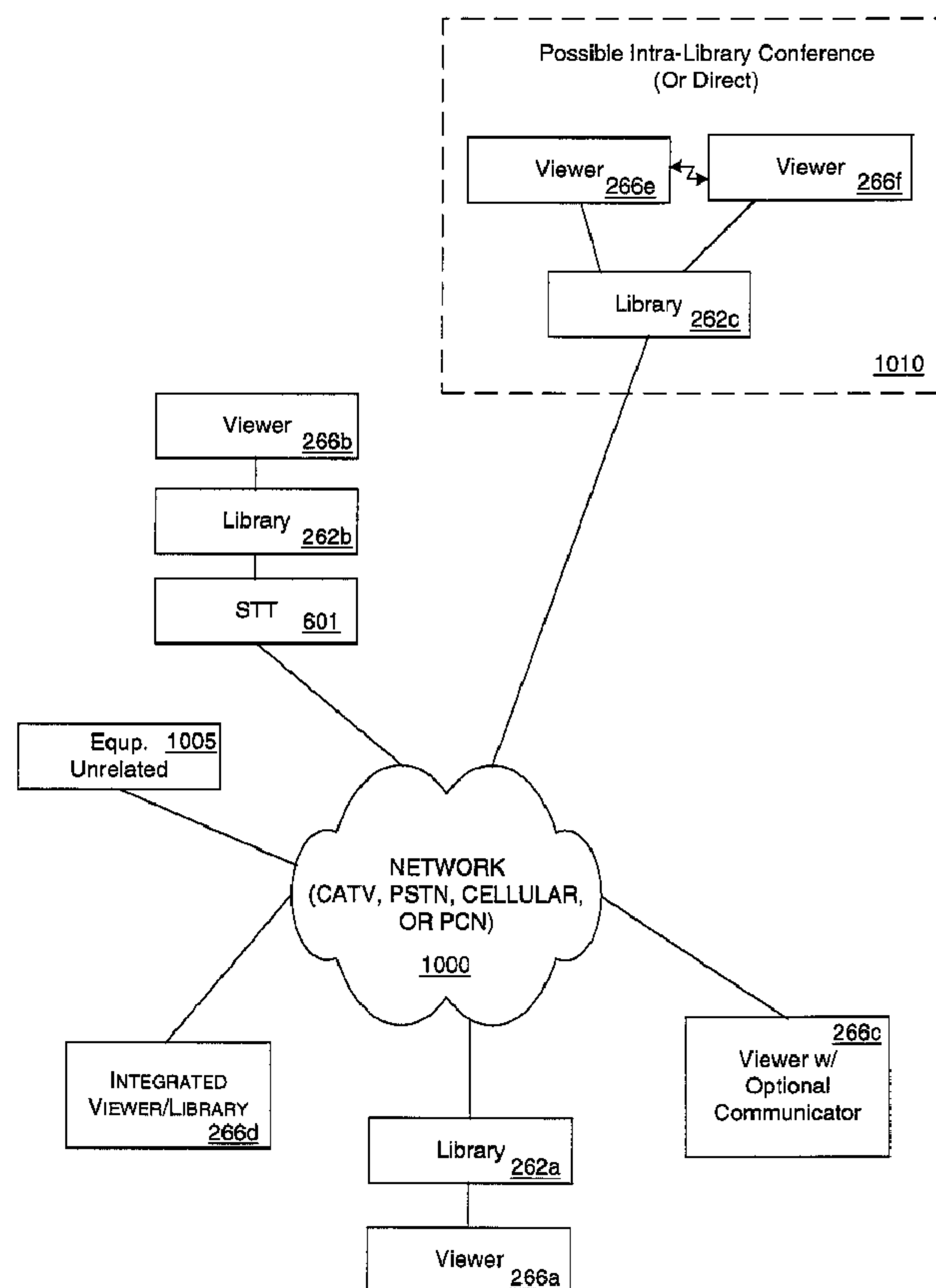




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(54) Title: VIDEO CONFERENCING USING AN ELECTRONIC BOOK VIEWER



(57) Abrégé/Abstract:

The present invention provides the capability to perform conference calls, preferably video conference calls, utilizing an enhanced electronic book viewer and/or electronic book delivery system. In one embodiment, the electronic book viewer comprises a



(57) **Abrégé(suite)/Abstract(continued):**

memory, a video display, a speaker, a microphone, a transmitter, and a receiver. Data representing an electronic book can be stored in the memory and displayed on the video display. The transmitter is connected to the microphone, while the speaker is connected to the receiver. The transmitter and the receiver have sufficient bandwidth to accommodate a conference call. In another embodiment, the electronic book viewer comprises a memory, a video display, a speaker, a microphone, a transmitter, a receiver, a processor, and conference calling software. The processor is connected to the other components, and the conference calling software executes on the processor, enabling the electronic book viewer to be utilized in a conference call. Optionally, the conference call includes video received by the electronic book viewer and displayed on the video display.

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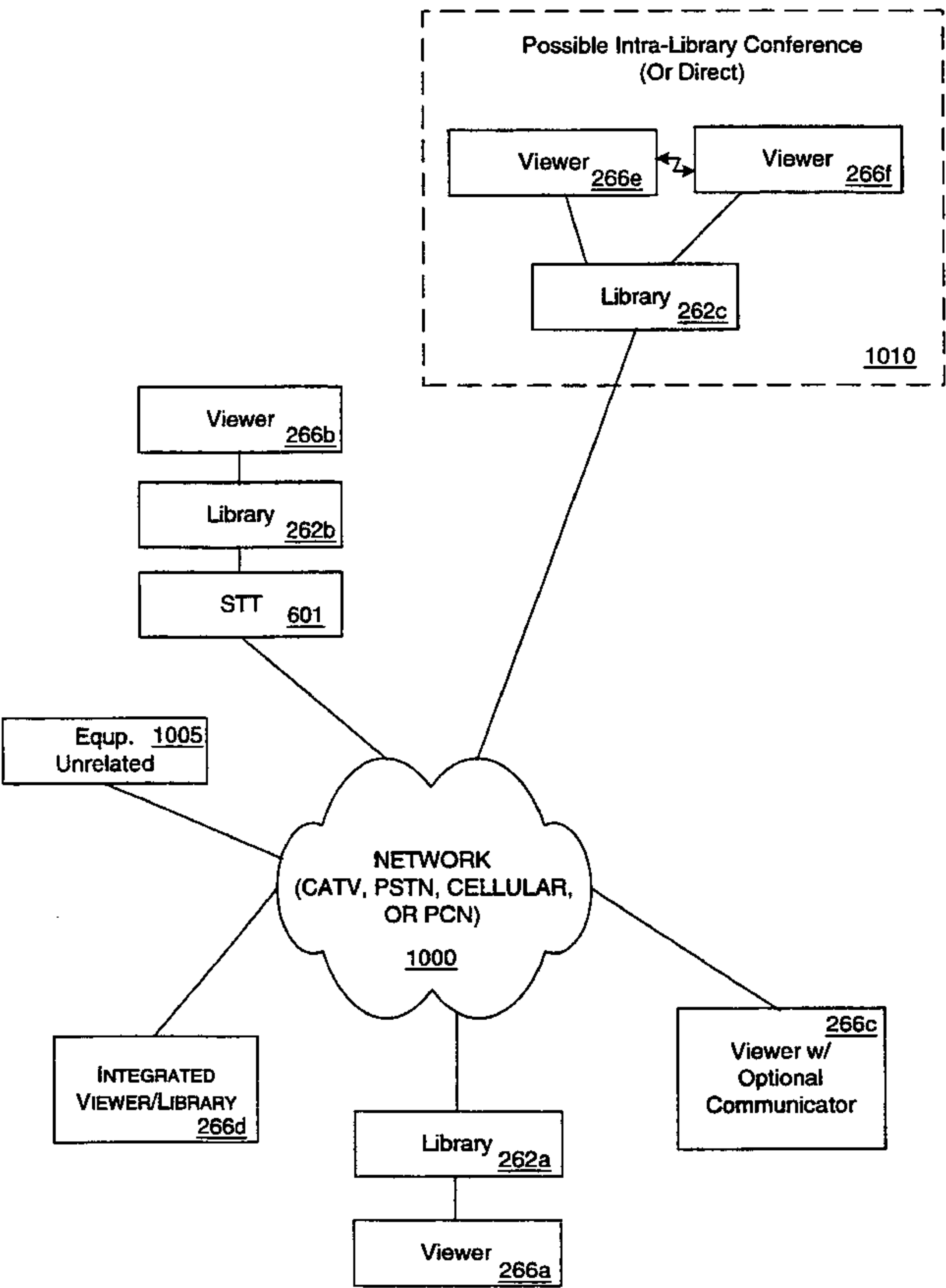
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(54) Title: VIDEO CONFERENCING USING AN ELECTRONIC BOOK VIEWER



(57) Abstract: The present invention provides the capability to perform conference calls, preferably video conference calls, utilizing an enhanced electronic book viewer and/or electronic book delivery system. In one embodiment, the electronic book viewer comprises a memory, a video display, a speaker, a microphone, a transmitter, and a receiver. Data representing an electronic book can be stored in the memory and displayed on the video display. The transmitter is connected to the microphone, while the speaker is connected to the receiver. The transmitter and the receiver have sufficient bandwidth to accommodate a conference call. In another embodiment, the electronic book viewer comprises a memory, a video display, a speaker, a microphone, a transmitter, a receiver, a processor, and conference calling software. The processor is connected to the other components, and the conference calling software executes on the processor, enabling the electronic book viewer to be utilized in a conference call. Optionally, the conference call includes video received by the electronic book viewer and displayed on the video display.

WO 01/18665 A1

## **VIDEO CONFERENCING USING AN ELECTRONIC BOOK VIEWER**

### **Technical Field**

The invention relates to electronic book viewers. More particularly, the invention relates to electronic book viewers with capabilities for conference calling and associated communication systems and processes.

### **Background OF The Invention**

Sparked by the concept of an information superhighway, a revolution will take place in the distribution of books. Not since the introduction of Gutenberg's movable typeset printing has the world stood on the brink of such a revolution in the distribution of text material. The definition of the word "book" will change drastically in the near future. Due to reasons such as security, convenience, cost, and other technical problems, book and magazine publishers are currently only able to distribute their products in paper form. The electronic book system of the present invention solves the problems encountered by publishers.



## 1    **Summary Of The Invention**

2            The present invention is an improvement to electronic book delivery systems. More  
3    specifically, the present invention provides the capability to perform conference calls, preferably  
4    video conference calls, utilizing an enhanced electronic book viewer and/or electronic book delivery  
5    system.

6            The present invention provides an electronic book viewer that can be utilized in a  
7    conference call. In one embodiment, the electronic book viewer comprises a memory, a video  
8    display, a speaker, a microphone, a transmitter, and a receiver. Data representing an electronic  
9    book can be stored in the memory and displayed on the video display. The transmitter is  
10   connected to the microphone, while the speaker is connected to the receiver. The transmitter and  
11   the receiver have sufficient bandwidth to accommodate a conference call. In another embodiment,  
12   the electronic book viewer comprises a memory, a video display, a speaker, a microphone, a  
13   transmitter, a receiver, a processor, and conference calling software. The processor is connected  
14   to the other components, and the conference calling software executes on the processor, enabling  
15   the electronic book viewer to be utilized in a conference call. Optionally, the conference call  
16   includes video received by the electronic book viewer and displayed on the video display. As  
17   another option, the electronic book viewer further comprises a camera connected to the transmitter,  
18   and the conference call includes video transmitted from the electronic book viewer.

19           The present invention also provides a conferencing system comprising at least one electronic  
20   book viewer, at least one end equipment; and an interconnection network capable of linking two  
21   or more of the at least one electronic book viewer and the at least one end equipment in a  
22   conference call.

23           The present invention also provides a method of conferencing using an electronic book  
24   viewer. The method comprises displaying an electronic book on the electronic book viewer;  
25   participating in a conference call while viewing the electronic book; and communicating information  
26   content of the conference call with the electronic book viewer. Participation in the conference call  
27   may involve, for example, initiating or receiving a conference call.

28           The present invention also provides a method of distance learning using an electronic book  
29   viewer. The distance learning method comprises displaying learning material as an electronic book  
30   on the electronic book viewer; participating in a conference call while displaying the electronic

book; and communicating information content of the conference call with the electronic book viewer. For example, the learning material may include a textbook, and the conference call may be an interactive lecture concerning a subject of the textbook.

As used herein, the term "conference call," or sometimes more simply "call," denotes a traditional two-party call as well as a multi-party call or a single party call with storage and future access by others, includes calls utilizing only one or a combination of several types of media (e. g., voice only or voice plus video and/or other media such as data, programs, etc.), and includes one-way broadcast calls (i.e., view only) as well as full duplex calls or mixed media combinations of one-way broadcast and full duplex (e.g., broadcast video from one party and shared return audio from all parties).

In one aspect, the present invention provides a conferencing system, comprising: at least one electronic book home system, comprising: a portable electronic book viewer comprising: a feature for selecting an electronic book from a list of available books displayed in the electronic book viewer, a feature for ordering a selected electronic book; a feature for receiving an electronic transmission of the selected electronic book; a feature for establishing and managing a conference call while viewing the selected electronic book; a feature for participating in the conference call while viewing the selected electronic book; a memory in which data representing an electronic book can be stored, a video display, connected to the memory for displaying the selected electronic book, a speaker, a microphone, a transmitter connected to the microphone, and a receiver connected to the speaker, wherein the transmitter and the receiver have sufficient bandwidth to accommodate a conference call, whereby the electronic book viewer can be utilized in a conference call; and a library unit, locally coupled to the electronic book viewer, configured to download from a remote source and store a plurality of electronic books and to deliver the selected electronic book to the electronic book viewer upon request, the library unit comprising: local connections between the library unit and the electronic book viewer and the library unit and an interconnection network, and a controlling mechanism for controlling communications involved in the conference call; and at least one end equipment; wherein the interconnection network is capable of linking two or more of the at least one electronic book viewer and the at least one end equipment in the conference call during the conference call; wherein the conference call is initiated by selecting a portion of a text of the displayed selected electronic book.

In a further aspect, the present invention provides an electronic book conferencing system, comprising: at least one electronic book home system, comprising: an electronic book viewer comprising: a feature for selecting and ordering an electronic book from a list of



3a

available books displayed in the electronic book viewer; a feature for receiving an electronic transmission of the selected electronic book; a feature for establishing and managing a conference call while viewing the selected electronic book; a feature for participating the conference call while viewing the selected electronic book; a memory in which data representing an electronic book can be stored, a video display, connected to the memory for displaying the selected electronic book, a speaker, a microphone, a transmitter connected to the microphone, and a receiver connected to the speaker, wherein the transmitter and the receiver have sufficient bandwidth to accommodate a conference call, whereby the electronic book viewer can be utilized in a conference call; and a library unit configured to receive a plurality of electronic books from a remote operations center, and store the plurality of electronic books for local and secure access by the electronic book viewer, the library unit comprising: a local connection between the library unit and the electronic book viewer, and a controlling mechanism for controlling communications involved in the conference call; a feature for charging the recipient a price for the ordered electronic book; at least one end equipment; and an interconnection network capable of linking two or more of the at least one electronic book viewer and the at least one end equipment in a conference call, wherein the conference call is initiated by selecting a portion of a text of the displayed selected electronic book.

Certain embodiments of the present invention achieve desirable advantages. Because an electronic book viewer is a daily use household appliance that has a high tech aura while being very practical, portable, and easy to use, it is highly advantageous to enhance the functionality of an electronic book viewer to support video conferencing. There are synergistic effects from the combined convenience of viewing electronic books in association with participation in a video conference call. For example, a conference call can be initiated while viewing an electronic book, which is a directory containing call connection numbers or addresses. As another example, a conference call can be initiated while viewing an electronic book, which may be a topic of the call or which can be transmitted wholly or partially as part of or in conjunction with the call. In yet another example, a user engaged in conference call that the user finds boring or distracting can conveniently view an electronic book while maintaining the conference call connection. Other advantages and benefits of the present invention will be apparent from the following Detailed Description of a Preferred Embodiment, with references to the Drawings.

3b

**Brief Description Of The Drawings**

Figure 1 is a schematic showing an overview of the electronic book selection and delivery system.

Figure 2 is a block diagram of a hardware configuration for a four component home subsystem.

Figure 3 is a block diagram of a hardware configuration for a two unit home subsystem.



1 Figure 4 is a block diagram for an example of a library unit.

2 Figure 5 is a block diagram of an electronic book viewer.

3 Figure 6 is a block diagram of an electronic book viewer with video conferencing  
4 capabilities.

5 Figure 7 is a diagram of various video conferencing network connections according to a  
6 preferred embodiment of the present invention.

7 Figure 8 is a diagram of a mini-network without a central node, according to a preferred  
8 embodiment of the present invention.

9 Figure 9 is a diagram of a mini-network having a library central node, according to a  
10 preferred embodiment of the present invention.

11 Figure 10 is a connection diagram of a conference call among the three viewers.

12 Figure 11 is a block diagram of a video conferencing central node.

### 13 **Detailed Description Of A Preferred Embodiment**

#### 14 **I. Overview of An Electronic Book Delivery System**

15 Electronic book selection and delivery systems distribute books to bookstores, public  
16 libraries, schools and consumers, providing a secure electronic system for both delivering selected  
17 books and receiving payments. The electronic book system of the present invention has an unusual  
18 combination of features that provides the consumer with a daily use household appliance that has  
19 a high tech aura while being very practical, portable, and easy to use.

20 An advantage of electronic books is the elimination of the distribution of any physical object  
21 such as a paper book or computer memory device from any book or text distribution system. The  
22 purchase of a book becomes a PAY-PER-READ™ event avoiding the overhead, "middle-men,"  
23 printing costs, and time delay associated with the current book distribution system. Published  
24 material and text such as the President's speech, a new law, a court decision on abortion, or O.J.  
25 Simpson's testimony can be made immediately available to the consumer at a nominal fee.

26 The primary components of an electronic book delivery system are the subsystem for  
27 preparing the text for delivery and the subsystem for receiving and selecting text that was delivered.  
28 The system may be configured for use by bookstores, public libraries, schools and consumers. The  
29 system for consumer use is made up of four subsystems, namely: (1) an operations center, (2) a

distribution system, (3) a home subsystem including reception, selection, viewing, transacting and transmission capabilities, and (4) a billing and collection system.

The operations center performs several primary functions: manipulating text data (including receiving, formatting and storing of text data), security encoding of text, cataloging of books, providing a messaging center capability, and performing uplink functions. In one embodiment, the system delivers the text from the operations center to consumer homes by inserting text data within analog video signals. The insertion of text is generally performed with an encoder at an uplink site that is within or near the operations center. The system can use several lines of the vertical blanking interval (VBI), all the lines of the analog video signal, a digital video signal or unused portions of bandwidth to transmit text data. Using the VBI delivery method, the top ten or twenty book titles may be transmitted with video during normal programming utilizing existing cable or broadcast transmission capability without disruption to the subscriber's video reception. Using the entire video signal, thousands of books may be transmitted within just one hour of air time. Nearly any analog or digital video or data distribution system may be used to deliver the text data.

The home subsystem performs at least four functions: connecting to the distribution system, selecting text, storing text, and transacting through a communicating mechanism. The components of the home subsystem may be configured in a variety of hardware configurations. Each function may be performed by a separate component, the components may be integrated, or the capability of existing cable set top converter boxes, computers, and televisions may be utilized. A connector, library unit and viewer unit may be used. In one embodiment, the connector portion of the home subsystem receives an analog video signal and strips or extracts the text from the video. The home library stores the text signal, provides a user friendly software interface to the system and processes the transactions at the consumer home. The viewer provides a screen for viewing text or menus and novel user friendly controls.

The viewing device may be a portable book shaped viewer which stores one or more books for viewing and provides a screen for interacting with the home library unit. In one embodiment, a high resolution LCD (liquid crystal display) is used to both read the books and to interact with the home library software. In one embodiment, an optional phone connector or return path cable connection initiates the telephone calls and, with the aid of the library, transmits the



1 necessary data to complete the ordering and billing portion of the consumer transaction. The billing  
2 and collection system performs transaction management, authorizations, collections and publisher  
3 payments automatically.

4 Figure 1 shows one embodiment of an electronic book selection and delivery system 200.  
5 The delivery system 200 includes: an operations center 250 including an uplink site 254; a video  
6 distribution system 208; an electronic book device, or home system 258 including a video  
7 connector 212, a library 262, a viewer 266, and a phone connector 270; telephone system 274;  
8 an Internet web site 279; and a billing and collection system 278. Also as shown in Figure 1, the  
9 home system 258 may include connections to a television 259, a printer 318 and a personal  
10 computer 261 may be used to display menu screens, electronic books, electronic files, or any other  
11 information associated with the electronic book delivery system 200. In addition, the television 259  
12 and the personal computer 261 may provide control functions that replicate and supplement those  
13 of the viewer 266.

14 The operations center 250 receives textual material from outside sources 282 such as  
15 publishers, newspapers, and on-line services. Alternately, the outside sources may maintain  
16 electronic books at the Internet web site 279. The outside sources 282 may convert textual and  
17 graphical material to digital format, or may contract with another vendor to provide this service.  
18 The operations center 250 may receive the textual and graphical material in various digital formats  
19 and may convert the textual material to a standard compressed format for storage. In so doing, the  
20 operations center 250 may create a pool of textual material that is available to be delivered to the  
21 home system 258. The textual material may be grouped by books or titles for easy access.

22 As used herein, "book" means textual or graphical information such as contained in any  
23 novels, encyclopedias, articles, magazines, newspapers, catalogues, periodicals, or manuals. The  
24 term "title" may represent the actual title assigned by an author to a book, or any other designation  
25 indicating a particular group, portion, or category of textual information. The title may refer to a  
26 series of related textual information, a grouping of textual information, or a portion of textual data.  
27 For example, "Latest Harlequin Romance", "Four Child Reading Books (Ages 10-12)," "  
28 "Encyclopedia 'BRITANNICA'™," "President's Speech," "Instruction Manual," "Schedule of 4th  
29 of July Events," "Pet Handbooks," "Roe v. Wade," and "The Joy of Cooking," are suitable titles.  
30 Also, the title may be a graphical symbol or icon. Thus, a picture of a wrench may be a title for a



repair book, a picture of a computer a title for a computer book, a graphical symbol of a telephone a title for a telephone book, a drawing of a dagger a title for a mystery book, a picture of a bat and ball a title for a sports book, and a picture of tickertape a title for a business book.

The operations center 250 includes the uplink site 254 for placing the text onto a telecommunications signal and sending the telecommunications signal into a distribution system. The uplink site 254 would generally include an encoder (not shown in Figure 1) to encode the text onto the telecommunications signal.

Many analog and digital video distribution systems may be used with the electronic book delivery system 200, such as cable television distribution systems, broadcast television distribution systems, video distributed over telephone systems, direct satellite broadcast distribution systems, and other wired and wireless video distribution systems. Nearly any distribution system which can deliver a telecommunications signal, including a video signal, will work with the electronic book delivery system 200. It is also possible to distribute the electronic book without using a telecommunications signal.

The home system 258 performs five functions related to the reception and viewing of electronic books: (1) connecting with a video distribution system; (2) selecting data; (3) storing data; (4) displaying data; and (5) handling transactions. An important optional function of the home system 258 is communicating using, in one embodiment, a telephone communication system 274. The home system 258 may be made up of four parts: a video connector 212 or similar type of connector for connecting with the distribution system 208, a library 262 for storing and processing, a viewer 266 for viewing menus and text and a telephone connector 270 for connecting with a telephone communications system 274.

The billing and collection system 278 may be co-located with the operations center 250 or located remote from the operations center 250. The billing and collection system 278 may be in communication with the home system 258 using telephone-type communication systems (for example 274). Any of a number of communication systems, such as a cellular system or the Internet, will operate with the billing and collection system 278. The billing and collection system 278 records the electronic books or portions of text that are selected or ordered by the subscriber. The collection system can charge a subscriber's

credit account or bill the subscriber. In addition, the billing and collection system 278 may monitor the amount due to publishers or other outside sources 282 who have provided textual data or other services such as air time to enable the text delivery system 200 to operate.

Also within the scope of the present invention is an intranet configuration of the embodiments illustrated in Figure 1 that may be used as a part of a private distribution network for distributing and circulating electronic books. For example, a university library or bookstore may use such an intranet to circulate electronic books to university students and professors.

Additional details regarding the electronic book selection and delivery system 200 as well as alternatives can be found in the copending U.S. Patent No. 5,986,690, already cited above.

## II. Electronic Book Home System

The hardware configuration for a four component home system 258 is shown in Figure 2. Figure 3 shows a hardware configuration for a two component home subsystem. The home system 258 performs several functions, such as receiving data and video transmissions, stripping (or extracting) the data from the video signal, screening and storing the data, providing user friendly interface controls and software, displaying menus and text, processing transactions, initiating telephone calls and transmitting billing data. Various hardware configurations may be utilized to achieve the desired functions of the home system 258. For example, as shown in Figure 3, the home system 258 can be configured to utilize the reception and channel tuning capability of the current installed subscriber base of cable converter boxes and televisions 601 and networked computers. The home system 258 can also be designed as an advanced set top terminal with menu generation capability, electronic memory and a telephone modem.

The electronic components that make up the home system 258 can be arranged in a variety of ways. In the four unit subsystem of Figure 2 the viewer 266 and library 262 are wired together while the remaining components communicate through RF (radio frequency) transceivers 604. In a simple version of the home system 258 there are only two units, a library 262 and a viewer 266. Figure 3 shows a two unit home system 258 with certain optional features.

The viewer 266 is generally equipped with a high resolution viewing area 602, digital logic (including a key 605, security 606, and a microprocessor 621), video graphics control and memory 607, power supply circuitry (not shown in Figure 3), an optional battery 603 and an optional RF



1 transceiver 604. In a two unit arrangement, the library 262 contains the connector function to the  
2 electronic book distribution system, connector function to a public telephone communications  
3 system, and memory 600, which may be removable and portable memory 600' (Figure 4). More  
4 specifically, the library 262 would include data stripping functions 617, digital logic 609, memory  
5 storage 600, power circuitry 610, optional connections 611, including cellular or PCN (personal  
6 communications network) phone 611', optional battery (not shown), optional tuner module 613 and  
7 an optional RF transceiver 604. The connector 212 and the public telephone system connection  
8 270, as well as the removable portable memory unit 600' of the library 262 may be broken out into  
9 separate components. (Figure 3 shows a removable portable hard disk memory 600' with  
10 removable cartridges 614.) Finally, the home system 258 may include an attached keyboard 267  
11 or a wireless keyboard 268. Both the attached keyboard 267 and the wireless keyboard 268 may  
12 be used to communicate with the viewer 266 (not shown) or the library unit 262. The wireless  
13 keyboard 268 may communicate using RF signaling, for example.

14 In an alternate arrangement, all functions of the home system 258 may be incorporated into  
15 a single unit. The functions of the library 262, for example, may be carried out by a card or chipset  
16 in the viewer 266. All the communications devices needed to couple the home system 258 to  
17 various telecommunications networks may also be incorporated into the viewer. All interfaces  
18 between the home system 258 and the subscriber may be included with the viewer 266. In this  
19 embodiment, the viewer 266 may include a communication device for receiving inputs from a  
20 separate keyboard.

21 Therefore, the home system 258 may have as many as five separate components, which  
22 communicate with each other. The two, three, four or five separate components which make up  
23 the home subsystem can communicate with each other in a variety of ways, including hardwired  
24 connection 615, RF transceiver 604 and other wireless methods.

25 RF communications may be used in the home, allowing separate components to be located  
26 throughout the home without restriction. The data communicated between the units may be secure  
27 data. In addition, the library 262 may provide power to the viewer 266 through the hard wire  
28 communication link 615.

29 To receive and strip data from a video signal at the consumer's home, a device such as a  
30 cable interface device or cable connector 212, 21' is used. The cable connector device 212'



1 includes a tuner 613, while the cable interface device 212 makes use of existing tuning equipment  
2 in the home. In either configuration, data is stripped from the video signal and stored at the  
3 subscribers location in the library 262. The phone connector 270, optional connector 611, and a  
4 modular connector initiate communications and transmit ordering and billing information to the  
5 operations center 250 or billing and collection system 278. A digital connector 619 is provided to  
6 communicate digital information with the set top terminal 601. The library 262 is the intelligent  
7 component of the home subsystem, incorporating the hardware and software necessary to store the  
8 text data, generate menus and effect the purchase transactions. In addition to an RF transceiver  
9 604, the home library 262 also includes the necessary jacks and connections (e.g., communications  
10 connector 270') to allow the system to be connected to the viewer 266. As shown in Figure 3, the  
11 library 262 communicates the text data to the viewer 266 in a secure format, which requires a key  
12 605 for decryption. The text may be decrypted page by page just before viewing.

13 A. Video Connector

14 The connection to the video distribution system may be a cable connector to a cable  
15 television delivery system, as shown in Figure 3. The cable connector includes a data stripper  
16 circuit 617, which accepts video input from either a set top terminal 601, a TV or a VCR, or an  
17 optional tuner block 613 that receives the CATV signal through the cable connector 212'. The  
18 data stripper circuit 617 strips data out of the video, and outputs a digital bit stream to the digital  
19 logic portion 609 of the library unit 262. The data is embedded in the video signal either in the  
20 vertical blanking interval or the active video portion in an encrypted and compressed format. The  
21 data stripper circuit 617 can be placed inside the set top terminal 601, TV, or in the library unit.  
22 The data stripper circuit 617 outputs the digital bit stream to be used by the library digital logic 609.

23 The video connector 212 may also contain a channel tuner module 613 that can tune to the  
24 video channel and provide access to the video that contains the data to be stripped. Using the  
25 optional tuner module 613, a set top terminal, VCR, or TV tuner is not needed in the home  
26 subsystem. The optional tuner module 613 would instead receive the CATV signal directly through  
27 the cable connector 212'. Additional connector options, which allow for the receipt of electronic  
28 book content using alternative delivery methods, are possible. This ubiquitous access is provided  
29 using the modular connector as depicted in Figure 3.

## B. Library

An embodiment of the library 262 for a two unit home subsystem is shown in both Figure 3 and Figure 4. The embodiment shown includes the following optional parts: the video connector 212, phone connector 270, RF transceiver 604, and battery pack 624 in addition to a removal portable memory 600', microprocessor 628, instruction memory unit 632, digital logic 636, and power unit 640.

The library 262 contains a digital logic section 609 (not shown in Figure 4) which includes the microprocessor 628, the digital logic 636 and the instruction memory unit 632. The microprocessor 628 may be a secure microprocessor such as the Mot SC21 device sold by Motorola. The digital logic section 609 receives the serial digital bit stream from the data stripper circuit 617 and process the data. Error correction is also performed by the digital logic section 609 and the data is checked for a proper address. If the address of the data is correct and the library 262 is authorized to receive the data, the data is transferred to the memory storage unit 600, 600'. Authorization to receive the data is provided by the cable headend or another distribution point. An authorization code may be sent in the serial digital bit stream. The digital logic section 609 sends appropriate text and graphical data to the memory storage unit 600, 600'. It transfers this data in a compressed and encrypted format and the data remains stored in a compressed and encrypted format.

### 1. Memory Storage Unit

The memory storage unit of the library may be a removable portable memory unit 600' (as shown in Figures 2-4). A variety of options are available for memory storage: a hard disk drive, such as one having an 80 megabyte or 200 megabyte capacity; a hard disk with removable platters; and a CD ROM. Referring to Figure 3, a hard disk drive unit 600', which contains removable platters, may also be used. This would provide virtually unlimited library storage capacity. Data will be stored in the memory storage unit in a compressed and encrypted format. As is also shown in Figure 3, the data may also contain a key or unique ID number that matches the ID or key of the viewer 266. This matching of a unique key or ID number prevents unauthorized transfer of text data from the memory storage unit to an unauthorized viewer. Small memory devices such as smart cards, electronic memory cards or PCM CIA cards (personal computer memory card industry association) may also be used to store the data.

## 2. Power Circuitry

As shown in Figures 3 and 4, the library 262 will accept power from AC wall power 610, DC power 640, or optional battery power 624. The power circuitry 610, 640 may provide all the voltage necessary from either the battery 624 or AC unit for the various circuitry in the library. The power circuitry 610, 640 may also provide power to the viewer through a single data cable when connected to the viewer. The power circuitry 610, 640 will recharge the battery using AC power when in operation. With the optional battery unit 624 installed, the library 262 becomes a portable unit and can still provide power to the viewer 266. In order to extend battery life, power conservation measures may be utilized, such as shutting down the memory system when not in use. When the viewer unit 266 is being utilized and the library circuitry is not being utilized, virtually all power may be shut down to the library 262.

## 3. Connection to the Public Telephone System

In an embodiment, the connection to the telephone system may be provided by a connector device 611, which consists of a modem. Various available modems may be used to perform this function. As shown in Figure 3, cellular phone or PCN phone connections 611' may also be provided. When the home system 258 is first initialized, the modem may be used to transfer the name and credit card information of the consumer to the billing and collection system 278. The telephone connection 270 may be utilized each time an electronic book is purchased by a consumer to complete and record the transaction. The telephone connection 270 may also be used to receive the text data from the operations center 250, by-passing the video distribution system 208. Additionally, the telephone connection 270 may be used to send and/or receive video and/or audio associated with a conference call. The telephone connection 270 may be a separate unit as shown in Figure 3. However, alternate means exist to connect the home system 258 to the billing and collection system 278 or the operation center 250. The modular connector (shown in Figures 3 and 4) provides access to each communication network to provide a path from the home system 258 to the billing and collection system 278 or the operations center 250.

Additional details regarding the home system 258 as well as alternatives can be found in the copending U.S. Application Serial Nos. 09/289,956 and 08/336,247, cited above.



### 1 III. Electronic Book Viewer

2 Figure 5 is a block diagram of a viewer 266 showing its internal components. The viewer  
3 266 of Figure 5 is similar to the viewer 266 depicted in Figure 3. The viewer 266 is preferably  
4 designed to physically resemble a bound book. The viewer 266 is made up of five primary  
5 components and several optional components: (1) LCD display 602; (2) digital circuitry (not  
6 shown); (3) video graphics controller 607'; (4) input controls 740'; (5) book memory 728; (6)  
7 optional power supply circuitry 736; (7) optional battery 603'; (8) optional RF transceiver 604;  
8 and (9) optional alternative communication interface devices, such as cellular or mobile connector  
9 611; (10) optional keyboards 267 and 268 (not shown); and (11) an optional speaker/microphone  
10 608'.

11 (1) A high resolution LCD screen 602, of VGA quality, may be used by the viewer 266  
12 to display text and graphic images. Alternatively, flat panel CRT technology can be employed for  
13 the screen 602. The screen 602 may be the size of one page of an electronic book. A two page  
14 screen or two screens may also be used with the viewer 266.

15 (2) Digital circuitry that includes a secure microprocessor 621, instruction memory 732,  
16 and digital logic. Data is transferred to the viewer 266 in compressed and encrypted format. The  
17 secure microprocessor 621 compares the ID number of the viewer 266 with the incoming data  
18 stream and only stores the text data if the ID number of the viewer 266 matches that within the  
19 incoming data stream. The viewer 266 may be configured not to output text data or other data, and  
20 the data can be decompressed and decrypted only at the moment of viewing and only for the  
21 current page being viewed. These measures provide additional security against unauthorized access  
22 to data.

23 (3) A video graphics controller 607' that is capable of assisting and displaying VGA quality  
24 text and graphic images is included in the viewer 266. The graphics controller 607' is controlled  
25 by the digital circuitry described above. Text may be displayed in multiple font sizes.

26 (4) The viewer 266 of Figure 5 has touch panel controls. These unique and novel controls  
27 allow the consumer to select stored electronic books and electronic books from catalogues, move  
28 a cursor, and turn pages in an electronic book. Typically, the controls include forward and reverse  
29 page buttons, a ball for cursor movement, one or more selection buttons, a current book button and  
30 a bookmark button.

1 (5) Book memory 728 for at least one electronic book or other data is included in the  
2 viewer 266. The memory 728 stores text and any graphics, which represent pictures in a book.  
3 The memory 728 can also store menu graphics data. Two different memory 728 devices may be  
4 used in the viewer 266, one for the instructions for the microprocessor 621 in the digital circuitry  
5 and a second type of memory may be used for the book memory 728 (and graphics). Various  
6 memory devices available on the market may be used such as, ROM, RAM or a small hard disk.  
7 Since an electronic book requires approximately 0.6 megabytes of storage, a small hard disk  
8 providing approximately 60 MBytes of storage provides memory to store approximately 100  
9 electronic books.

10 Text for electronic books may be displayed in various font sizes. To accommodate various  
11 fonts for display, a variety of fonts are stored in instruction 732 or book memory 728. Thus larger  
12 or smaller fonts may be recalled from memory 621, 728 to create displays desired by the  
13 subscriber.

14 (6) Power supply circuitry 736 in the viewer 266 accepts power from either an AC power  
15 source or from an optional battery 603' or the library 262. The power supply circuitry 736  
16 provides the necessary voltages to accommodate the various systems within the viewer 266.

17 (7) An optional battery 603' is provided in one embodiment. The battery 603' is  
18 automatically recharged when AC power is available.

19 (8) An optional RF transceiver 604 which provides a two-way data link between the  
20 viewer 266 and other components of the home subsystem can also be included in the viewer 266.

21 (9) The optional alternative communication interface devices allow the viewer 266 to make  
22 use of a variety of communication paths. For instance, the viewer 266 may include a cellular or  
23 PCN transceiver 611 for mobile communications.

24 (10) The optional wired (attached) keyboard 267 and wireless (e.g., RF) keyboard 268  
25 (see Figure 2) may be used with the viewer 266 to provide communications between the subscriber  
26 and the viewer 266.

27 (11) The optional speaker and microphone 608' allow the viewer 266 to provide audio  
28 signals to the subscriber, and allow the subscriber to provide an audio input. The speaker and  
29 microphone 608' may be used in conjunction with the cellular transceiver 608 or other

1 telecommunications equipment to provide for reception and transmission of telephony and  
2 data.

3 The viewer 266 of Figure 5 has parts available for providing connections to: a library 744,  
4 electronic card memory 748, CD ROM units 752, and a portable memory unit 756 (such as that  
5 shown in Figure 3 as 600'). Various electronic memory cards such as PCMCIA can be used with  
6 the viewer 266 to supply and store electronic books.

7 Security, low power consumption and excellent display technology are desired features of  
8 the viewer 266 design. The viewer 266 should be lightweight and portable. The viewer 266  
9 contains a software operating system that allows electronic books to be stored, read and erased  
10 and includes the capability to order electronic books and retain them in memory 728 for a  
11 predefined period of time determined by the system operator. The software can be configured to  
12 allow the electronic book to be read during a period of time (i.e., two weeks) and then  
13 automatically erased, read once and erased, or held in memory permanently. Each viewer 266 may  
14 have a unique key 605. All of the data storage may be encrypted with the key 605 for an individual  
15 viewer 266 to prevent more than one viewer 266 accessing the text file or electronic book file.

16 To support video conferencing, the viewer 266 can be augmented with additional features,  
17 as shown in Figure 5. The additional features can be integrated into an enhanced electronic book  
18 viewer 266 or provided as one or more upgrades to a more basic electronic book viewer 266. In  
19 Figure 5, a camera 608" and an input device 740' are included in the viewer 266. The camera  
20 608" is preferably a small video camera located and oriented on the viewer 266 so that it is typically  
21 directed at the face, torso, or entire body of one viewing the display 602. The direction of pointing  
22 is manually adjustable by the user. Alternatively or additionally, the camera 608" can be  
23 electronically steerable, focusable and otherwise controllable.

24 The input device 740' may take many forms. The input device 740' performs the function  
25 of accepting user input in order to establish and manage a conference call, e.g., entering party  
26 identifiers, hanging up, etc. Exemplary forms of the input device 740' include a telephone style  
27 number key pad; cursor/pointer movement device, such as a track ball, joystick or touch pad; click-  
28 type buttons; and a wired or wireless interface to a separate keyboard. Alternatively or  
29 additionally, the display 602 and the input device 740' can be combined in the form of a



1 touchscreen. The input device 740' may be a combinations of several different forms, including the  
2 illustrative ones just mentioned.

3 Conference calling also requires an upstream (or reverse path or transmission)  
4 communication capability of sufficient bandwidth. The upstream communication capability for video  
5 conferencing is in addition to the downstream communication capability by which textual book data  
6 can be received, and the upstream communication capability requires significantly more bandwidth  
7 than that minimally required for ordering or billing related to electronic books.

8 To support conference calling, the instruction memory 732 of the viewer 266 preferably  
9 contains programs for call establishment and management. The programs provide menus and a  
10 graphical user interface for call initiation, adding a party to a call, accepting an incoming call,  
11 terminating a call, and setting up call characteristics as well as display and other output  
12 characteristics.

13 Figure 6 is a block diagram of videoconferencing transmission and reception functions of  
14 the electronic book viewer 266. In regards to transmission, a video signal from the camera 608"  
15 is subjected to source encoding (i.e., conversion to spectrally efficient or compressed digital form)  
16 by a video source encoder 705, and an audio signal from the speaker/microphone 608' is subjected  
17 to source encoding by an audio source encoder 710. The source encoded video and audio signals  
18 are synchronized and multiplexed together by a synchronizer multiplexer 715. The video source  
19 encoder 705, audio source encoder 710 and the synchronizer multiplexer 715 together can function  
20 to perform standard audio/visual encoding algorithms such as MPEG (motion picture expert  
21 group) or ITU standard H.261 or H.263, which are well known in the art. Other media signals or  
22 signals containing signaling information can also be multiplexed with the audio and video signals, as  
23 described in greater detail below. The multiplexed audio/visual signal output from the synchronizer  
24 multiplexer 715 is optionally encrypted by an encryptor 720 and channel encoded (e.g., forward  
25 error correction encoding and/or interleaving) by a channel encoder 725 before being transmitted  
26 by a transmitter 730 upstream into a video conferencing connection network. Those skilled in the  
27 art will appreciate that the transmission functions illustrated in Figure 6 can be implemented in an  
28 order different from that illustrated.

29 In regards to reception, an incoming (i.e., downstream) video conferencing signal is  
30 received by a receiver 750, decoded by a channel decoder 755, decrypted by a decryptor 760,

1 and demultiplexed with proper relative timing among video, audio and other data components by  
2 a demultiplexer synchronizer 765. Video signals are decompressed and output for display by a  
3 video source decoder 770. Audio signals are decompressed and output for playing by an audio  
4 source decoder 775. Again, the order of processing can be different from that illustrated.

5 The other signals that can be multiplexed with the audio and video conference call signals  
6 include, for example, data files, electronic books, or HTML (hyper-text markup language) based  
7 content according to the ATVEF (advanced television enhancement forum) specification. The  
8 HTML content may be displayed on the viewer 266, may be stored in the home system for later  
9 use, or may be passed to devices such as televisions or computers attached to the home system  
10 components for immediate or later display. Broadcast data triggers, announcements, and content  
11 resources can be sent in the VBI of the video conference video signal on in an auxiliary data channel  
12 delivered with the video conference signal. Announcements are used to indicate to the viewer 266  
13 that interactive programming content is available for a given video conference or segment of a video  
14 conference. Content resources contain the actual content or programming to be run on the  
15 receiving device. Such content includes Web pages, scripts and images. The broadcast data  
16 trigger is used to synchronize the initiation of the interactive programming content to the ongoing  
17 video conference.

#### 18 IV. Network for Video Conferencing

19 Figure 7 illustrates a video conferencing network 1000 and various configurations for  
20 connecting viewers 266 (or other video conferencing end equipment 1005) to the network 1000.  
21 The network 1000 provides full duplex interconnectivity between viewers 266 involved in a given  
22 video conference call. The network 1000 can support many simultaneous calls. One typical  
23 configuration for connecting a viewer to the network 1000 is via a library, such as shown in the  
24 lower central area of Figure 7, where a viewer 266a is connected to a library 262a, which in turn  
25 is connected to the network 1000. A variation of this configuration is shown in the upper left area  
26 of Figure 7, where a set top terminal 601 is an intermediary between the network 1000 and a  
27 library 262b linked to a viewer 266b. Another typical connection configuration is a direct  
28 connection between the network 1000 and a viewer 266, such as the viewer 266c provided with  
29 an optional communicator, or the viewer 266d, which is provided with integrated library  
30 functionality.



### A. Mini-Networks

Figure 7 also illustrates a mini-network 1010. The mini-network 1010 can provide full duplex interconnectivity between viewers 266 in a limited area (e. g., within a home, building, or campus) so as to support video conference calls without involvement of the network 1000. For example, in the case of a video conference call between two viewers 266e and 266f within the mini-network 1010, the connection between the viewers 266e and 266f can be a direct connection or it can be a connection through the library unit 262c. Figures 8 and 9 further illustrate these two connection options, respectively.

#### 1. Direct Links Between Viewers

In Figure 8, the viewers 266e and 266f, as well as a third viewer 266g, communicate with each other without an intermediary. The communication paths between the viewers 266e-266g are preferably wireless links, and in one embodiment the wireless links are RF links that utilize the RF transceiver 604 in each of the viewers 266e-266g. Wireless infrared links are also possible. In alternate embodiments, the communication paths can be provided by wired networks, such as an existing data or computer network (e. g., LAN), existing television cabling, or existing home/building power wiring (as disclosed, for example, in U.S. Patent No. 5,319,634. In any case, the channel linking the viewers 266e-266g is multiplexed to accommodate six unidirectional links that connect the three viewers 266e-266g in a fully meshed network. Although one skilled in the art will readily appreciate that many multiplexing schemes are possible, including TDMA (time division multiple access) and FDMA (frequency division multiple access), the multiplexing scheme preferably utilizes CDMA (code division multiple access), also termed SSMA (spread spectrum multiple access), techniques. Advantages of CDMA in this instance include security of transmissions and the fact that FCC (Federal Communication Commission) regulations might not apply to these transmissions.

In one embodiment, an asynchronous direct sequence CDMA system with a common spreading code is utilized. Similar CDMA systems are well known and discussed, for example, in U.S. Patent No. 5,103,459 and U.S. Patent No. 5,546,381. In such a system, the transceiver 604 of each of the viewers 266e-266g includes an omnidirectional or essentially omnidirectional antenna, so that each viewer 266e-266f can receive the transmission of the other two viewers. Each of the viewers 266e-266g encodes its



1 transmissions using the same m-sequence as a direct sequence spreading code but at different  
2 phases. For example, the viewer 266e may transmit at a relative code phase of zero; the viewer  
3 266f may transmit at a relative code phase of -3.2 chips; and the viewer 266g may transmit at a  
4 relative code phase of +38.0 chips. Actually, each of the viewers 266e-266g can transmit at a  
5 random code phase while the receiver circuitry includes a search/selection algorithm as well as  
6 some contention protocol to resolve code phase collisions. The transceiver 604 of each of the  
7 viewers 266e-266g in this embodiment is a CDMA receiver that suppresses self-reception  
8 interference, despreads the received signals at the various incoming codes phases, tracks those  
9 phases, and possibly mitigates multipath and/or interuser interference.

10 Because the mini-network 1010 of Figure 8 is fully meshed, it can operate under  
11 distributed control. Preferably, a receiver-oriented control protocol is utilized. Each of the viewers  
12 participating in a video conference call broadcasts its audio/video signal(s), and any viewer that  
13 receives the signal(s) performs the necessary processing to output the audio and video components  
14 in combination with those of other received signal(s). Preferably, the video portions of the incoming  
15 signals are scaled and displayed together in some arrangement on the display 602, while the audio  
16 portions of the incoming signals are summed, synchronized to the video, if necessary, so that a  
17 summed, synchronized audio signal is sounded from the speaker/microphone 608'.

## 18 2. Using a Library Unit as a Central Node

19 In Figure 9, the library unit 262c is used as a central node in the mini-network 1010, and  
20 connections 1200, 1205, 1210 link the library unit 262c to the viewers 266e-266g, respectively.  
21 The connections 1200, 1205, 1210 can be hardwired or wireless. Although Figure 9 depicts the  
22 connections 1200, 1205, 1210 in a star arrangement, other arrangements, such as a ring, for  
23 example, are possible. In cases where the connections 1200, 1205, 1210 share a common medium  
24 (e.g., a hardwired ring, or free space in the case of wireless connections), then a multiplexing  
25 scheme is necessary. Again, many well known multiplexing schemes are possible, including TDMA  
26 and FDMA, but the multiplexing scheme preferably utilizes CDMA techniques for wireless  
27 connections. In this case, the centralized node (i.e., the library unit 262c) allows a synchronous,  
28 orthogonal CDMA system to be utilized.

29 Specifically, synchronous orthogonal CDMA spreading codes, such as Walsh-Hadamard  
30 codes, are employed on the uplinks from each of the viewers 266e-266g to the library unit 262c;

meanwhile, a broadcast downlink is transmitted from the library unit 262c and received by each of the viewers 266e-266g. In one embodiment, the broadcast downlink is spread using one of the Walsh-Hadamard codes unused by the uplinks and includes control data for uplink timing and transmission power control feedback as well as call data comprising combined audio/video signal (s) from each viewer participating in the conference call.

In one embodiment, the library unit 262c provides centralized control of communications involved in a video conference call. Such centralized control may include call set-up, audio summing, and video combining. Alternatively, the library unit 262c can perform only switching and connectivity functions, while each of the viewers 266e-266g performs the control functions, just like in the case of a directly connected mini-network where there is no library unit 262c.

The access control of the library unit 262c can be modified to accommodate multiple viewer connections during a conference call. During typical use for delivery of electronic books, only a single viewer holds the encryption key for the library unit 262c. This is done in order to prevent unauthorized distribution of electronic books. As depicted in Figure 9, however, the library unit 262c may communicate with several viewers 266e-266g during a conference call. This can be accomplished by operating the library unit 262c in a "clear" mode during a conference call. Clear mode transmissions from the library unit 262c may be unencrypted or, preferably, clear mode transmissions from the library unit 262c utilize a common key to which all of the viewers 266e-266g have access.

#### B. Large Scale Network

The mini-network just described is capable of supporting calls between viewers in a relatively small geographical area, without involvement of the network 1000. For calls of greater range the network 1000 is necessary. National or worldwide connectivity is possible using the network 1000, which may take various forms, as described below, including hybrids of the following.

##### 1. Cable Television Backbone

In one embodiment, the network 1000 utilizes a cable television transmission network. A cable television distribution network is described in U.S. Patent No. 5,559,549. Generally, a cable television transmission network comprises headends, each of which serves a number of subscribers. The connection between a headend and a



subscriber may be metallic coaxial cable, optical fiber, or a hybrid, e. g., hybrid fiber-coax (HFC) systems. The most common cable networks today are HFC networks, but 100% fiber optic networks, i.e., fiber to the curb (FTTC), will be more prevalent in the future.

To support conference calling, the cable television network and the home interface to the cable network must support two-way communications. This can be accomplished by having separate physical fibers/cables or directional multiplexing on the same fibers/cables or some combination of both. For example, the frequency range between 5 MHz and 42 MHz is allocated for upstream (also called “uplink”) transmissions (i.e., from a subscriber to a headend). In a typical HFC layout, there are separate optical fibers for upstream and downstream transmissions between a headend and each of several neighborhood fiber nodes, where signals are converted between optical and electrical forms. However, upstream and downstream transmissions are multiplexed together onto the same coaxial cable that links a fiber node to subscriber sites (e.g., homes, offices). Bidirectional amplifiers employing diplexers are typically utilized in the coaxial portion between a fiber node and subscriber sites. Further details of a bidirectional cable television system are contained in U.S. Patent No. 7,590,993, filed July 29, 1998, entitled METHOD AND APPARATUS FOR USING PROGRAMS WATCHED DATA. An alternative use of the cable plant is via cable modem pairs between a viewer or library unit and a headend.

Further upstream from the cable headends are one or more operations centers. The general downstream functionality of an operations center is collecting programs and/or data, packaging the collected programs and/or data, and transmitting the packaged programs and/or data to headends. The link between an operations center and a headend may involve fixed terrestrial medium (e.g., cable/fiber), terrestrial microwave, satellite, or some combination of channels, although satellite channels are the most common presently. The link between a headend and an operations center may be bidirectional to support duplex calling between electronic viewers. Operations centers may be linked together to provide support over an even larger geographical area.

In direct broadcast satellite (DBS) systems, the headend is absent or bypassed, and the operations center communicates directly with the subscriber via satellite. To the extent that a DBS satellite link is bidirectional with sufficient upstream bandwidth, a DBS system may also be utilized to support calling between electronic viewers. As an alternative to the DBS system, a separate,



1 dedicated or proprietary system of satellites may be utilized with the present invention to provide  
2 a satellite backbone for the network 1000. Alternatively, diverse communication channels, such  
3 as telephony or the Internet, can be used to provide upstream communications in conjunction with  
4 a downstream satellite transmission. For example, a downstream satellite broadcast of audio and  
5 video from a teacher or professor along with upstream audio only transmissions from students via  
6 a diverse communication channel is well suited to distance learning applications using the conference  
7 calling capabilities of the present invention.

8         The extent to which bidirectional communication capability is present in the cable television  
9 system determines the support for calling between electronic viewers 266. In one embodiment, a  
10 central node within the network 1000 performs signal processing and coordination to establish and  
11 manage a multiparty video conference call, as described in greater detail below. A video  
12 conferencing central node may be combined or collocated with other equipment in the cable  
13 television network. For example, a central node may be associated with an operations center to  
14 provide national or regional coverage. A smaller scope of coverage may be supported by a central  
15 node associated with a headend. An even smaller scope of coverage may be supported by a  
16 central node associated with a fiber node. Continuing one step further, the mini-network, as  
17 described above, results when a central node is associated with a library unit.

## 18                 2. Cellular Telephony Backbone

19         The cellular telephony system is a bidirectional communication network that can be utilized  
20 for calls between electronic book viewers 266 with cellular transceivers. Analog and digital cellular  
21 telephony systems are well known in the art and easily support two-party conference calls without  
22 video. Digital cellular systems are preferred for use with the present invention, because they offer  
23 greater bandwidth, which is necessary for transmission of video. A central node for video  
24 conferencing in a cellular network may be a cellular base station (i.e., at the center of a cell) or  
25 mobile switching station, which links many base stations together.

## 26                 3. PCS Backbone

27         A wireless PCS (personal communication system) is another bidirectional communication  
28 network that is well known in the art and can be utilized for calls between electronic book viewers  
29 having PCS transceivers. The PCS may be, for example, a PCN.

#### 1 4. PSTN Backbone

2 The PSTN (public switched telephone network) can be utilized with the present invention  
3 to communicate video conferencing calls among viewers 266 having a PSTN interface. The PSTN  
4 reaches worldwide and encompasses land lines (both metallic and fiber optic), terrestrial microwave  
5 links, and satellite links, as well as a large number of switching centers and exchanges. The PSTN  
6 is well known in the art, and in particular, multiparty conference calling in the PSTN is well known.  
7 Furthermore, schemes for video transmission via the PSTN are known in the art. For example,  
8 U.S. Pat. No. 5,563,882 (the '882 patent), which is hereby incorporated by reference, discloses  
9 a video conferencing system that utilizes ISDN (integrated services digital network) and the H.320  
10 video telephone protocol. The '882 patent discloses a "multipoint control unit (MCU)," which is  
11 an example of a video conferencing central node, as used herein.

#### 12 5. Hybrids

13 Hybrids of cable television networks, cellular telephony networks, PCNs, the PSTN, and  
14 other networks, such as the Internet, are possible. By way of example, some cable television  
15 networks presently provide interconnection to the PSTN and the Internet, so that a television cable  
16 can be the single communications conduit for a home or office. Further integration and  
17 interconnections to PCNs and/or cellular networks is technically straightforward and likely in the  
18 future.

### 19 V. Conferencing Processes and Methods

#### 20 A. Call Establishment

21 A video conferencing call can be established in a variety of manners. One or more channels  
22 for combined audio, video, and possibly other data can be set up at the initialization of the call.  
23 Alternatively, video and possibly other data communication can be added to an existing call that  
24 initially carries less media or fewer media channels, such as an audio-only call, for example.

25 In any case, channels for the various media are typically requested by one of the call  
26 participants. Requests are communicated to a video conferencing central node via a signaling  
27 network that may be inband or out-of-band with respect to the media content of the call. In a  
28 circuit switched or connection oriented network, a request is processed by one or more video  
29 conferencing central node(s) so as to route the requested media channels, reserve adequate switch  
30 ports and/or configure various switches between the call participants as necessary to support the



requested media. For example, a request for video communication midstream in an audio-only call that is already established would prompt the video conferencing central node to configure its video switch to establish one or more connections of sufficient bandwidth to accommodate duplex video transmissions and possibly perform other processing to mark, join, or synchronize the video transmissions to the pre-existing audio communications. Further examples of requests schemes in a video conferencing system are disclosed in the '882 patent and U.S. Patent No. 5,896,128 (the '128 patent). In a packet switched or connectionless network, requests as just described may not be necessary. In an asynchronous transfer mode (ATM) network, which has some qualities of both circuit switching and packet switching, use of requests would be appropriately modified in accordance with well known understanding in the art.

It is also possible to add a party to an ongoing video conferencing call. For example, a point-to-point two-party call can be converted to a bridged three-party call. A technique for doing so without disruption to the call is disclosed in the '882 patent.

A particular participant may select which, if any, other participants of a conference call will be able to receive all or some of its signals. This selection may be made during initial call establishment or "on the fly." For example, if a party A to a three-way conference call among parties A-C wishes to disclose to party B something secretly from party C, party A may temporarily turn off the ability of party C to hear or view the signals of party A.

#### B. Viewer Signal Processing and Functions

A viewer 266 performs signal processing associated with the transmission and reception of call content. In regards to transmission, the audio signal sensed by the speaker/microphone 608' is converted to digital form and compressed. For voice or speech audio, the following families of algorithms are particularly suitable: pulse code modulation (PCM), delta modulation (DM) and linear predictive coding (LPC). Each of the above families of algorithms includes variations, such as differential and adaptive variations. Similarly, the video signal sensed by the camera 608" is converted to digital form and compressed. The fundamental techniques for image compression include vector quantization, discrete cosine transforms, and run-length encoding. Combinations of these techniques are also possible. For video sequences of images, interframe encoding based on motion prediction can be applied to provide further compression gains. These techniques as well as others are utilized in standard video compression algorithms, including low-rate MPEG and ITU



standard H.261 and H.263 for video conferencing, which are well known in the art. Any compression algorithm that produces acceptably low bit rates for video and/or audio transmission through the network and can be implemented in real time with acceptably small delay is suitable for use with the present invention. Encoding of video and audio may be distinct or interrelated. By way of example, MPEG is a combined standard for both video and audio. These and other features are disclosed in additional detail in the '128 patent.

In regards to reception, a viewer 266 executes a decompression algorithm corresponding to the compression algorithm. In addition, the viewer 266 may perform additional processing of the received signals. For example, the viewer 266 can deselect some or all other conference call participants for output on that particular viewer 266, scale video images, overlap video images, and otherwise customize the display and output characteristics. Furthermore, the viewer 266 may be programmed to automatically select the dominant speaker on the basis of the audio components of the conference call and enlarge the size and/or display resolution of the corresponding video output. These and other reception signal processing features are disclosed in the '128 patent cited above as well as U.S. Patent No. 5,801,756.

Optionally, the video conferencing system can support more sophisticated remote participant controls of video and camera functions. For example, the viewer camera 608" may be electronically controllable (e. g., electronically steerable, focusing, zoom, pan, etc.) locally or remotely, and one or more other participating viewers 266 can command these electronically controllable aspects of the camera 608" to customize and dynamically alter the characteristics of the video image sensed by the camera 608". Alternatively, the same "camera" video effects may be achieved using signal processing techniques. Camera commands and related video manipulation commands can be communicated from the remote (controlling) viewer to the subject (controlled) viewer by a low rate signaling channel.

Other conferencing display controls are possible, including, for example: (1) round robin display in a predetermined sequence; (2) visual token passing, wherein everybody can see the participant who holds the token; (3) dominant voice activation, wherein whoever has the loudest audio signal is displayed; and (4) "Hollywood Squares" style display of all participants jointly in an arrangement such as a checkerboard.

Additional output manipulations are possible for non-video media. Examples of non-video media (besides audio) include electronic books, data files, documents, spreadsheets, graphics, programs, text streams, web pages, and interactive whiteboards. Each of the above can be contained within a window on the display 602 and sized, positioned and layered to suit the user's preferences. Alternately, each of the above can be provided as a picture-in-picture. According to one process of the present invention, a new object for display, when it is received at a viewer 266, is initially displayed as a small icon. When the user provides input to open the icon (e.g., by clicking it), the icon transforms into a window of default size and position. The user can then adjust the display characteristics of the window. In the case of an interactive whiteboard, each participant in the conference call may view and potentially edit the contents of the whiteboard, which is preferably a window on which simple drawings, graphics, and text may be entered. Each call participant sees the same version of the whiteboard, which is globally updated periodically or as necessary.

A receiving viewer 266 with sufficient memory can record a call in its entirety or selected components of a call, including one's own audio, video, or other components. The ability to store and later retrieve calls or call components is useful for record keeping, recollection or message delivery. The record function can be programmed to operate without a human user present at the receiving viewer 266. In this case, the record function provides the viewer 266 with the capability of an answering machine or voice mail system with video and/or other media embodiments. By way of illustration of this capability, an unattended viewer 266 may receive a video call from a calling party. The unattended viewer 266 answers the call automatically and transmits an audio/video greeting to the calling party. In response to the greeting, the calling party transmits an audio/video message to the unattended viewer 266, which records the message.

A receiving viewer 266 can also convert an audio message to text in accordance with algorithms (e. g., voice recognition) that are well known in the art. The resulting text file can be displayed on the display 602 of the viewer 266 or stored in memory, such as book memory 728, within the viewer 266. This feature is useful to produce a transcript of a call or to "listen" to a call or message silently. The same speech to text conversion capability can be utilized with outgoing calls or messages as well. By way of example, a user may choose to transmit her audio signal as a text stream in place of or in addition to her audio signal. The viewer 266 can also be programmed



to convert text to speech in accordance with well known algorithms. Such a feature is useful for users who have difficulty seeing or reading. Additional details of viewer conversion between speech and text are provided in the above-cited U.S. Patent No. 6,261,564.

### C. Central Unit Functions

Some or all of the viewer functionality, as described in the preceding section can be performed by a video conferencing central node instead (or additionally). For example, the record and storage function can be easily, and in cases advantageously, located in a central storage node rather than distributed among viewers. As further examples, a central node can perform speech-text conversion and can store and manage an interactive whiteboard. Central unit recording, storage and management are desirable when the content of the video conference call concerns a lecture or presentation.

In a preferred embodiment, a video conferencing central node performs central combining for a conference call. Central combining simplifies the communication among the viewers 266 participating in a conference call by establishing full duplex connections having fixed or bounded bandwidth, one between each participating viewer 266 and the central node. The central node manages all aspects of the call and is ultimately responsible for the selection of information received by each participating viewer on its single channel. The central node receives all uplink transmissions of video, audio and possibly other media. The central node then makes various combinations of the uplink data, one combination being transmitted to each participating viewer 266. Each participating viewer 266 can customize its downlink combination and output display, as described above by communicating configurations commands to the central node, which effects the requested configuration. Further details of central combining for video conferencing is disclosed in the '128 patent already cited and U.S. Patent No. 5,657,096.

Figure 10 illustrates central combining for a conference call among the three viewers 266a, 266b and 266c. A node 1025 is the central node for this call. Nodes 1030 and 1035 are utilized for connection of the viewer 266a. In this example, the network 1000 initially determines that the node 1025 would act as the central node. Upon establishment of the conference call, signaling within the network 1000 occurs to set up the node 1025 as the central node and to configure switches at the nodes 1030 and 1035 so as to make the connections as shown, in the case of circuit switching. In the case of packet switching, the illustrated routes may be ones or the most likely ones



1 of many possible routes for given packets. Signals such as video, audio, and/or other media  
2 generated or originating at the viewer 266a are transmitted to the central node 1025. Likewise,  
3 each of the viewers 266b and 266c transmit uplink signals to the central node 1025. In one  
4 embodiment, each of the viewers 266a-266c also transmits via signaling connections configuration  
5 information pertaining to its display setup and other functions. Based on this configuration  
6 information, the central node 1025 performs combining of data from some or all of the three uplinks  
7 to create three customized downlink signals -- one for each of the viewers 266a-266c -- and  
8 transmits the downlink signals along the paths shown. One skilled in the art will appreciate that  
9 uplink and downlink transmissions to/from a given viewer need not share the same path physically  
10 or logically.

11 In one embodiment, the central node 1025 performs audio combining. Typically, the audio  
12 uplink components from every other participating viewer 266 are summed to create a sum or  
13 combined audio signal, which is then transmitted to a participating viewer as part or all of its  
14 downlink transmission. Audio summation combining has the effect of allowing every call participant  
15 to hear all other participants, as occurs in a face to face conference. Optionally, a viewer's own  
16 uplink audio signal can be added to the sum downlink audio it receives, thus providing a side tone.  
17 The summation can be a weighted sum and the weighting can be altered dynamically. For example,  
18 relative audio weights, and thus amplification, can be in proportion to the size of that speaker's  
19 corresponding video image on a particular viewer screen. As another example, the relative audio  
20 weight of the dominant speaker at any time may be increased. The time relationship between the  
21 component audio signals and their corresponding video signals is maintained and synchronized as  
22 necessary. Those skilled in the art will appreciate these and many other variations and features from  
23 well known techniques of audio conferencing.

24 In an embodiment of the present invention, the central node 1025 performs video  
25 processing to combine various video components of a video conferencing call. In the simplest case,  
26 the central node 1025 switches video signals from one or more uplinks to a given downlink without  
27 processing the content of the video signals. In this case, each viewer performs any video content  
28 processing. In a more active role, the central node 1025 performs substantive processing of the  
29 uplink video signals to create a composite video signal for each participating viewer 266. In this  
30 more active role, the central node 1025 can select from the available uplink video images (still or

1 moving) as well as other media, position and scale the images. Downward scaling (shrinking) of  
2 images may result in a reduction of resolution compared to the corresponding video uplink signal.  
3 Upward scaling (enlargement or magnification) of images may produce a coarser image whose  
4 resolution can be enhanced using well known techniques, such as, for example, image interpolation  
5 and edge enhancement. The composite image for each participating viewer 266 is then encoded  
6 for transmission. Standard digital encoding formats for moving video are preferred, such as, for  
7 example, an MPEG, H.261 or H.263 format.

8 Figure 11 is a block diagram of the video conferencing central node 1025. The central  
9 node 1025 contains circuitry to perform the functions just described, including a video combiner  
10 1410, audio summation combiner 1415, and a switch 1420. The central node 1025 also contains  
11 a synchronizer 1425 to adjust relative timing between audio and video signals as necessary and a  
12 memory 1430 in which signals can be recorded for future retrieval and playback. A signaling  
13 module 1435 transmits and receives signaling information to/from viewers and other nodes. Finally,  
14 a controller 1440 controls the operation of the other circuitry. Those skilled in the art will recognize  
15 that other arrangements than the one illustrated in Figure 11 are possible and that another node or  
16 central node may contain less than all of the illustrated circuitry.

## 17 VI. Applications

18 The present invention provides synergistic effects from the combined convenience of  
19 viewing electronic books in association with participating in a video conference call.

20 At the most basic level, the viewer 266 of the present invention provides the advantages  
21 and convenience of a single device that can perform the dual functions of viewing electronic books  
22 and participating in conference calls. The combination takes advantage of common components,  
23 such as the display 602 and communication capability, that can be utilized for both functions. The  
24 viewer 266 is simpler to transport and utilize than two or more separate devices. Furthermore, the  
25 portability of the viewer 266, especially when utilizing wireless communications, enables it to be  
26 used in a variety of settings, including at the home and office, while traveling, even at a  
27 beach.

28 Another example of the synergistic advantages of the present invention is the ability to  
29 initiate a conference call while viewing an electronic book. The electronic book may be directly  
30 pertinent to the conference call. For example, the electronic book may be a directory or listing of



1 call connection numbers, addresses, or the like, such as a “White Pages”, “Yellow Pages” or a  
2 personal contact booklet. While or soon after viewing the electronic book directory on a viewer  
3 266 to look up one or more parties to call, a conference call can be established conveniently using  
4 the same viewer 266. The viewer 266 can be programmed to mask the connection number or  
5 address from the user, so that a user need only deal with the called parties name or “handle” that  
6 is more familiar. In particular, a user can simply highlight, click or otherwise select a name from the  
7 directory, and the viewer will automatically capture the appropriate connection information and  
8 initiate the call. A directory can also be used in this manner to add a new party to an existing call.

9 As another example, the electronic book may be a merchandise catalog. While reading the  
10 catalog, a user can initiate a call to a store or seller to order an item in the catalog or to obtain  
11 additional information. The electronic book catalog can be written to accommodate easy and  
12 automated calling in relation to the catalog contents. For example, a user may highlight, click or  
13 otherwise select an item in the catalog and press a single button (e.g., a “dial” or “connect” button)  
14 to place the call. In certain embodiments, the call may be a conference call in which the selected  
15 items are auctioned and the callers are live participants in the auction. More generally, the  
16 electronic book need not be a catalog, but can be any publication containing an advertisement for  
17 stores, merchandise or special information services (e.g., sports results, weather information,  
18 astrology, dealer locator services, or adult entertainment) that can be called.

19 Other synergistic effects occur when the electronic book is not directly pertinent to the  
20 conference call. A user engaged in viewing an electronic book can initiate or receive a call with  
21 minimal disruptive effect because the call and the electronic book are seen and/or heard on the  
22 same viewer 266. Furthermore, the user can automatically mark an active electronic book at the  
23 current page or position when a call is initiated or received, to further ease resumption of reading  
24 the electronic book after conclusion of the call. A user participating in a conference call that the  
25 user finds boring or disruptive can inconspicuously and conveniently read an electronic book on the  
26 same viewer 266 while feigning interest in the conference call. When the display 602 of the  
27 electronic book viewer 266 is actually two separate screens, one screen can display the electronic  
28 book or text while the other screen can be utilized to display the video conference. For incoming  
29 calls, caller identification (“caller ID”) can be performed in accordance with well known techniques  
30 in the art, and the caller identification can be conveniently displayed on the display 602.

1 Perhaps most importantly, the present invention finds advantageous use in distance learning  
2 applications. Textbooks and lecture or presentation materials (e.g., an outline or slide show of the  
3 lecture or presentation) can take the form of electronic books, and lectures, presentations or  
4 discussions can be conducted as video conference calls. In one preferred arrangement, video is  
5 broadcast from the professor or presenter to all participants in the call while audio only from all call  
6 participants (including the professor or presenter) is combined so that all can hear all others' audio,  
7 though only the professor or presenter can be seen. In this way, questions and answers can be  
8 exchanged. In another preferred arrangement, a visual token passing scheme is employed, wherein  
9 the professor or presenter is the default token holder, but the professor or presenter can pass the  
10 token to a student or audience member so that everyone can see the student or audience member's  
11 camera 608" video when, for example, the student or audience member asks a question.  
12 Interactive whiteboards are desirably incorporated into the conference call to facilitate student  
13 questions or input that is more naturally expressed non-verbally (such as sketches or mathematical  
14 formula). Text files, text banner, graphics files, video clips, computer programs, and other data is  
15 also advantageously incorporated into the conference call to aid in effective communication and  
16 learning. For example, the professor or presenter may play a video recording or run a computer  
17 simulation as part of a lecture or presentation.

18 The present invention provides many other benefits and advantages when used in distance  
19 learning applications. For example, students need only have a single, lightweight viewer 266, rather  
20 than a large number of bulky and heavy books. A viewer 266 with sufficient memory capacity can  
21 easily store all the books used by a busy student over the course of a semester. As another  
22 example, the speech-to-text capabilities of the present invention simplify note-taking by students.  
23 As a further example, the ability to store some or all components of a distance learning conference  
24 call lecture enables students who were "absent" from the lecture to easily view the missed lecture.  
25 Also, a student wishing to review a particular topic can easily access the lecture covering the topic  
26 for retrieval and replay, without having to meet a professor during office hours just to have the  
27 professor repeat what was said in the lecture. When a student does require consultation with a  
28 professor, the consultation can take the form of a conference call, and relevant sections of a  
29 textbook (e.g. an assigned homework problem) can be displayed and discussed conveniently.  
30 Professor-student consultations can also advantageously utilize the whiteboards provided by the



1 present invention. Schools and universities can utilize the present invention to offer distance learning  
2 classes to a very large number of students economically, without the traditional physical constraints  
3 of room size and capacity of physical facilities.

4 In short, the present invention can revolutionize campuses and the educational process,  
5 sparking a new renaissance of learning, much like Gutenberg's moveable typeset printing did over  
6 500 years ago.

7 The terms and descriptions used herein are set forth by way of illustration only and are not  
8 meant as limitations. Those skilled in the art will recognize that numerous variations are possible  
9 within the spirit and scope of the invention as defined in the following claims and their equivalents.

We claim:

1. A conferencing system, comprising:

at least one electronic book home system, comprising:

a portable electronic book viewer comprising:

a feature for selecting an electronic book from a list of available books displayed in the electronic book viewer,

a feature for ordering a selected electronic book;

a feature for receiving an electronic transmission of the selected electronic book;

a feature for establishing and managing a conference call while viewing the selected electronic book;

a feature for participating in the conference call while viewing the selected electronic book;

a memory in which data representing an electronic book can be stored, a video display, connected to the memory for displaying the selected electronic book,

a speaker,

a microphone,

a transmitter connected to the microphone, and

a receiver connected to the speaker, wherein the transmitter and the receiver have sufficient bandwidth to accommodate a conference call, whereby the electronic book viewer can be utilized in a conference call; and

a library unit, locally coupled to the electronic book viewer, configured to download from a remote source and store a plurality of electronic books and to deliver the selected electronic book to the electronic book viewer upon request, the library unit



comprising:

local connections between the library unit and the electronic book viewer and the library unit and an interconnection network, and

a controlling mechanism for controlling communications involved in the conference call; and

at least one end equipment;

wherein the interconnection network is capable of linking two or more of the at least one electronic book viewer and the at least one end equipment in the conference call during the conference call;

wherein the conference call is initiated by selecting a portion of a text of the displayed selected electronic book.

2. The conferencing system of claim 1 wherein the at least one end equipment is another electronic book viewer.

3. The conferencing system of claim 1 wherein the interconnection network comprises a direct connection between the at least one electronic book viewer and the at least one end equipment.

4. The conferencing system of claim 3 wherein the direct connection is a hardwired connection.

5. The conferencing system of claim 4 wherein the hardwired connection comprises at least one from the group consisting of in-home telephone wiring, in-home power wiring, in-home coaxial cable, and a computer network.

6. The conferencing system of claim 3 wherein the direct connection is a wireless connection.

7. The conferencing system of claim 6 wherein the wireless connection comprises at least one from the group of a radio frequency link and an infrared link.
8. The conferencing system of claim 1 wherein the connection is a hardwired connection.
9. The conferencing system of claim 8 wherein the hardwired connection comprises at least one from the group consisting of in-home telephone wiring, in-home power wiring, in-home coaxial cable, and a computer network.
10. The conferencing system of claim 1 wherein the connection is a wireless connection.
11. The conferencing system of claim 10 wherein the wireless connection comprises at least one from the group consisting of a radio frequency link and an infrared link.
12. The conferencing system of claim 1 wherein the interconnection network further comprises:
  - a set top terminal connected to the library unit.
13. The conferencing system of claim 12 wherein the interconnection network further comprises:
  - a video distribution system connected to the set top terminal via a two way communication path.
14. The conferencing system of claim 13 wherein the video distribution system is a cable television system.
15. The conferencing system of claim 13, wherein the video distribution system is a



direct broadcast satellite system.

16. The conferencing system of claim 1 wherein the interconnection network comprises one or more of the group consisting of a cellular telephone network, a PCS, the public switched telephone network, the Internet, a LAN, and a satellite communication network.

17. The conferencing system of claim 1 wherein the interconnection network comprises a central combining node.

18. The conferencing system of claim 17 wherein the central combining node comprises a video combiner.

19. The conferencing system of claim 17 wherein the central combining node comprises an audio signal summation module.

20. The conferencing system of claim 17 wherein the central combining node comprises a switch.

21. The conferencing system of claim 17 wherein the central combining node comprises a controller.

22. The conferencing system of claim 17 wherein the central combining node comprises a signaling module.

23. The conferencing system of claim 17 wherein the central combining node comprises a memory capable of storing components of the conference call.

24. The conferencing system of claim 23 wherein the stored components of the conference call comprise at least one selected from the group consisting of an audio signal, a video signal, a program file, a data file, a text file, and an electronic book.

25. The system of claim 1 wherein at least one electronic book viewer further comprises:

a processor connected to the memory, the video display, the speaker, and the microphone; and  
conference calling software for execution on the processor.

26. The system of claim 1, wherein the electronic book viewer further comprises: a feature for purchasing an electronic version of a selected electronic book.

27. The system of claim 1, wherein the electronic book viewer comprises an encrypted electronic key.

28. The system of claim 1, wherein the memory stores the electronic book for a predetermined period of time.

29. An electronic book conferencing system, comprising:  
at least one electronic book home system, comprising:  
an electronic book viewer comprising:  
a feature for selecting and ordering an electronic book from a list of available books displayed in the electronic book viewer;  
a feature for receiving an electronic transmission of the selected electronic book;  
a feature for establishing and managing a conference call while viewing the selected electronic book;  
a feature for participating the conference call while viewing the selected electronic book;  
a memory in which data representing an electronic book can be stored,



a video display, connected to the memory for displaying the selected electronic book,

a speaker,

a microphone,

a transmitter connected to the microphone, and

a receiver connected to the speaker, wherein the transmitter and the receiver have sufficient bandwidth to accommodate a conference call, whereby the electronic book viewer can be utilized in a conference call; and

a library unit configured to receive a plurality of electronic books from a remote operations center, and store the plurality of electronic books for local and secure access by the electronic book viewer, the library unit comprising:

a local connection between the library unit and the electronic book viewer, and

a controlling mechanism for controlling communications involved in the conference call;

a feature for charging the recipient a price for the ordered electronic book;

at least one end equipment; and

an interconnection network capable of linking two or more of the at least one electronic book viewer and the at least one end equipment in a conference call, wherein the conference call is initiated by selecting a portion of a text of the displayed selected electronic book.

30. The conference system according to claim 29, wherein the interconnection network directly links two or more of the at least one electronic book viewer and the at least one end equipment in a conference call.

31. The conference system according to claim 1, further comprising a conference call software stored in at least one of the library unit, the electronic book viewer, and the interconnection network for enabling the electronic book viewer to be used in the conference call.

32. The conference system according to claim 29, further comprising a conference call software stored in at least one of the library unit, the electronic book viewer, and the interconnection network for enabling the electronic book viewer to be used in the conference call.



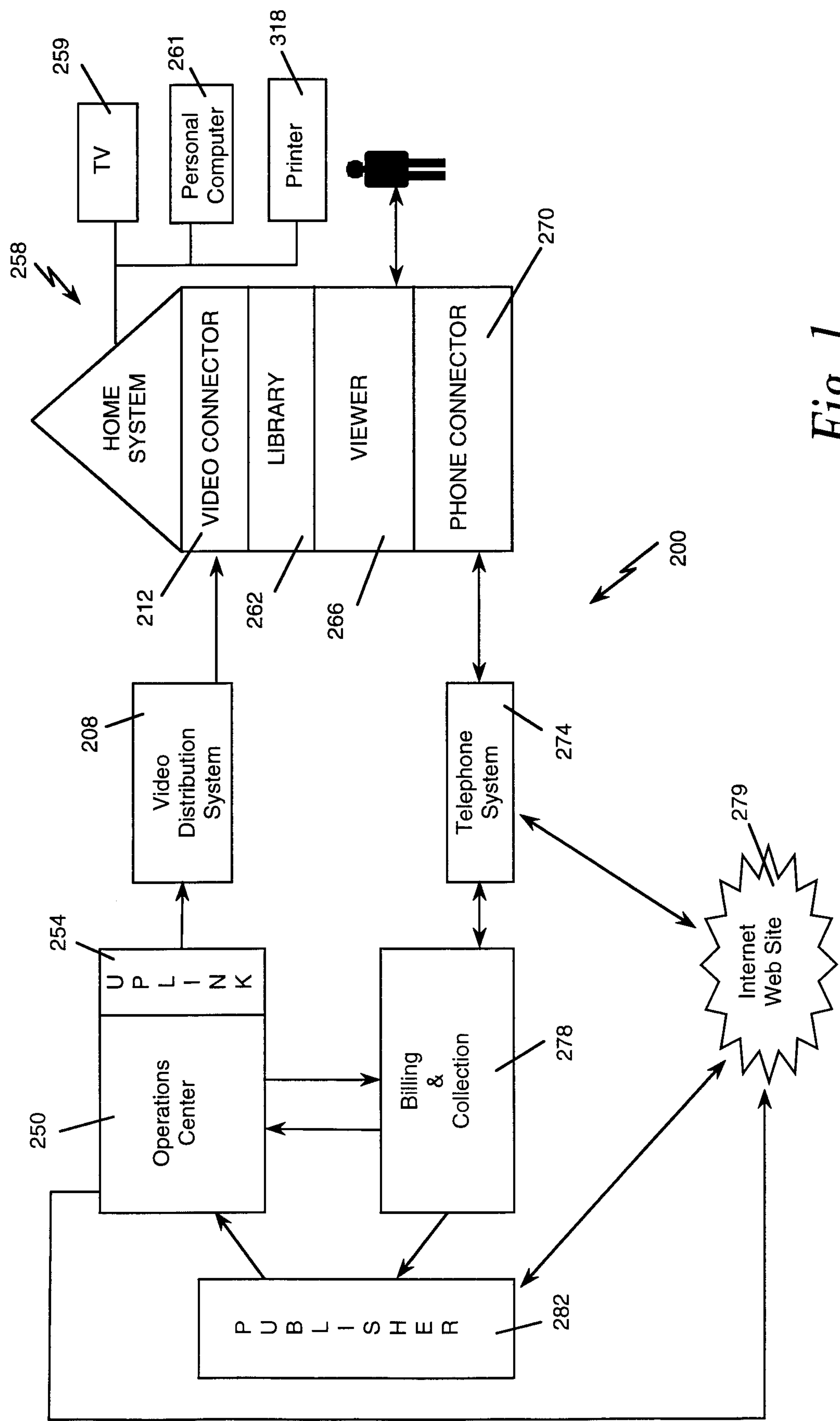


Fig. 1

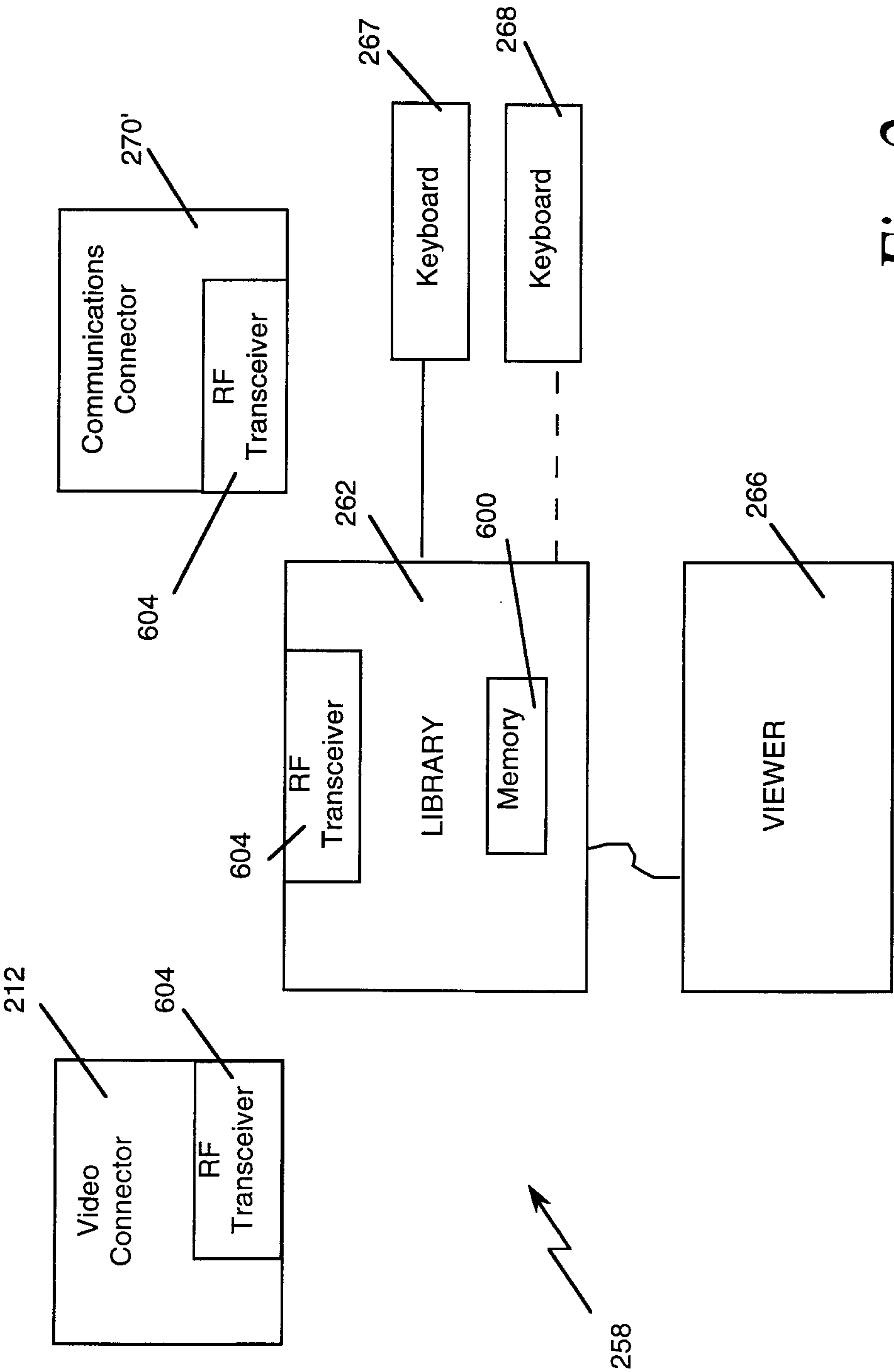


Fig. 2

3/10

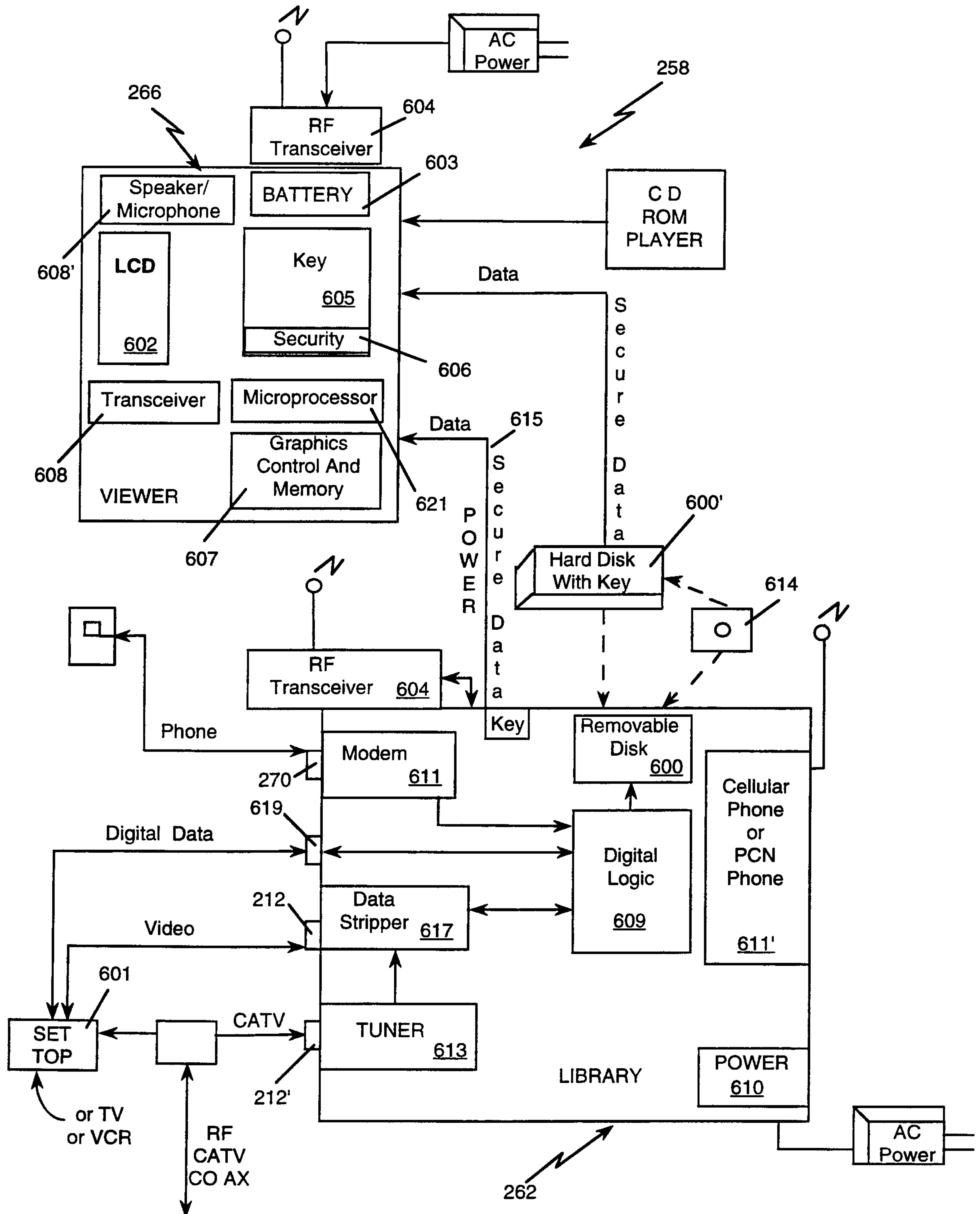


Fig. 3



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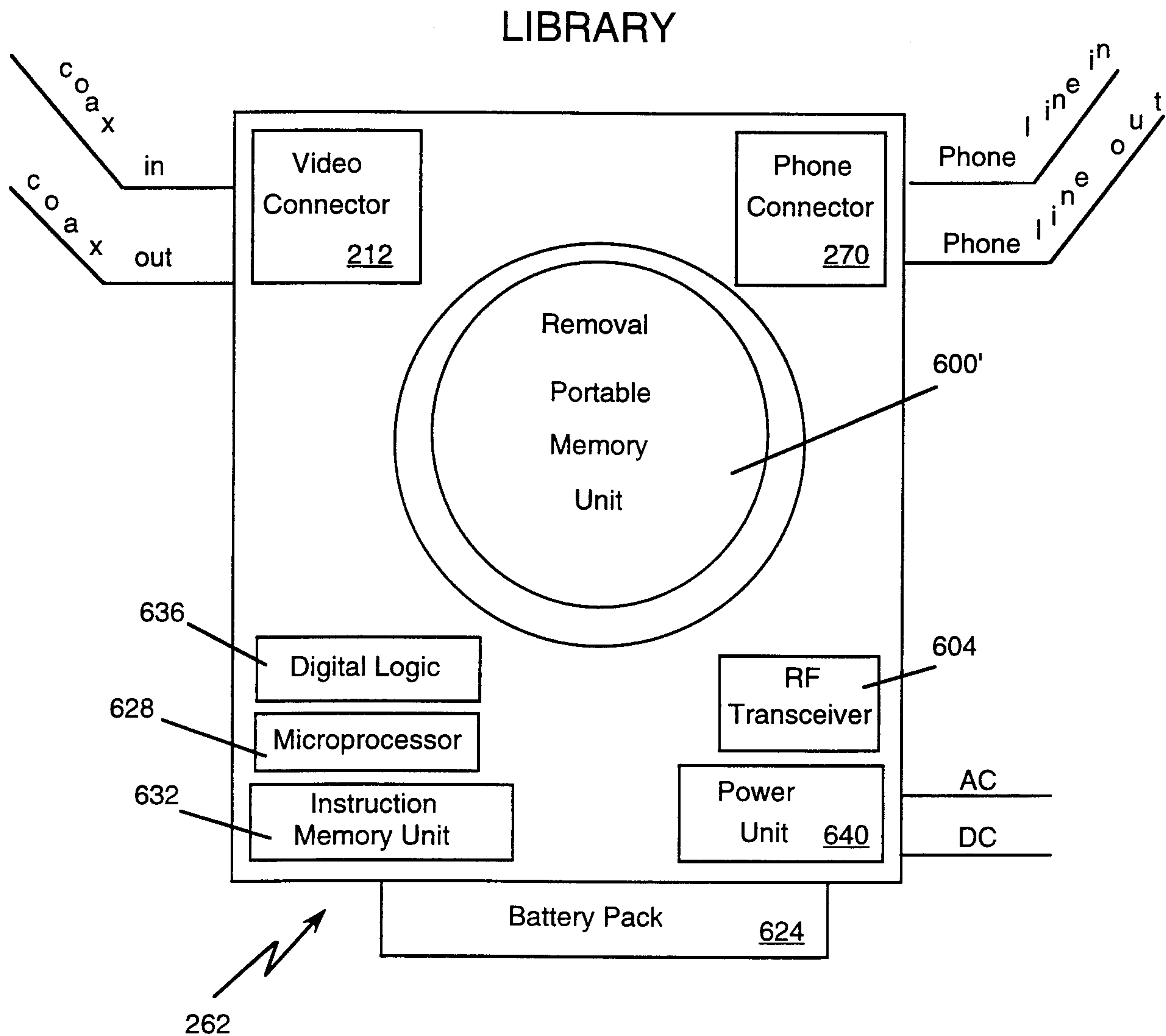


Fig. 4

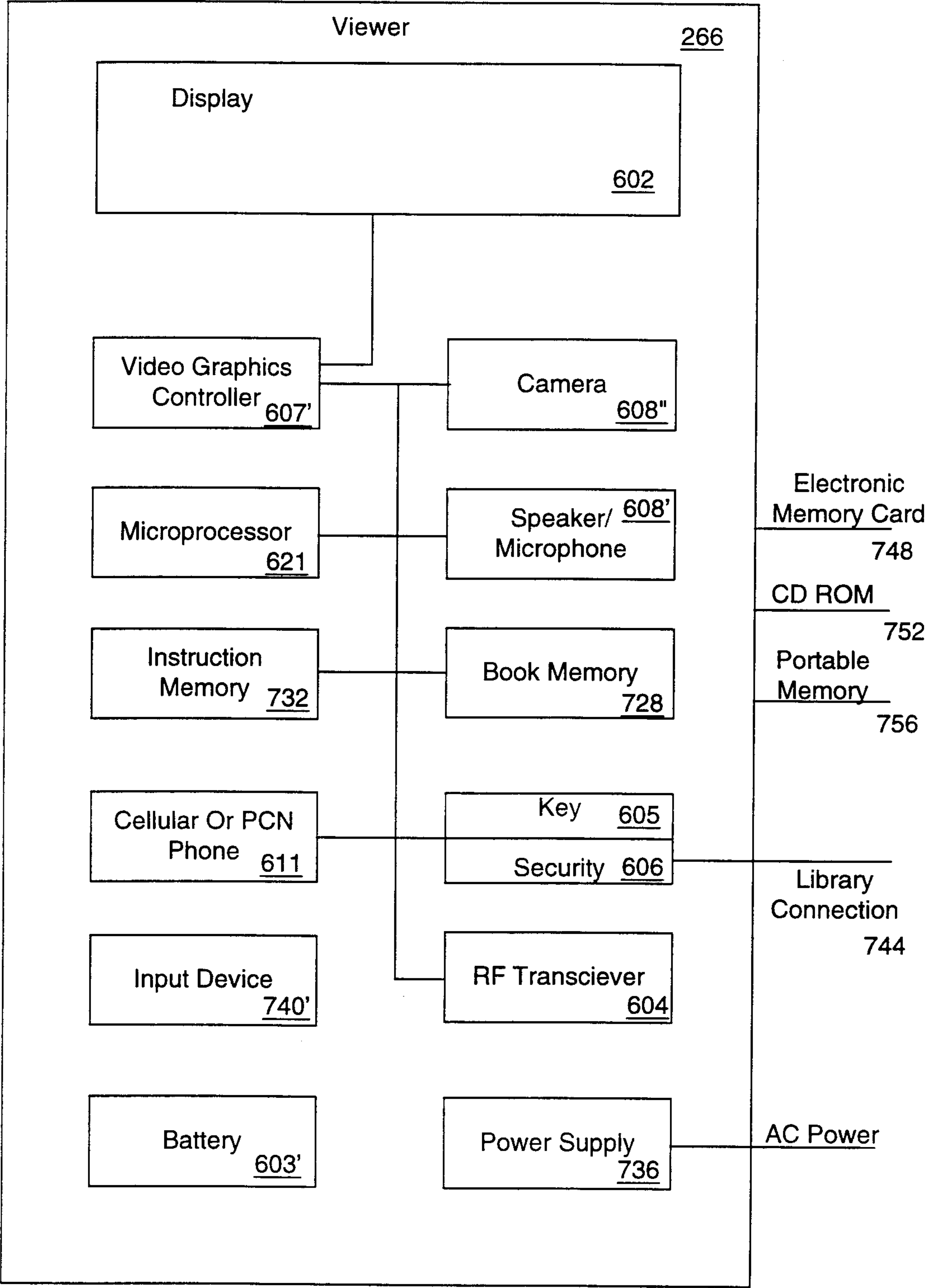


Fig. 5

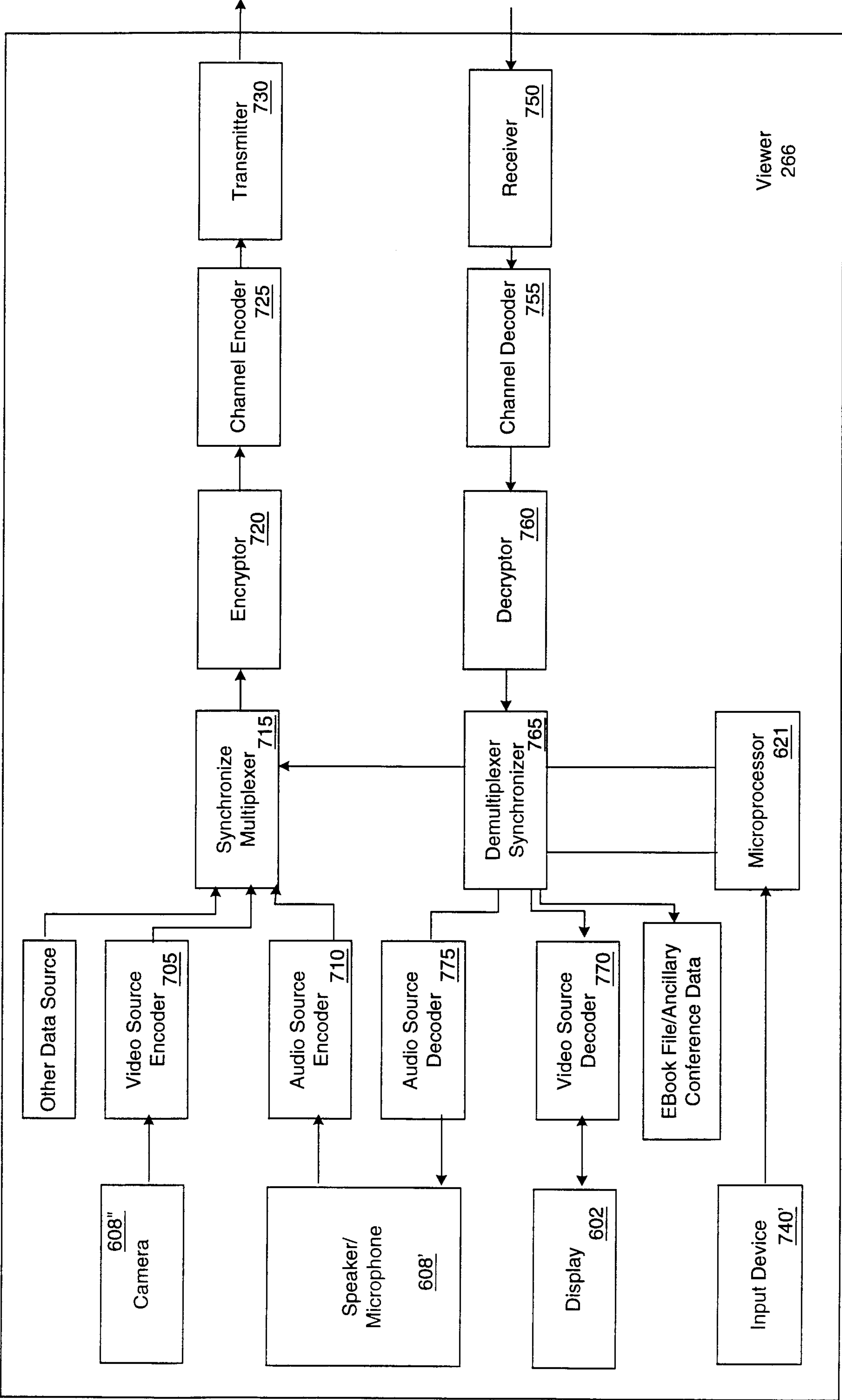


Fig. 6



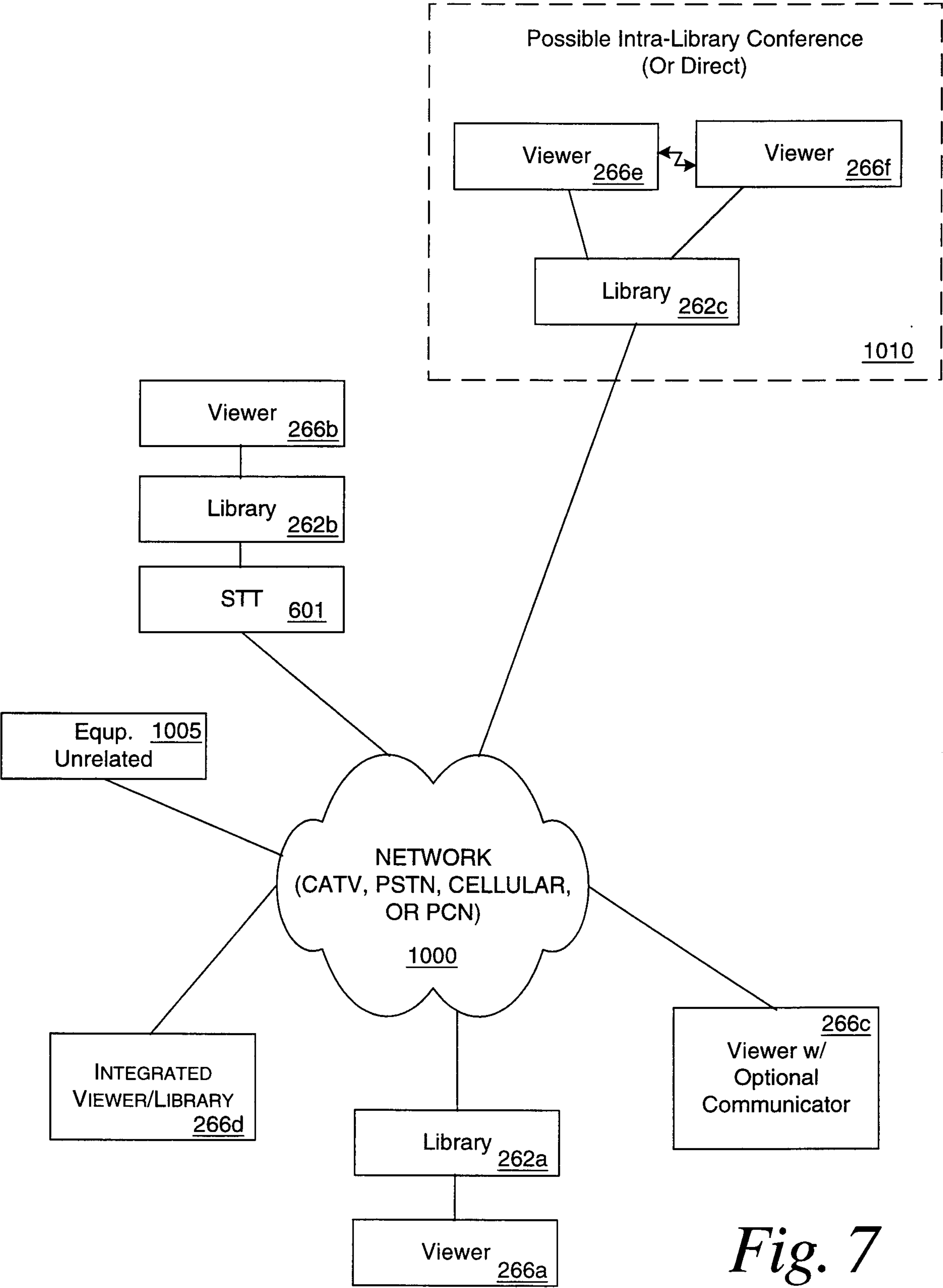
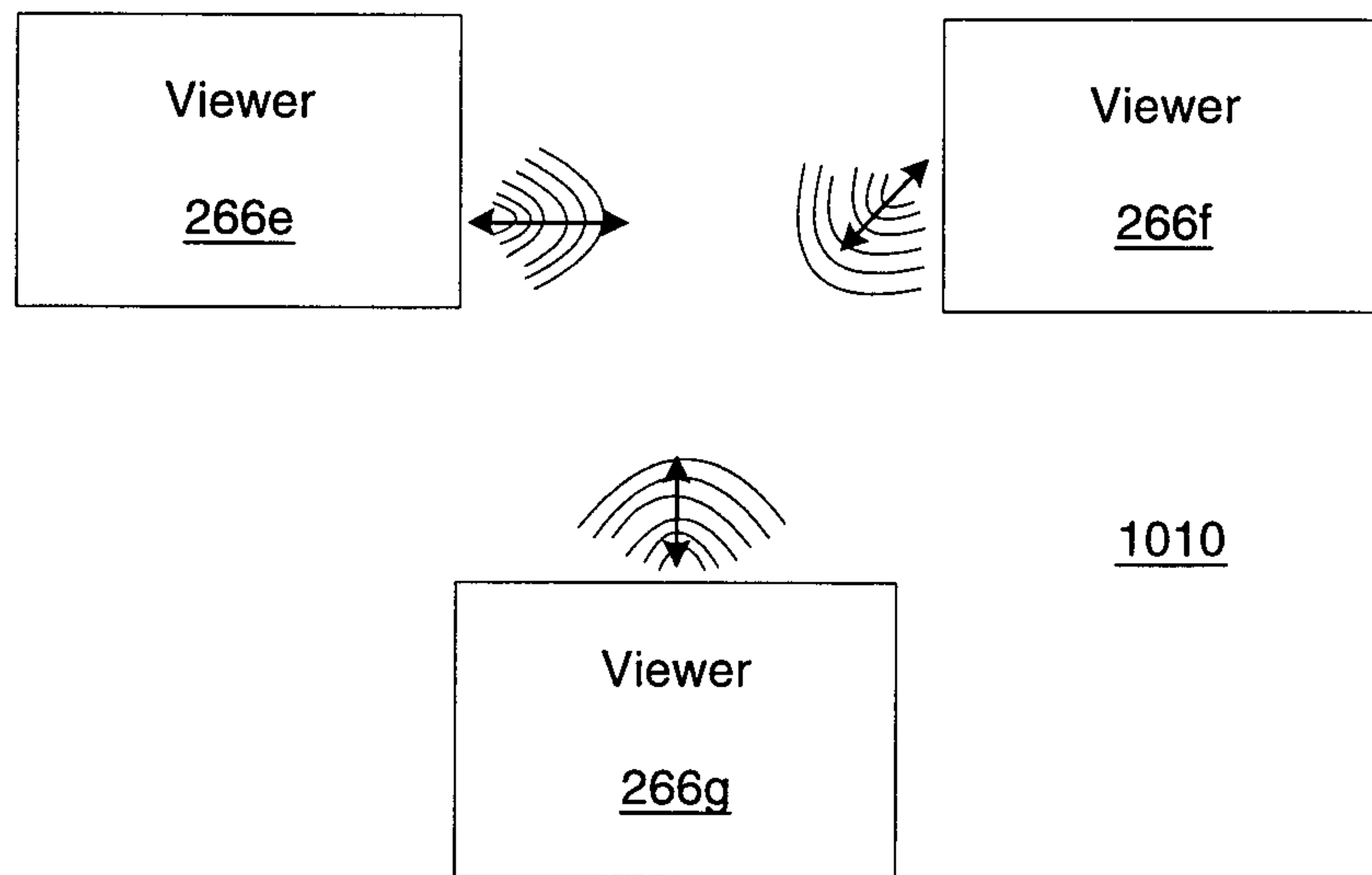
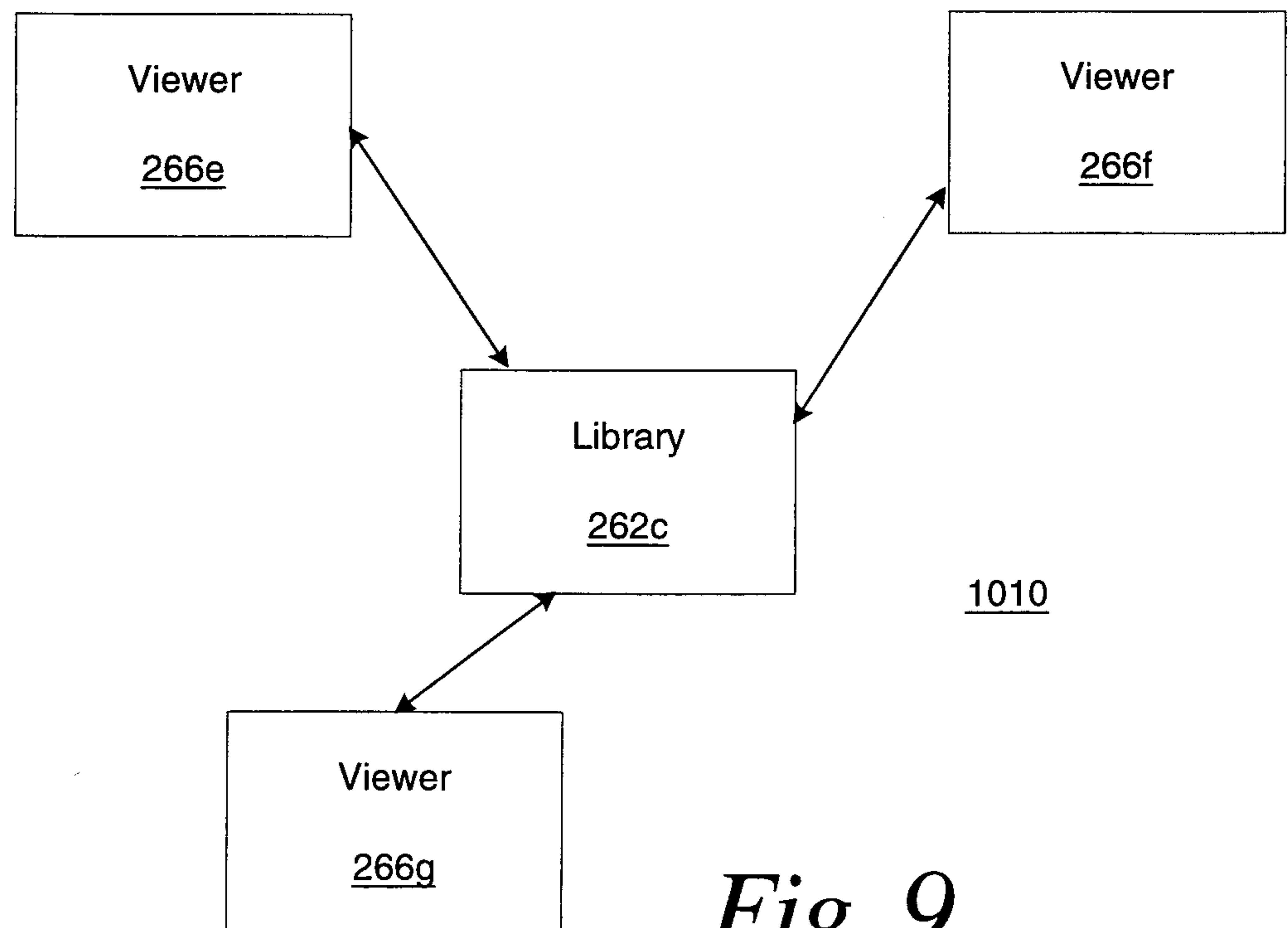
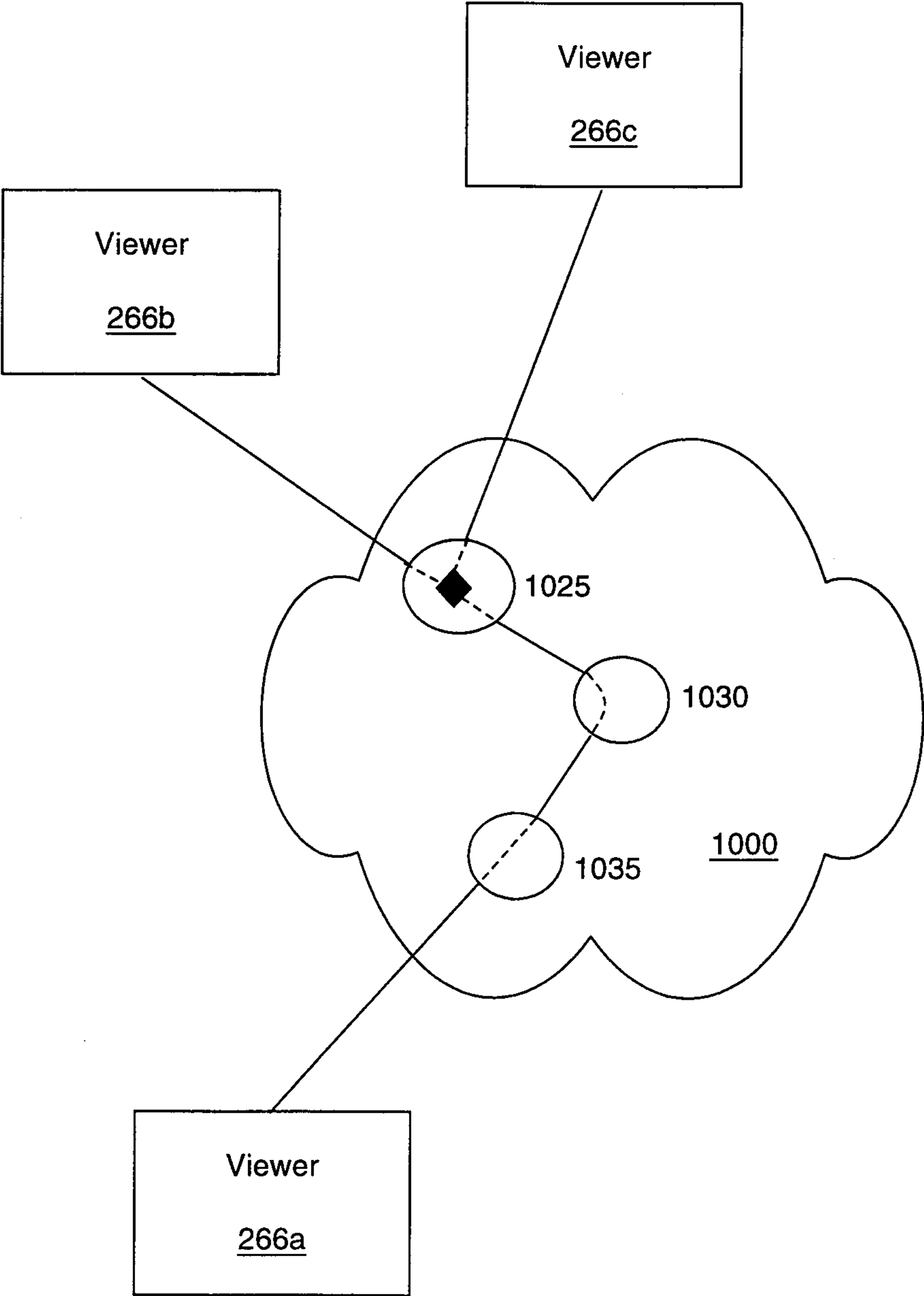


Fig. 7

8/10

*Fig. 8**Fig. 9*



*Fig. 10*



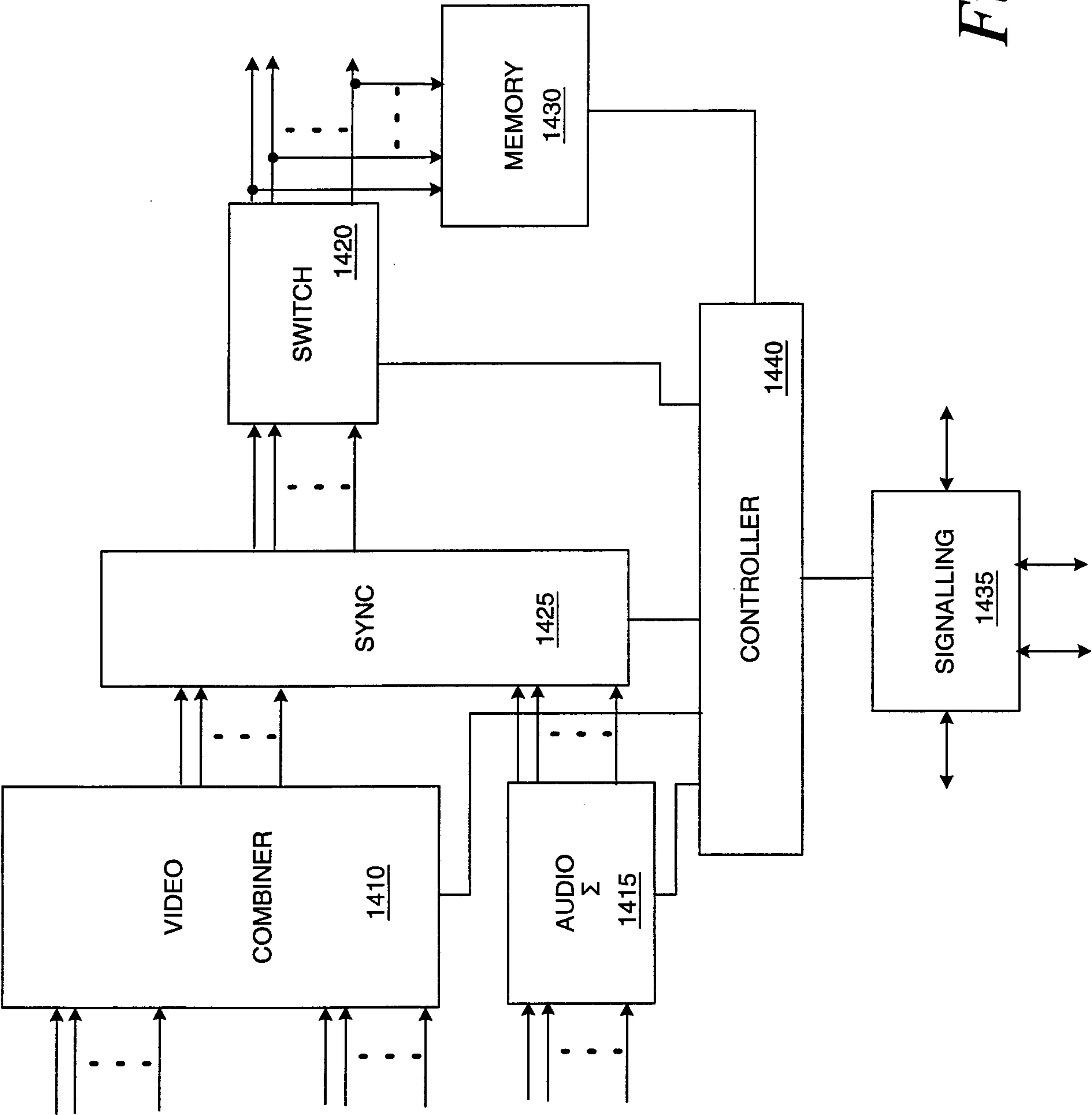


Fig. 11

