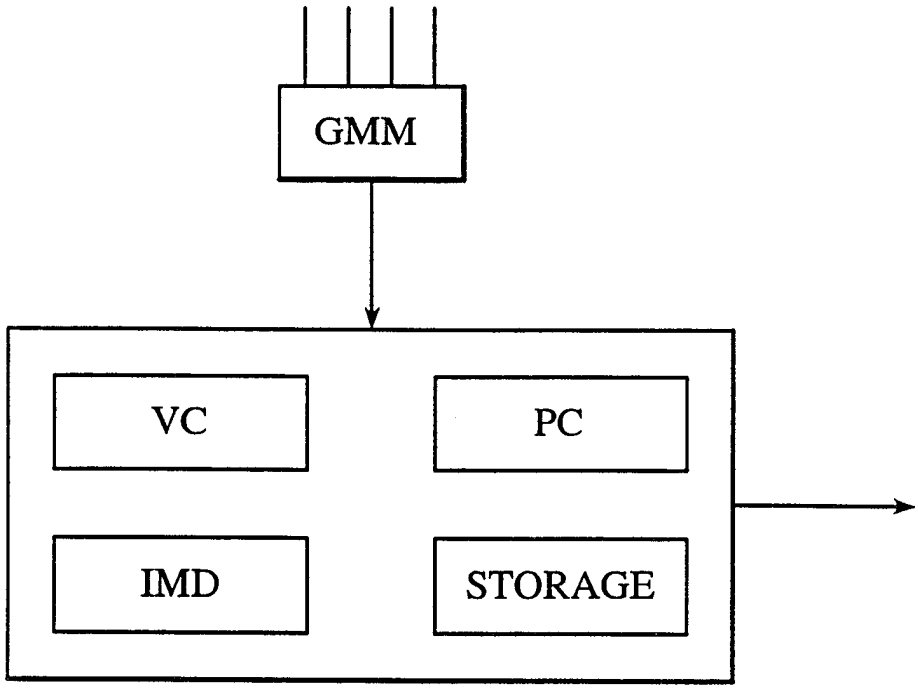


FIG. 1B

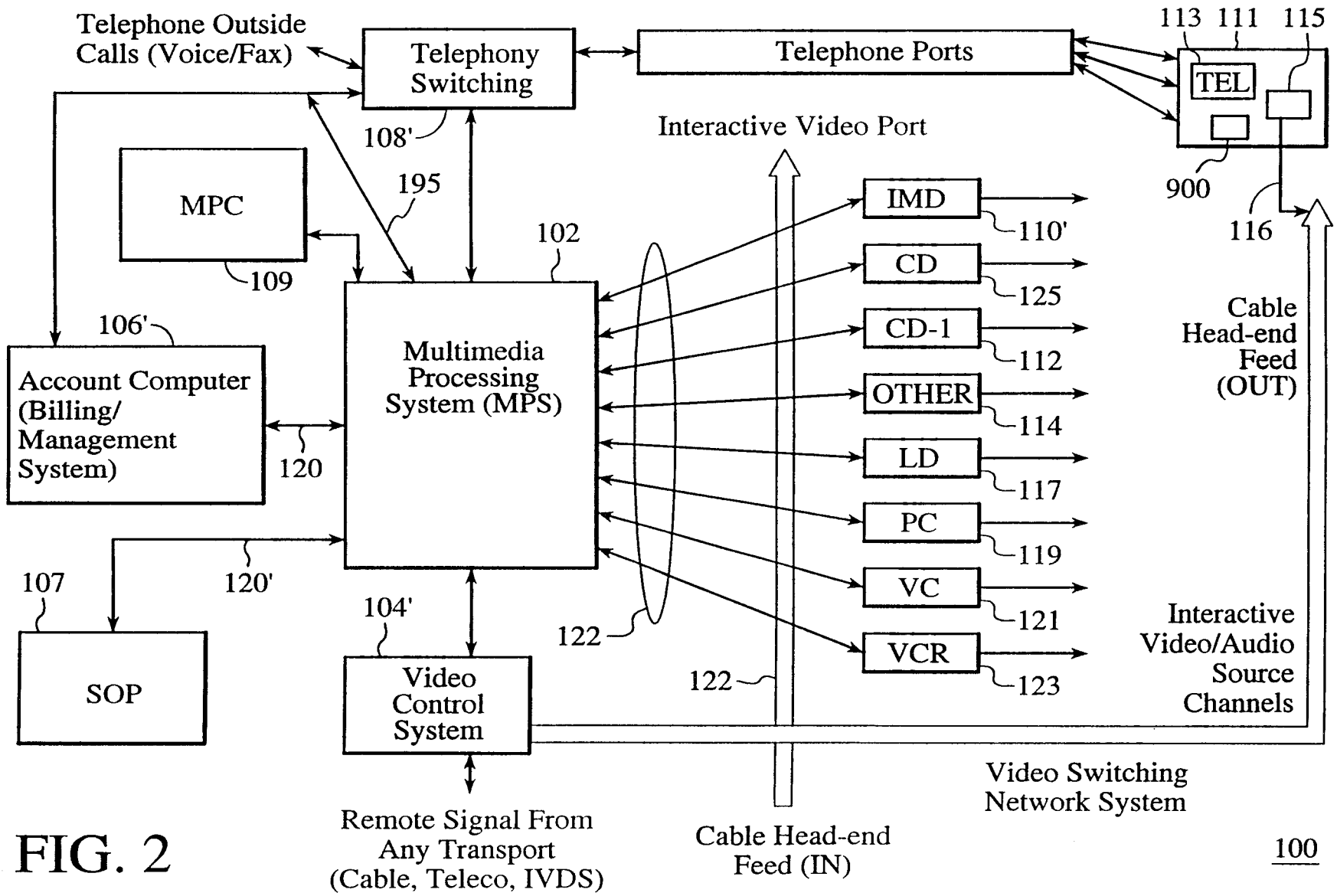

Telephone Outside Calls (Voice/Fax)
Telephony Switching
Telephone Ports
113
111
115
TEL
900
116
108'
195
MPC
109
102
Interactive Video Port
IMD
110'
CD
125
CD-1
112
OTHER
114
LD
117
PC
119
VC
121
VCR
123
Cable Head-end Feed (OUT)
106'
Account Computer (Billing/ Management System)
120
Multimedia Processing System (MPS)
107
120'
104'
SOP
Video Control System
122
122
Interactive Video/Audio Source Channels
Video Switching Network System
Remote Signal From Any Transport (Cable, Teleco, IVDS)
Cable Head-end Feed (IN)
100

FIG. 2

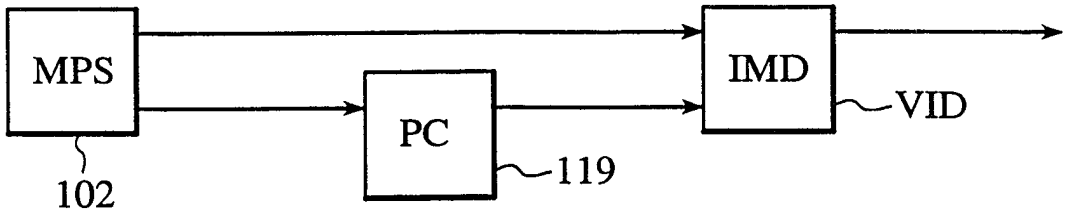


FIG. 2A

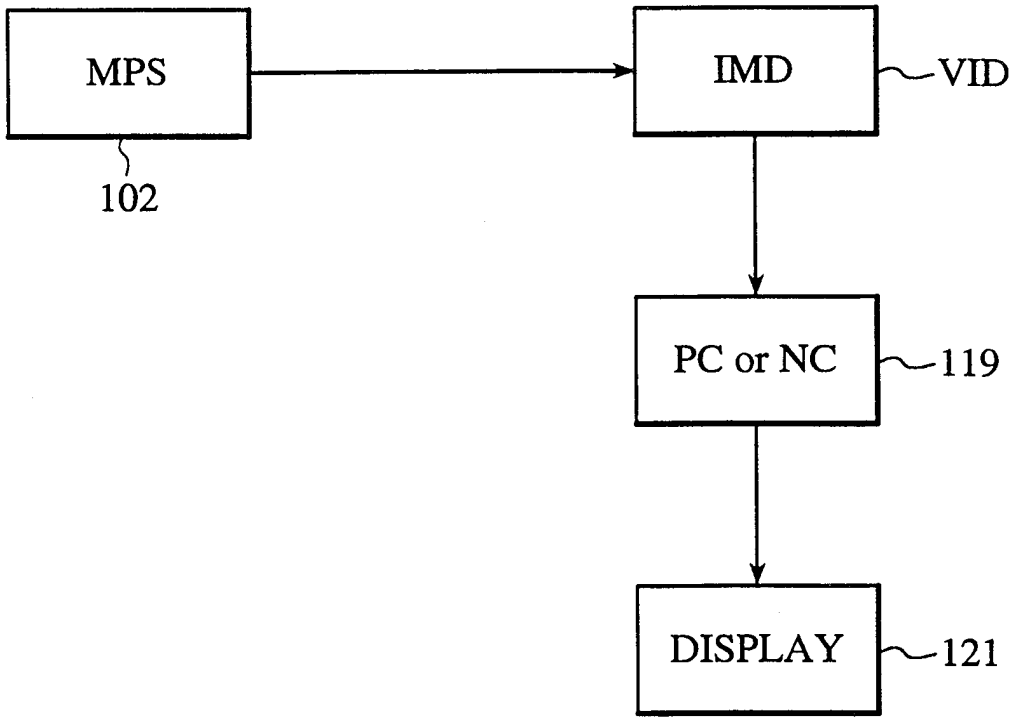


FIG. 2A'

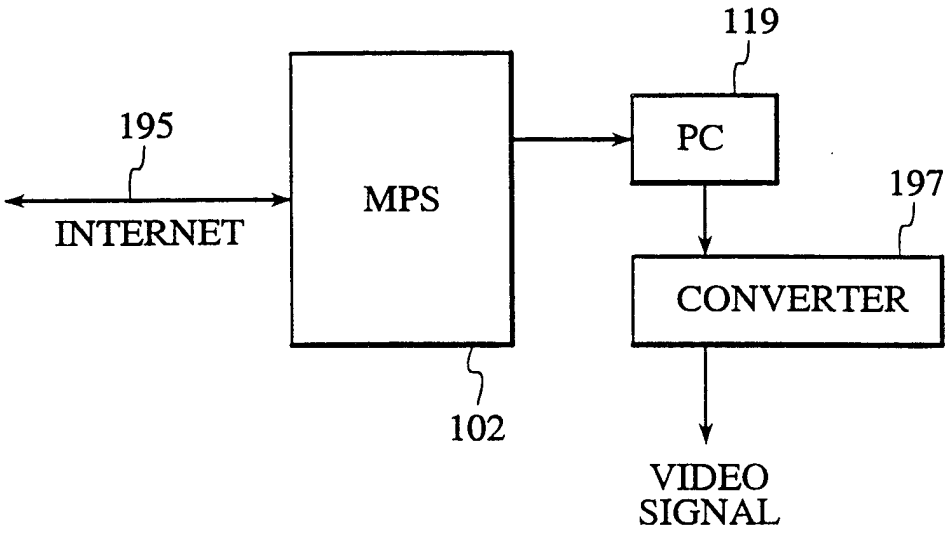

119
195
PC
MPS
197
INTERNET
CONVERTER
102
VIDEO
SIGNAL

FIG. 2B

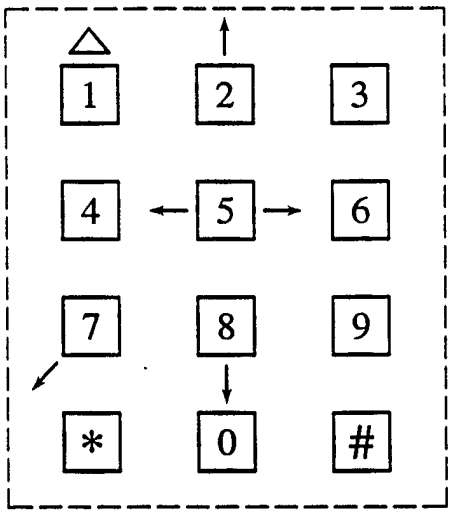

1
2
3
4
5
6
7
8
9
*
0
#

FIG. 2C

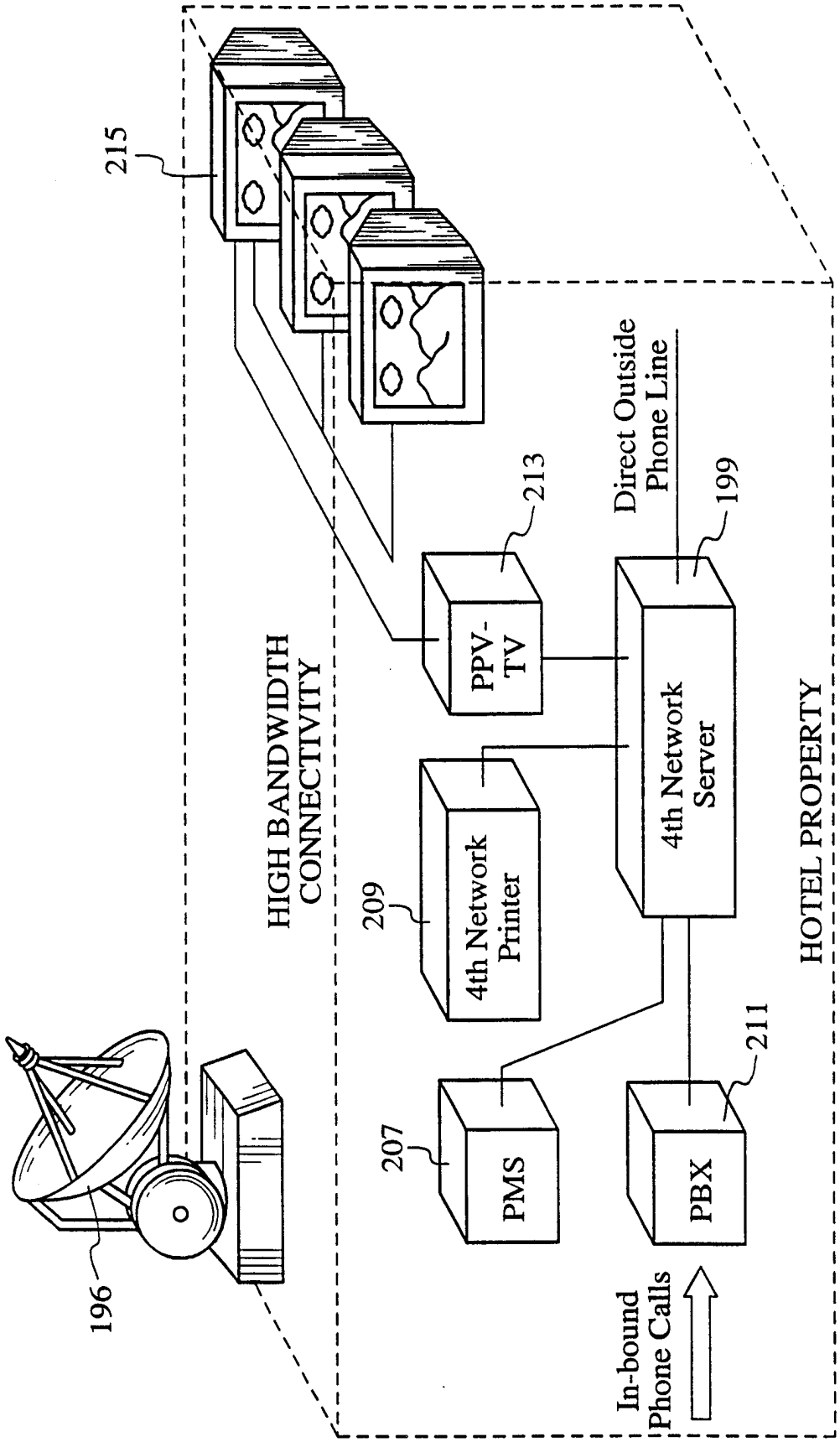
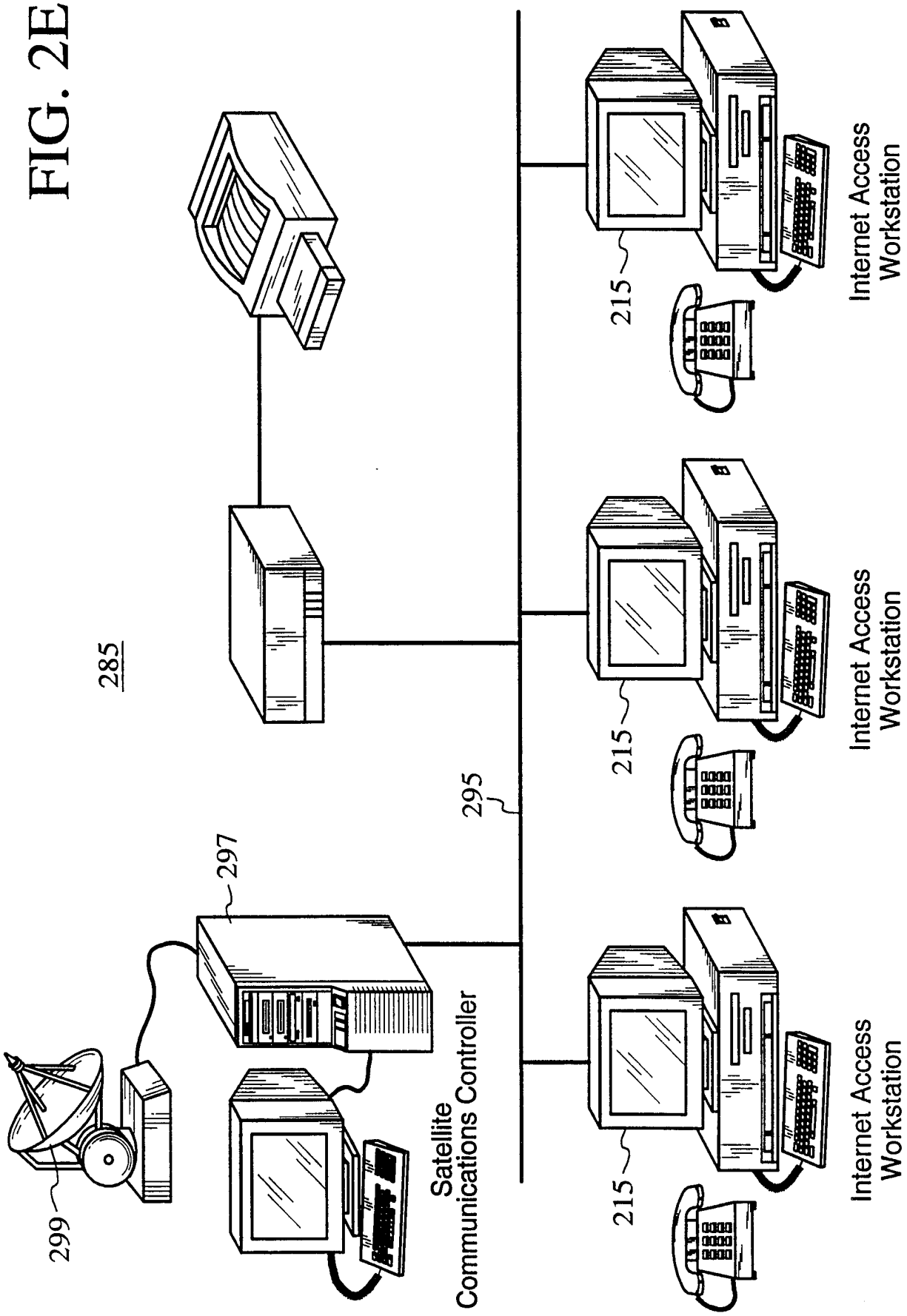

4th NETWORK
HOTEL PROPERTY
HIGH BANDWIDTH CONNECTIVITY
215
213
PPV-TV
Direct Outside Phone Line
199
4th Network Server
209
4th Network Printer
207
PMS
211
PBX
In-bound Phone Calls
196

FIG. 2D

FIG. 2E


285
295
297
299
215
215
215
Satellite
Communications Controller
Internet Access
Workstation
Internet Access
Workstation
Internet Access
Workstation

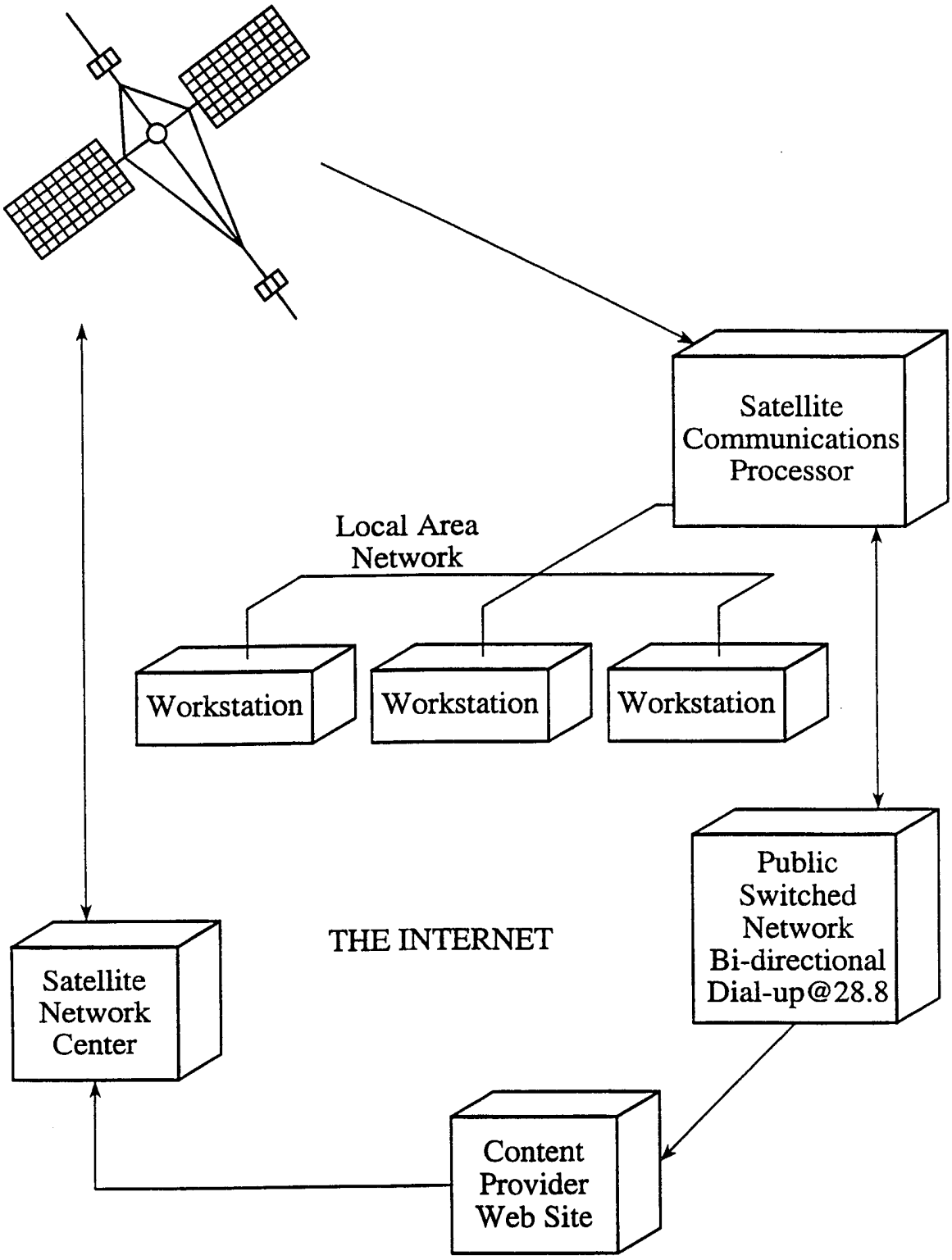

Satellite
Communications
Processor
Local Area
Network
Workstation
Workstation
Workstation
Public
Switched
Network
Bi-directional
Dial-up@28.8
THE INTERNET
Satellite
Network
Center
Content
Provider
Web Site

FIG. 2F

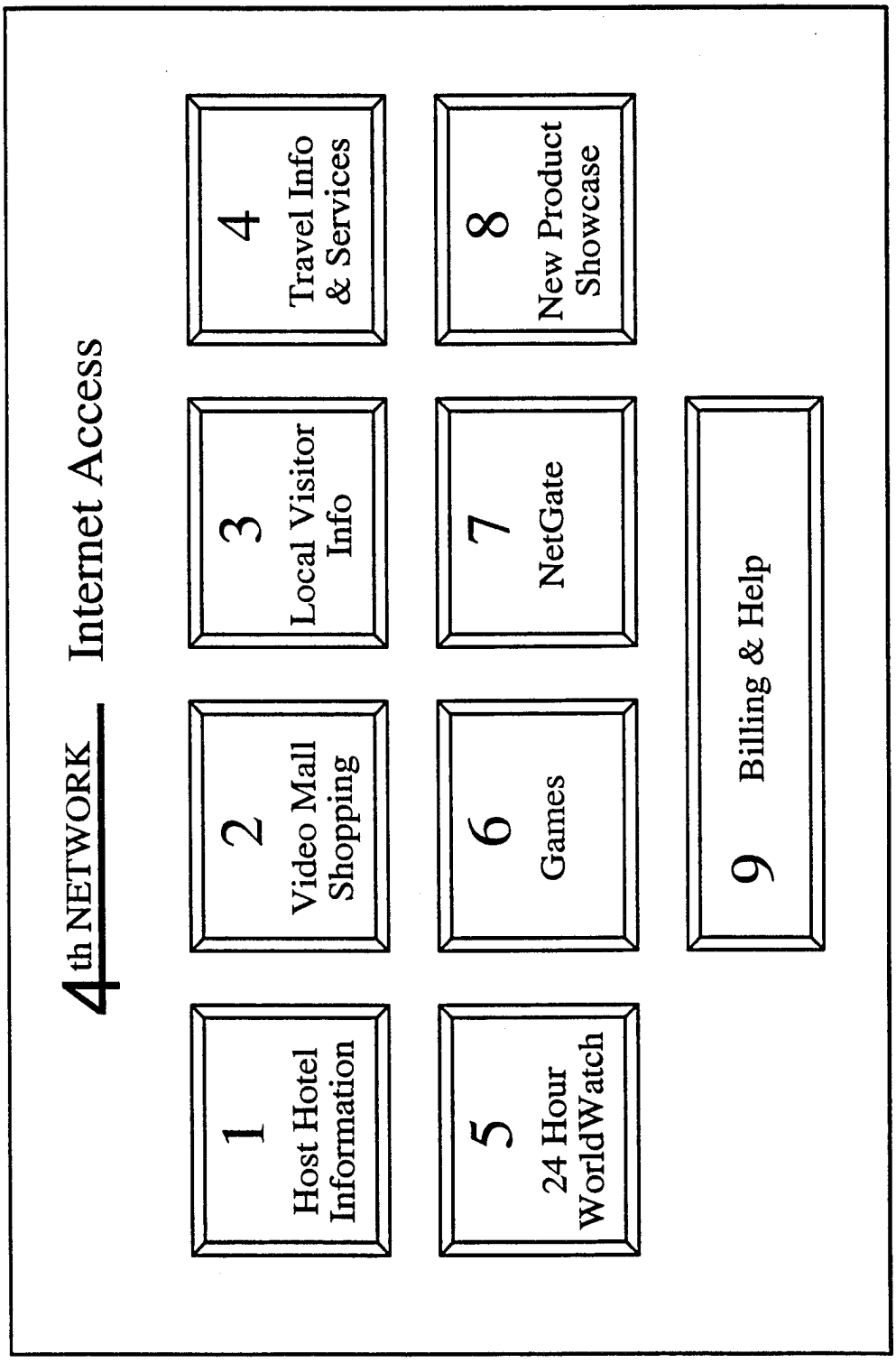

4th NETWORK
Internet Access
1
Host Hotel Information
2
Video Mall Shopping
3
Local Visitor Info
4
Travel Info & Services
5
24 Hour WorldWatch
6
Games
7
NetGate
8
New Product Showcase
9
Billing & Help

FIG. 2G

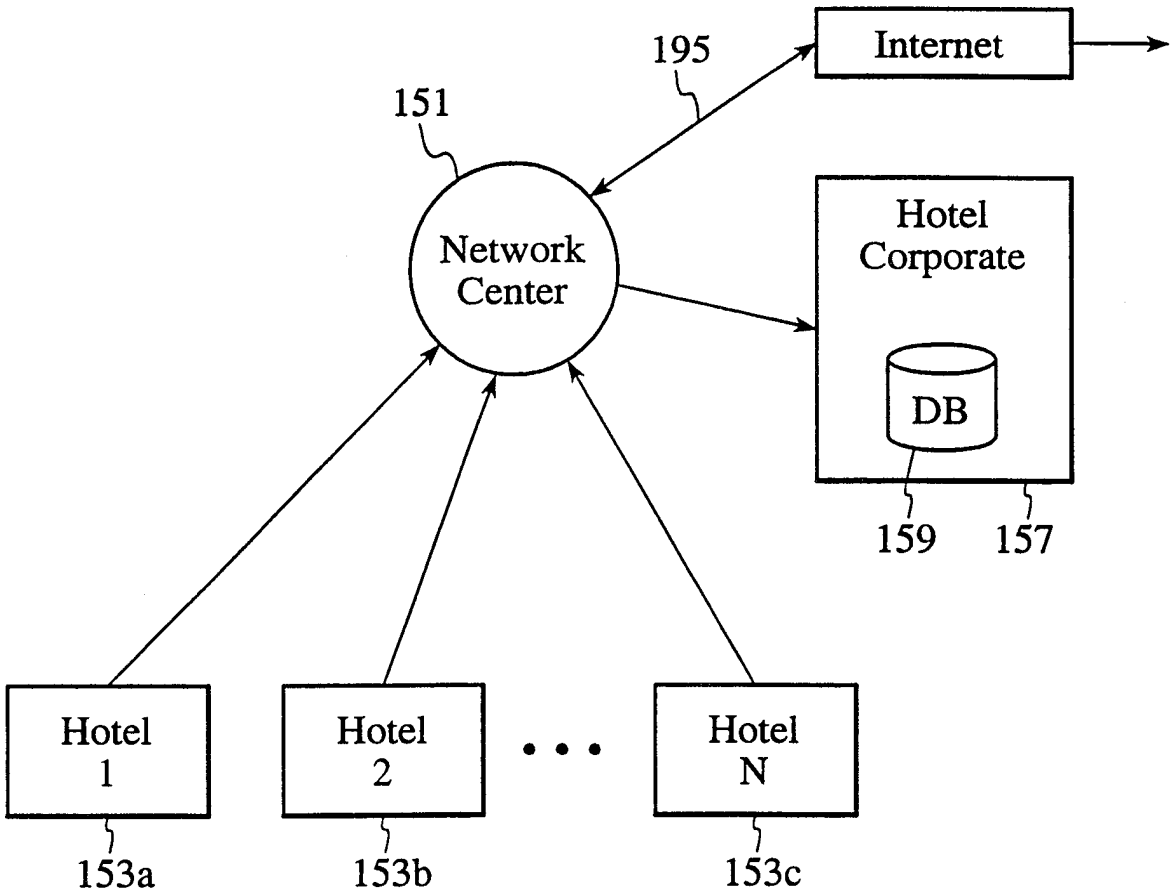

Internet
195
151
Network Center
Hotel Corporate
DB
159
157
Hotel 1
Hotel 2
Hotel N
153a
153b
153c

FIG. 2H

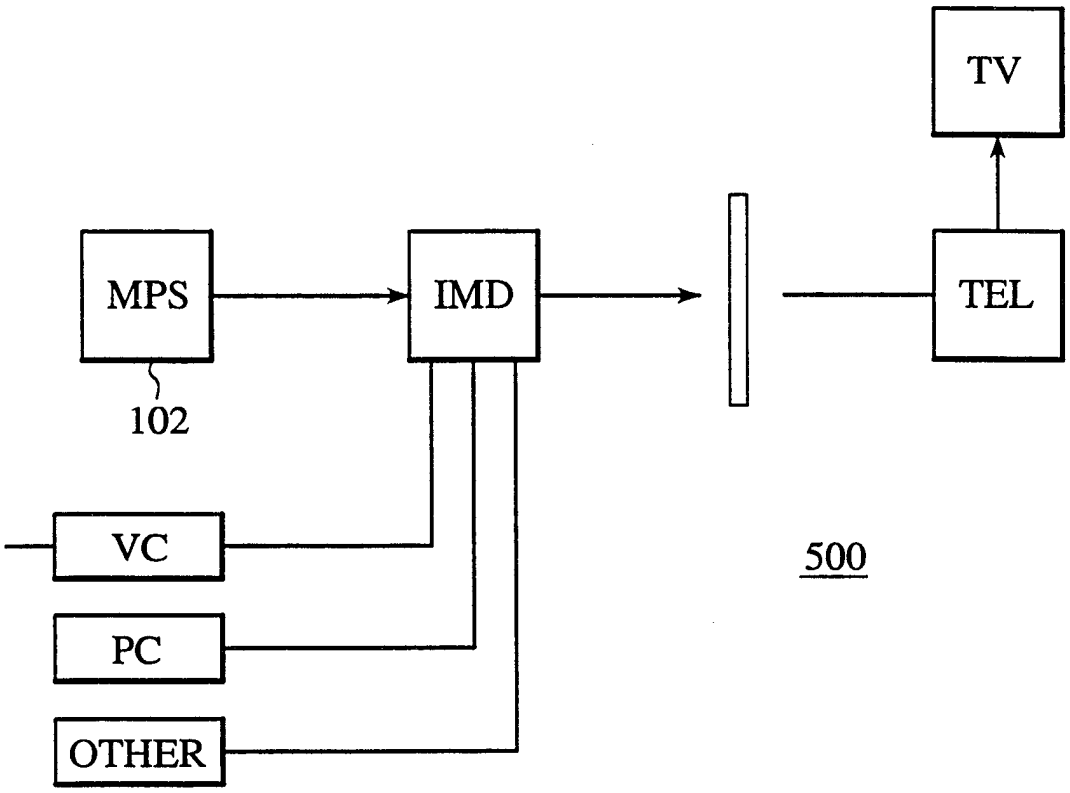


FIG. 2I

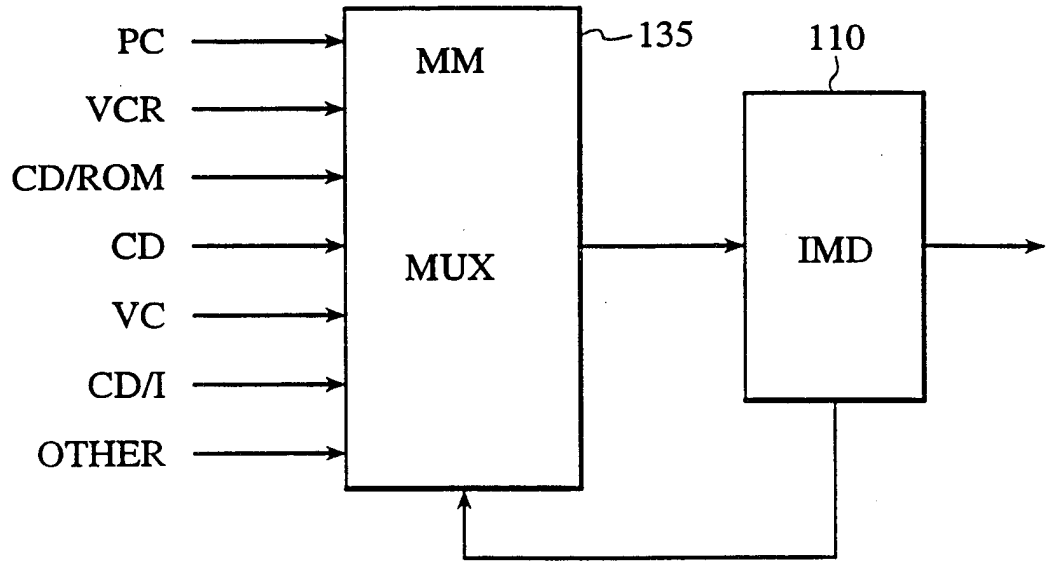

PC
VCR
CD/ROM
CD
VC
CD/I
OTHER
MM
MUX
135
110
IMD

FIG. 2J

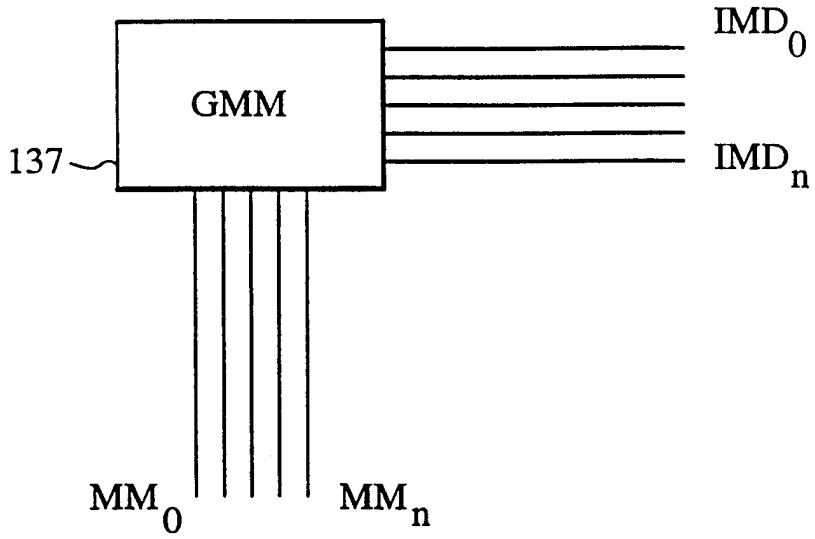

GMM
137
IMD0
IMDn
MM0
MMn

FIG. 2K

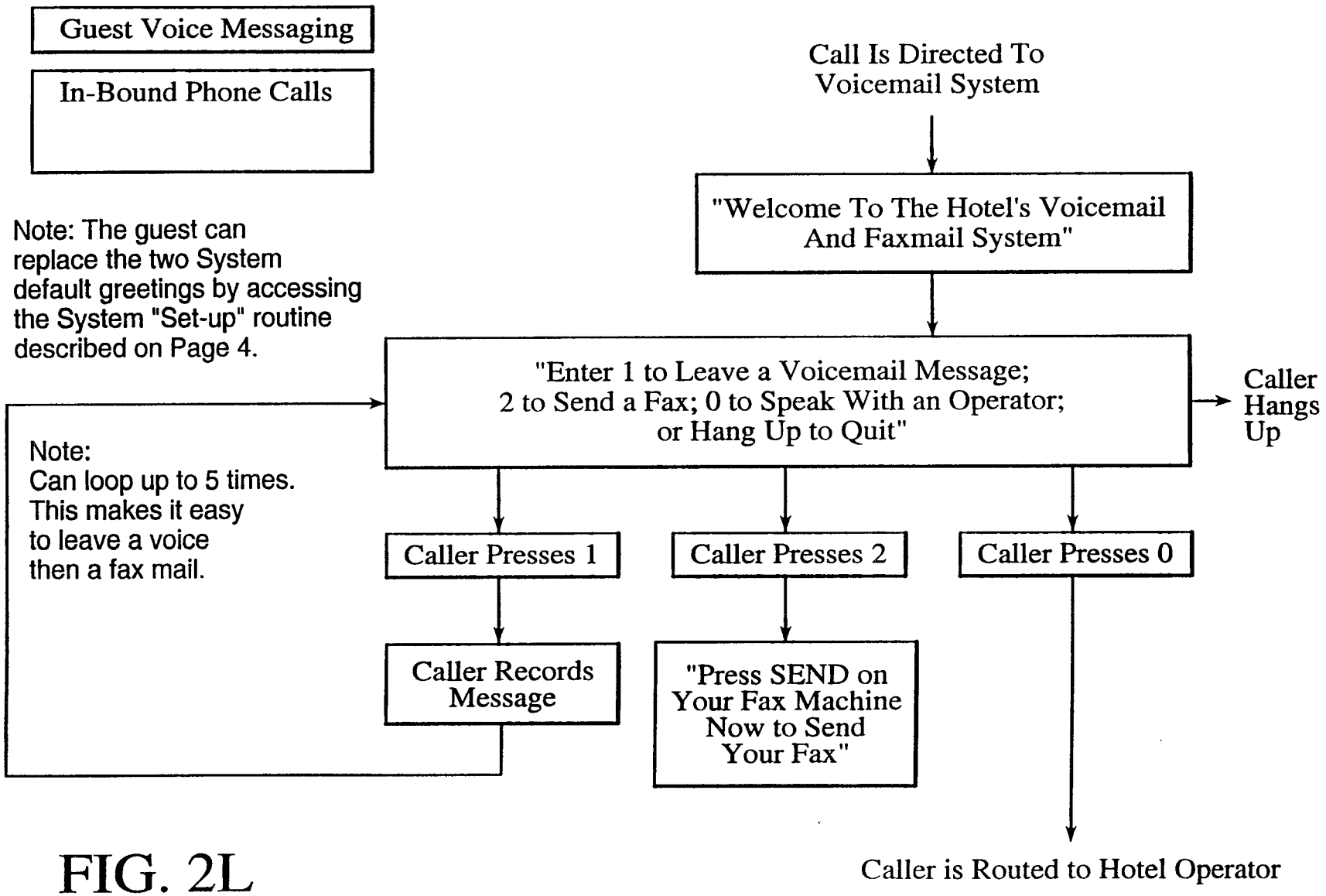


FIG. 2L

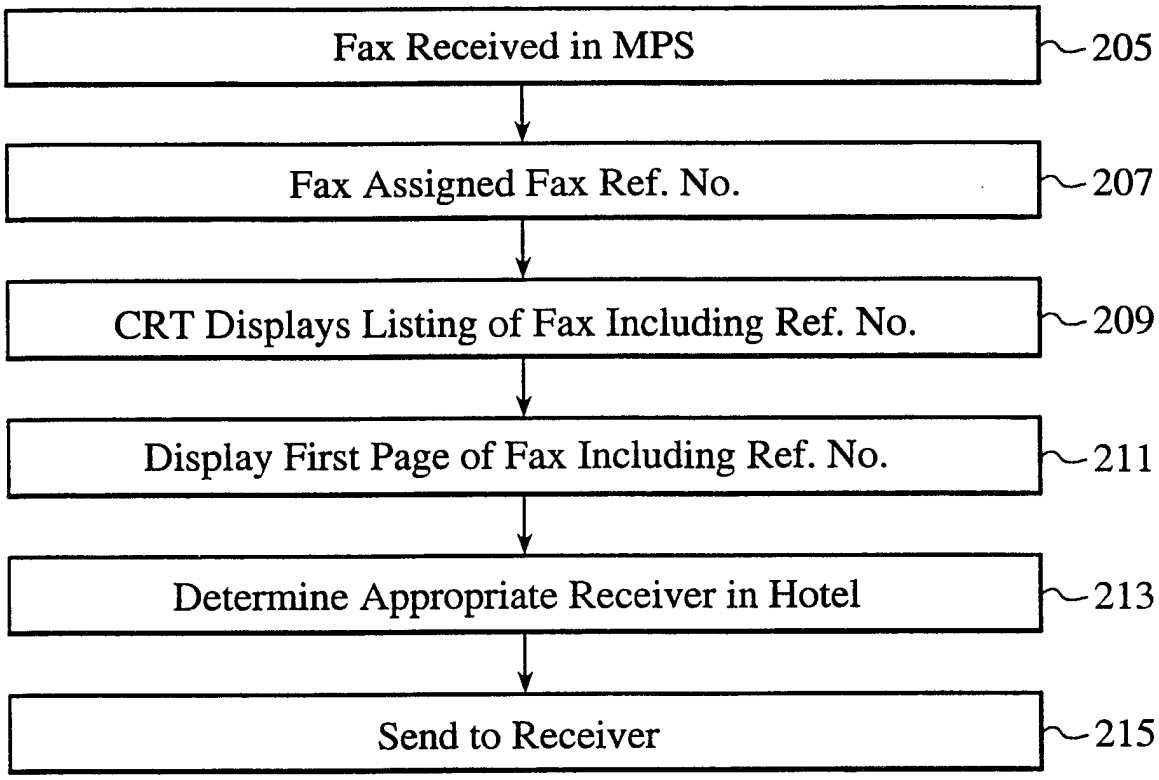
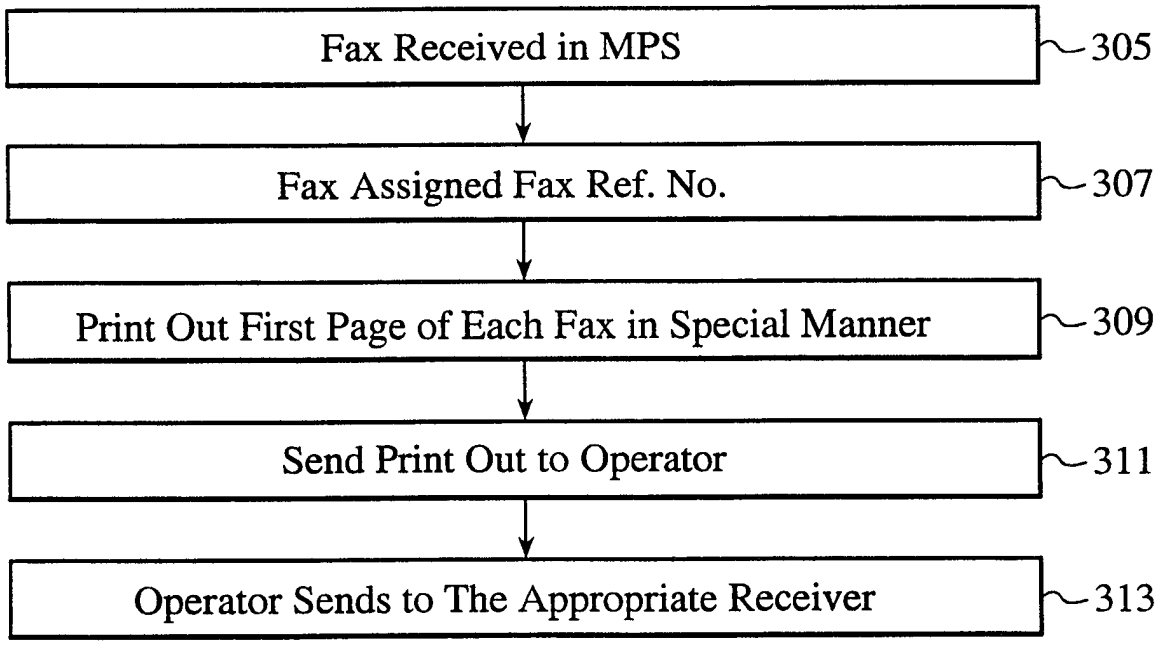

Fax Received in MPS
205
Fax Assigned Fax Ref. No.
207
CRT Displays Listing of Fax Including Ref. No.
209
Display First Page of Fax Including Ref. No.
211
Determine Appropriate Receiver in Hotel
213
Send to Receiver
215

FIG. 2M


Fax Received in MPS
305
Fax Assigned Fax Ref. No.
307
Print Out First Page of Each Fax in Special Manner
309
Send Print Out to Operator
311
Operator Sends to The Appropriate Receiver
313

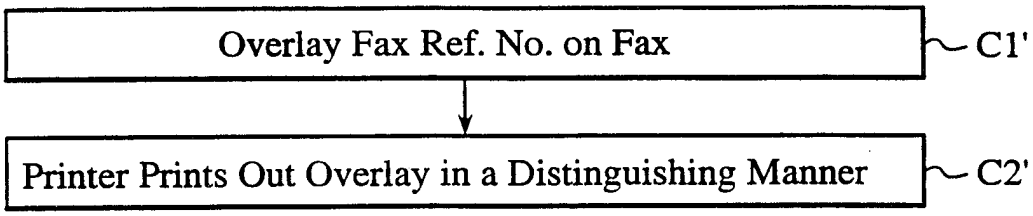

Overlay Fax Ref. No. on Fax
C1'
Printer Prints Out Overlay in a Distinguishing Manner
C2'

FIG. 2O

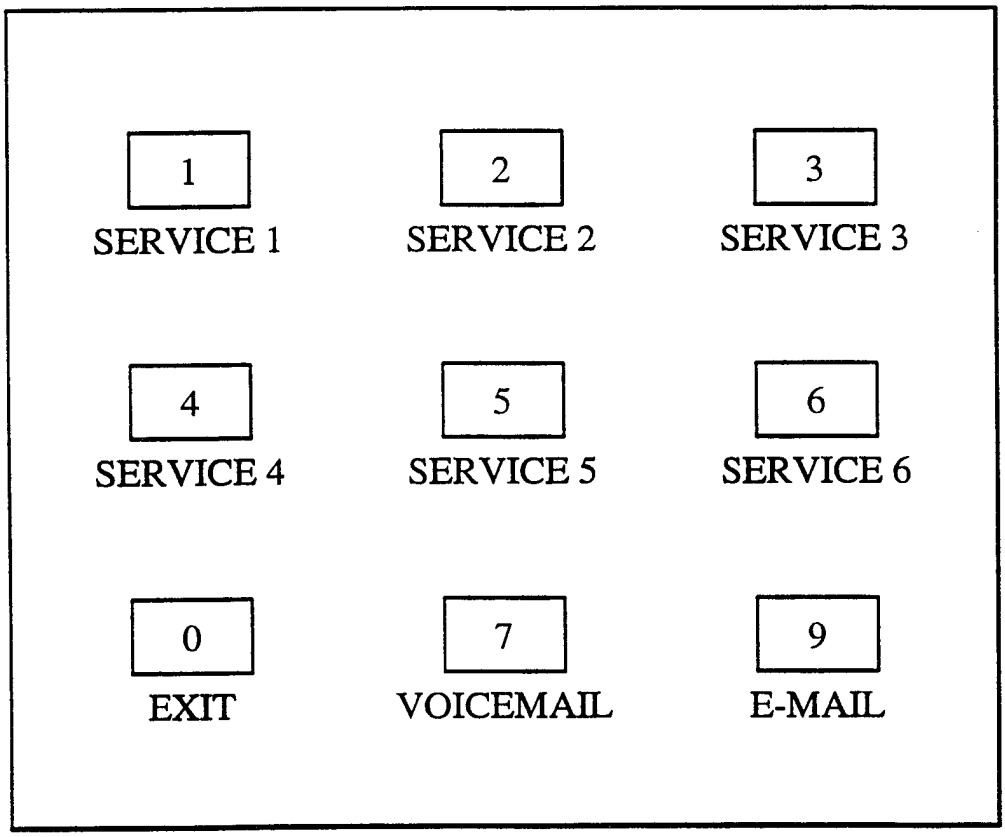

1
SERVICE 1
2
SERVICE 2
3
SERVICE 3
4
SERVICE 4
5
SERVICE 5
6
SERVICE 6
0
EXIT
7
VOICEMAIL
9
E-MAIL

FIG. 2P

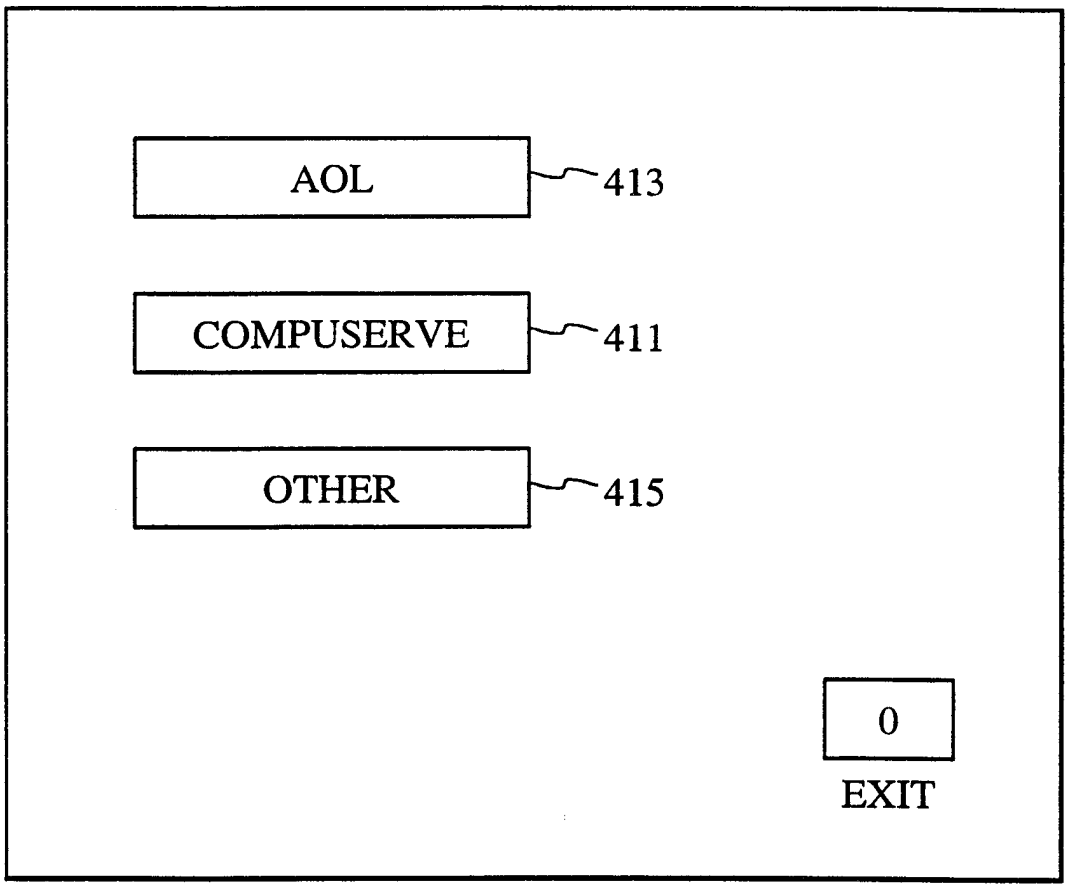


FIG. 2Q

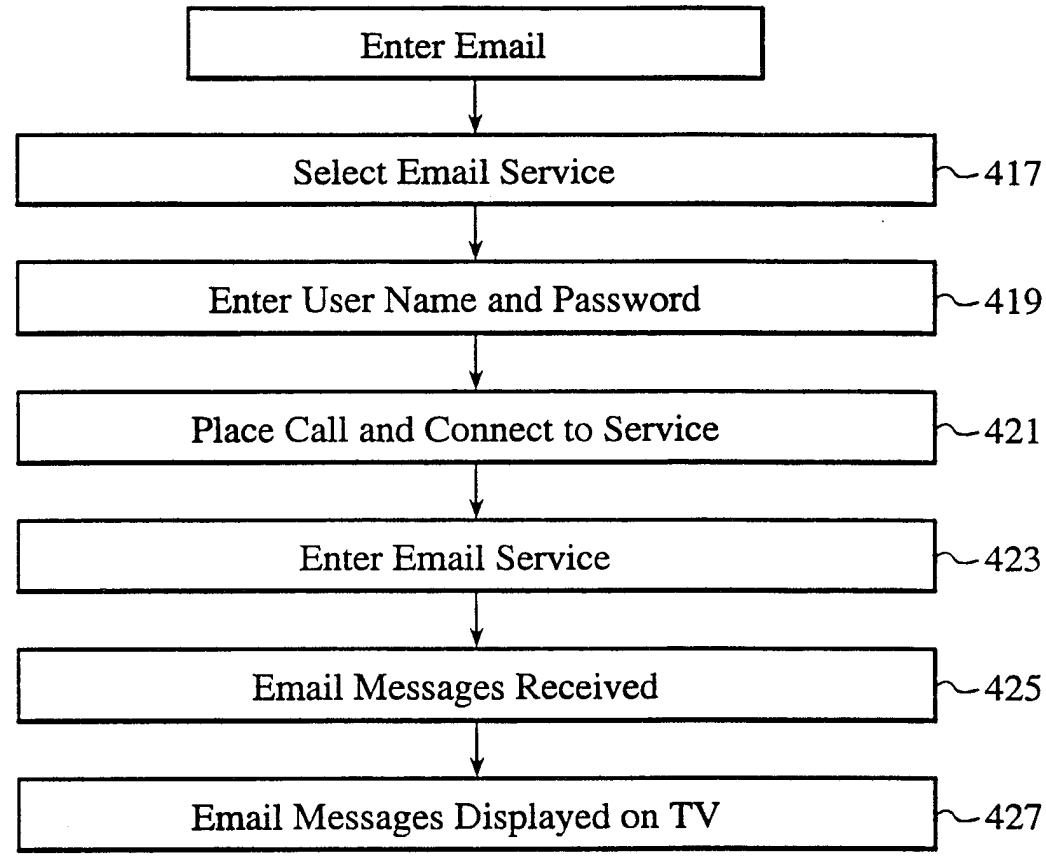

Enter Email
Select Email Service
417
Enter User Name and Password
419
Place Call and Connect to Service
421
Enter Email Service
423
Email Messages Received
425
Email Messages Displayed on TV
427

FIG. 2R

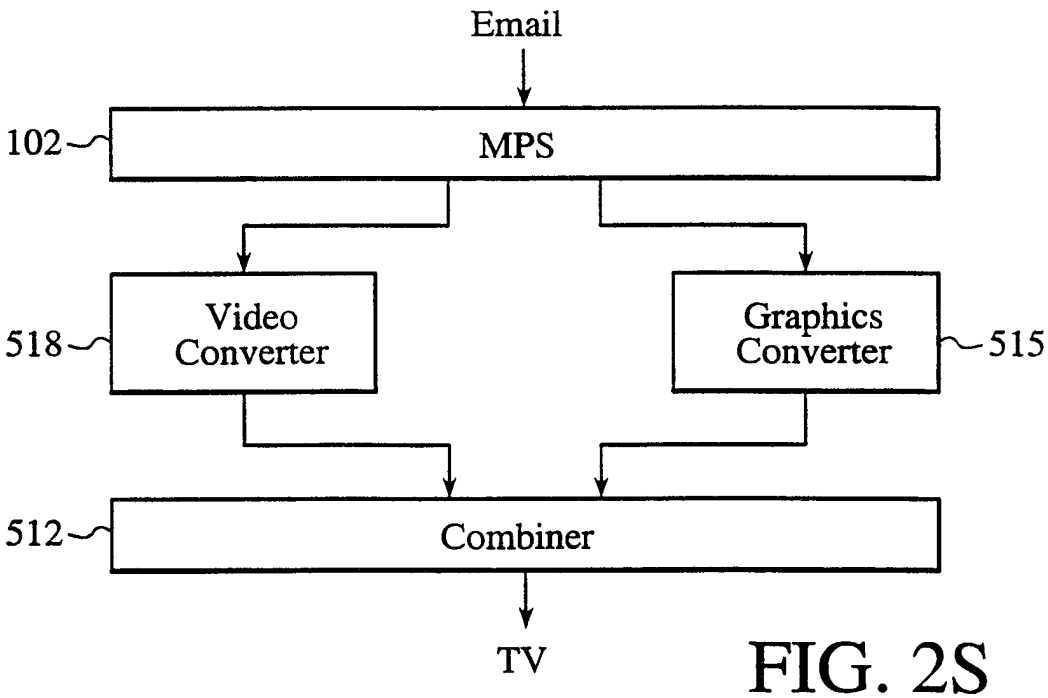

Email
102
MPS
518
Video Converter
Graphics Converter
515
512
Combiner
TV

FIG. 2S

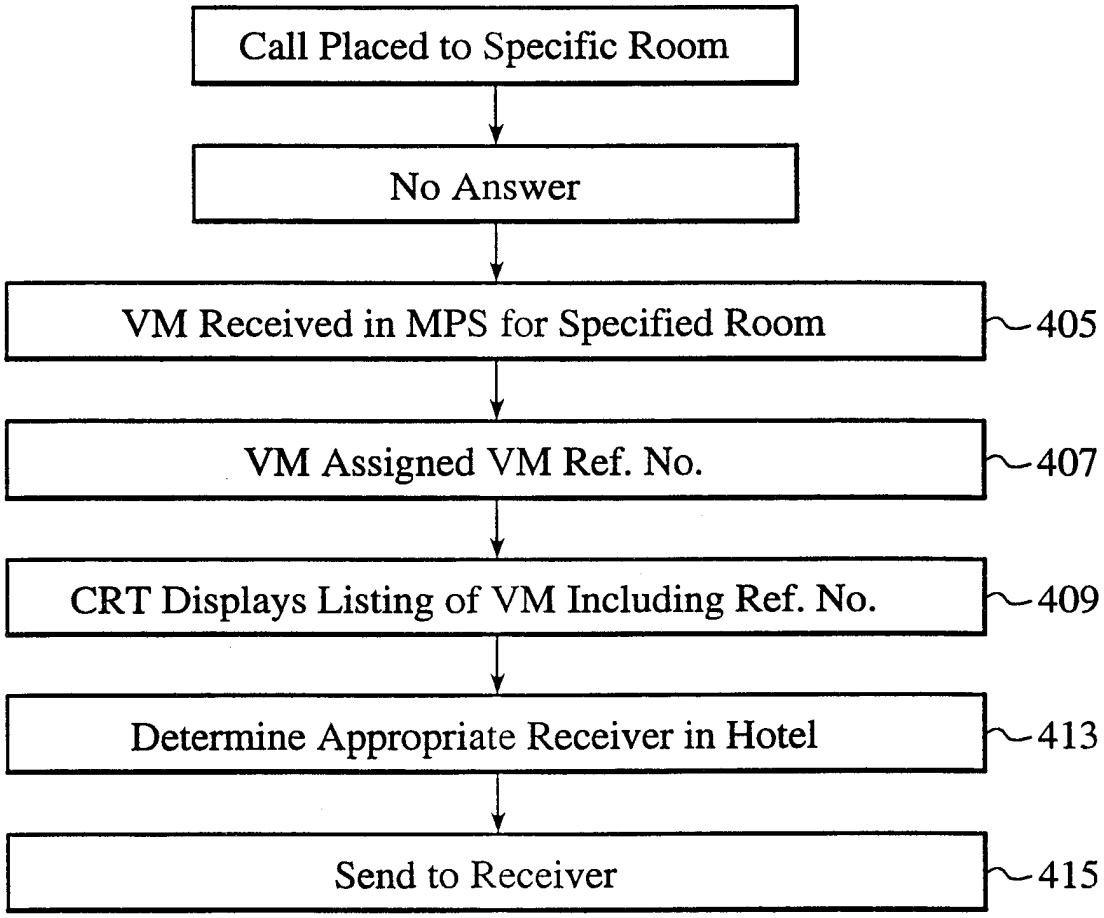

Call Placed to Specific Room
No Answer
VM Received in MPS for Specified Room
405
VM Assigned VM Ref. No.
407
CRT Displays Listing of VM Including Ref. No.
409
Determine Appropriate Receiver in Hotel
413
Send to Receiver
415

FIG. 2T

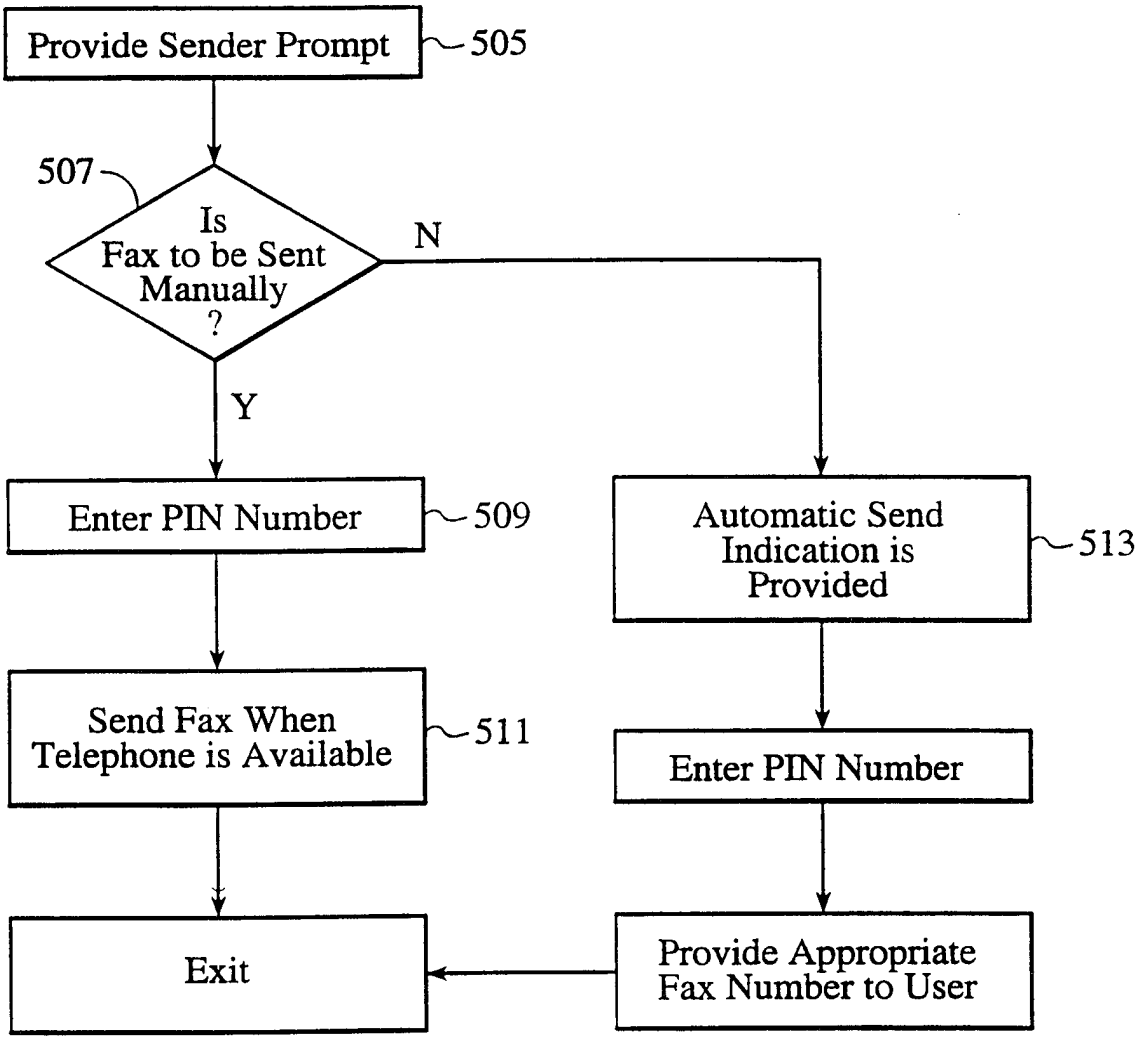

Provide Sender Prompt
505
507
Is Fax to be Sent Manually ?
N
Y
Enter PIN Number
509
Automatic Send Indication is Provided
513
Send Fax When Telephone is Available
511
Enter PIN Number
Exit
Provide Appropriate Fax Number to User

FIG. 2U

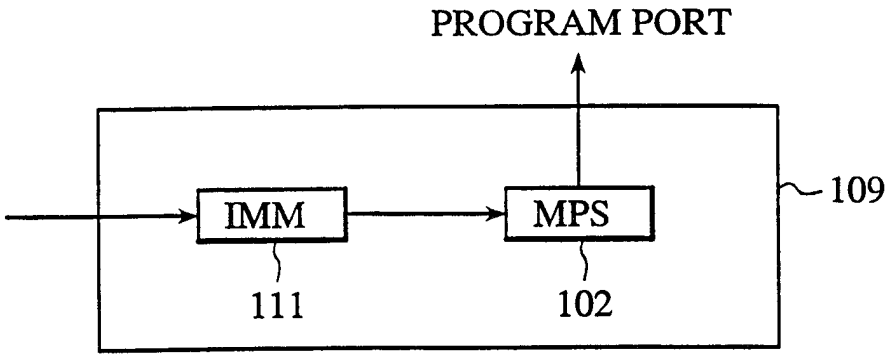

PROGRAM PORT
IMM
MPS
109
111
102

FIG. 2V

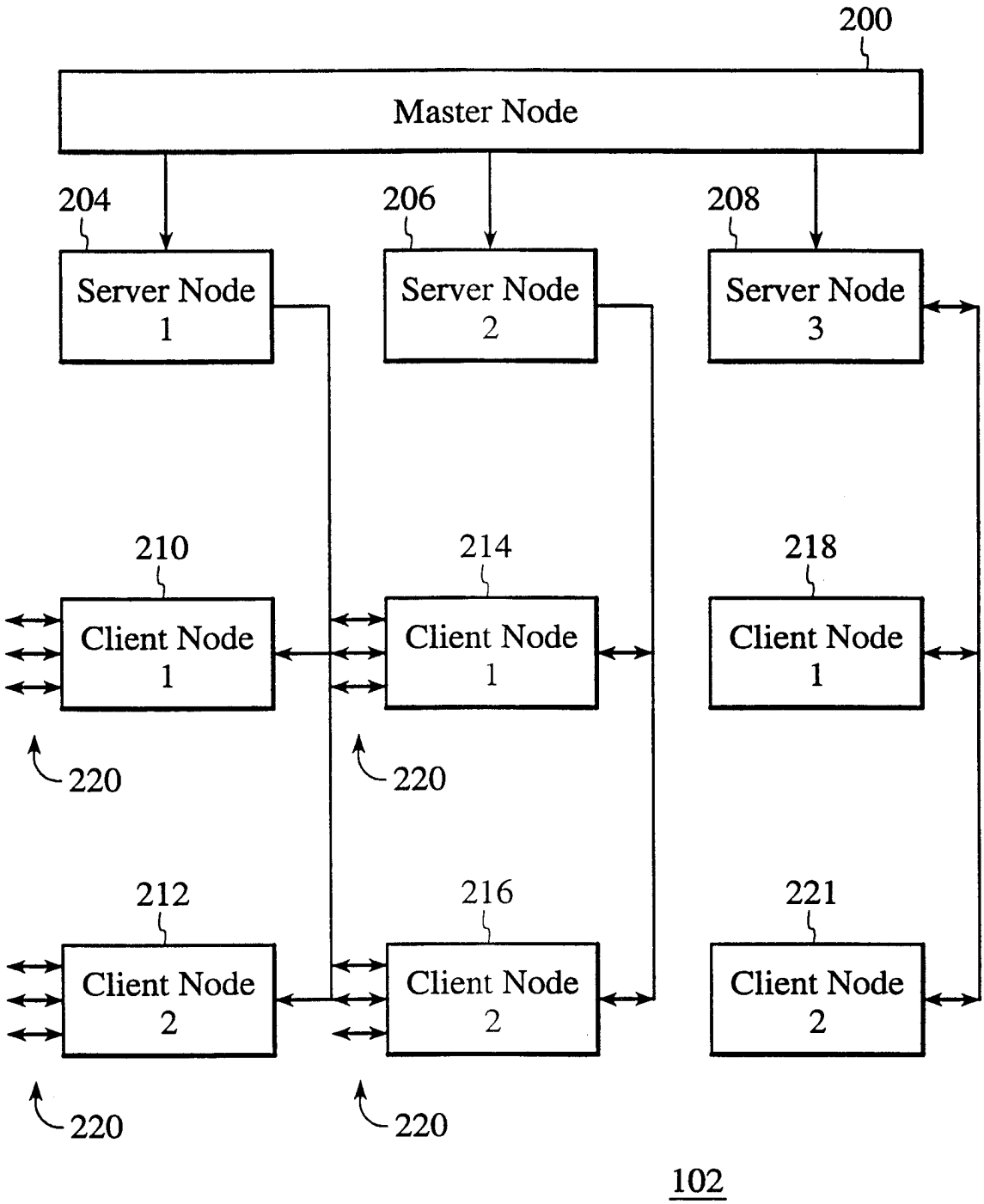

200
Master Node
204
206
208
Server Node 1
Server Node 2
Server Node 3
210
214
218
Client Node 1
Client Node 1
Client Node 1
220
220
212
216
221
Client Node 2
Client Node 2
Client Node 2
220
220
102

FIG. 3

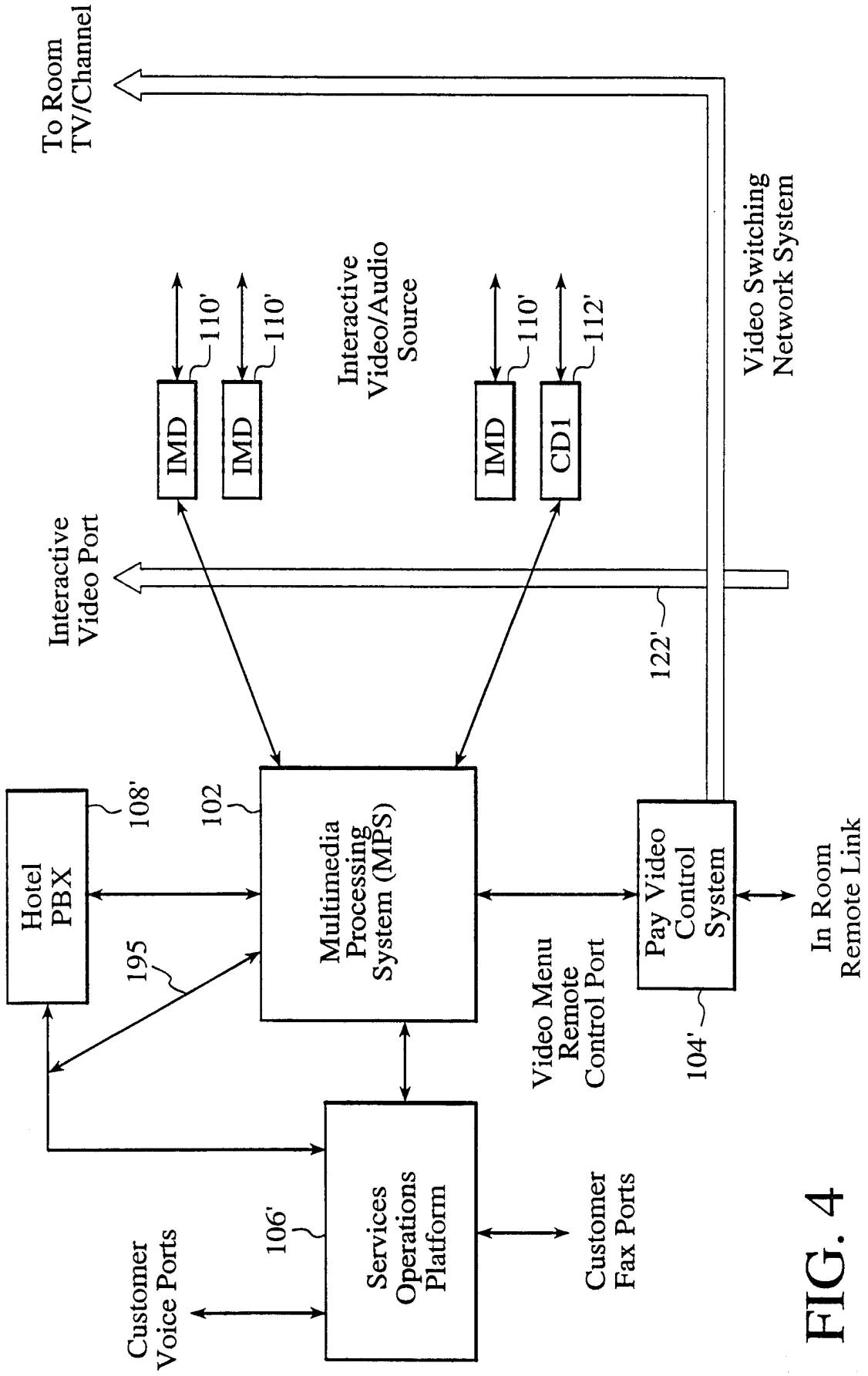

To Room TV/Channel
Video Switching Network System
Interactive Video/Audio Source
IMD
110'
IMD
110'
IMD
110'
CD1
112'
Interactive Video Port
122'
Hotel PBX
108'
102
Multimedia Processing System (MPS)
195
Pay Video Control System
In Room Remote Link
Video Menu Remote Control Port
104'
Services Operations Platform
106'
Customer Voice Ports
Customer Fax Ports

FIG. 4

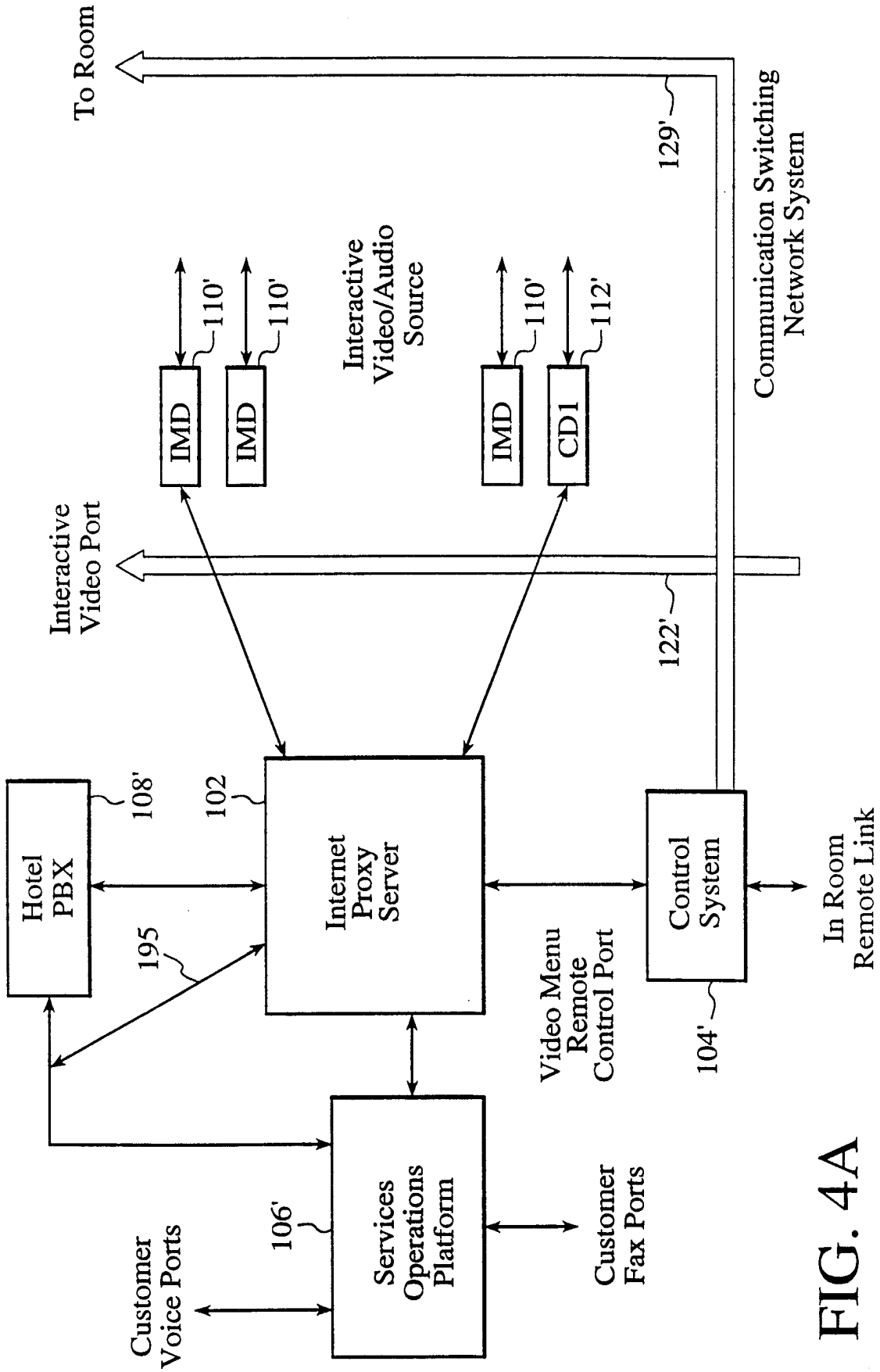

To Room
129'
Communication Switching Network System
Interactive Video/Audio Source
IMD
110'
IMD
110'
IMD
110'
CD1
112'
Interactive Video Port
122'
Hotel PBX
108'
102
Internet Proxy Server
195
Control System
In Room Remote Link
Video Menu Remote Control Port
104'
Services Operations Platform
106'
Customer Voice Ports
Customer Fax Ports

FIG. 4A

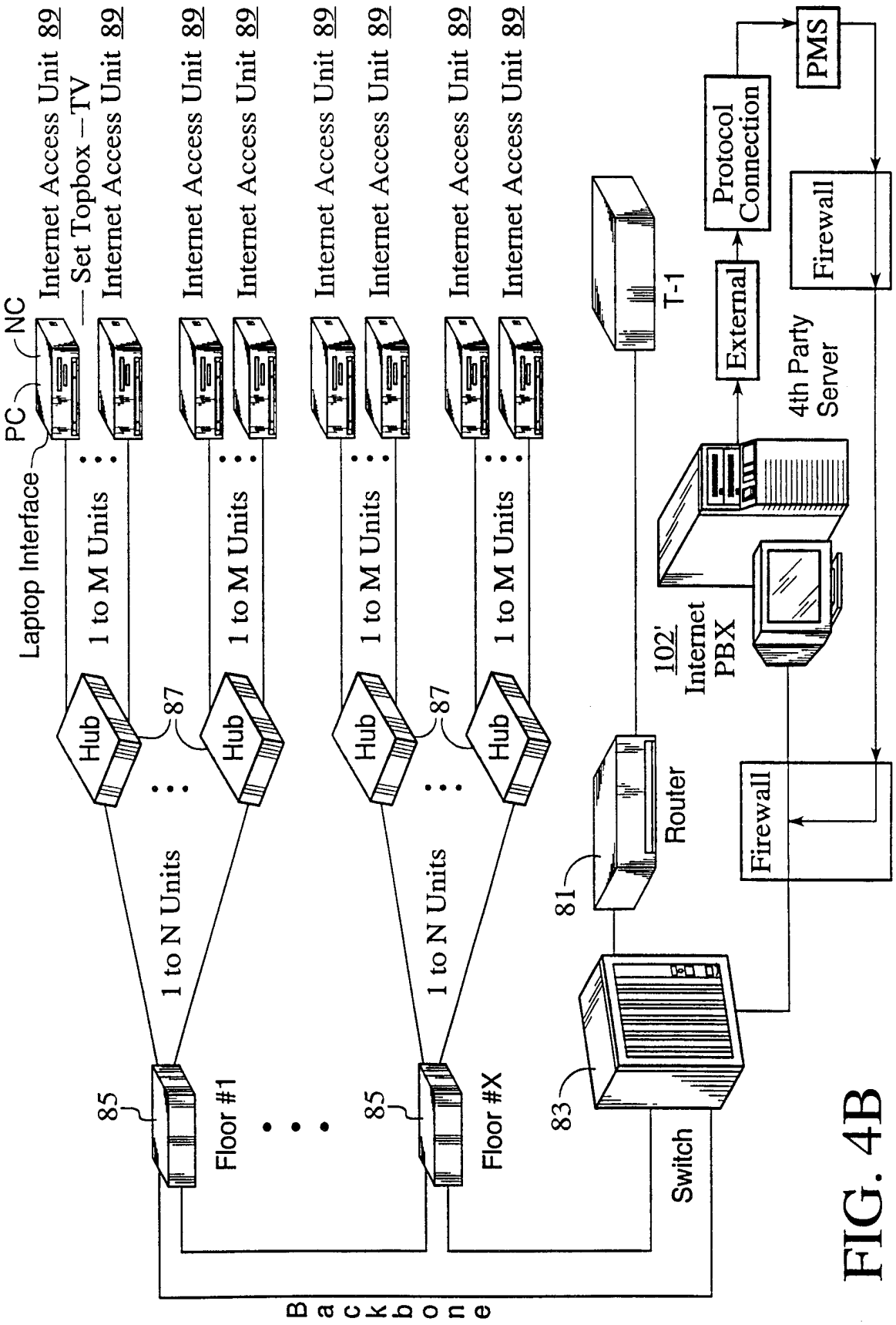

Internet Access Unit 89
Set Topbox – TV
Internet Access Unit 89
NC
PC
Laptop Interface
1 to M Units
Hub
87
1 to N Units
85
Floor #1
Floor #X
Backbone
Switch
83
Router
81
T-1
102'
Internet PBX
External
Protocol Connection
4th Party Server
Firewall
PMS

FIG. 4B

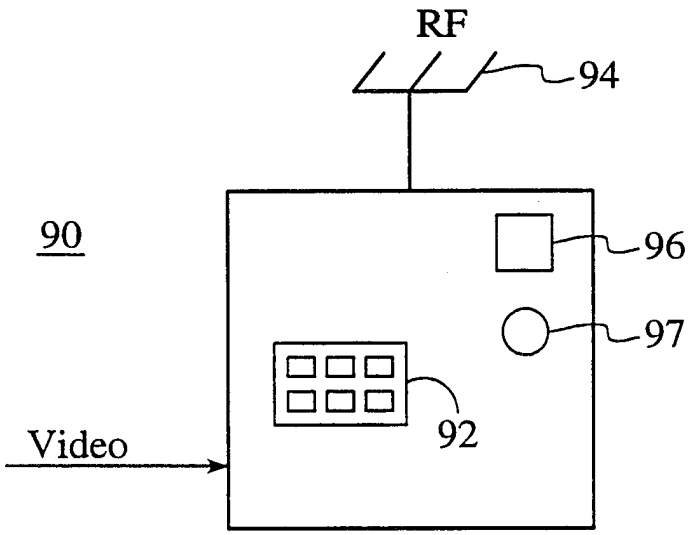


FIG. 4C

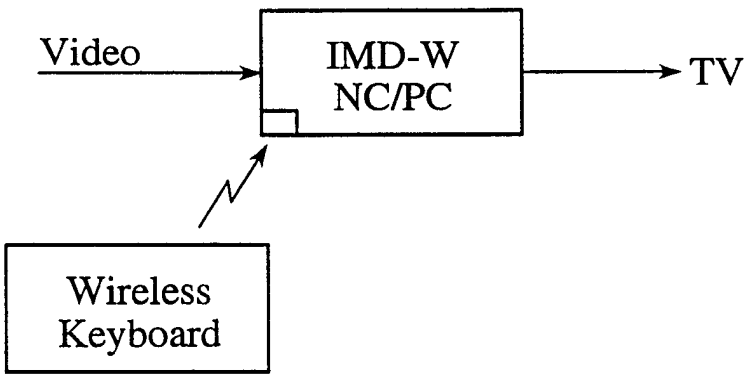


FIG. 4D

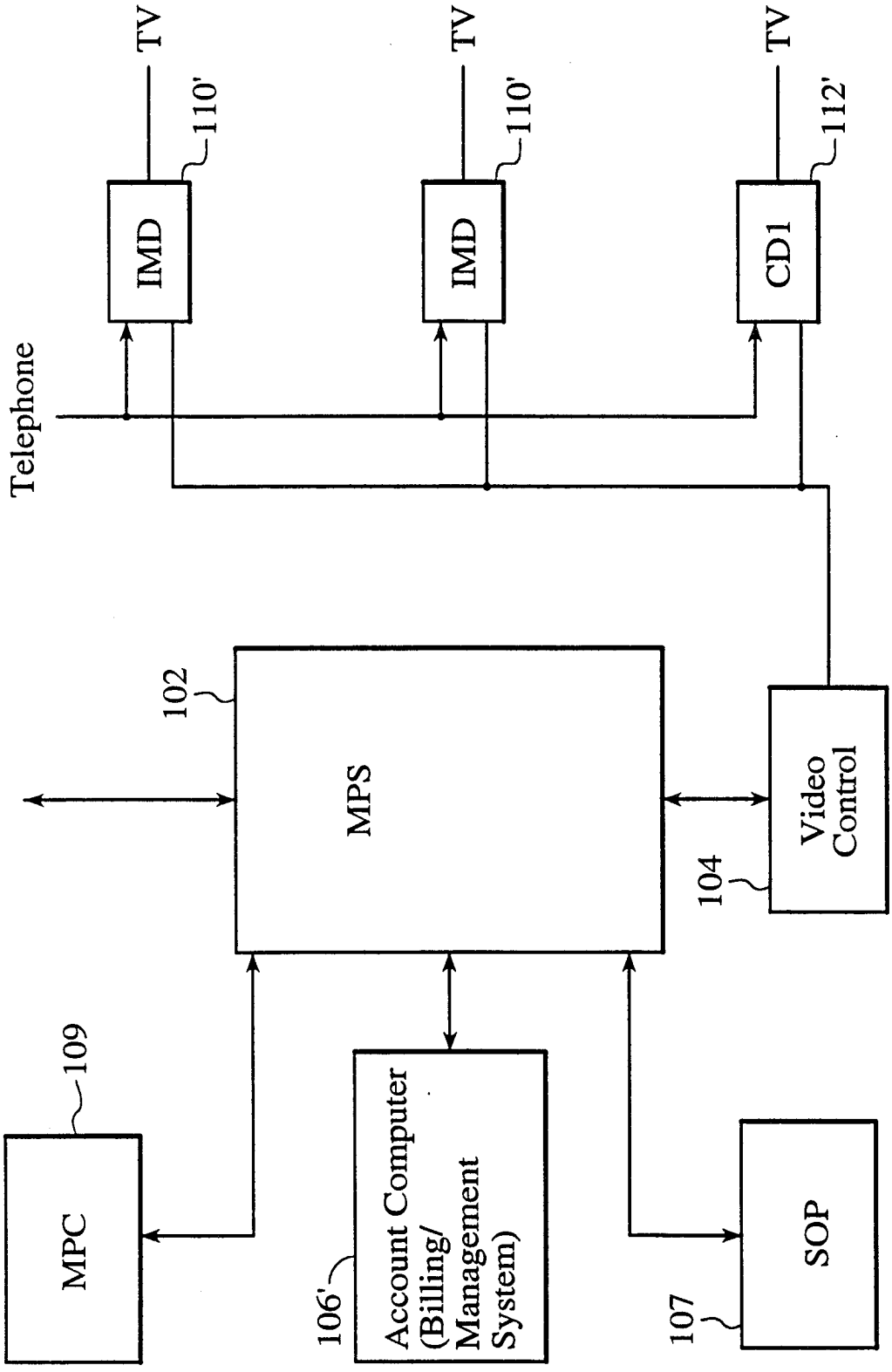

TV
110'
IMD
TV
110'
IMD
TV
112'
CD1
Telephone
102
MPS
Video Control
104
109
MPC
106'
Account Computer (Billing/ Management System)
107
SOP

FIG. 5

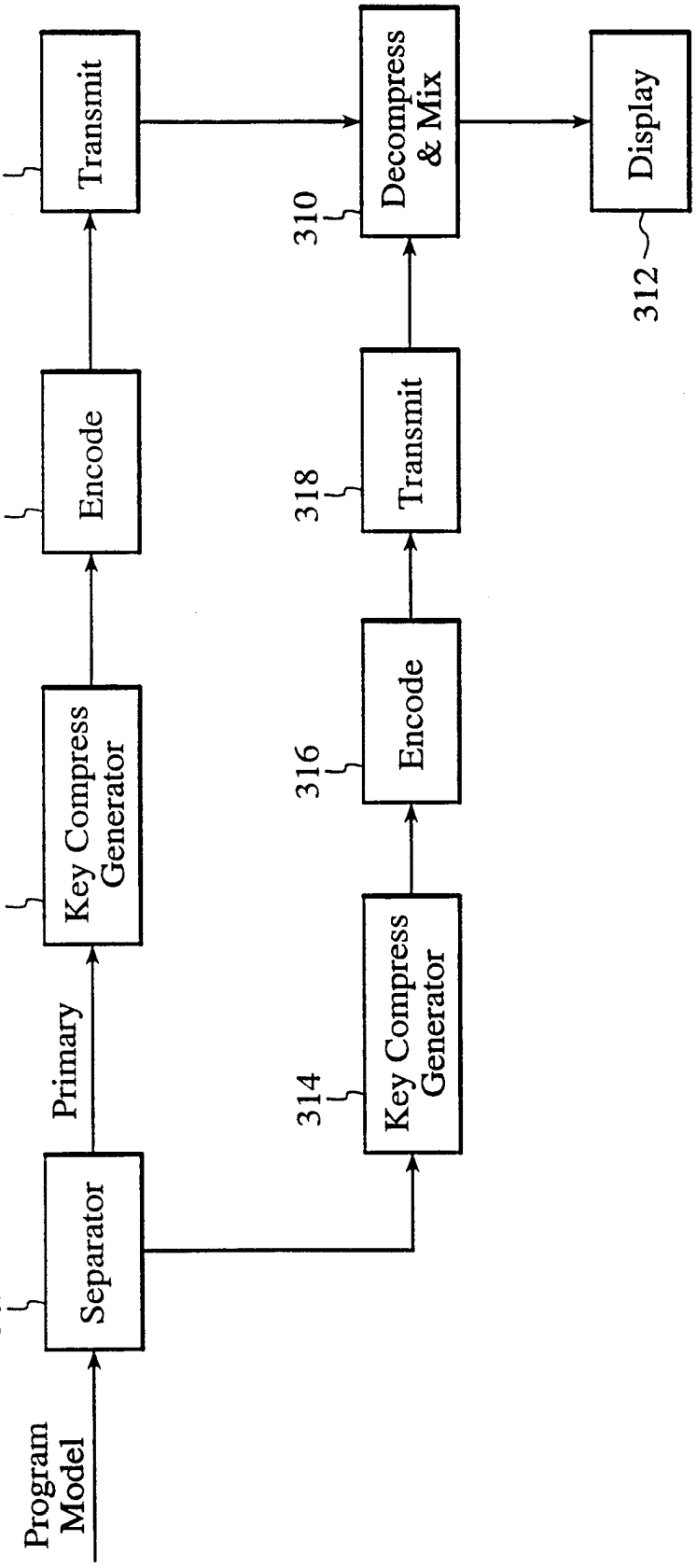

Program Model
302
Separator
Primary
304
Key Compress Generator
306
Encode
308
Transmit
314
Key Compress Generator
316
Encode
318
Transmit
310
Decompress & Mix
312
Display

FIG. 6

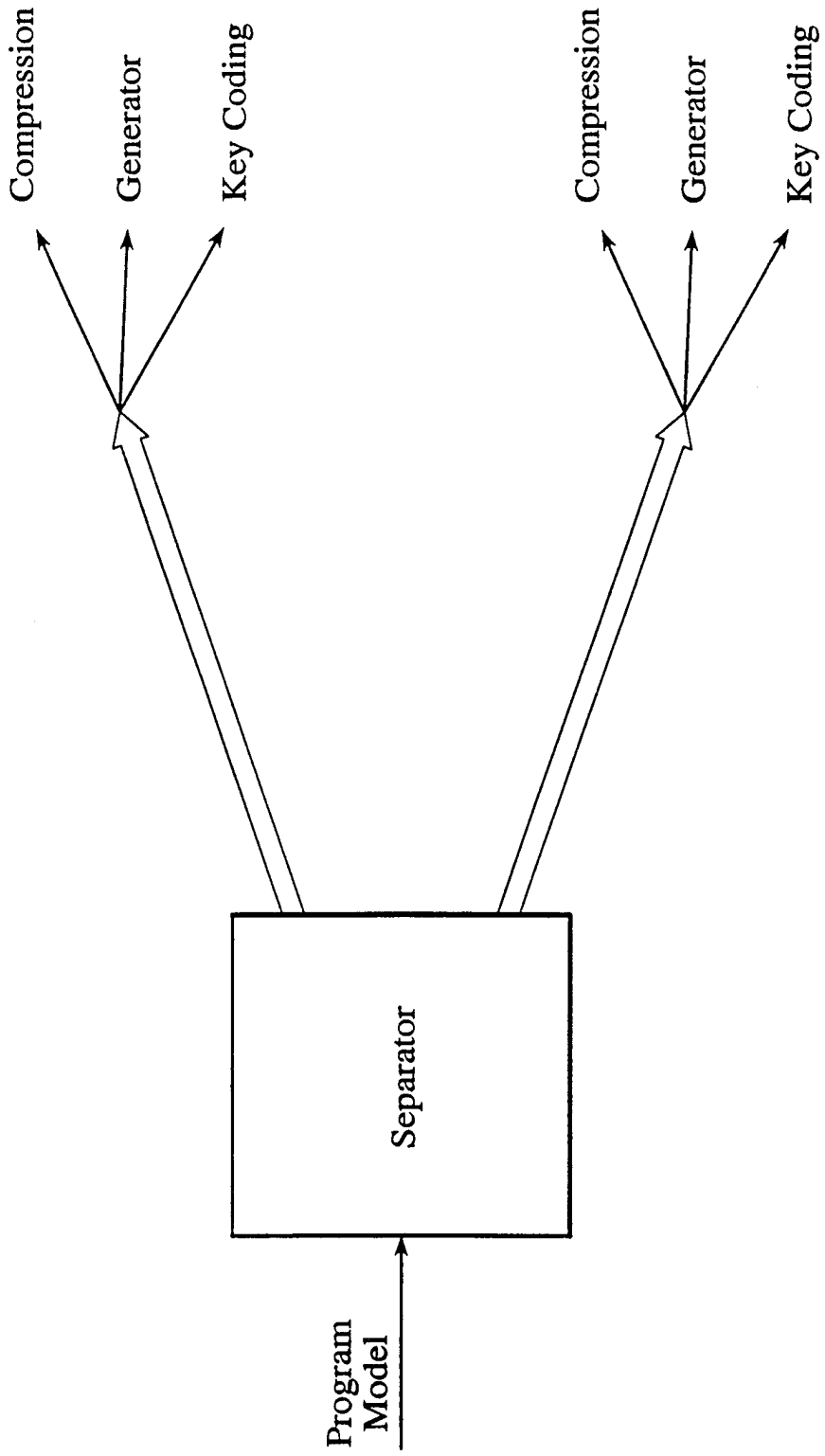

Compression
Generator
Key Coding
Compression
Generator
Key Coding
Separator
Program
Model

FIG. 7

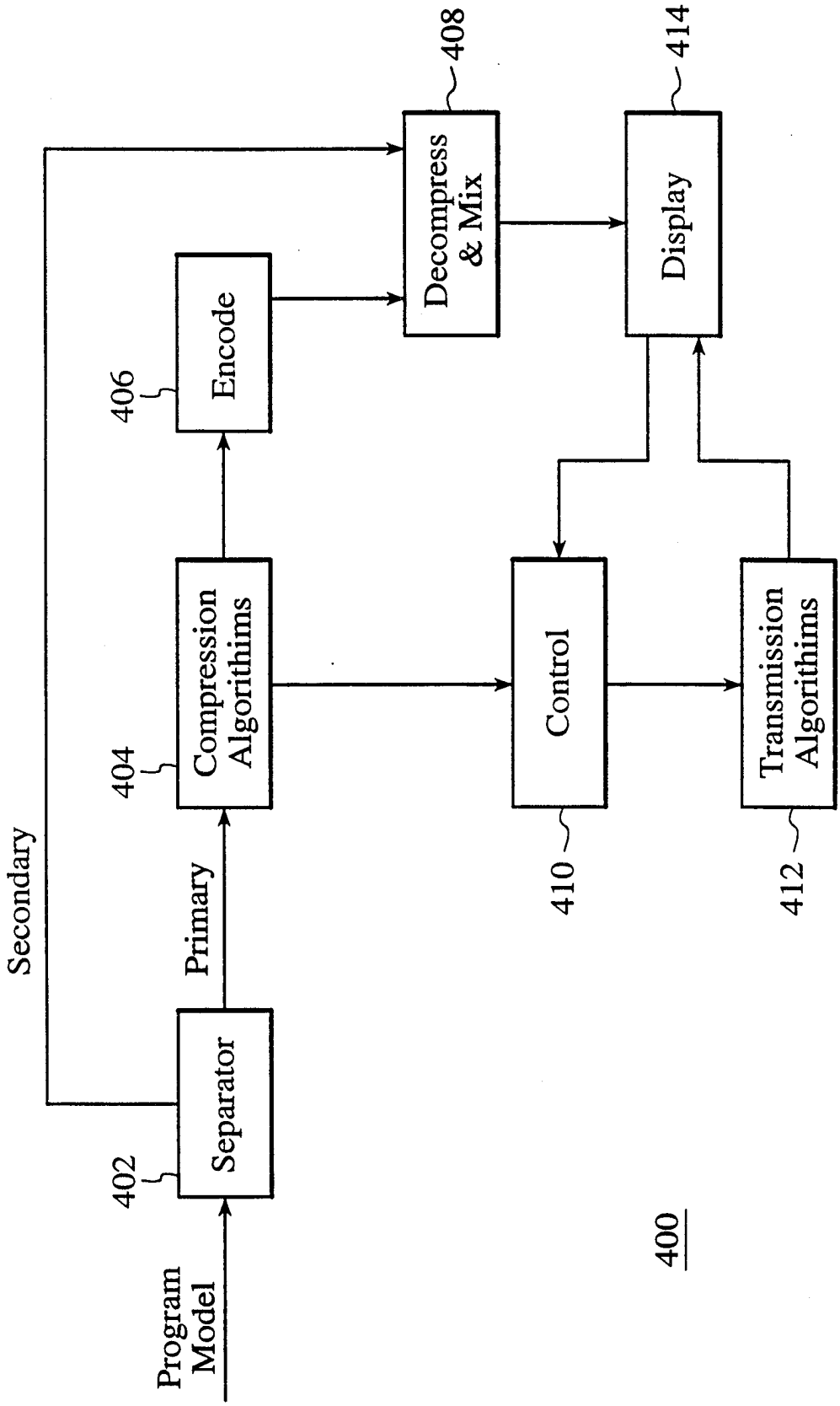

Program Model
Separator
402
Secondary
Primary
Compression Algorithims
404
Encode
406
Decompress & Mix
408
Control
410
Transmission Algorithims
412
Display
414
400

FIG. 8

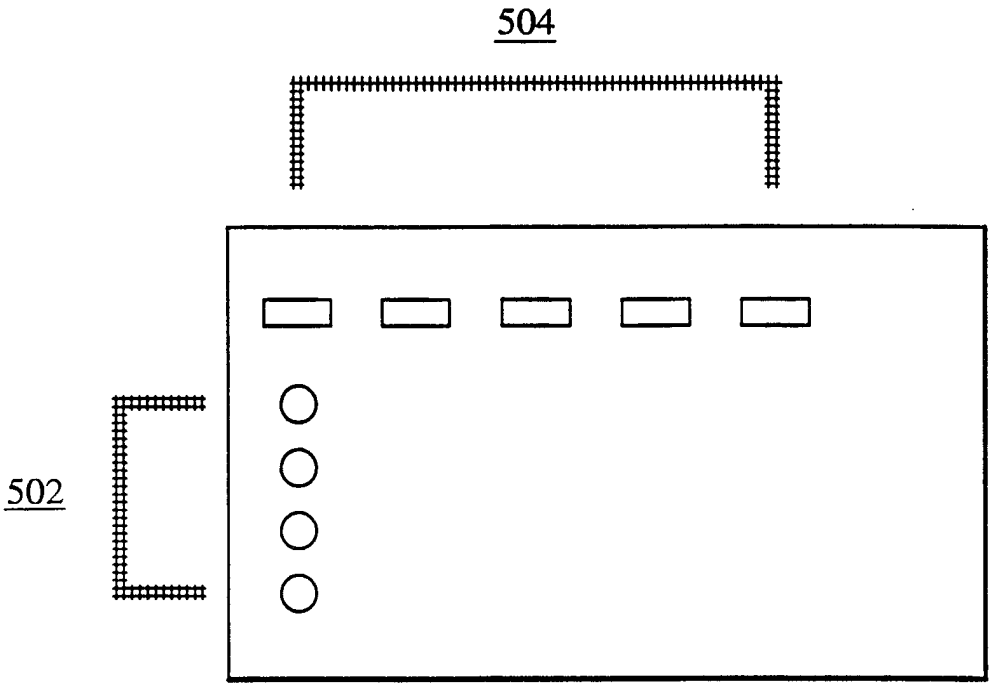


FIG. 9

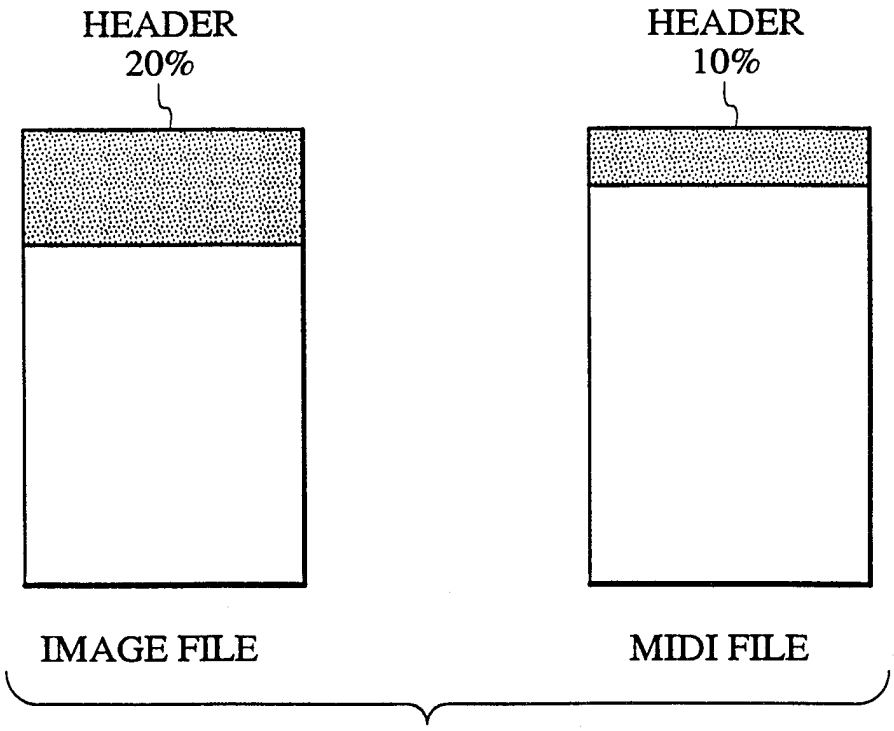


FIG. 10

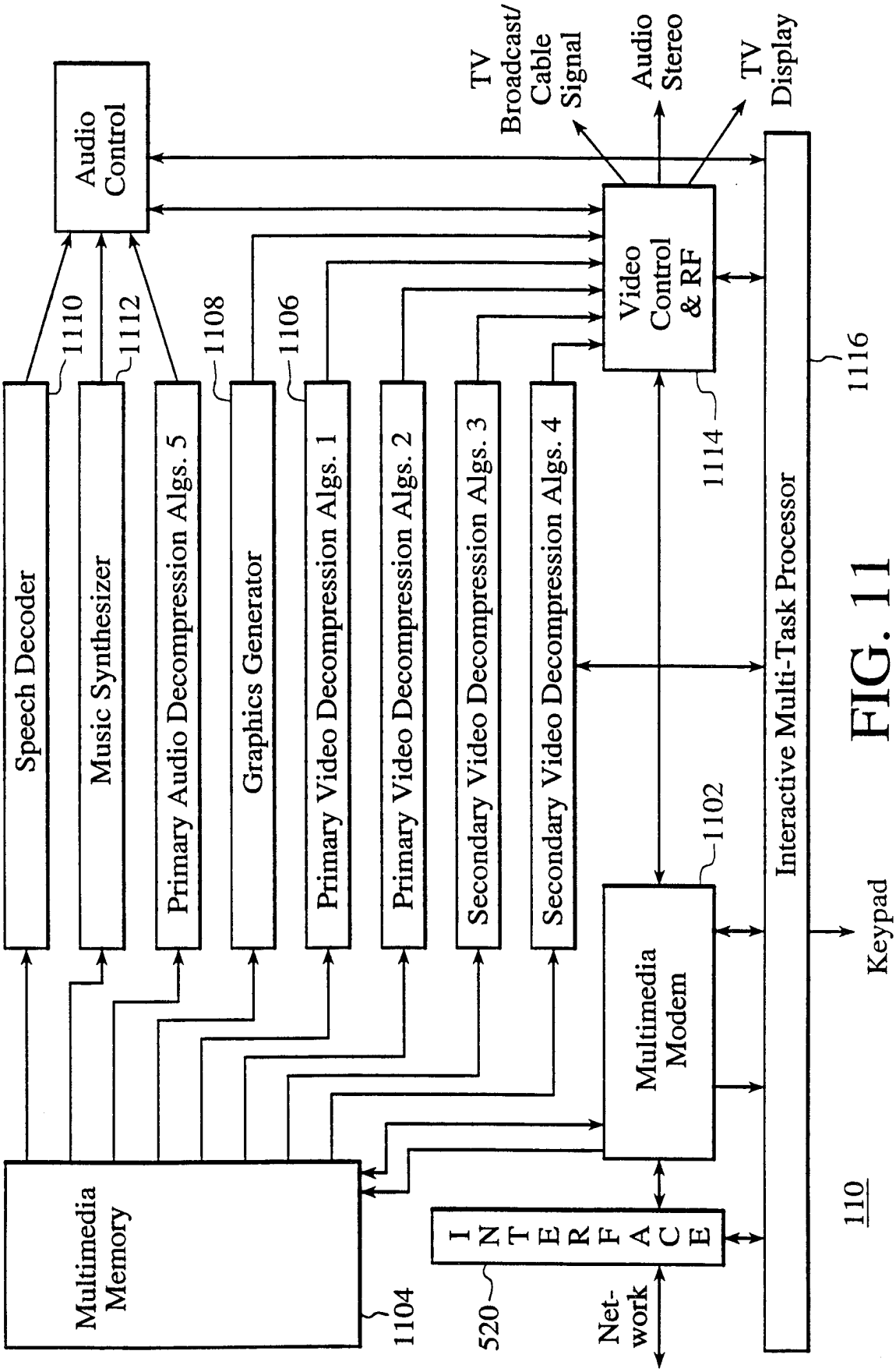

Audio Control
TV Broadcast/ Cable Signal
Audio Stereo
TV Display
Video Control & RF
Speech Decoder
Music Synthesizer
Primary Audio Decompression Algs. 5
Graphics Generator
Primary Video Decompression Algs. 1
Primary Video Decompression Algs. 2
Secondary Video Decompression Algs. 3
Secondary Video Decompression Algs. 4
1110
1112
1108
1106
1114
1116
1102
Multimedia Modem
Interactive Multi-Task Processor
Keypad
Multimedia Memory
1104
INTERFACE
520
Net-work
110

FIG. 11

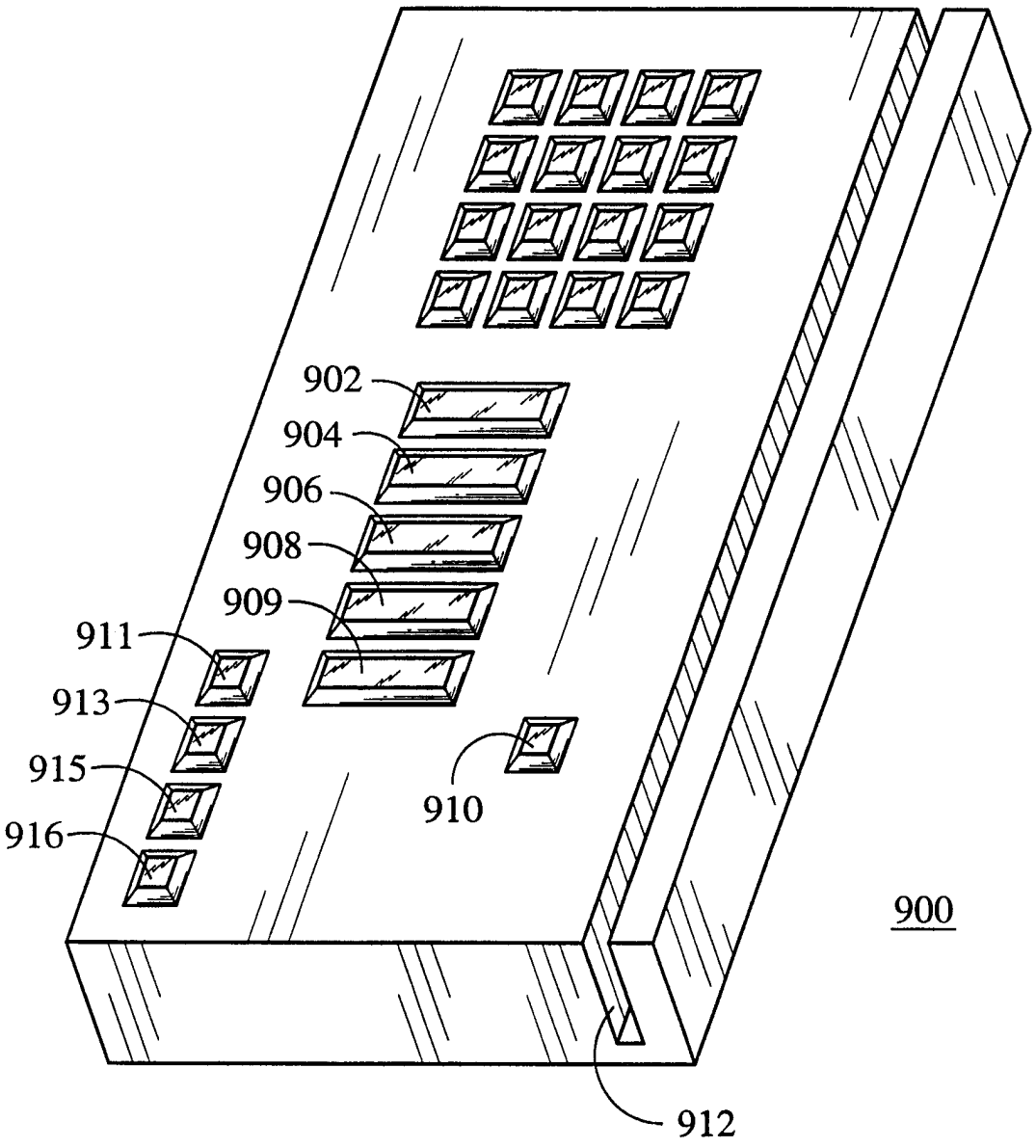


FIG. 12

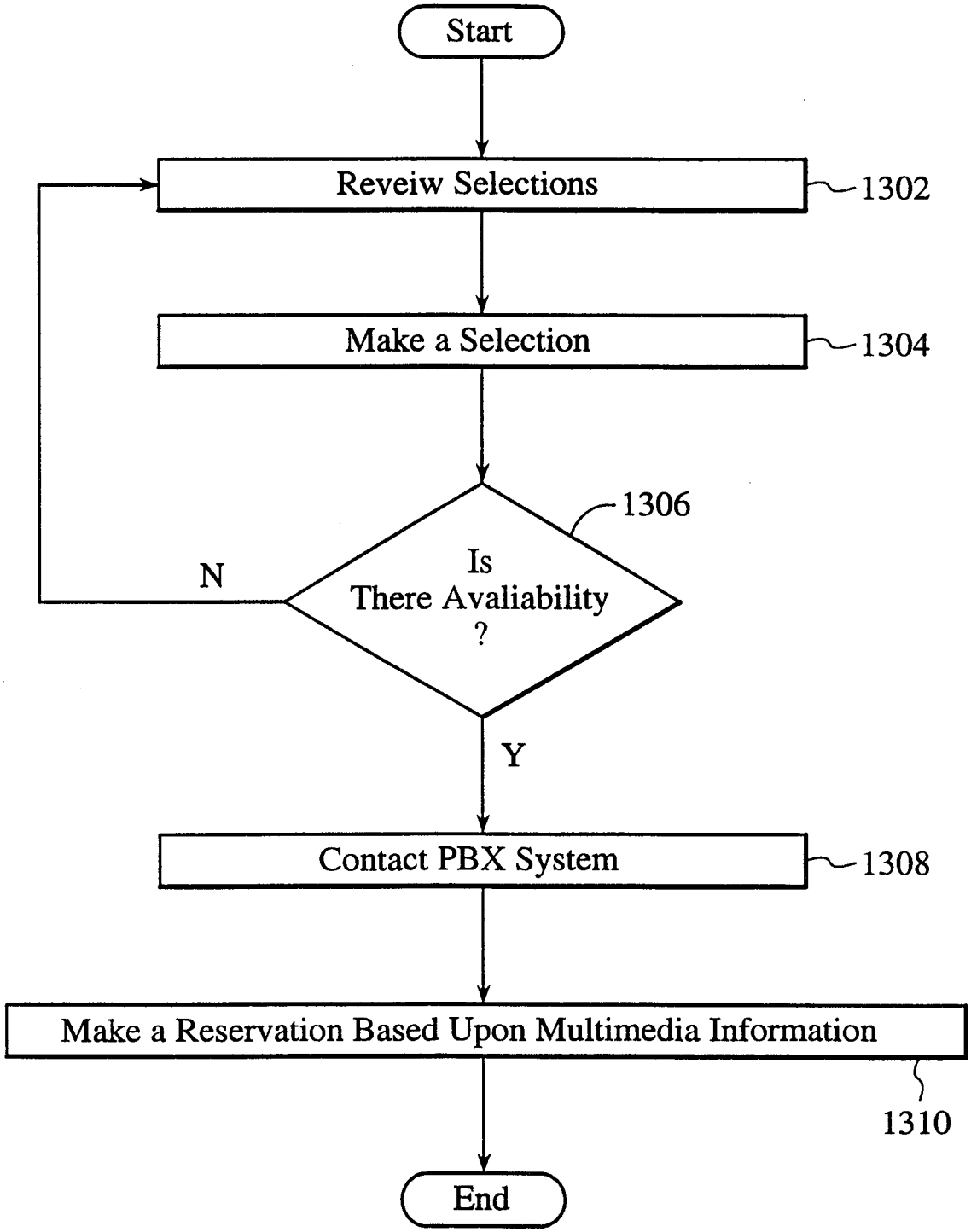

Start
Reveiw Selections
1302
Make a Selection
1304
1306
Is
There Avaliability
?
N
Y
Contact PBX System
1308
Make a Reservation Based Upon Multimedia Information
1310
End

FIG. 13

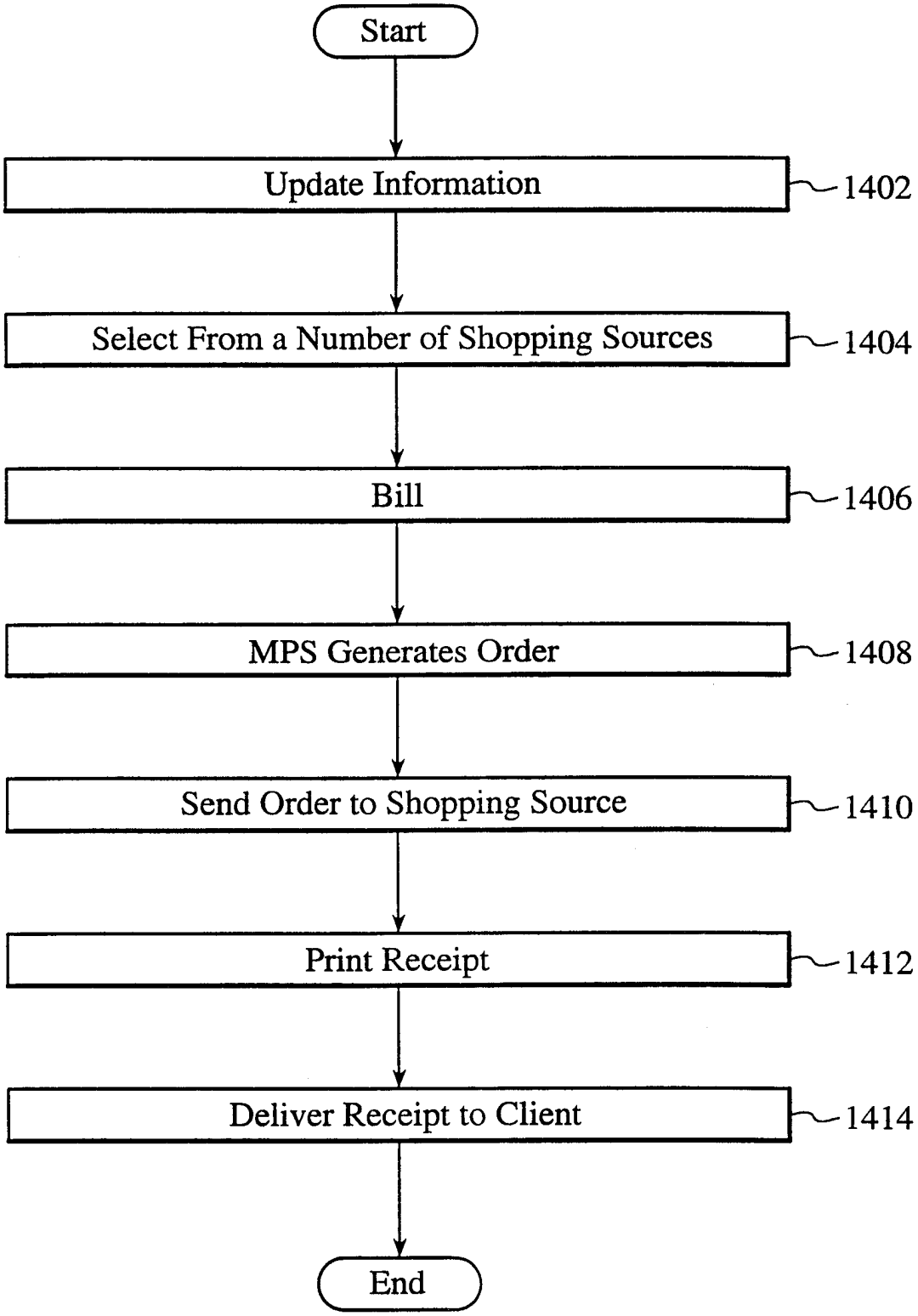

Start
Update Information
1402
Select From a Number of Shopping Sources
1404
Bill
1406
MPS Generates Order
1408
Send Order to Shopping Source
1410
Print Receipt
1412
Deliver Receipt to Client
1414
End

FIG. 14

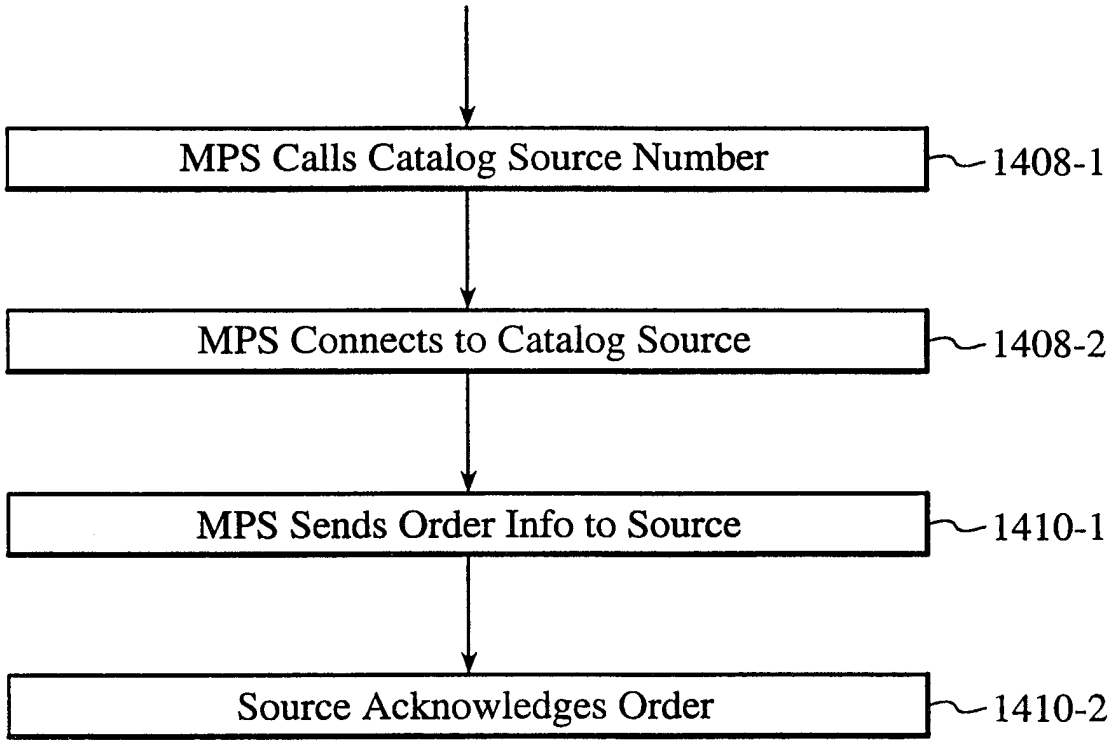

MPS Calls Catalog Source Number
1408-1
MPS Connects to Catalog Source
1408-2
MPS Sends Order Info to Source
1410-1
Source Acknowledges Order
1410-2

FIG. 14A

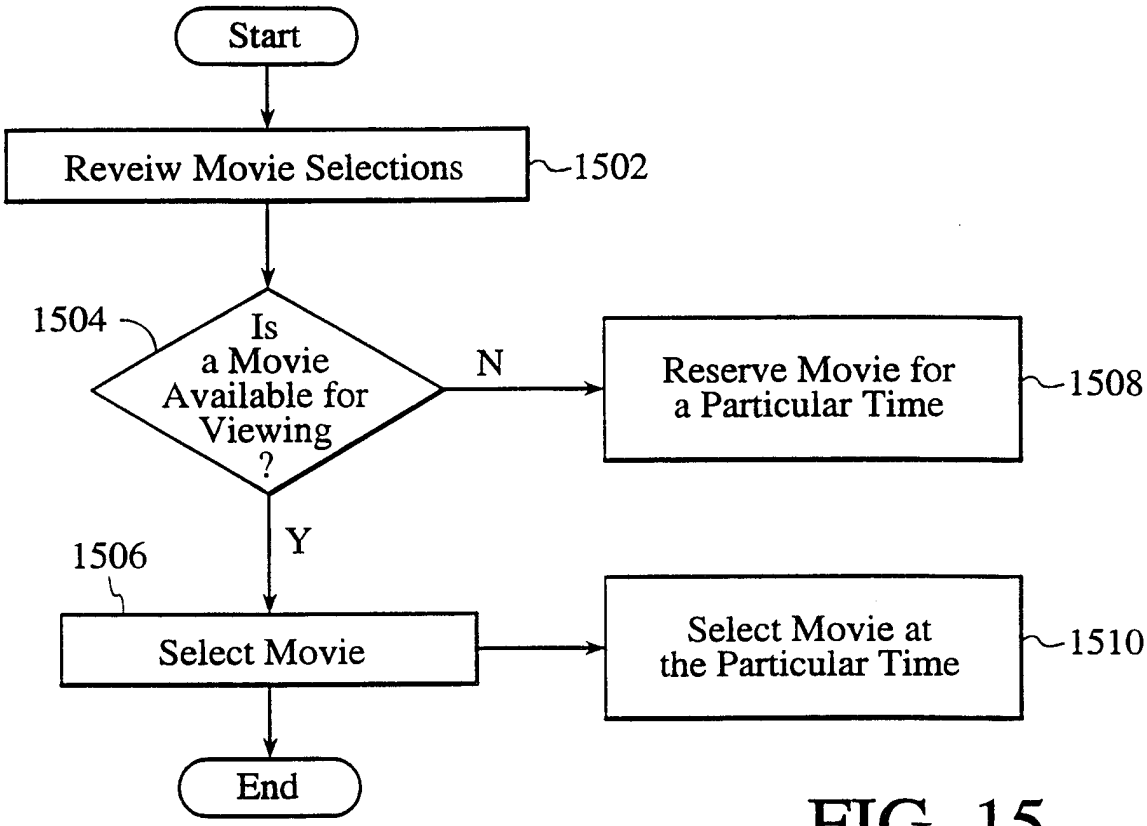


FIG. 15

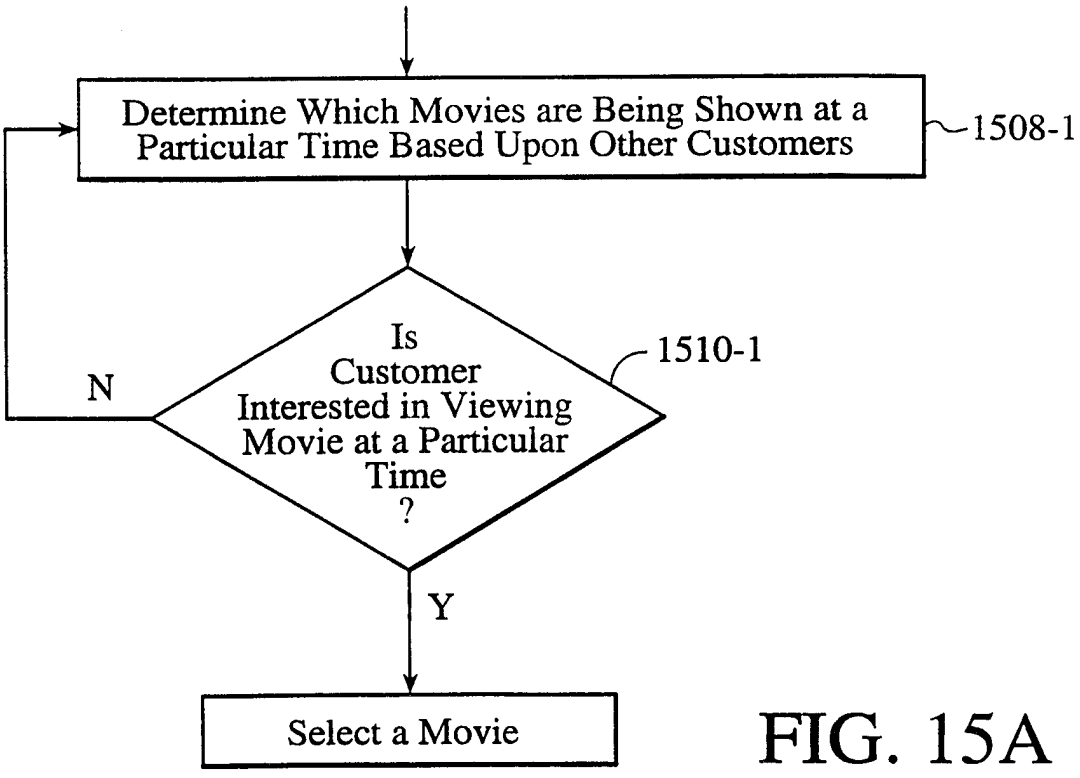


FIG. 15A

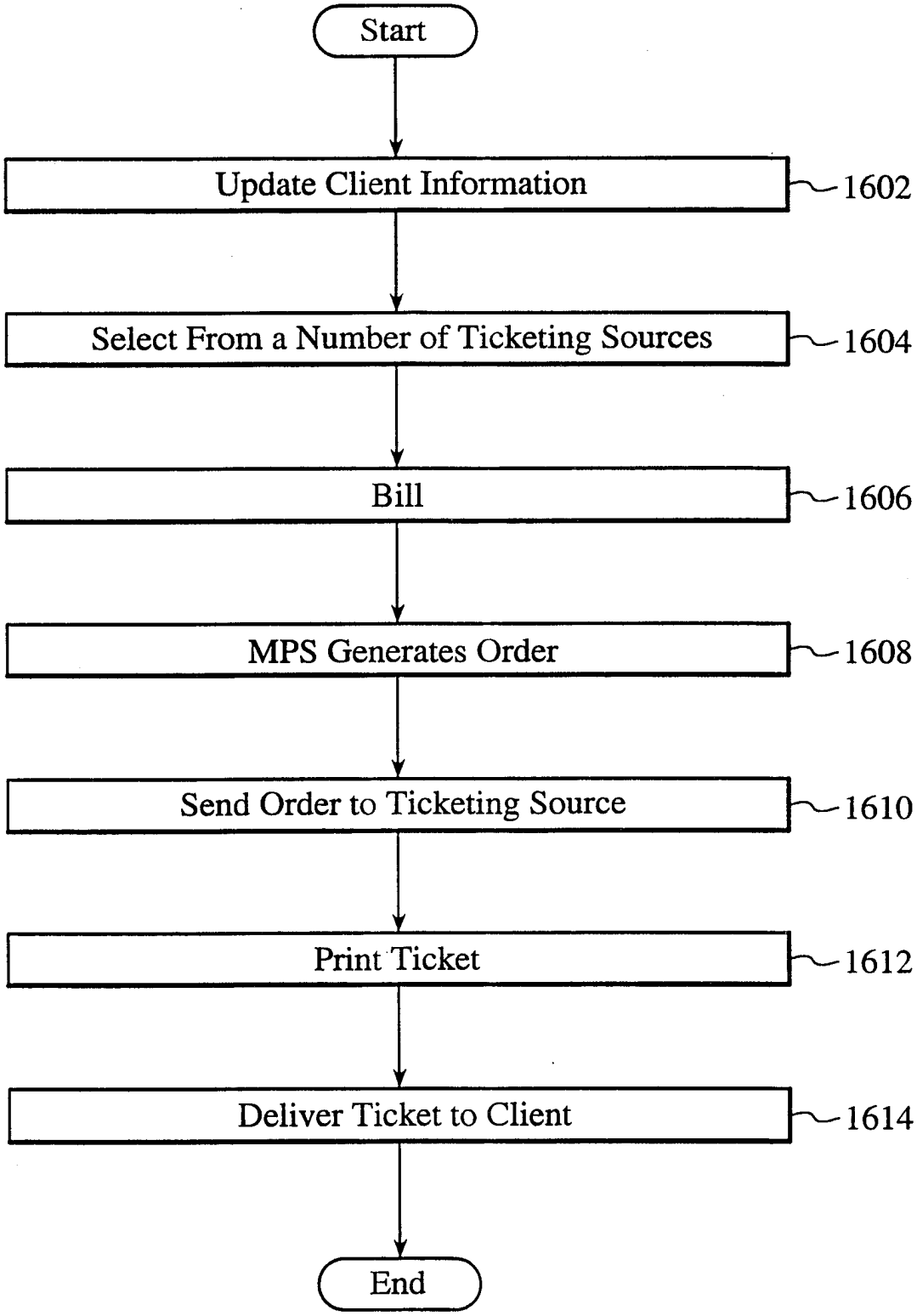

Start
Update Client Information
1602
Select From a Number of Ticketing Sources
1604
Bill
1606
MPS Generates Order
1608
Send Order to Ticketing Source
1610
Print Ticket
1612
Deliver Ticket to Client
1614
End

FIG. 16

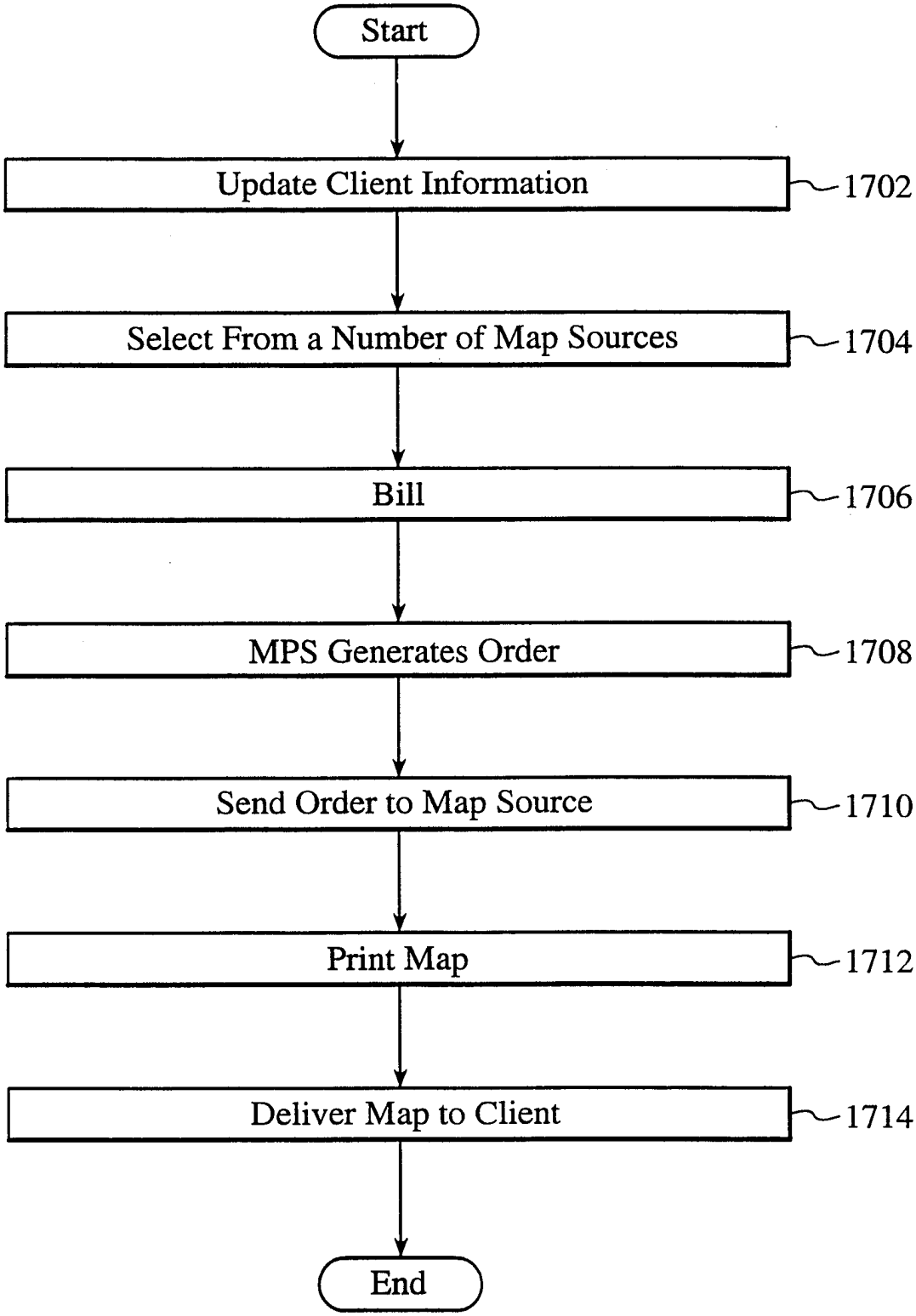

Start
Update Client Information
1702
Select From a Number of Map Sources
1704
Bill
1706
MPS Generates Order
1708
Send Order to Map Source
1710
Print Map
1712
Deliver Map to Client
1714
End

FIG. 17

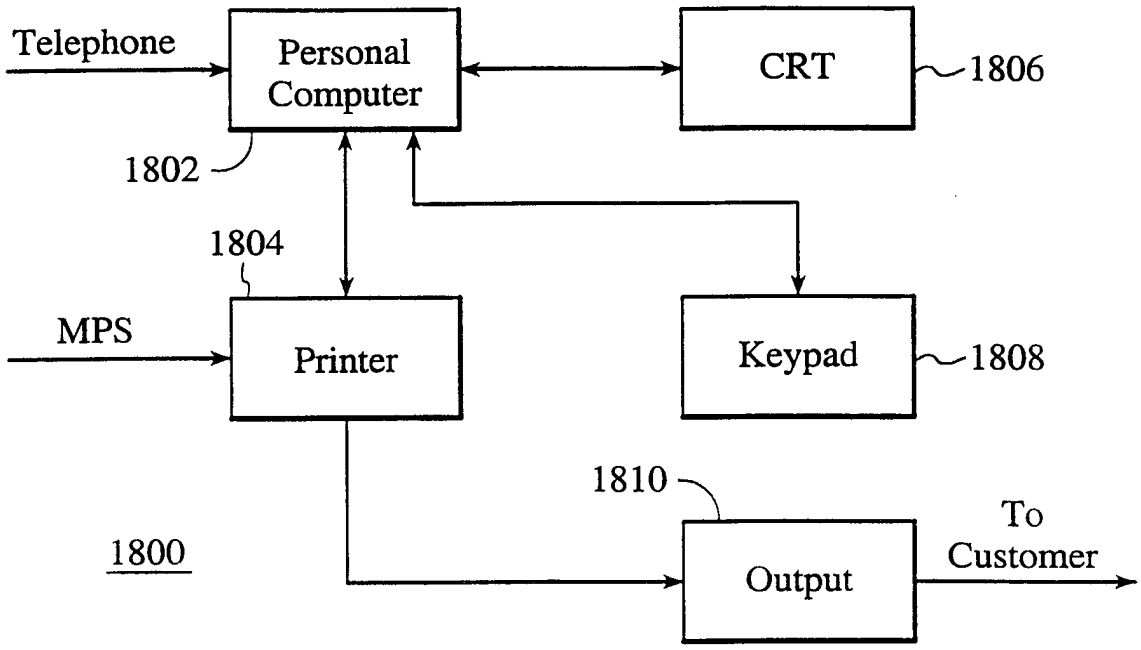


FIG. 18A

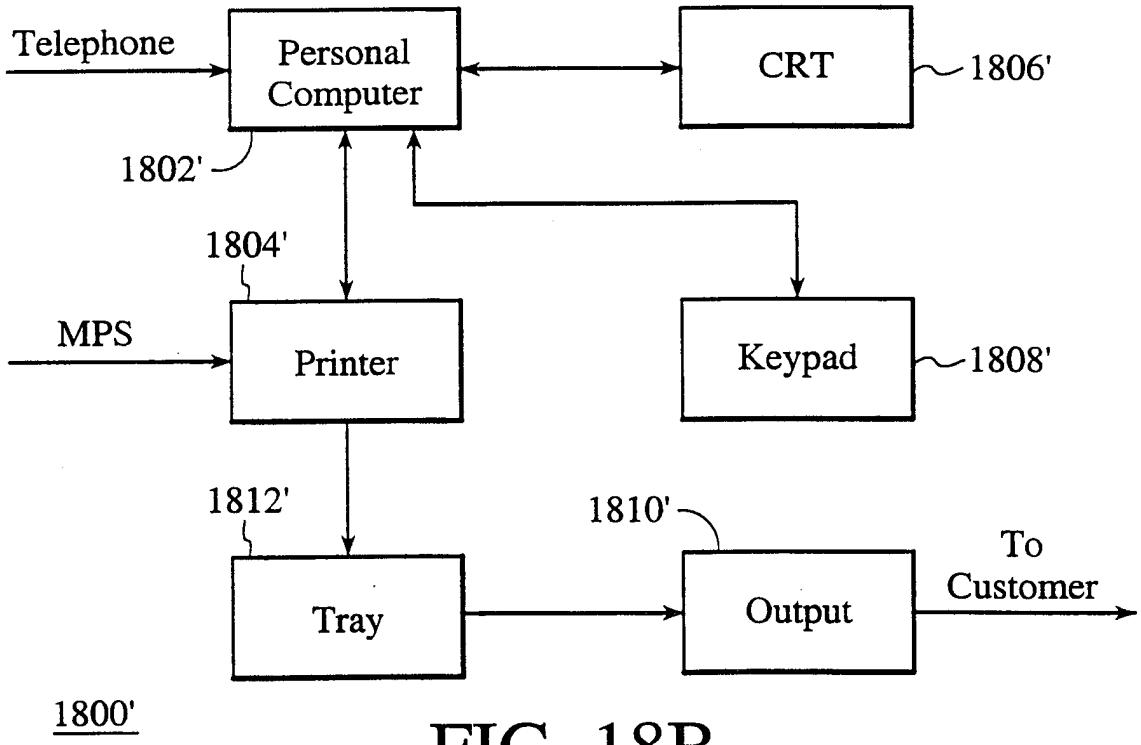


FIG. 18B