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(54) CONTROLLING DIGITAL DATA DISTRIBUTION IN A RELAY SERVER NETWORK

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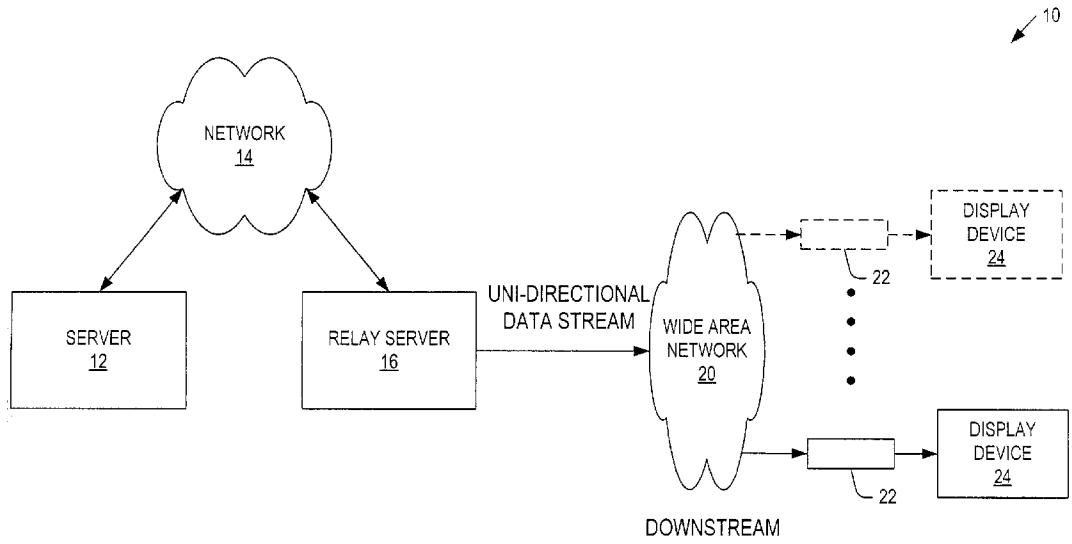
(57) **ABSTRACT**

The present invention teaches methods and systems for providing a relay server for enabling a data-on-demand (DOD) digital broadcast system to provide digital DOD service via a communications medium over one or more channels, the relay server comprising: an communications network interface for receiving at least one DOD service from the DOD digital broadcast system, wherein the DOD service is formatted as a stream of data blocks arranged in a schedule such that a first data block of the DOD service may be accessed at any selected time period; a uni-directional network interface for providing the stream of data blocks to a plurality of users, wherein the users may access the first data block at any time period and may access subsequent data blocks of the stream of data blocks thereby accessing the at least one DOD service.



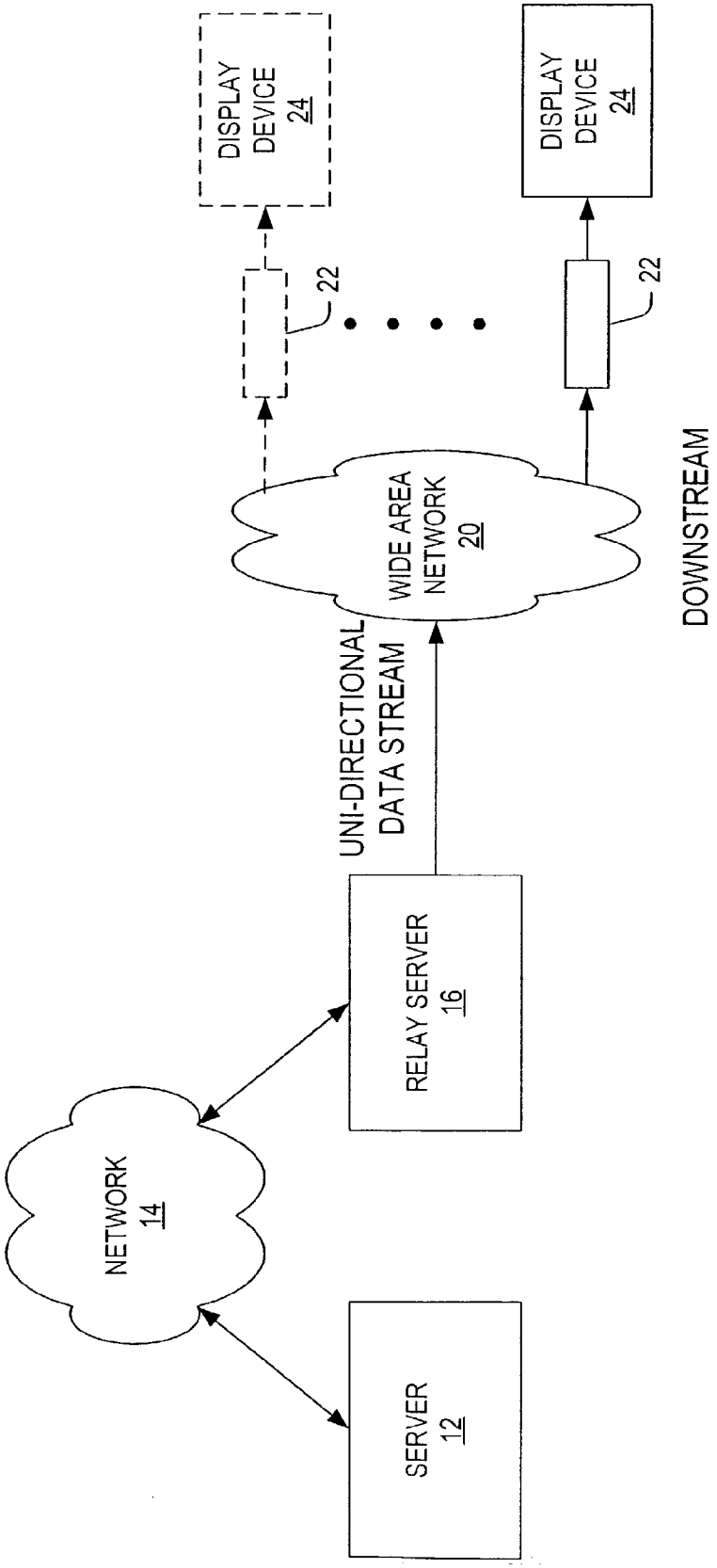

10
DISPLAY DEVICE 24
DISPLAY DEVICE 24
22
22
WIDE AREA NETWORK 20
DOWNSTREAM
UNI-DIRECTIONAL DATA STREAM
RELAY SERVER 16
NETWORK 14
SERVER 12

FIG. 1

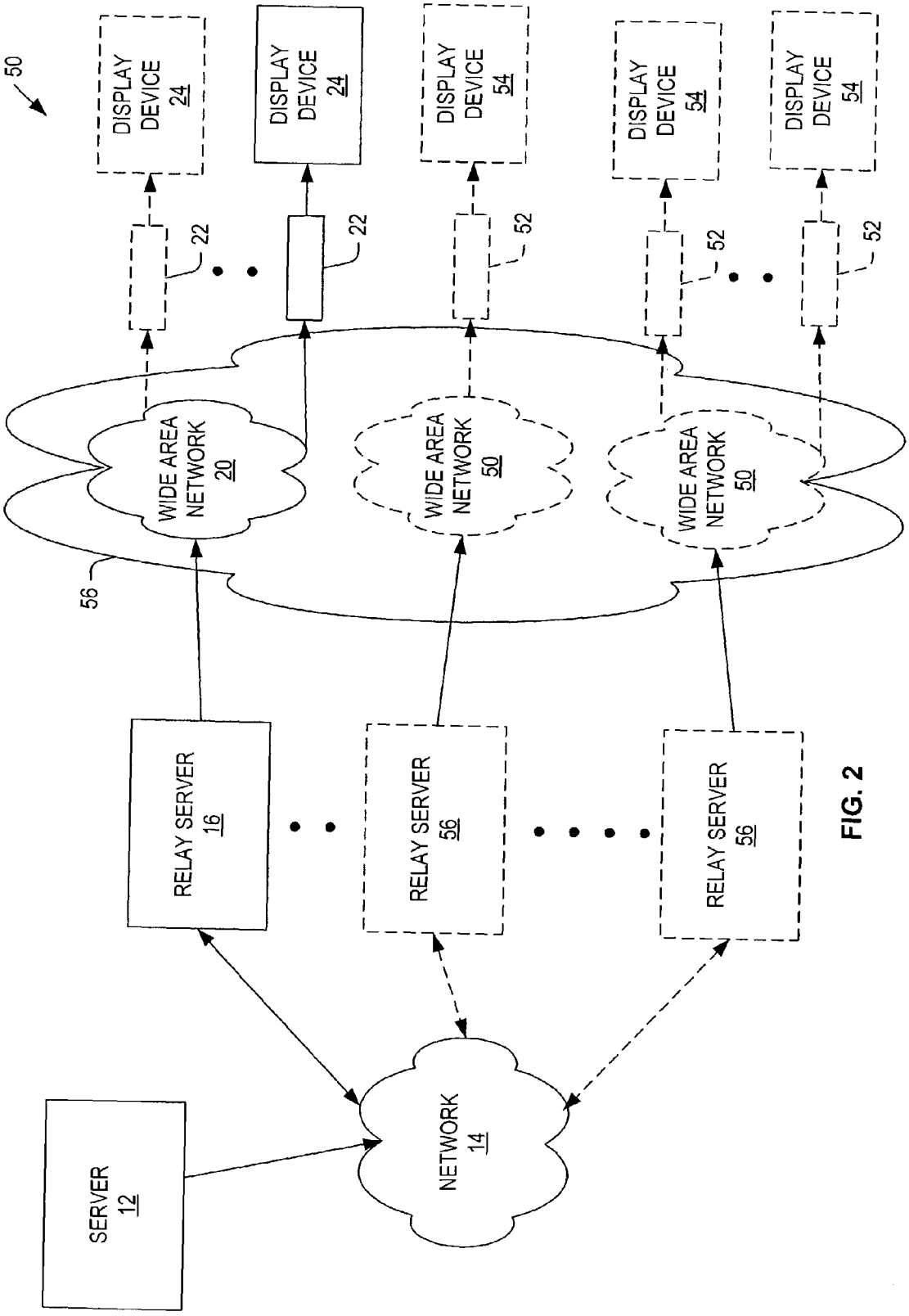

50
DISPLAY DEVICE 24
DISPLAY DEVICE 24
DISPLAY DEVICE 54
DISPLAY DEVICE 54
DISPLAY DEVICE 54
22
22
52
52
52
WIDE AREA NETWORK 20
WIDE AREA NETWORK 50
WIDE AREA NETWORK 50
56
RELAY SERVER 16
RELAY SERVER 56
RELAY SERVER 56
NETWORK 14
SERVER 12

FIG. 2

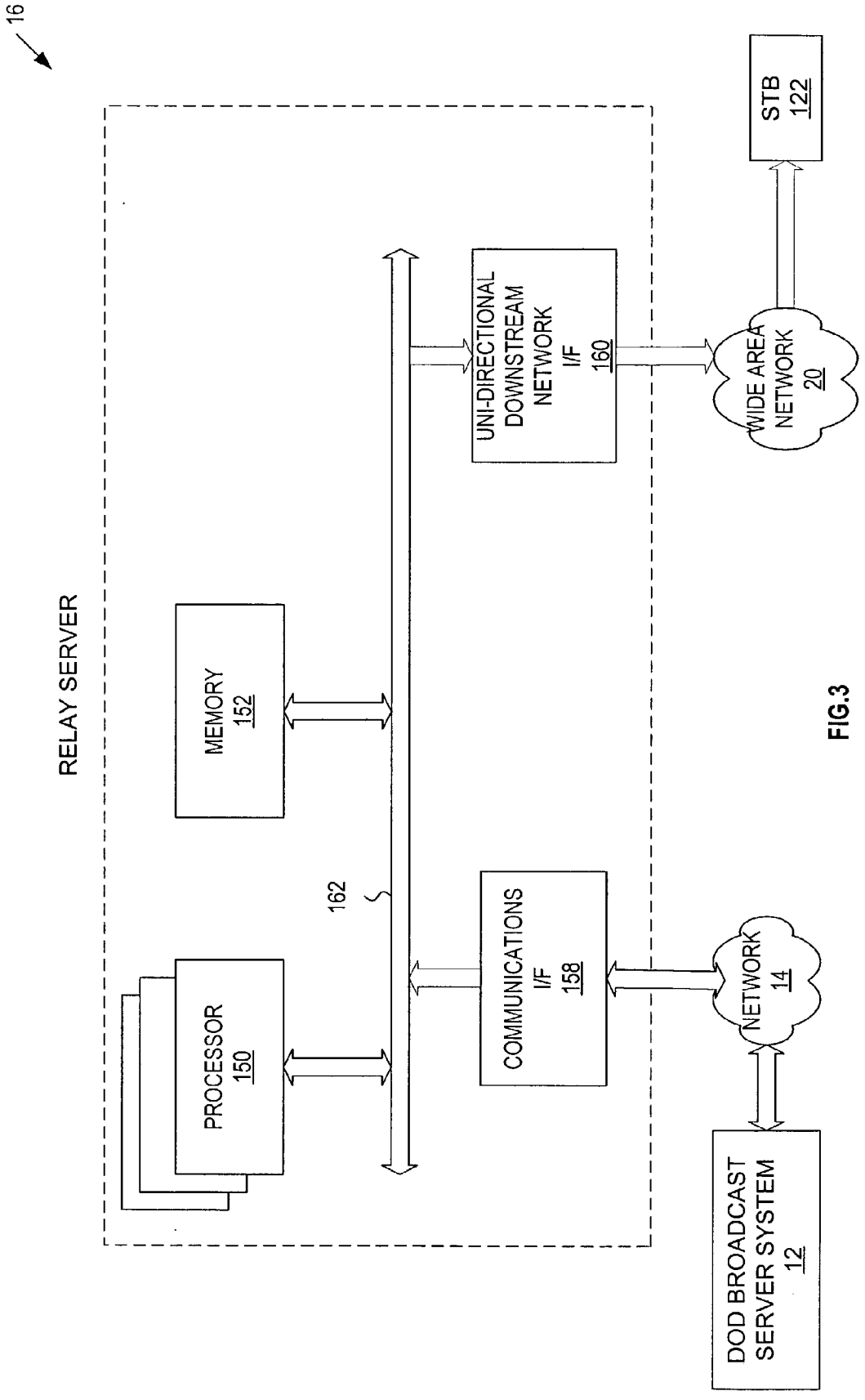

16
RELAY SERVER
MEMORY 152
PROCESSOR 150
162
UNI-DIRECTIONAL DOWNSTREAM NETWORK I/F 160
COMMUNICATIONS I/F 158
WIDE AREA NETWORK 20
NETWORK 14
STB 122
DOD BROADCAST SERVER SYSTEM 12

FIG.3

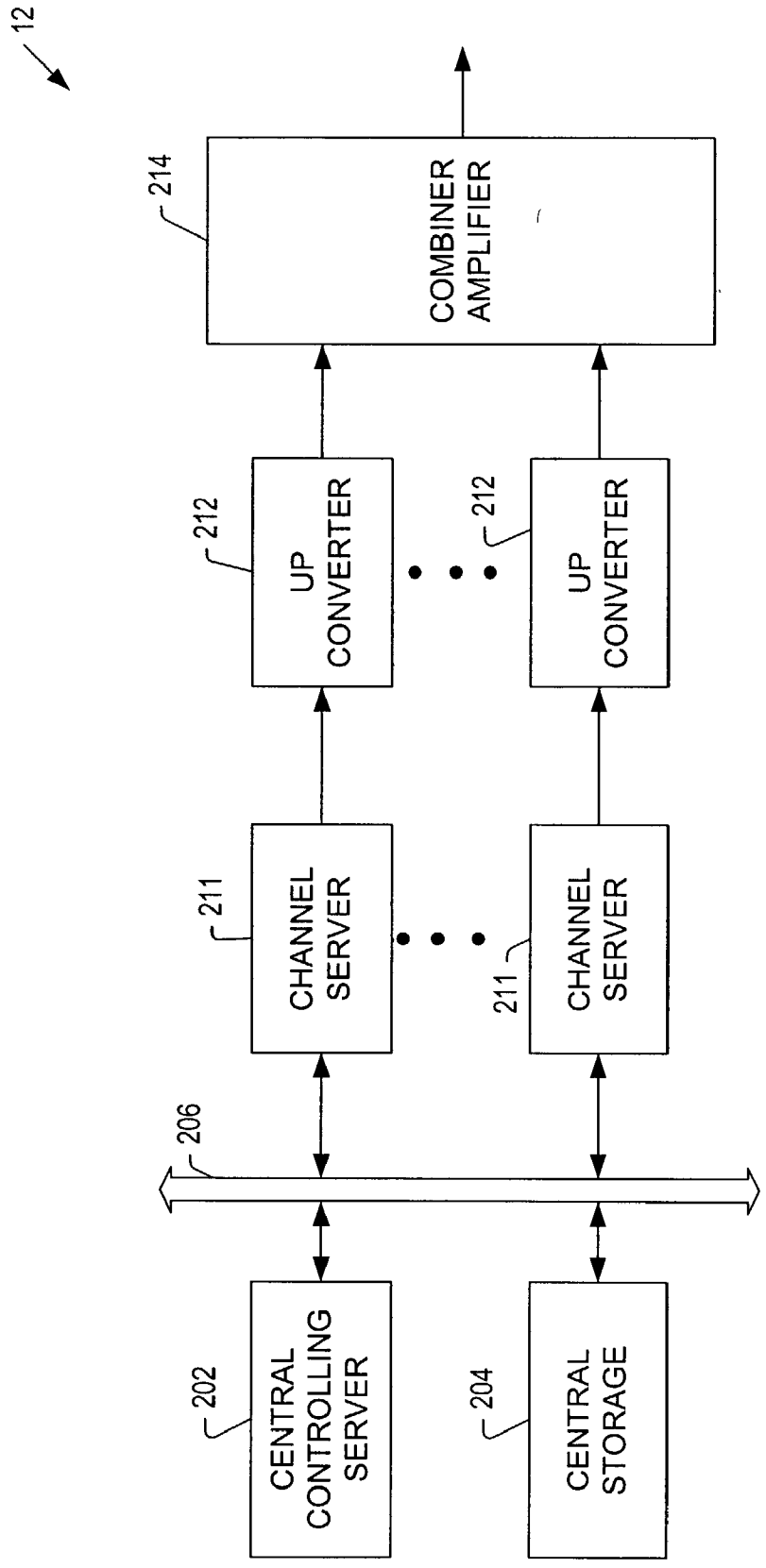

12
214
COMBINER AMPLIFIER
212
UP CONVERTER
212
UP CONVERTER
211
CHANNEL SERVER
211
CHANNEL SERVER
206
202
CENTRAL CONTROLLING SERVER
204
CENTRAL STORAGE

FIG. 4

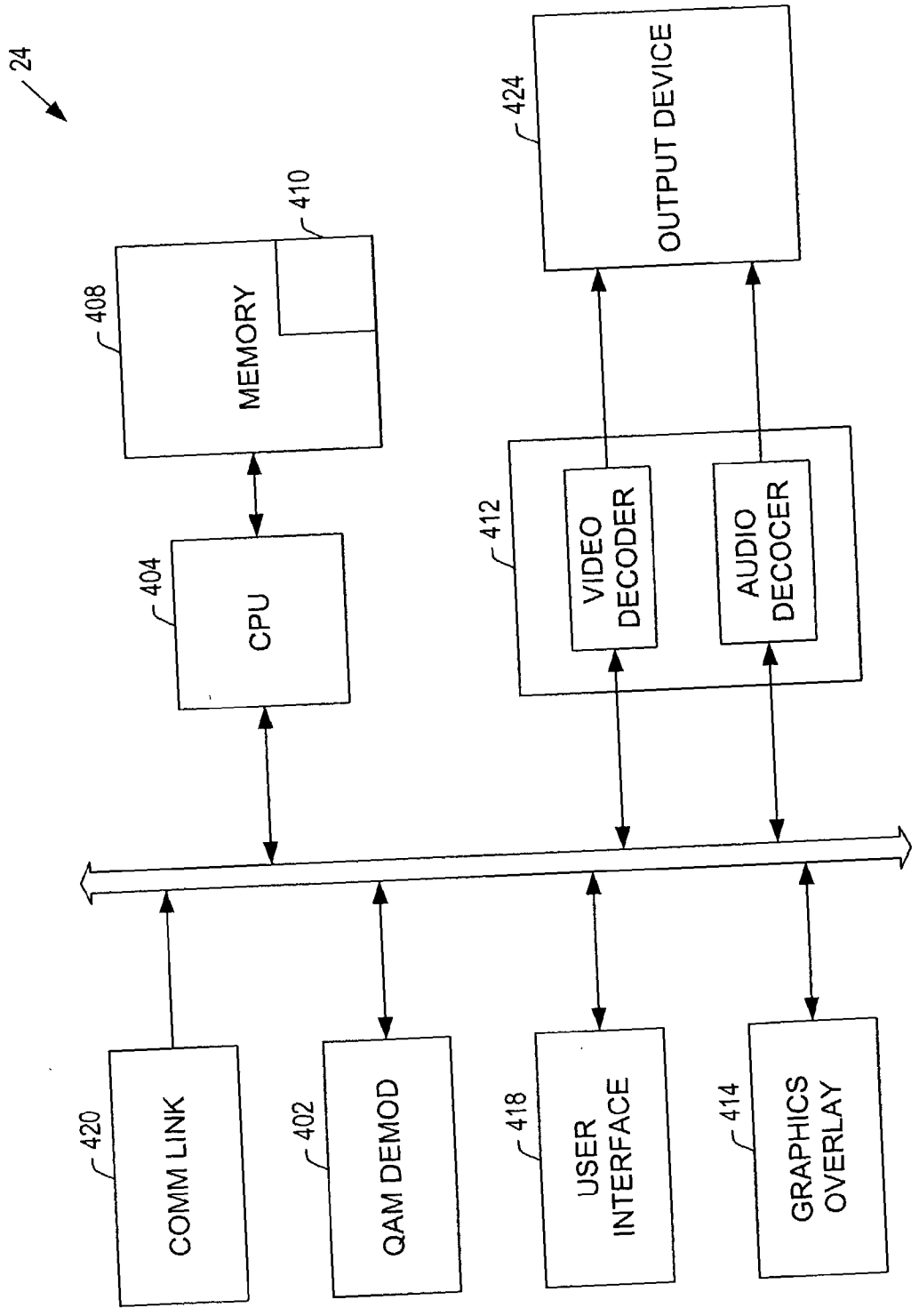

24
OUTPUT DEVICE
424
410
MEMORY
408
CPU
404
VIDEO DECODER
AUDIO DECOCER
412
COMM LINK
420
QAM DEMOD
402
USER INTERFACE
418
GRAPHICS OVERLAY
414

FIG. 5

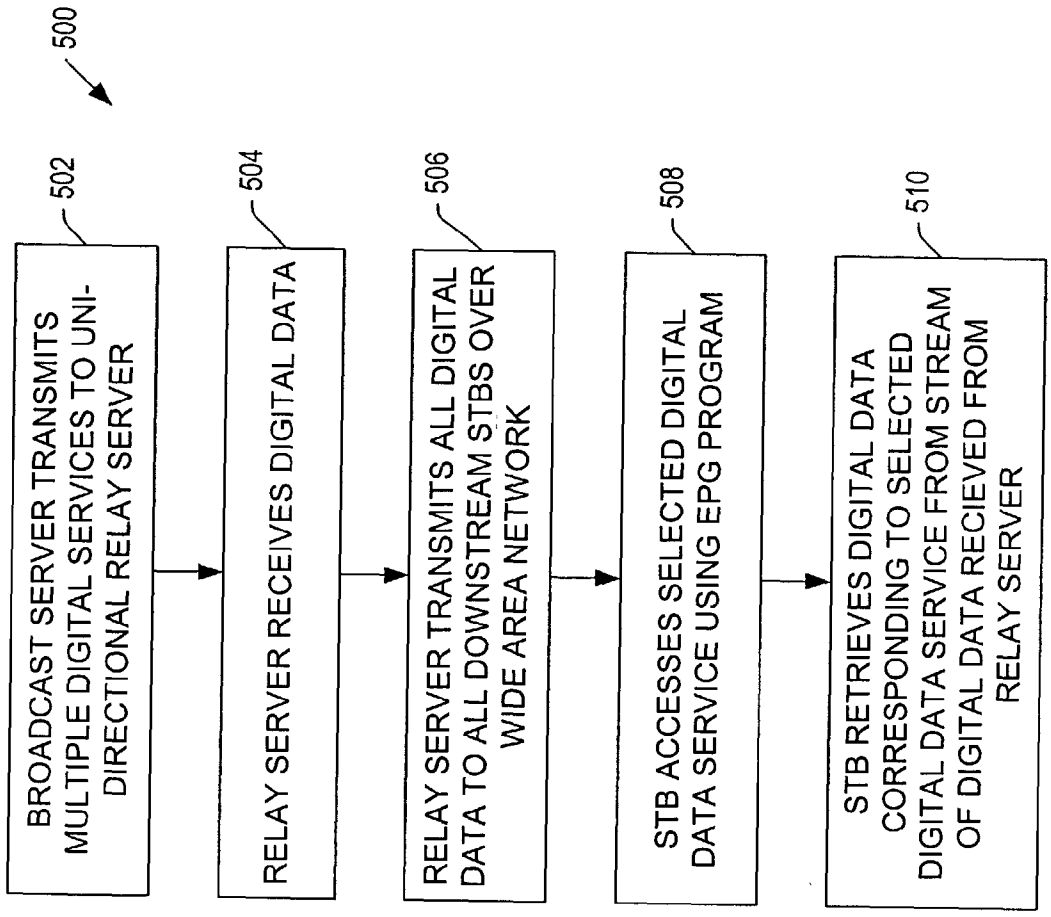

500
502
BROADCAST SERVER TRANSMITS MULTIPLE DIGITAL SERVICES TO UNI-DIRECTIONAL RELAY SERVER
504
RELAY SERVER RECEIVES DIGITAL DATA
506
RELAY SERVER TRANSMITS ALL DIGITAL DATA TO ALL DOWNSTREAM STBS OVER WIDE AREA NETWORK
508
STB ACCESSES SELECTED DIGITAL DATA SERVICE USING EPG PROGRAM
510
STB RETRIEVES DIGITAL DATA CORRESPONDING TO SELECTED DIGITAL DATA SERVICE FROM STREAM OF DIGITAL DATA RECIEVED FROM RELAY SERVER

FIG. 6

CONTROLLING DIGITAL DATA DISTRIBUTION IN A RELAY SERVER NETWORK

RELATED APPLICATION

[0001] This application is a continuation-in-part claiming priority to Khoi Hoang's patent application NON CLIENT SPECIFIC ON-DEMAND DATA BROADCAST (Amended) filed on May 31, 2000, bearing application Ser. No. 09/584,832, which application is incorporated herein by reference.

BRIEF DESCRIPTION OF THE INVENTION

[0002] The present invention relates to video-on-demand and digital broadcast technology. In particular, the present invention teaches a digital broadcast relay server system for use in both uni-directional and bi-directional data-on-demand (DOD) digital broadcast networks.

BACKGROUND OF THE INVENTION

[0003] A variety of mechanisms are available for delivering digital data-on-demand (DOD) services over existing networks such as the Internet. These methods all require expensive and complex equipment due to the need to provide a large volume of data to large numbers of customers. Many providers of data over these networks utilize relay servers to provide a large volume of data to customers in widely distributed regions. The relay server distributes individual DOD services to customers through wide area networks. Relay servers provide more efficient distribution because they are usually located within fewer hops of each customer than a single central data server would be. They may be used to provide redundancy to central servers by operating in tandem with a central server.

[0004] One problem with existing relay servers is that they require bi-directional communication with customers to provide these digital data services. Also conventional relay servers can only serve a limited number of clients because they require a transmission bandwidth proportional to the number of clients receiving data. Also conventional relay servers cannot provide client generic data transmissions.

[0005] Also, existing bi-directional DOD service distribution networks require a large number of bi-directional systems, because each system can only support a limited number of set-top-box (STB) receivers. Additionally bi-directional DOD services require a greater number of bi-directional systems because bi-directional DOD distribution systems require a relatively large bandwidth.

[0006] What is needed is a uni-directional DOD relay server system capable of distributing uni-directional broadcast DOD services to a greater number of end users than existing bi-directional units. Also needed is a uni-directional relay server system that is less complex and expensive than existing bi-directional units. What is further needed is a uni-directional DOD broadcast system that uses fewer relay server systems to serve more clients. Also needed is a relay server system using less transmission bandwidth than conventional bi-directional systems to serve more clients.

SUMMARY OF THE INVENTION

[0007] Certain embodiments of the present invention teaches methods and systems for providing a uni-directional DOD relay server system capable of distributing uni-directional broadcast DOD services to a greater number of end users than existing bi-directional units. Additionally the present invention provides for a uni-directional relay server system that is less complex and expensive than existing bi-directional units. Furthermore the present invention provides a uni-directional DOD broadcast system that uses fewer relay server systems to serve more clients. Furthermore the present invention provides a relay server system using less transmission bandwidth than conventional bi-directional systems to serve more clients.

[0008] A first embodiment of the present invention teaches a relay server for enabling a data-on-demand (DOD) digital broadcast system to provide digital DOD service via a communications medium over one or more channels, the relay server comprising: an communications network interface for receiving at least one DOD service from the DOD digital broadcast system, wherein the DOD service is formatted as a stream of data blocks arranged in a schedule such that a first data block of the DOD service may be accessed at any selected time period; a uni-directional network interface for providing the stream of data blocks to a plurality of users, wherein the users may access the first data block at any time period and may access subsequent data blocks of the stream of data blocks thereby accessing the at least one DOD service.

[0009] In accordance with such an embodiment the at least one DOD service is a plurality of DOD services formatted as a stream of data blocks arranged in a schedule such that a first data block of a selected DOD services may be accessed during any selected time period, and wherein a user may access subsequent data blocks of the selected DOD service, thereby accessing the selected DOD service on demand.

[0010] A second embodiment of the present invention teaches a data-on-demand (DOD) digital broadcast system for providing digital DOD services via a communications medium, the system comprising: a digital broadcast server system for providing client generic DOD digital data; a digital data relay server system for receiving the DOD digital data, wherein the relay server system is further operative to provide the DOD digital data to a plurality of authorized clients via a network, wherein the authorized clients access the DOD digital data without sending data to the digital relay data server.

[0011] It is important to remark that as types of set-top boxes become more ubiquitous, they are often built-in to a unit, such as a TV or computer, rather than actually set on top or beside. One of ordinary skill in the art would recognize that all references to STBs would apply equally to built-in version, and thus the two become synonymous.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] **FIG. 1** is a schematic block diagram generally illustrating a digital data on demand (DOD) broadcast system in accordance with one embodiment of the present invention;

[0013] **FIG. 2** is a schematic block diagram illustrating a uni-directional digital data on demand (DOD) broadcast system incorporating a plurality of relay servers providing digital data services to widely distributed customers in accordance with one embodiment of the present invention,

[0014] **FIG. 3** is a schematic block diagram generally illustrating relay server incorporating a uni-directional in accordance with one embodiment of the present invention;

[0015] **FIG. 4** is a schematic block diagram illustrating the architecture for a DOD broadcast server in accordance with one embodiment of the present invention;

[0016] **FIG. 5** is a schematic block diagram generally illustrating a universal set-top-box (STB) in accordance with one embodiment of the invention; and

[0017] **FIG. 6** is a flow chart diagram generally illustrating the process performed by the system of **FIG. 3** for distributing DOD services.

DETAILED DESCRIPTION OF THE INVENTION

[0018] In the following detailed description of the embodiments, reference is made to the drawings that accompany and that are a part of the embodiments. The drawings show, by way of illustration, specific embodiments in which the invention may be practiced. Those embodiments are described in sufficient detail to enable those skilled in the art to practice the invention and it is to be understood that other embodiments may be utilized and that structural, logical, and electrical changes as well as other modifications may be made without departing from the spirit and scope of the present invention.

[0019] Preferred embodiments teach methods and systems for providing a uni-directional relay server capable of distributing DOD services to a greater number of end users than prior bi-directional units. More specifically the present invention teaches methods and systems for providing a relay server for enabling a data-on-demand (DOD) digital broadcast system to provide digital DOD service via a communications medium over one or more channels, the relay server comprising: an communications network interface for receiving at least one DOD service from the DOD digital broadcast system, wherein the DOD service is formatted as a stream of data blocks arranged in a schedule such that a first data block of the DOD service may be accessed at any selected time period; a uni-directional network interface for providing the stream of data blocks to a plurality of users, wherein the users may access the first data block at any time period and may access subsequent data blocks of the stream of data blocks thereby accessing the at least one DOD service.

[0020] **FIG. 1** is a schematic block diagram illustrating a uni-directional digital data on demand (DOD) broadcast system at **10** in accordance with one embodiment of the present invention. The DOD broadcast system **10** is comprised of: a DOD broadcast server **12**; a data network **14**; a relay server **16**; a wide area network **20**; a plurality of set-top-box (STB) DOD receivers **22**; and a plurality of audio visual (A/V) display units **24**.

[0021] DOD broadcast server **12** transmits all available DOD services within one or more DOD data streams. In an exemplary embodiment the DOD broadcast server also transmits cable television signals in addition to DOD services. The number of DOD data streams is dependent on the bandwidth of a cable channel (e.g., 6, 6.5, or 8 MHz), QAM modulation (e.g., QAM 64 or QAM 256), and a compression standard/bit rate of the DOD data stream (e.g., MPEG-1 or MPEG-2). Each DOD service is transmitted as multiple data blocks (T0-Tx) arranged in accordance with a scheduling matrix. The data blocks are transmitted so that at any time a receiving STB **22** may begin accessing any DOD service's T0 data block and continue receiving each subsequent data block comprising the selected DOD service Unlike prior DOD broadcast systems **10**, the sequence of transmitted data blocks is not temporally linear, and some data blocks of a selected DOD service are transmitted more often than other data blocks.

[0022] This method of broadcasting DOD services is discussed in detail in Khoi Nhu Hoang's patent applications entitled UNIVERSAL STB ARCHITECTURES AND CONTROL METHODS filed on May 30, 2001, SYSTEMS AND METHODS FOR PROVIDING VIDEO ON DEMAND SERVICES FOR BROADCASTING SYSTEMS filed on May 31, 2000, bearing application Ser. No. 09/584,832, METHODS FOR PROVIDING VIDEO ON DEMAND SERVICES FOR BROADCASTING SYSTEMS filed Nov. 10, 2000, bearing application Ser. No. 09/709,948 and UNIVERSAL DIGITAL BROADCAST SYSTEM AND METHODS filed on Apr. 24, 2001, bearing application Ser. No. 09/841,792, each of which is hereby incorporated by reference.

[0023] The data network **14** transmits the DOD data streams to the relay server **16**. The data network **14** may include a fiber optic transmission system or any transmission system capable of transmitting large data streams such as satellite transmission systems. In accordance with one embodiment data network **14** includes the Internet.

[0024] The relay server **16** receives this DOD data stream via the data network **14**. In an exemplary embodiment a network interface system (not shown) establishes a link between the broadcast server **12** and the relay server **16** in order to facilitate transmission of the DOD data stream.

[0025] The relay server **16** transmits the DOD data streams to each downstream set-top-box (STB) DOD receiver **22** via the wide area network **20**. In accordance with one embodiment of the present invention each STB receiver **22** receives identical streams of DOD data.

[0026] In accordance with one embodiment of the present invention a server **12** will provide digital data to a large number of relay servers **16** located in different geographical regions, such as different countries of the Earth.

[0027] **FIG. 2** is a schematic block diagram illustrating a uni-directional digital data on demand (DOD) broadcast system at **50** incorporating a plurality of relay servers **56** providing digital data services to widely distributed customers in accordance with one embodiment of the present invention. The DOD broadcast system **50** is comprised of: a DOD broadcast server **12**; a data network **14**; relay servers **16** and **56***s*; wide area networks **20** and **50***s*; a plurality of set-top-box (STB) DOD receivers **22** and **52***s*; and a plurality of audio visual (A/V) display units **24** and **54***s*.

[0028] In accordance with one embodiment each wide area network **54** is a separate network serving a separate predefined geographic or political region such as a state. In accordance with one embodiment each wide area network **20**, **50**, etc., is part of a larger network **76**. In accordance with one embodiment large network **76** is the Internet and wide area networks **20**, **50** each service a separate state or continent.

[0029] **FIG. 3** illustrates the architecture for a DOD relay server at **16** incorporating a uni-directional data transmission scheme in accordance with one embodiment of the present invention. By implementing a uni-directional client generic transmission scheme a much greater number of clients may receive data than possible using conventional bi-directional network systems. The relay server **16** includes: a processor **150**; memory **152**; a communications network interface **158** and a uni-directional downstream interface **160**, with each component communicatively coupled to each other via a system bus **162**. DOD services received from the DOD broadcast system via the data network **14** (**FIG. 1**) are transmitted to the wide area network **20** (**FIG. 1**) via the communications network interface **160**. The entire data stream of DOD services is transmitted to each STB **22** via the wide area network **20**. An individual user may access any DOD service that the user's STB **22** is authorized to access.

[0030] Unlike previous bi-directional relay server units, the uni-directional relay server **16** of the present invention simply relays all received data down stream to all STBs **22** connected to the wide area network **20**. Because all available services are transmitted to all STBs **22**, there is no need for the relay server **16** to route individual DOD services to individual users. There is also no need to receive data from the end users. The primary function of the processor **102** is to maintain communication with the DOD broadcast server system **12**. In accordance with one embodiment the relay server **16** stores no address tables and no upstream communications from users are received by the relay server **16**. In an exemplary embodiment the unit also relays digital cable television signals from the server system **12** to all downstream users.

[0031] A stream of DOD data is transmitted in a format suitable for display by relay server **16** to all STBs **22** via the wide area network **20**. In an exemplary embodiment the relay server **16** transmits the DOD data stream in a QAM-modulated IF stream suitable for broadcast over the cable network. No communications are received by the uni-directional directional system from the STBs. In an exemplary embodiment the DOD data stream signal strength is amplified to assure a clear signal reaches all downstream users.

[0032] The uni-directional relay server **16** of the present invention is capable of supporting many more downstream users than previous systems, because individual DOD services are not routed to individual users. Also, many more users may be supported because the relay server **16** does not process upstream requests from users for selected DOD services.

[0033] **FIG. 4** illustrates a DOD broadcast server system **12** in accordance with one embodiment of the present invention. The DOD server system **12** includes a plurality of channel servers **211**, a plurality of up converters **212** each corresponding to a channel server **211**, a combiner amplifier **214**, a central controlling server **202**, and a central storage **204**, coupled as illustrated through a data bus **206**. As will be described below, the central controlling server **202** controls off-line operation of the channel servers **211**, as well as initiating real-time transmission once the channel servers **211** are ready. The central storage **204** typically stores data files in a digital format. However, any suitable mass persistent data storage device may be used.

[0034] In an exemplary embodiment, data files stored in the central storage **204** are accessible via a standard network interface (e.g., Ethernet connection) by any authorized computer, such as the central controlling server **202**, connected to the network. The channel servers **211** provide data files that are retrieved from the central storage **204** in accordance with instructions from the central controlling server **202**. The retrieval of digital data and the scheduling of transmission of the digital data for DOD is performed "off-line" to fully prepare each channel server **211** for real-time data transmission. Each channel server **211** informs the central controlling server **202** when ready to provide DOD, at which point the central controlling server **202** can control the channel servers **211** to begin DOD transmission.

[0035] In a preferred embodiment, the central controlling server **202** includes a graphics user interface (not shown) to enable a service provider to schedule data delivery by a drag-and-drop operation. Further, the central controlling server **202** authenticates and controls the channel servers **210** to start or stop according to delivery matrices. Systems and methods for providing uni-directional DOD broadcast matrices are taught in Khoi Hoang's patent application entitled SYSTEMS AND METHODS FOR PROVIDING VIDEO ON DEMAND SERVICES FOR BROADCASTING SYSTEMS filed on May 31, 2000, bearing application Ser. No. 09/584,832, which is incorporated herein by reference.

[0036] The output of the up channel servers **211** is a quadrature amplitude modulation (QAM) modulated intermediate frequency (IF) signal having a suitable frequency for the up converters **212**. The QAM-modulated IF signals are dependent upon adopted standards. The current adopted standard in the United States is the data-over-cable-systems-interface-specification (DOCSIS) standard, which requires an approximately 43.75 MHz IF frequency.

[0037] The up-converters **212** convert IF signals received from the channel servers **211** to radio frequency signals (RF signals). The RF signals, which include frequency and bandwidth, are dependent on a desired channel and adopted standards. For example, under the current standard in the United States for a cable television channel **80**, the RF signal has a frequency of approximately 559.25 MHz and a bandwidth of approximately 6 MHz.

[0038] The combiner/amplifier **214** amplifies, conditions and combines the received RF signals then outputs the signals out to the data network **14** (**FIG. 1**).

[0039] **FIG. 5** illustrates a universal STB **22** in accordance with one embodiment of the invention. The STB **22** comprises a QAM demodulator **402**, a CPU **404**, a local memory **408**, a buffer memory **410**, a decoder **412** having video and audio decoding capabilities, a graphics overlay module **414**, a user interface **418**, a communications link **420**, and a fast data bus **422** coupling these devices as illustrated. The CPU **402** controls overall operation of the universal STB **400** in order to select data in response to a client's request, decode selected data, decompress decoded data, re-assemble decoded data, store decoded data in the local memory **408** or the buffer memory **410**, and deliver stored data to the decoder **412**. In an exemplary embodiment, the local memory **408** comprises both non-volatile memory (e.g., a hard drive) and secure memory (e.g., a ROM chip), and the buffer memory **410** comprises volatile memory.

[0040] In one embodiment, the QAM demodulator **402** comprises transmitter and receiver modules and one or more

of the following: privacy encryption/decryption module, forward error correction decoder/encoder, tuner control, downstream and upstream processors, CPU and memory interface circuits. The QAM demodulator **402** receives modulated IF signals, samples and demodulates the signals to restore data.

[**0041**] In an exemplary embodiment, when access is granted, the decoder **412** decodes at least one data block to transform the data block into images displayable on an output screen. The decoder **412** supports commands from a subscribing client, such as play, stop, pause, step, rewind, forward, etc. The decoder **412** provides decoded data to an output device **624** for use by the client. The output device **424** may be any suitable device such as a television, computer, any appropriate display monitor, a VCR, or the like.

[**0042**] The graphics overlay module **414** enhances displayed graphics quality by, for example, providing alpha blending or picture-in-picture capabilities. In an exemplary embodiment, the graphics overlay module **414** can be used for graphics acceleration during game playing mode, for example, when the service provider provides games-on-demand services using the system in accordance with the invention.

[**0043**] The user interface **418** enables user control of the STB **22**, and may be any suitable device such as a remote control device, a keyboard, a smartcard, etc. The communications link **420** provides an additional communications connection. This may be coupled to another computer, or may be used to implement bi-directional communication. The data bus **422** is preferably a commercially available "fast" data bus suitable for performing data communications in a real time manner as required by the present invention. Suitable examples are USB, firewire, etc. Although services are broadcast to all cable television subscribers, only the DOD subscriber who has an STB **22** authorized to view a selected DOD service will be able to decode and enjoy the selected service.

[**0044**] **FIG. 6** illustrates a process at **500** for distributing digital data services to a large number of clients via a relay server in accordance with one embodiment of the present invention. At step **502** the DOD broadcast server **12** transmits multiple digital data services to relay server **16** via network **14**. In step **504** the relay server **16** (**FIG. 1**) receives one or more data streams containing the digital data available from the DOD broadcast server system **12** (**FIG. 1**). In accordance with one embodiment relay server **16** will be assigned to distribute data services to a selected geographical region allowing one central DOD broadcast server system **12** to provide data services to many geographical regions spanning great distances.

[**0045**] In a step **506** the relay server **16** (**FIG. 1**) transmits all received digital data to all downstream STBs **22** via the wide area network **20** (**FIG. 1**). In step **508** a receiving STB accesses a selected digital data service from a menu provided by an electronic program guide (EPG). In step **510** STB **22** retrieves digital data associated with the selected digital data service from stream of all data received from relay server **16**. In an exemplary embodiment, wherein the digital data service is a DOD video presentation such as a movie, a user may access the presentation from the beginning at any time period. For example, a user is able to view the movie "Star Wars" from the beginning of the movie at any time the user selects a play command for that movie.

[**0046**] The foregoing examples illustrate certain exemplary embodiments of the invention from which other embodiments, variations, and modifications will be apparent to those skilled in the art. The invention should therefore not be limited to the particular embodiments discussed above, but rather is defined by the following claims.

What is claimed is:

1. A relay server system comprising:

a communications interface for receiving data transmissions from a digital data server system; and

uni-directional interface for providing digital data transmissions to a plurality of clients via a wide area network, wherein said relay server does not require upstream communications to provide said digital data transmissions to said clients.

2. A uni-directional relay server as recited in claim 1, wherein said communications interface is further operative for receiving at least one data file from said digital data server system, wherein said data file is formatted as a stream of data blocks arranged in a schedule such that a first data block of said data file may be accessed at any selected time period; and wherein said uni-directional interface is further operative for providing said stream of data blocks to a plurality of users, and wherein said users may access said first data block at any time period and may access subsequent data blocks of said stream of data blocks thereby accessing said at least one data file on demand.

3. A relay server system as recited in claim 2, wherein said at least one data file is a plurality of data files formatted as a stream of data blocks arranged in a schedule such that a first data block of a selected one of said plurality of data files may be accessed at any selected time period, and wherein a user may access subsequent data blocks of said selected data file thereby accessing any one of said plurality of data files on demand.

4. A relay server system as recited in claim 2, wherein said accessing said selected data file by said users includes displaying at least a portion of a graphical representation of at least one of said data blocks.

5. A relay server system as recited in claim 3, wherein said downstream network interface is communicatively coupled to a plurality of set-top-boxes via a cable network.

6. A relay server system as recited in claim 5, wherein said set-top-boxes include an audio-visual display apparatus for displaying at least a portion of at least one of said data files.

7. A relay server system as recited in claim 5, wherein said downstream network interface is not operative to receive data from said plurality of set-top-boxes.

8. A relay server system as recited in claim 3, wherein said relay server is incapable of receiving information from said user.

9. A relay server system as recited in claim 5, wherein said relay server is uni-directionally coupled to said plurality of set-top-boxes.

10. A relay server system as recited in claim 2, wherein said communications interface is operative to receive digitally encoded data, and wherein said uni-directional network interface is operative to transmit said received digitally encoded data to a plurality of data receivers operative to decode said encoded data.

11. A relay server system as recited in claim 2, wherein said uni-directional network interface provides said stream of data blocks as electronic signals.

12. A relay server system as recited in claim 2, wherein said communications interface is operative to receive data from a server system, and wherein at least one of said plurality of set-top-boxes is operative to communicate with said server system via a communications medium.

13. A relay server system as recited in claim 12, wherein said communications medium includes a telephone network.

14. A relay server system as recited in claim 12, wherein said communications medium includes a wireless network.

15. A relay server system as recited in claim 12, wherein said communications medium includes the Internet.

16. A relay server for enabling a data-on-demand (DOD) digital broadcast system to provide digital DOD service via a communications medium over one or more channels, said relay server comprising:

an communications network interface for receiving at least one DOD service from said DOD digital broadcast system, wherein said DOD service is formatted as a stream of data blocks arranged in a schedule such that a first data block of said DOD service may be accessed at any selected time period; and

a uni-directional network interface for providing said stream of data blocks to a plurality of users, wherein said users may access said first data block at any time period and may access subsequent data blocks of said stream of data blocks thereby accessing said at least one DOD service.

17. A relay server as recited in claim 16, wherein said at least one DOD service is a plurality of DOD services formatted as a stream of data blocks arranged in a schedule such that a first data block of a selected DOD services may be accessed during any selected time period, and wherein a user may access subsequent data blocks of said selected DOD service, thereby accessing said selected DOD service on demand.

18. A relay server as recited in claim 16, wherein said accessing said at least one DOD service by said users includes displaying at least a portion of a graphical representation of at least one of said data blocks.

19. A relay server as recited in claim 17, wherein said uni-directional network interface is communicatively coupled to a plurality of set-top-boxes via a cable network.

20. A relay server as recited in claim 19, wherein said set-top-boxes include an audio-visual display apparatus for displaying at least a portion of at least one of said DOD services.

21. A relay server as recited in claim 19, wherein said uni-directional network interface may not receive data from said plurality of set-top-boxes.

22. A relay server as recited in claim 17, wherein said relay server is incapable of receiving information from said user.

23. A relay server as recited in claim 19, wherein said relay server is uni-directionally coupled to said plurality of set-top-boxes.

24. A relay server as recited in claim 16, wherein said communications network interface is operative to receive digitally encoded data, and wherein said uni-directional network interface is operative to transmit said received digitally encoded data.

25. A universal broadcast system as recited in claim 16, wherein said uni-directional network interface provides said stream of data blocks as electronic signals.

26. A relay server method for providing data-on-demand (DOD) digital services via a communications medium over one or more channels, said relay server method comprising the acts of:

receiving at least one DOD service from a DOD broadcast server system, wherein said DOD service is formatted as a stream of data blocks arranged in a schedule such that a first data block of said DOD service may be accessed at any selected time period; and

transmitting said stream of data blocks to a plurality of users, wherein said users may access said first data block at any time period and may access subsequent data blocks of said stream of data blocks thereby accessing said at least one DOD service.

27. A method as recited in claim 26, wherein said at least one DOD service is a plurality of DOD services formatted as a stream of data blocks arranged in a schedule such that a first data block of a selected DOD service is accessed at a selected time period, and wherein a user may access subsequent data blocks of said selected DOD service thereby accessing any one of said plurality of DOD services on demand.

28. A method as recited in claim 26, wherein said accessing said selected DOD service by said users includes displaying at least a portion of a graphical representation of at least one of said data blocks.

29. A method as recited in claim 12, wherein said stream of data blocks is transmitted to a plurality of set-top-boxes via a cable network.

30. A method as recited in claim 29, wherein said set-top-boxes include an audio-visual display apparatus for displaying at least a portion of at least one of said DOD services.

31. A method as recited in claim 29, wherein said method excludes receiving data from said plurality of set-top-boxes.

32. A method as recited in claim 27, wherein said stream of data blocks is transmitted to said plurality of set-top-boxes as an electronic signal.

33. A method as recited in claim 32, further comprising amplifying said stream of data blocks.

34. A method as recited in claim 29, wherein said set-top-boxes include advanced television receivers having internal set-top-boxes.

35. A method as recited in claim 29, further including receiving digitally encoded data and transmitting said digitally encoded data via said cable network.

36. A digital data relay server system for providing digital data services to a plurality of users via a communications medium over one or more channels, said system comprising:

first means for receiving at least one DOD service from a DOD digital broadcast server system, wherein said DOD service is formatted as a stream of data blocks arranged in a schedule such that a first data block of said DOD service may be accessed at any selected time period; and

second means for providing said stream of data blocks to a plurality of users, wherein said users may access said first data block at any time period and may access subsequent data blocks of said stream of data blocks thereby accessing said DOD service on demand.

37. A data-on-demand (DOD) digital broadcast system for providing digital DOD services via a communications medium, said system comprising:

a digital broadcast server system for providing client generic DOD digital data; and

a digital data relay server system for receiving said DOD digital data, wherein said relay server system is further operative to provide said DOD digital data to a plurality of authorized clients via a network, wherein said authorized clients access said DOD digital data without sending data to said digital relay data server.

38. A data-on-demand (DOD) digital broadcast system as recited in claim 37, wherein said accessing said DOD data by said clients includes displaying at least a portion of a graphical representation of said DOD data.

39. A data-on-demand (DOD) digital broadcast system as recited in claim 37, wherein said relay server provides said DOD data to said clients in a client generic manner.

40. A data-on-demand (DOD) digital broadcast system as recited in claim 37, wherein set-top-boxes (STB) are used to receive said DOD data, and wherein said STBs include an audio-visual display apparatus for displaying at least a portion of at least one of said DOD services.

41. A data-on-demand (DOD) digital broadcast system as recited in claim 40, wherein said STBs are operative to receive and decode digitally encoded data.

42. A data-on-demand (DOD) digital broadcast system as recited in claim 37, wherein said relay server is a first relay server for providing digital data to clients within a first area, wherein said data-on-demand (DOD) digital broadcast system includes a second relay server for providing digital data to clients within a second area, wherein said second relay server is located in communicative proximity to said second area in order to more efficiently provide said digital data to said clients of said second area.

43. A data-on-demand (DOD) digital broadcast system as recited in claim 42, wherein said first area includes a political region such as a state, and wherein said second area includes a political region such as a state.

44. A data-on-demand (DOD) digital broadcast system as recited in claim 43, wherein said first area includes a geographical region such as an island, and wherein said second area includes a portion of a geographical region such as a portion of a continent.

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