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Carden

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(54) **SYSTEM AND METHOD FOR PROVIDING UPDATE INFORMATION**

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See application file for complete search history.

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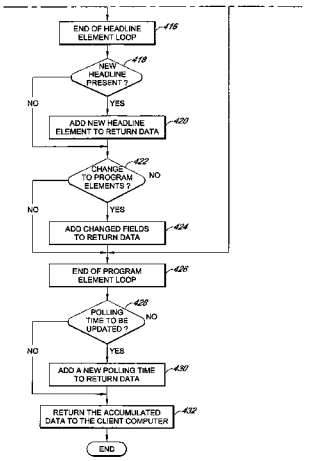
(57) **ABSTRACT**

A system and a method for providing update information. The system includes a client computer which is operably connected to a program information server. The program information server maintains one or more program information items. The system also includes a program selection server which allows the user to select which of the program information items are to viewed by the user. Based upon a dynamically adjustable polling period, the client computer requests the program information server to provide the client computer new program information items. The program information items include one or more media items that may be selected for viewing by a user positioned at the client computer. The client computer provides a newness indicator to the user, the newness indicator indicating to the user when one or more items of the media content is new and has not been previously viewed by the user.

51 Claims, 8 Drawing Sheets



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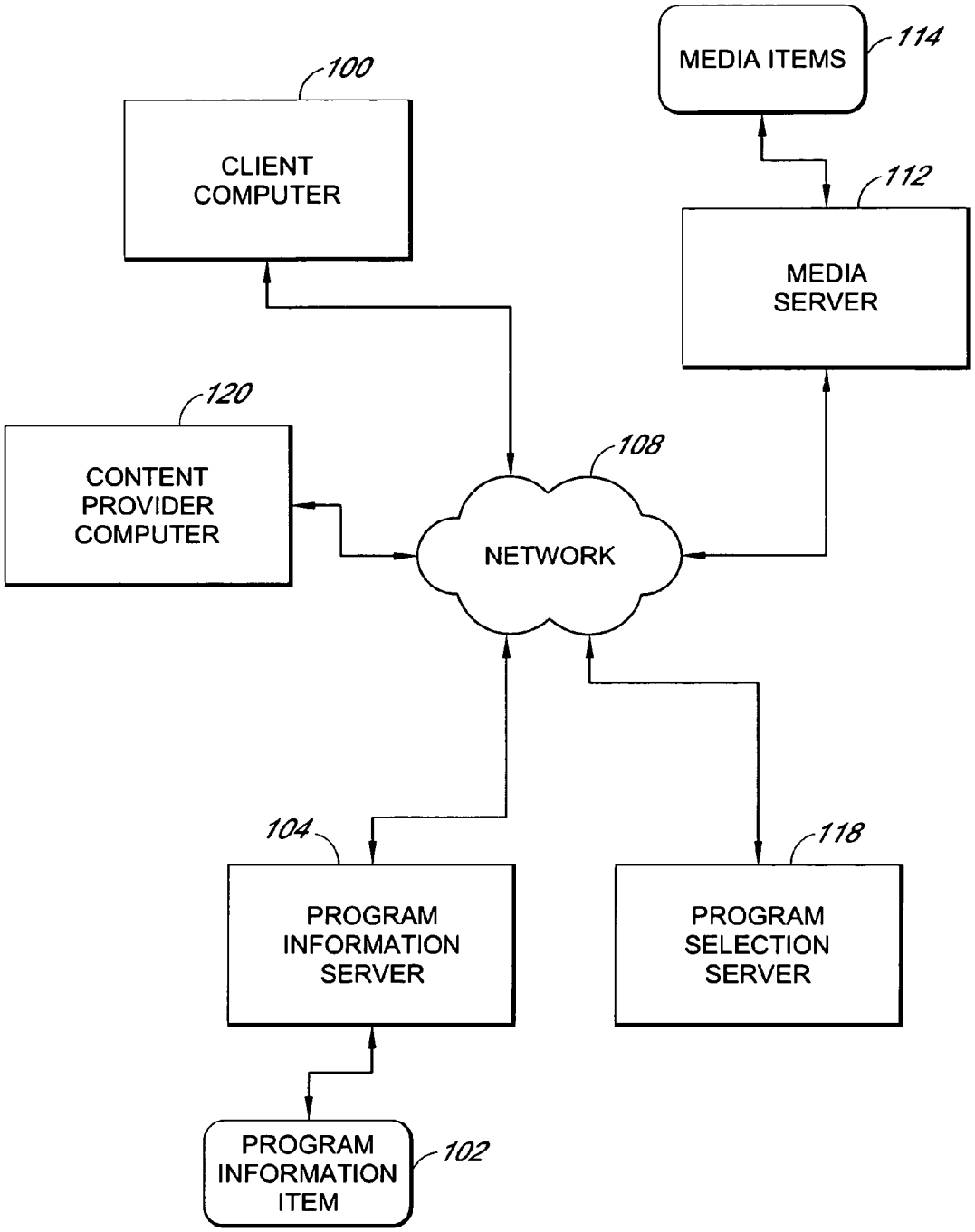
MEDIA ITEMS
114
100
CLIENT COMPUTER
112
MEDIA SERVER
120
CONTENT PROVIDER COMPUTER
108
NETWORK
104
118
PROGRAM INFORMATION SERVER
PROGRAM SELECTION SERVER
PROGRAM INFORMATION ITEM
102

FIG. 1

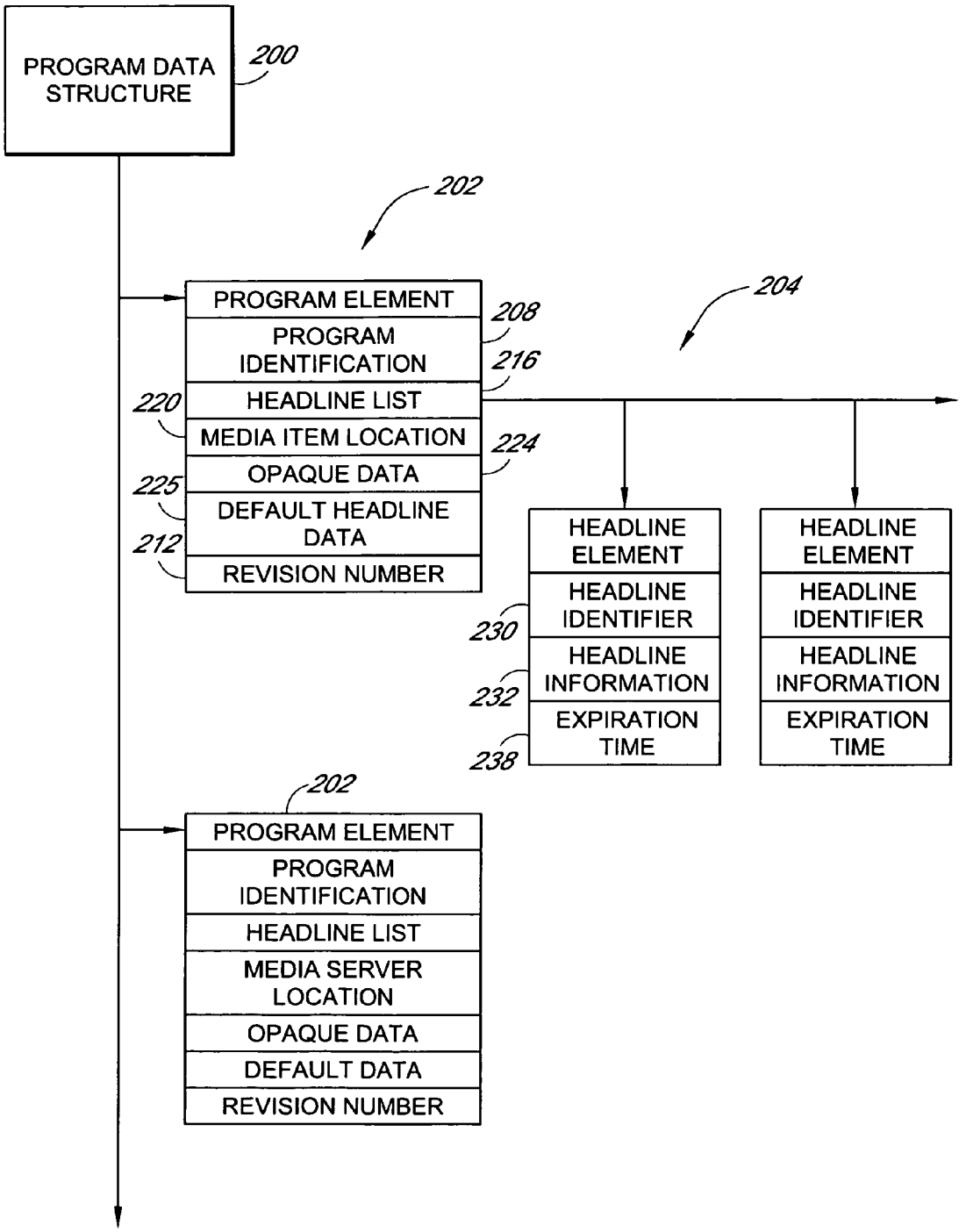
PROGRAM DATA STRUCTURE
200
202
PROGRAM ELEMENT
PROGRAM IDENTIFICATION
HEADLINE LIST
MEDIA ITEM LOCATION
OPAQUE DATA
DEFAULT HEADLINE DATA
REVISION NUMBER
208
216
220
224
225
212
204
HEADLINE ELEMENT
HEADLINE IDENTIFIER
HEADLINE INFORMATION
EXPIRATION TIME
230
232
238
HEADLINE ELEMENT
HEADLINE IDENTIFIER
HEADLINE INFORMATION
EXPIRATION TIME
202
PROGRAM ELEMENT
PROGRAM IDENTIFICATION
HEADLINE LIST
MEDIA SERVER LOCATION
OPAQUE DATA
DEFAULT DATA
REVISION NUMBER

FIG. 2

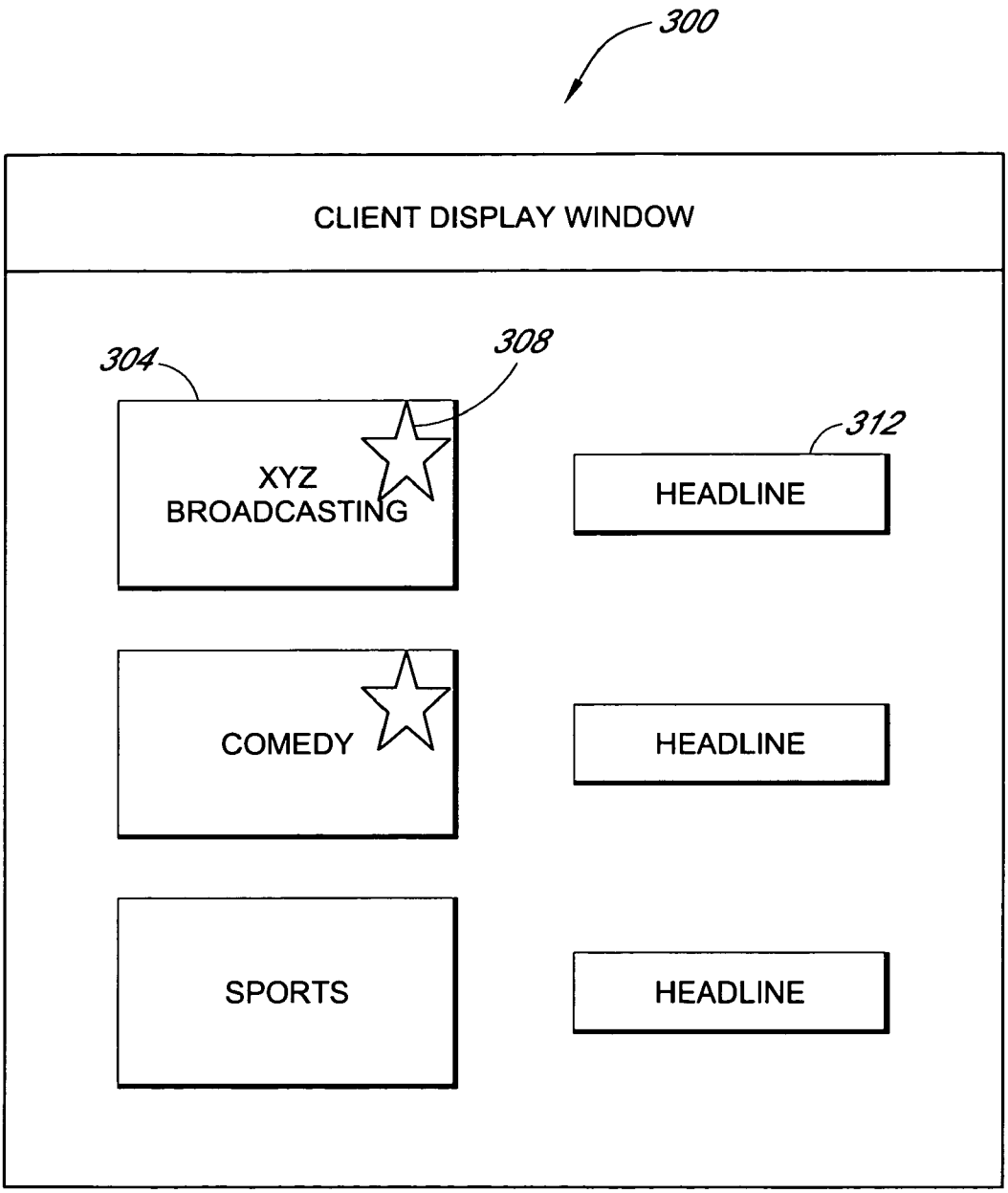
300
CLIENT DISPLAY WINDOW
304
308
312
XYZ BROADCASTING
HEADLINE
COMEDY
HEADLINE
SPORTS
HEADLINE

FIG. 3

FIG. 4A

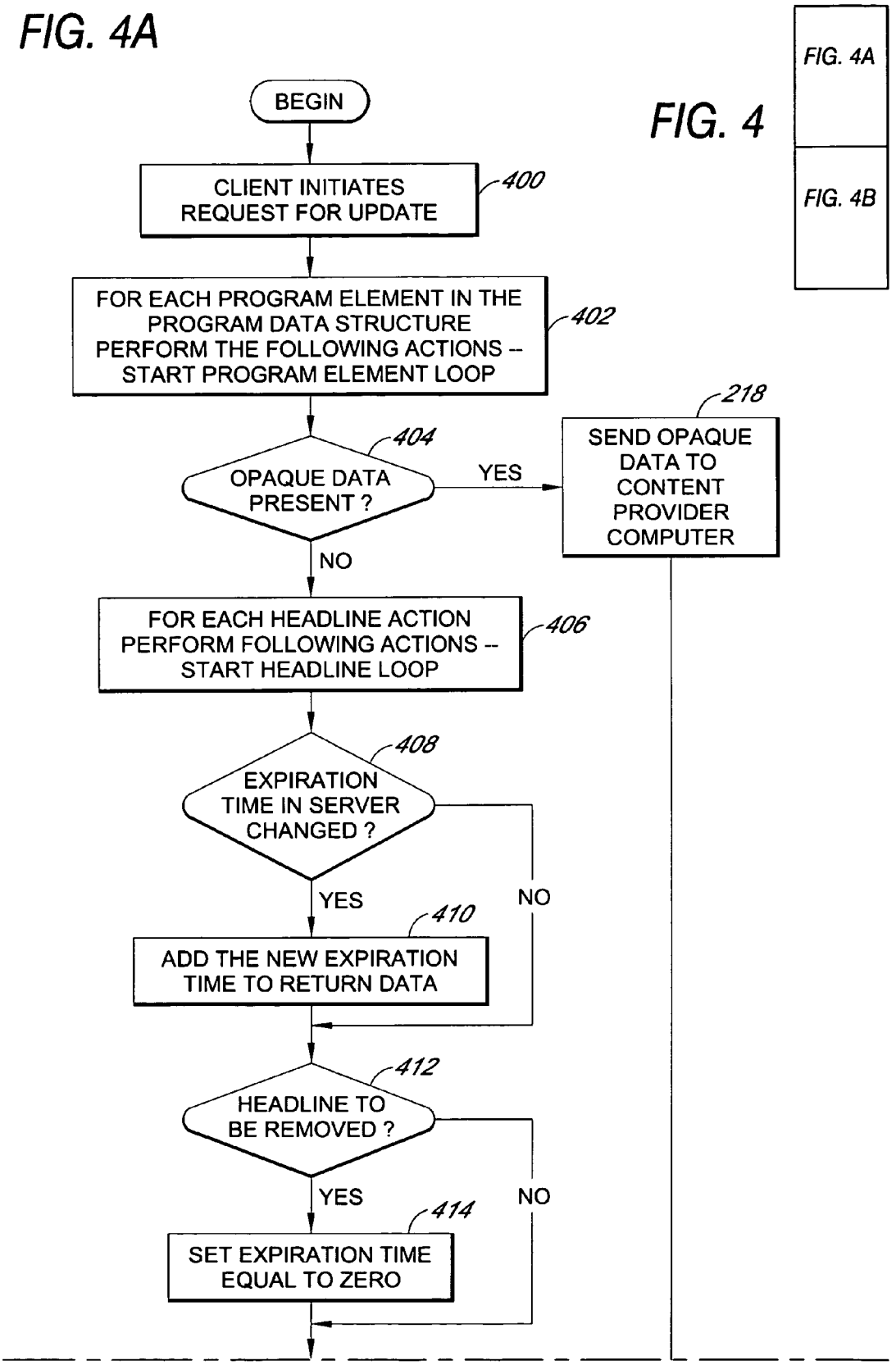
BEGIN
CLIENT INITIATES REQUEST FOR UPDATE
400
FOR EACH PROGRAM ELEMENT IN THE PROGRAM DATA STRUCTURE PERFORM THE FOLLOWING ACTIONS -- START PROGRAM ELEMENT LOOP
402
OPAQUE DATA PRESENT ?
404
YES
SEND OPAQUE DATA TO CONTENT PROVIDER COMPUTER
218
NO
FOR EACH HEADLINE ACTION PERFORM FOLLOWING ACTIONS -- START HEADLINE LOOP
406
EXPIRATION TIME IN SERVER CHANGED ?
408
YES
NO
ADD THE NEW EXPIRATION TIME TO RETURN DATA
410
HEADLINE TO BE REMOVED ?
412
YES
NO
SET EXPIRATION TIME EQUAL TO ZERO
414

FIG. 4

FIG. 4A
FIG. 4B

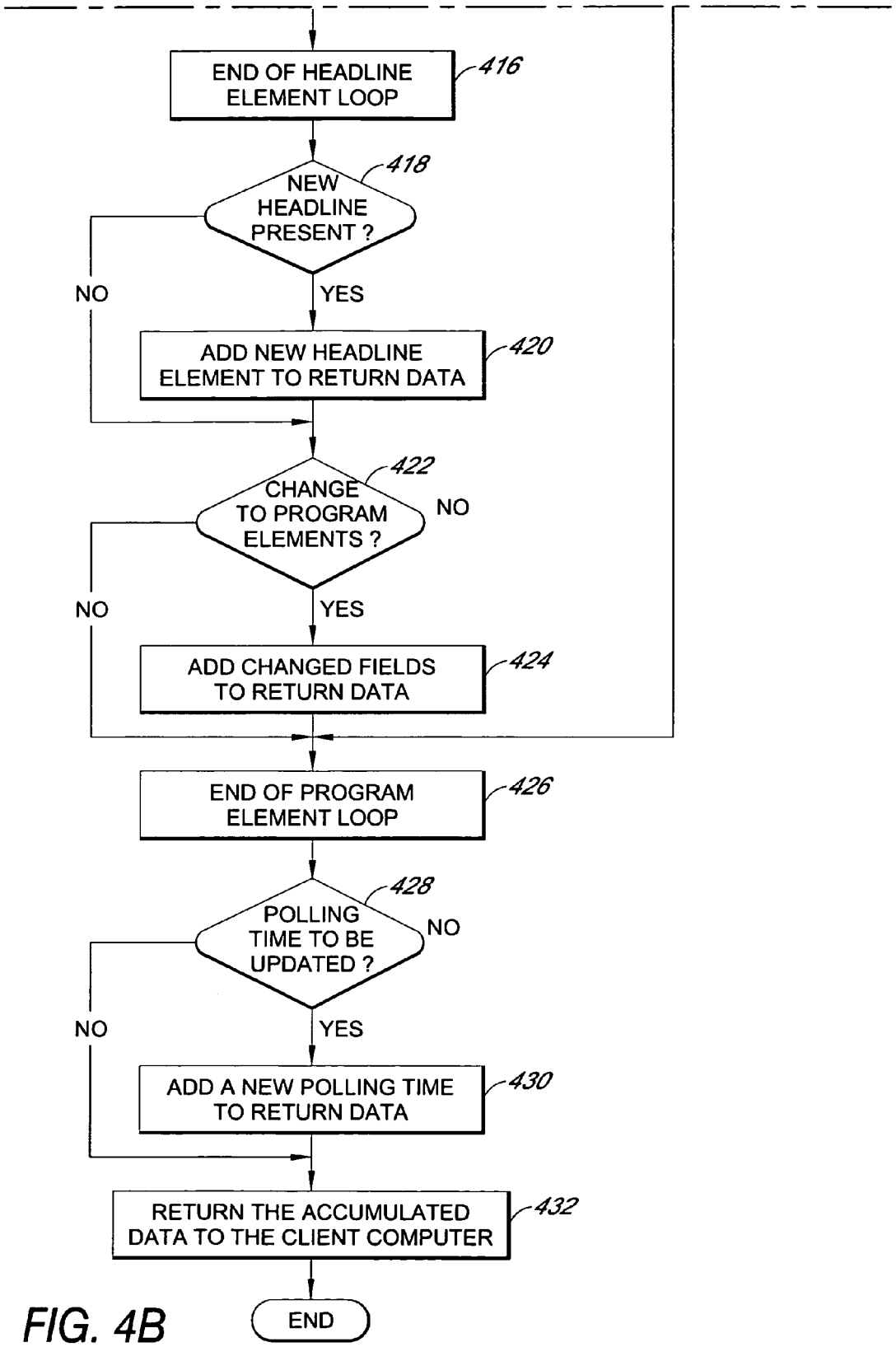
END OF HEADLINE ELEMENT LOOP
416
NEW HEADLINE PRESENT ?
418
NO
YES
ADD NEW HEADLINE ELEMENT TO RETURN DATA
420
CHANGE TO PROGRAM ELEMENTS ?
422
NO
NO
YES
ADD CHANGED FIELDS TO RETURN DATA
424
END OF PROGRAM ELEMENT LOOP
426
POLLING TIME TO BE UPDATED ?
428
NO
NO
YES
ADD A NEW POLLING TIME TO RETURN DATA
430
RETURN THE ACCUMULATED DATA TO THE CLIENT COMPUTER
432
END

FIG. 4B

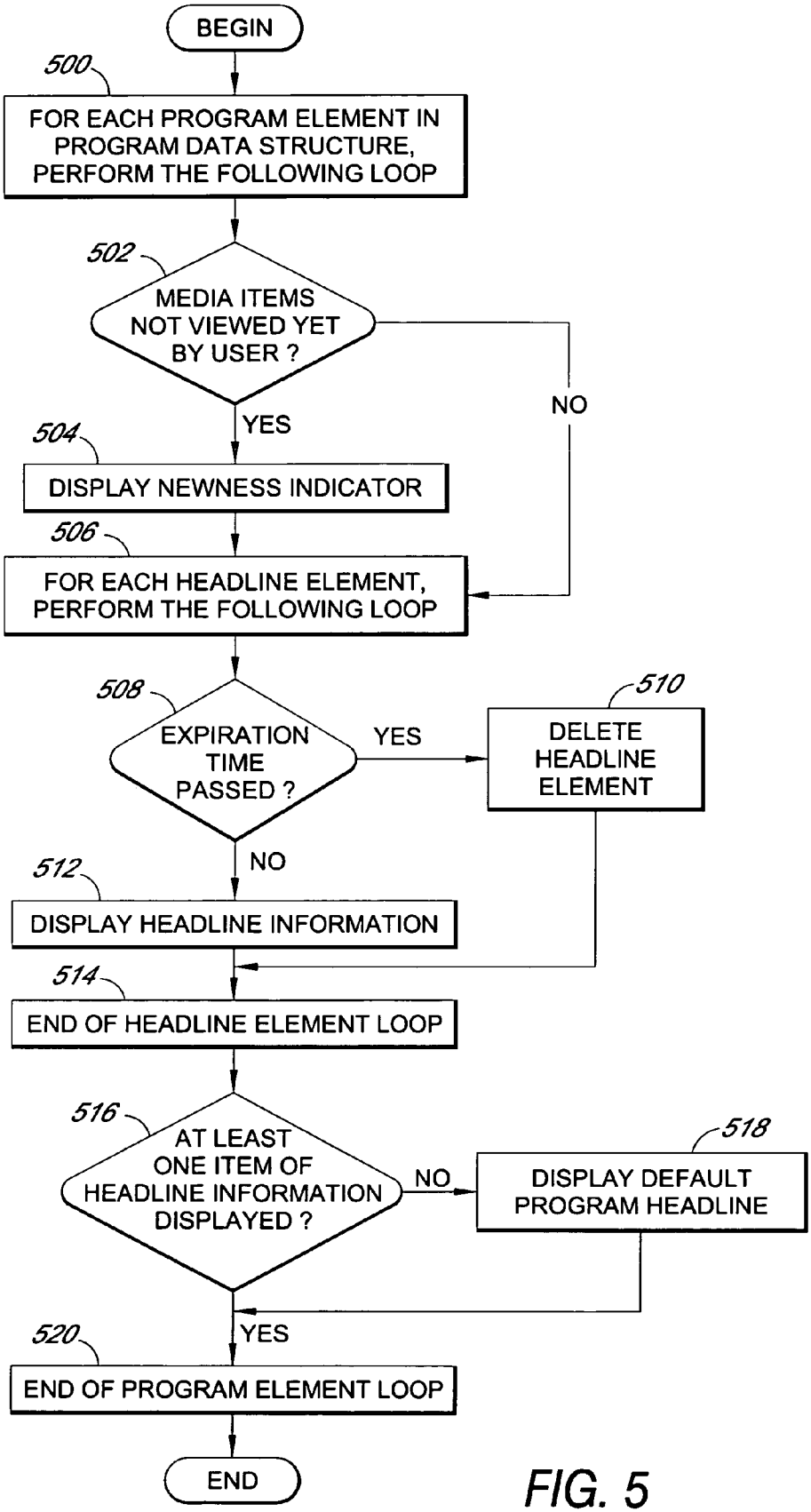
BEGIN
500
FOR EACH PROGRAM ELEMENT IN PROGRAM DATA STRUCTURE, PERFORM THE FOLLOWING LOOP
502
MEDIA ITEMS NOT VIEWED YET BY USER ?
YES
NO
504
DISPLAY NEWNESS INDICATOR
506
FOR EACH HEADLINE ELEMENT, PERFORM THE FOLLOWING LOOP
508
EXPIRATION TIME PASSED ?
YES
510
DELETE HEADLINE ELEMENT
NO
512
DISPLAY HEADLINE INFORMATION
514
END OF HEADLINE ELEMENT LOOP
516
AT LEAST ONE ITEM OF HEADLINE INFORMATION DISPLAYED ?
NO
518
DISPLAY DEFAULT PROGRAM HEADLINE
YES
520
END OF PROGRAM ELEMENT LOOP
END

FIG. 5

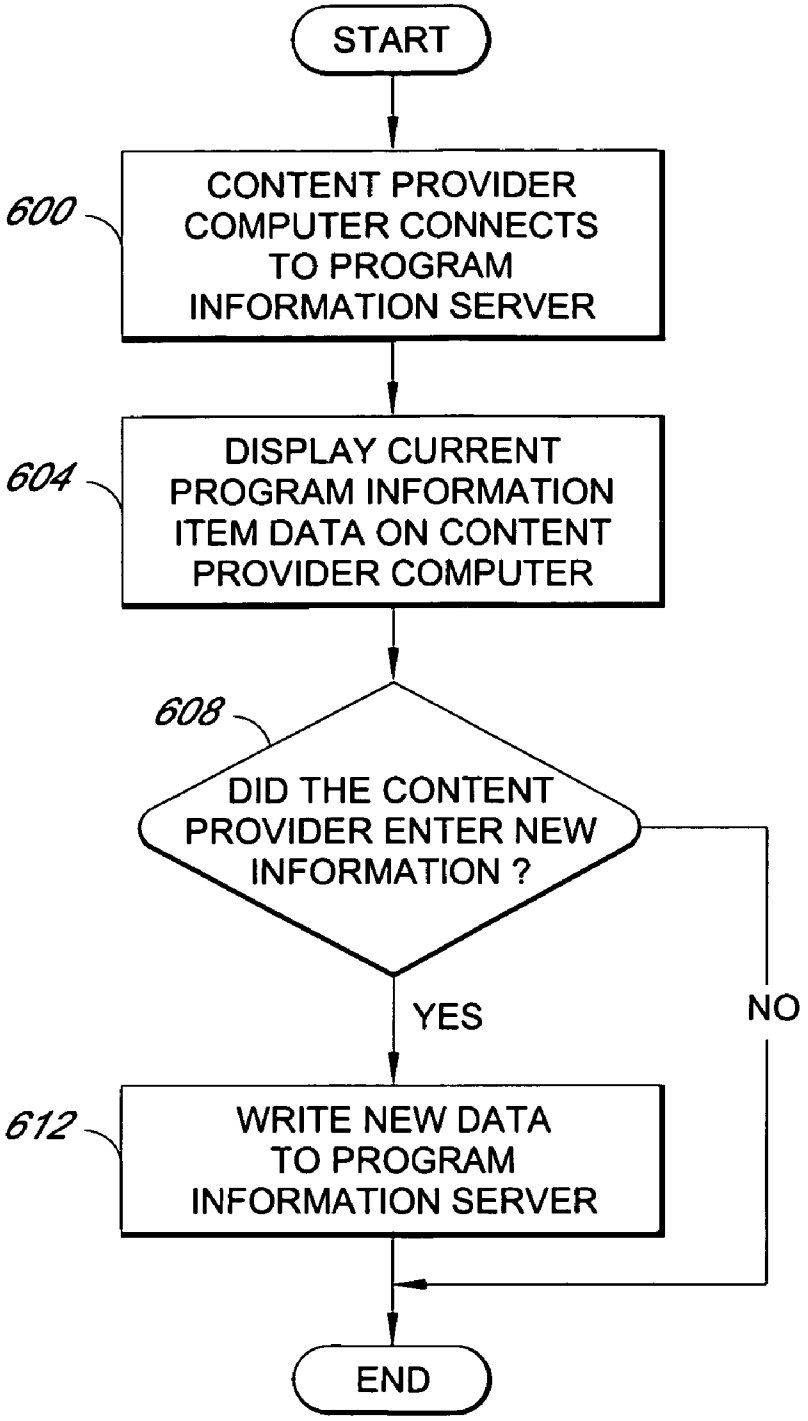
START
600
CONTENT PROVIDER COMPUTER CONNECTS TO PROGRAM INFORMATION SERVER
604
DISPLAY CURRENT PROGRAM INFORMATION ITEM DATA ON CONTENT PROVIDER COMPUTER
608
DID THE CONTENT PROVIDER ENTER NEW INFORMATION ?
YES
NO
612
WRITE NEW DATA TO PROGRAM INFORMATION SERVER
END

FIG. 6

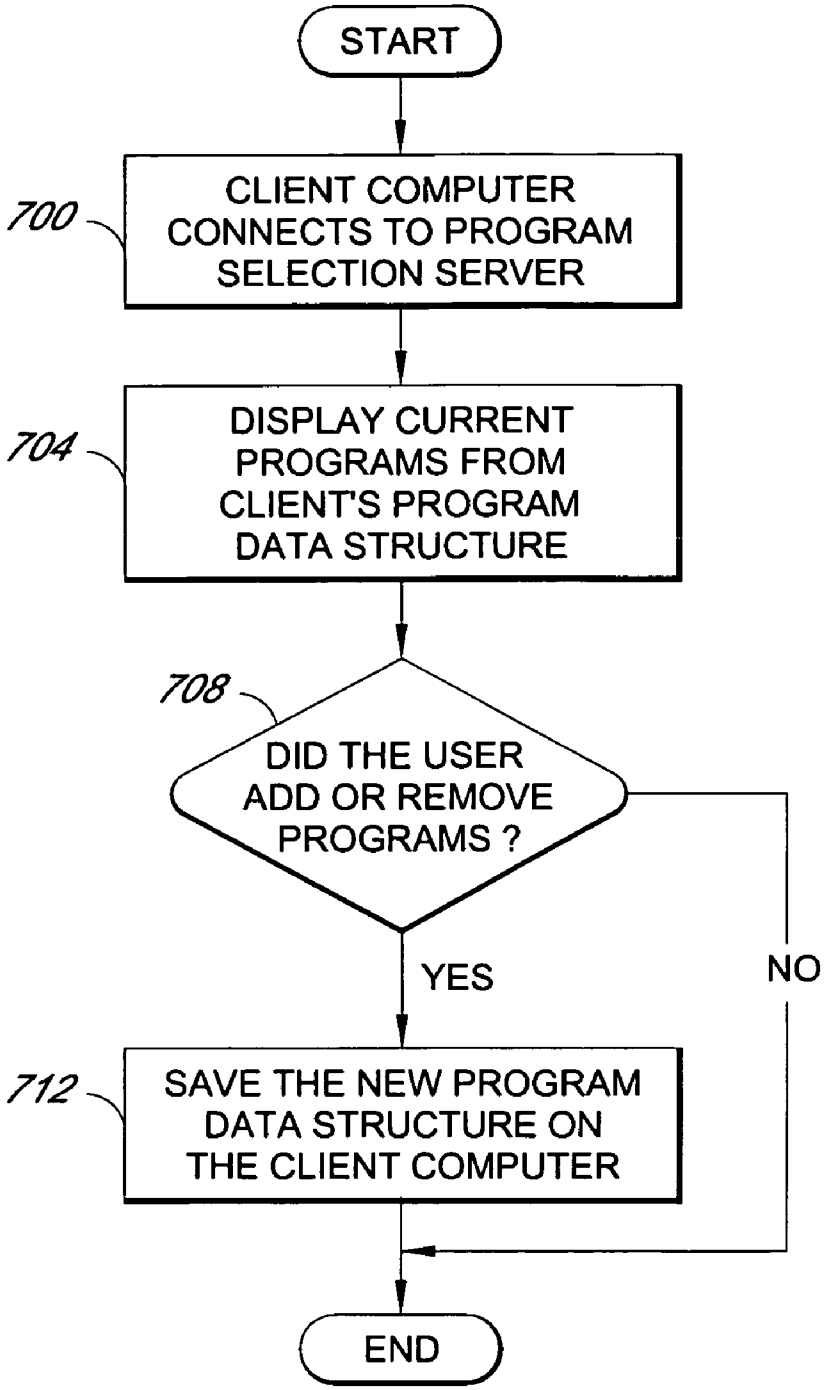
START
700
CLIENT COMPUTER CONNECTS TO PROGRAM SELECTION SERVER
704
DISPLAY CURRENT PROGRAMS FROM CLIENT'S PROGRAM DATA STRUCTURE
708
DID THE USER ADD OR REMOVE PROGRAMS ?
YES
NO
712
SAVE THE NEW PROGRAM DATA STRUCTURE ON THE CLIENT COMPUTER
END

FIG. 7

SYSTEM AND METHOD FOR PROVIDING UPDATE INFORMATION

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention pertains to automatic computer upgrading. More particularly, the invention pertains to a system and method for updating program information items via a network.

2. Description of the Related Technology

As the popularity of the Internet increases, users are turning from traditional media sources, such as television and newspaper, to the Internet to obtain information about current news events, activities, entertainment and other information. By using a client program which resides on a client computer, a user can visit one of many media servers that contain information which is provided by various content providers. A typical media server may include a plurality of web pages that are viewable by a user at the client computer. The web pages are virtual documents often having embedded links which link portions of the virtual pages to other virtual pages and other data. A user can traverse the virtual pages and download data by selecting with a mouse or other input device a predetermined portion of the virtual page enabled as a link.

Traditionally, the client program has been an Internet browser that allows a user to visit various web pages by providing an address of a selected media server. More recently, however, client programs provide for the automatic downloading and playback of selected items of information to the client computer. As an example, various media servers have been developed offering various "streamable" programs. The term streamable refers to media that can be transmitted from one computer to another, and played in real time as the media is received. A streamable program can include any type of audiovisual presentation, such as, for example, a news report, an entertainment show, a picture, text, or an advertisement.

As a service to the user, the media server provides information about each of the streamable programs to the user so that the user may make an informed selection from the available programs. These media servers are designed to periodically update the client computer with the latest set of program information as it is accumulated.

However, these media servers have encountered difficulty servicing large numbers of users. Some popular media servers may service thousands of client computers. When a content provider desires to make new programming available on the media server, the content provider needs to send the new information each of the new users. Disadvantageously, such an update can cause network congestion within selected portions of the Internet network and consume network resources. Network congestion may cause network packets representing portions of the streamable program to be lost and also impair other communications that are being transmitted over the Internet.

Therefore, there is a need for an improved system for distributing information from a media server to a client computer. The system should minimize the amount of network congestion that is caused by an update from a server computer to a client computer.

SUMMARY OF THE INVENTION

The present invention has several aspects, no single one of which is solely responsible for its desirable attributes.

Without limiting the scope of this invention as expressed by the claims which follow, its more prominent features will now be discussed briefly.

One embodiment of the invention includes a method of dynamically adjusting the polling frequency of a client computer, the method comprising sending a polling interval from a server to a client computer, periodically determining whether the server has new program information items, the determining period based at least in part upon the polling interval, and transmitting new program information items to the media renderer upon the determination that the media server has new program information items.

Another embodiment of the invention includes a system for updating program information items on a client computer, the system comprising a network, a server computer, and a client computer periodically determining whether the server has new program information items, the determining period based at least in part upon an polling interval that is provided by the server computer.

Yet another embodiment of the invention includes a system for dynamically adjusting the polling frequency of a client computer, the system comprising means for sending an polling interval from a server to a client computer, means for periodically determining whether the media server has new program information items, the determining period based at least in part upon the polling interval, and means for transmitting new program information items to the media renderer upon the determination that the media server has new program information items.

Yet another embodiment of the invention includes a system for delivering custom media content to a client computer, the system comprising a network, at least one media content provider, each of the at least one media content provider operably connected to the network, a client computer operably connected to the network, opaque data residing on the client computer, the opaque data being associated with one of the at least one media content provider, a server computer configured to retrieve the opaque data from the client computer and forward the opaque data to the media content provider that is associated with the opaque data.

Yet another embodiment of the invention includes a system for delivering custom media content to a client computer, the system comprising means for receiving a request from a client computer for new information, means for determining whether the client computer has any opaque data that is associated with the new information, means for identifying a media content provider that is associated with the opaque data, means for transmitting the opaque data to the media content provider, and means for customizing the new information based upon the opaque data, and means for sending the new information from the media content provider to the client computer.

Yet another embodiment of the invention includes a method of displaying program information items, the method comprising determining that a media server has one or more new program information items, and displaying a content indicator to a user, the content indicator identifying to the user that one or more new program information items are available for presentation.

Yet another embodiment of the invention includes a system for updating information to a client computer, the system comprising a network, a server computer operably connected to the network, and a client computer operably connected to the network, the client computer periodically receiving updates from the server, the client computer displaying a content indicator to a user indicating that one or

more program information items is accessible by the user upon receipt of each of the updates, the client computer retrieving the program information items from a media content provider upon a request of the user.

Yet another embodiment of the invention includes a system for displaying program information items, the system comprising means for receiving an update report from a server computer, the update report indicating that a media server has one or more new program information items, and means for displaying a content indicator to a user, the content indicator identifying to the user that one or more new program information is accessible.

Yet another embodiment of the invention includes a method for maintaining up-to-date program information, the system comprising receiving one or new program information items, each of the program information items having an associated expiration time, and extending at least one expiration time responsive to a request by a media server.

Yet another embodiment of the invention includes a program storage device storing instructions that when executed perform the steps comprising receiving one or new program information items, each of the program information items having an associated expiration time, and extending at least one expiration time responsive to a request by a media server.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a block diagram illustrating a system for transmitting one or more program information items to a client computer.

FIG. **2** is a block diagram of a data structure which is stored in the client computer of FIG. **1**, the data structure indicating which of the program information items are to be presented to the user.

FIG. **3** is an exemplary screen display of the client computer of FIG. **1**, the screen display illustrating selected ones of the program information items.

FIG. **4** is a flowchart illustrating a process for transmitting new program information items to the client computer of FIG. **1**.

FIG. **5** is a flowchart illustrating a process for displaying a newness indicator on the screen display on the client computer of FIG. **1**, the newness indicator indicating the presence of one or more media items that may be viewed by the client at the client computer.

FIG. **6** is a flowchart illustrating a process for updating the program information items of FIG. **1**.

FIG. **7** is a flowchart illustrating a process for selecting the program information items which are displayed to the client computer of FIG. **1**.

DETAILED DESCRIPTION OF THE INVENTION

The following detailed description is directed to certain specific embodiments of the invention. However, the invention can be embodied in a multitude of different ways as defined and covered by the claims. In this description, reference is made to the drawings wherein like parts are designated with like numerals throughout.

System Overview

FIG. **1** is a high-level block diagram illustrating an architectural overview of one embodiment of the present invention. The system is configured to periodically deliver program information items **102** to a client computer **100**. As used herein, the term "program information items" includes any information that is subject to change over time. As a non-limiting example, the program information items **102** can include audio and visual information about current news events, cultural activities, entertainment, sports, recreation, movies, stock information, interest rates, pricing information, cartoons, advertisements, and other information that may be desired by a user. Further, the program information items **102** may include the following types of data formats: text, animation, 3-D graphics, streaming media, Joint Photographic Experts Group (JPEG) files, Motion Picture Expert Group (MPEG) files, HyperText Markup Language (HTML) files, Extensible Markup Language (XML) files, and/or any other type of data that can be associated with media content. It is also noted that the program information items **102** may include an address or a reference which identifies the location of other program information items.

Further, although only one client computer **100** is shown in FIG. **1**, the present invention is capable for transmitting program information items **102** to a plurality of client computers **104** numbering in the tens of millions and upwards.

The client computer **100** is connected via a network **108** to a program information server **104**. It is noted that the term "program information server" is used for convenience to describe any computer that can maintain and transmit the program information items **102**. For example, the program information server **104** can be any traditional "web server" that hosts media content for viewing by users. The features of the program information server **104** are described in further detail below.

The client computer **100** and the program information server **104** are operably connected to a media server **112**. The media server **112** contains one or more media items **114**. The media items **114** are stored on the media server **112** until requested by a user at the client computer **100**. Each of the media items **114** is associated with selected program information items **102**. Further, each of the media items **114** can include any of the information as discussed above with reference to the program information items **102**.

In one embodiment of the invention, the media items **114** are significantly larger in size than the size of program information items **102**. In this embodiment, the media items **114** are stored by the media server **112** until requested by a user. Due to their size, the media items **114** cannot be distributed to the client computer **100** upon each update of the client computer **100**. However, in this embodiment, since the program information items **102** are significantly smaller than the media items **114**, the program information items **102** may be periodically transmitted to the client computer **100** even absent a specific request from the client for such information, and, advantageously, such periodic transmission does not cause network congestion.

It is noted that although only one media server **112** is shown in FIG. **1**, the present invention is capable of having a plurality of media servers **112** numbering in the tens of thousands and upwards. Further, in one embodiment of the invention, each of the media servers **112** is associated with a content provider. The content provider provides selected ones of the media items **114** to the user. As a non-limiting example, a content provider can include: any type of store, e.g., book, automobile, clothing; a broadcasting company; a newspaper; a streaming content provider; or an educational services provider. The content provider can provide the media items **114** to the user either for free or for a fee.

The client computer **100** is also connected to a program selection server **118** via the network **108**. The program selection server **118** contains a plurality of web pages that are viewable by a user at the client computer **100**. A user at the client computer **100** informs the program selection server **118** as to which of the program information items **102** are to be displayed to the user.

The network **108** is also operably connected to a content provider computer **120**. The content provider computer **120** can be used by a content provider to add, delete, and/or modify the contents of the program information items **102** on the program information server **104**. Furthermore, the content provider computer **120** can be used by a content provider to add, delete, and/or modify the contents of the media items **114** on the media server **112**.

Optionally, the program information server **104**, the media server **112**, the program selection server **118**, the content provider computer **120** or some combination thereof, may be integrated into a single computer platform. Further, it is noted the program information server **104**, the media server **112**, the program selection server **118**, the content provider computer **120** may not necessarily be located in the same room, building or complex. In fact, the program information server **104**, the media server **112**, the program selection server **118**, and the content provider computer **120** can be located in different buildings or states.

The client computer **100**, the program information server **104**, the media server **112**, the program selection server **118**, and the content provider computer **120** may each have one or more conventional general purpose microprocessors such as a Pentium® processor, a Pentium® Pro processor, a 8051 processor, a MPS® processor, a Power PC® processor, or an ALPHA® processor. In addition, the microprocessor may be any conventional special purpose microprocessor such as a digital signal processor or a graphics processor. Furthermore, the client computer **100**, the program information server **104**, the media server **112**, the program selection server **118**, and the content provider computer **120** may each comprise a plurality of computers that are connected by a network, such as the network **108**. In addition, the client computer **100**, the program information server **104**, the media server **112**, the program selection server **118**, and the content provider computer **120** may be a desktop, server, portable, hand-held, set-top, or other configured computer.

The client computer **100**, the program information server **104**, the media server **112**, the program selection server **118**, and the content provider computer **120** may each be used in connection with various operating systems such as: UNIX, LINUX, Disk Operating System (DOS), OS/2, Windows 3.X, Windows 95, Windows 98, and Windows NT.

The network **108** may include any type of electronically connected group of computers including, for instance, the following networks: Internet, Intranet, Local Area Networks (LAN) or Wide Area Networks (WAN). In addition, the connectivity to the network may be, for example, remote modem, Ethernet (IEEE 802.3), Token Ring (IEEE 802.5), Fiber Distributed Datalink Interface (FDDI) or Asynchronous Transfer Mode (ATM). As used herein, an Internet includes network variations such as public internet, a private internet, a secure internet, a private network, a public network, a value-added network, an intranet, and the like. The network **108** may include multiple network technologies including both high and low bandwidth connections. The network **108** may include non-persistent connections that are only available at intervals, e.g., dial up telephone lines, and may also include persistent connections.

As can be appreciated by one of ordinary skill in the art, each of the program information server **104**, the media server **112**, the program selection server **118**, and the content provider computer **120** includes a control program (not shown) that controls the operation of the respective computer. Each of the control programs comprise various subroutines, procedures, definitional statements, and macros. As will be appreciated by one of ordinary skill in the art, each of the control programs can be divided into several components which are linked together or made available in a shareable dynamic link library. Furthermore, the control programs may be written in any programming language such as C, C++, BASIC, Pascal, Java, and FORTRAN. C, C++, BASIC, Pascal, Java, and FORTRAN are industry standard programming languages for which many commercial compilers can be used to create executable code.

FIG. **2** is a block diagram illustrating the elements of one embodiment of a program data structure **200** which resides on the client computer **100**. The program data structure **200** contains some of the program information items **102** as well as identifies the location of other program information items **102**, such as the media items **114** (FIG. **1**). The program data structure **200** includes a plurality of program elements **202** that are each associated with a content provider. It is noted that some content providers may be associated with multiple program elements **202**. For example, the XYZ Broadcasting Company ("XYZ") may provide two types of media content: sports and entertainment. In this example, XYZ would have two program elements **202**, one associated with XYZ's sports content, the other associated with XYZ's entertainment content. It is noted that although FIG. **2** only displays two program elements **202**, the program data structure **200** may be adapted to contain any number of program elements **202**.

Each of the program elements **202** includes a number of data fields. As will be readily appreciated by one of ordinary skill in the art, the program elements **202** can be defined using any type of data structures having data fields. For example, the program elements **202** can be defined as arrays, linked lists, or other data structures. Each of the program elements **202** includes a program identification data field **208**. The program identification data field **208** contains a program identifier that uniquely identifies the program element **202**. The program identifier can be any arbitrary sequence of characters that uniquely identifies the program element **202**.

Each of the program elements **202** also includes a revision number data field **212**. The revision number data field **212** contains a revision number for the respective program element **202**. In one embodiment of the invention, the revision number is an integer. In this embodiment, the higher the revision number value of the program element **202**, the more recent is the information of the program element **202**.

Each of the program elements **202** also includes a headline list data field **216**. The headline list data field **216** identifies one or more headline elements **204**. The headline elements **204** are described in further detail below.

Further, the program elements **202** also include a media item location data field **220**. The media item location data field **220** identifies the location of additional information that may be delivered to the client pursuant to a client request. For example, in one embodiment of the invention, the media identification data field **220** contains an Uniform Resource Locator (URL) that identifies one of media items **114**.

In addition, the program elements **202** may optionally include an opaque data field **224**. The opaque data field **224**

includes information that may be customized by any content provider associated with the program element **202**. The opaque data field **224** allows the content provider to customize the information that is presented to the user as well as customizing the media content itself based upon the opaque data. The opaque data includes information that is specific to a user, such as a list of interests.

The program elements **202** also include a default headline data field **225**. The default headline data field **225** contains information that is displayed to a client at the client computer **100** if all of the headline elements **204** that are identified in the headline list data field **216** are expired.

Each of the headline elements **204** includes headline information that is to be presented to the user. As discussed above, each of the headline elements **204** is associated with at least one of the program elements **202**.

Each of the headline elements **204** includes a headline identifier data field **230**, a headline information data field **232** and an expiration data field **338**. The headline identifier data field **230** uniquely identifies the headline element **204**. The headline information data field **232** includes or identifies headline information that is to be presented to the user. In one embodiment of the invention, the headline information is stored in the headline information data field. In another embodiment of the invention, a location of the headline information is identified in the headline information data field. The headline information can include any of the information which is described above with reference to the program information items **102**.

Each of the headline elements **204** also includes an expiration time data field **238**. The expiration time data field **238** identifies an expiration time after which the headline information is no longer timely.

FIG. **3** is an exemplary screen display **300** that is presented to a user at the client computer **100**. The screen display **300** includes a plurality of graphical elements **304**. Each of the graphical elements **304** is associated with one of the program elements **202** (FIG. **2**). The graphical elements **304** can contain a label which identifies a content provider. Using the example from above, it can be assumed that XYZ is associated with one of the graphical elements **304**. As is shown in FIG. **3**, the graphical element **304** has a label specifying "XYZ Broadcasting."

Each of the graphical elements **304** also has an associated newness indicator **308**. The newness indicator **308** may be located on or near a graphical element to identify to a user its association with a respective graphical element. The newness indicator **308** is displayed to a user when one or more not previously viewed new media items **114** is available for presentation to the user. It is noted that although a star is used in connection with FIG. **3**, the newness indicator can be of any form, such as a square, a circle, a highlighted item of text, an audio signal, an arrow, or other such indicia.

Each of the graphical elements **304** also has a presentation area **312**. The presentation area **312** is used to display the headline data that is contained in the headline information data field **232** (FIG. **2**). It is noted, that if the headline information data field **232** contains audio data, such audio data can be rendered into sound and transmitted to the user via one or more speakers (not shown) subsequent to a user request.

If all of the headline information that is contained within the headline elements **204** cannot be formatted to be displayed in the presentation area **312**, the client computer **100** can either resize the presentation area **312** and/or present in sequence the information that is contained within each of the headline information data fields **232**.

In one embodiment of the invention, each of the graphical elements **304** is selectable by a user via input device, such as a mouse. Upon selection, the client computer **100** downloads the media content that is identified in the media item location data field **220** which is associated with the graphical element **304**.

Method of Operation

FIG. **4** is a high level flowchart illustrating a process for transmitting new program information items **102** to the client computer **100** (FIG. **1**). The client computer **100** periodically polls the program information server **102** at programmably definable time intervals. FIG. **4** describes the update process that occurs upon the expiration of the time interval.

Starting at a step **400**, the client computer **100** initiates a request to the program information server **104** for the most recent program information items **202**. To inform the program information server **102** which of the program elements **202** are associated with the client computer **100**, at the step **400**, the client computer **100** transmits a number of items to the program information server **104**, including: (i) each of the program identification numbers (identified in the program identification data field **208** of FIG. **2**), (ii) the revision number associated with each of the program elements **202** (identified in the revision number data field **212** of FIG. **2**), (iii) a list of the headline identification numbers (identified in each of the headline identifier data fields **230** of FIG. **2**), and (iv) and any opaque data that is associated with the program elements **202**.

Continuing to a step **402**, the program information server **104** performs a loop of steps (steps **404–426**) with respect to each of the program elements **202** (FIG. **2**). During each pass of the loop, one of the program elements **202** is successively selected for processing. For convenience of description, the following description with respect to steps **404–426** is described below with respect to only one of the program elements **202**.

Moving to a decision step **404**, the program information server **104** determines whether the opaque data field **224** (FIG. **2**) of the currently selected program element **202** includes any data. If the opaque data field **224** does include data, the program information server **104** proceeds to a step **405**. At the step **405**, the program information server **405** sends the content provider computer **120** the opaque data and passes control of the update to the content provider computer **120**. The content provider computer **120** can then directly handle the update request with the client computer **100**, or, alternatively, prepare an update for the client computer **100** and forward the update to the program information server **104** which can then respond to the client computer **100**.

Advantageously, the use of opaque data enables the content provider to customize the information that is presented to the user based upon the contents of the opaque data. Furthermore, the use of the opaque data allows for the reduction of the storage requirements of the program information server **104** and also allows for increased privacy for the content provider since the program information server **104** has no access to opaque data updates. From the step **405**, the process flow proceeds to a step **426** which is described in further detail below.

Referring again to the decision step **404**, if the opaque data field **224** does not contain any data, the program information server **104** proceeds to a step **406**. At the step **406**, the program information server **104** begins an iterative

loop. During the steps **408–426**, the program information server **104** (FIG. **1**) successively processes each of the headline elements **204** that are associated with the currently selected program element **202** (FIG. **2**). For convenience of description, the following description with respect to steps **408–426** describes the process flow with respect to only one of the headline elements **204**.

Proceeding to a decision step **408**, the program information server **104** (FIG. **1**) determines whether the expiration time identified in the headline expiration data field **238** of the currently selected headline element **204** is still later than the present time, in other words, whether the headline element **204** is still "fresh." As used herein, the term fresh is used to describe current information regarding a data item. If the headline element **204** is fresh, the program information server **104** proceeds to a decision step **412**. However, if it is not fresh, the program information server **104** proceeds to a step **410**. At the step **410**, the program information server **104** resets the expiration time that is associated with the headline element **204**. The expiration time is used by the client computer to determine the lifespan of a headline element. For example, a headline element **204** that included the current offer price of a stock may have a very short lifespan. Conversely, a headline element **204** that included the name of the winner of a governmental election would likely have a longer lifespan. At this step, the program information server **104** can extend or shorten the lifespan of a headline article depending on the circumstances.

If at the step **408**, the expiration time in the program information server **104** did not change, or after completing the step **410**, the program information server **104** proceeds to a decision step **412**. At the decision step **412**, the program information server **104** determines whether the headline element **204** is to be deleted. One or more of the headline elements **204** can be deleted pursuant to a request from the content provider computer **120**. If the headline element **204** is to be deleted, the program information server **104** proceeds to step **414**. At the step **414**, the program information server **104** sets the expiration time of the respective headline element **204** to any time in the past, for example, a year zero. The program information server **104** then proceeds to a step **416**.

Referring again to the decision step **412**, if the headline element **204** is not to be deleted, or after performing the step **414**, the program information server **104** proceeds to a step **416**. At the step **416**, the program information server **104** has completed processing one of the headline elements **204**. The program information server **104** then returns to the step **406** to continue to processing the next headline element **204**. The steps **406–416** are repeated with respect to a new headline element **204** until all of the headline elements **204** have been processed.

Moving to a decision step **418**, the program information server **104** (FIG. **1**) determines whether any new headline elements **204** are to be transmitted to the client computer **100**. A content provider at the content provider computer **120** (FIG. **1**) can access the program information server **104** (FIG. **1**) to add new headline elements **204** (FIG. **2**) to the program information server **104**.

If the program information server **104** determines that additional headline elements **204** (FIG. **2**) are to be transmitted to the user, the program information server **104** proceeds to a step **420**. At the step **420**, the program information server **104** adds a new headline element to the information that is to be returned to the client computer **100**.

Referring again to the decision step **418**, if the program information server **104** (FIG. **1**) determines that there are no new headline elements, or after completing the step **420**, the program information server **104** proceeds to a decision step **422**. At the decision step **422**, the program information server **104** determines whether any changes have been made by the content provider with respect to any of the program elements **202** (FIG. **2**). If any changes have been made, the program information server **104** proceeds to a step **424**.

At the step **424**, the program information server **104** adds the changed program elements to the information which is to be returned to the client computer **100** (FIG. **1**). For example, at the step **424**, the contents of the default headline data field **225** (FIG. **2**) can be modified if a new default headline is desired. Also for example, the contents of the media item location data field **220** can be modified to reference a different media item **114** (FIG. **1**).

Referring again to the decision step **422**, if the program information server **104** (FIG. **1**) determines that there are no changes to the program elements **202** (FIG. **2**), or, alternatively, after completing the step **424**, the program information server **104** proceeds to a step **426**. At the step **426**, the program information server **104** has completed processing one of the program elements **202**. The program information server **104** then returns to the step **402** to process the next program element **204**. The steps **404–426** are repeated until all of the program elements **202** have been processed.

From the step **426**, the program information server **104** proceeds to a decision step **428**. At the decision step **428**, the program information server **104** determines whether the polling time of the client computer **100** is in need of updating. The polling time of the client computer **100** can be adjusted either upwards or downwards in time based upon the preferences of the provider of the program information server **104**. For example, in times of breaking news, the polling interval can be decreased such that updates occur more frequently. Further, if the program information server **104** becomes overloaded with update requests from users, the polling interval can be increased such that updates occur less frequently. In addition, the polling interval can be increased or decreased based upon the program elements **202** which have been selected by the user at the client computer **100**. If the headline elements **204** associated with a program element **202** are modified frequently, the polling interval can be decreased to minimize the time in which the user views data that is not fresh.

If the polling time needs to be updated, the program information server **104** proceeds to a step **430**. The polling time interval may be determined by the system administrator of the program information server **104**, or, alternatively, by applying an algorithm to the list of program elements **202** in the program data structure **200**. At the step **430**, the program information servers adds a new polling interval to the information that is to be returned to the client computer **100**.

Referring again to the decision step **428**, if the polling interval does not need to be updated, or after performing the step **430**, the program information server **104** (FIG. **1**) proceeds to a step **432**. At the step **432**, the program information server **102** transmits the information that has been accumulated during steps **402–430** to the client computer **100**.

FIG. **5** is a flowchart illustrating the process that occurs on the client computer **100** subsequent to receiving an update from the program information server **104**. Starting at a step **500**, the client computer **100** performs a series of steps with respect to each of the program elements **202** (FIG. **2**) that are contained within the program data structure **200** (FIG. **2**). The client computer **100** performs the steps **500–520** with respect to each of the program elements **202**. For conve-

nience of description, the processing of program elements **202** is described below with respect to only one of the program elements **202**.

After starting at the step **500**, the client computer **100** (FIG. **1**) proceeds to a decision step **502**. At the decision step **502**, the client computer **100** determines whether the user has viewed the most recent version of the media items **114** available in connection with the currently selected program element **202**. It is noted that the client computer **100** stores the revision number identified in the revision number data field **212** of the program element **202** each time the user selects one of the media items **114** (FIG. **1**) associated with the program element **202**. If the client computer **100** determines that a later version of the media content **114** is available for transmission to the user, the client computer **100** proceeds to a step **504**. At the step **504**, the client computer **100** presents the newness indicator **308** (FIG. **3**) to the user. For example, by rendering a shape such as a star on the display.

Referring again to the step **502**, if the client computer **100** determines that the user has seen the most recent version of the media items **114** associated with the currently selected program element **202**, or, after completing the step **504**, the client computer **100** proceeds to a step **506**. At the step **506**, the client computer **100** performs the steps **508–516** with respect to each of the headline elements **202**. For convenience of description, the process flow is described below with respect to only one of the headline elements **202**.

Proceeding to a step **508**, the client computer **100** determines whether the expiration time identified in the expiration time data field **238** has been passed. If so, the client computer **100** proceeds to a step **510**, wherein the client computer removes the headline element from the program data structure **200** (FIG. **2**).

However, referring again to the decision step **508**, if the client computer **100** (FIG. **1**) determines the expiration time has not been passed, the client computer **100** proceeds to a step **512**. At the step **512**, the client computer **100** displays the headline information that is identified in the headline information data field **232** (FIG. **2**).

From either the step **510** or the step **512**, the client computer **100** proceeds to a step **514**. At the step **514**, the client computer **100** has finished processing one of the headline elements **204** that is associated with one of the program elements **202**. The client computer **100** then, if necessary, repeats the steps **506–514** with respect to any remaining unprocessed headline elements **204**.

Continuing to a decision step **516**, the client computer **100** determines whether the contents of at least one of the headline information data fields **230** (FIG. **2**) was displayed to a user at the client computer **100**. If no headline was displayed, the client computer **100** proceeds to a step **518**. At the step **518**, the client computer **100** displays the information that is contained within the default headline data field **225**.

Referring again to the decision step **516**, if at least the contents of one of the headline information data fields **230** was presented to the user, or after performing the step **518**, the client computer **100** proceeds to a step **520**.

At the step **520**, the client computer **100** returns to the step **500** to process any remaining program elements **202**. After all of the program elements **202** have been processed, the client computer **100** stops and awaits further action by the user, such as selection of one of the graphical elements **304** which may start the transmission of the media items **114** (FIG. **1**).

FIG. **6** is a flowchart illustrating the process for updating the information that is stored in the program information server **104**. Starting a step **600**, a content provider residing at the content provider computer **120** (FIG. **1**) connects to the program information server **104**. As will be appreciated by one of ordinary skill in the art, a number of methods exist for establishing a communication channel between two computers, e.g., TCP/IP.

Next, at a step **604**, the program information server **104** displays to the content provider at the content provider computer **120** the current state of the program information items **102** (FIG. **1**) maintained by the program information server **104**. For example, using the example from above, and assuming the current headline for XYZ was "New widget available now.", the content provider would be presented the headline "New widget available now."

Continuing to a decision step **608**, the program information server **104** determines whether the content provider wants to modify any of the program information items **102** (FIG. **1**). In one embodiment, at the decision step **608**, the program information server **102** displays a menu that enables the user to select from the program information items **102** (FIG. **2**) any that the user wants to modify.

If the content provider did not modify any of the program information items **102**, the process ends. However, if the user/content provider modified any of the program information items **102**, the program information server **104** proceeds to a step **612**. At the step **612**, the program information server **104** stores the information, such that when a client computer **100** requests for an update, the client computer **100** is presented with the most recent information. The content provider update process then ends.

FIG. **7** is a flowchart illustrating a process for selecting which of the program information items **102** are to be presented to the client computer **100**. Starting a step **700**, a user residing at the client computer **100** (FIG. **1**) desires to modify the set of program information items **102** presented to the user. At this step, the client computer **100** connects to the program selection server **118**. As will be appreciated by one of ordinary skill in the art, a number of methods exist for establishing a communication channel between two computers.

Proceeding to a step **704**, the program selection server **118** presents to the user each of the program information items **102** which currently selected by the user at the client computer **100**. In one embodiment of the invention, the program selection server **118** presents a screen display similar to the screen display which is shown in FIG. **3**.

Continuing to a decision step **708**, the user can modify the program information items **102** which are transmitted to the user upon each update. In particular, at this step, the user can add to or delete from a current lineup the program elements **202** which are in the program data structure **200**. It is noted that there exists a number of methods for determining which of the program elements **202** are desired by the user. For example, the program selection server **118** can present a master list that identifies each of the program elements **202** that can be selected by the user. The user can select with an input device which of the program elements **202** are to be added to a lineup data structure. Conversely, the user can remove any of the program elements **202** that are currently in the lineup by simply selecting with the input device the respective program element **202**.

Optionally, the program selection server **118** can request the user to provide additional information that is to be associated with one or more of the program elements **202**. Such additional information can be stored in the opaque data

field **224**. For example, if the program element **202** is related to stock information, the user may be prompted for stock symbols of interest.

The system of the present invention advantageously allows the program information server **104** to dynamically adjust the polling interval of the client computer **100**. The polling interval can be adjusted upwards when the program information server **104** becomes overloaded. Conversely, if breaking news occurs, the polling interval can be adjusted downwards such that the client computer **100** receives updates more frequently. Further, as part of the update process and by the use of opaque data, the system of the present invention allows a content provider to customize media items available to a user.

While the above detailed description has shown, described, and pointed out novel features of the invention as applied to various embodiments, it will be understood that various omissions, substitutions, and changes in the form and details of the device or process illustrated may be made by those skilled in the art without departing from the spirit of the invention. The scope of the invention is indicated by the appended claims rather than by the foregoing description. All changes which come within the meaning and range of equivalency of the claims are to be embraced within their scope.

What is claimed is:

1. A method comprising;

sending a polling interval information from a remote computer to a client computer, said polling interval information indicating to the client computer when to request that program information items be transmitted by the remote computer to the client computer, wherein said program information items comprise information at least in part relating to one or more media items;

periodically determining in the remote computer whether new media items are available, wherein the media items are selected from the group comprising audio or visual information relating to: current news events, cultural activities, entertainment, sports, recreation, movie information, stock information, interest rates, pricing information, cartoons, and/or advertisements, the determining period based at least in part upon the polling interval information; and

transmitting new media items and/or at least in part related program information items for display or rendering on the client computer upon the determination that new media items are available on the remote computer and upon request from the client computer.

2. The method of claim **1**, additionally comprising modifying the polling interval based upon one or more events.

3. The method of claim **2**, wherein the act of modifying the polling interval includes increasing the polling interval at least in part to reduce the load of the remote computer.

4. The method of claim **1**, additionally comprising customizing the polling interval based at least in part upon one or more actions of a user.

5. The method of claim **4**, wherein the one or more actions of a user comprise selecting one or more media items.

6. The method of claim **1**, and further comprising transmitting program information items relating at least in part to the available new media items based at least in part on a request from the client computer.

7. The method of claim **6**, wherein said request from the client computer is based at least in part on the polling interval information.

8. The method of claim **1**, wherein said program information items comprise content selected from the group consisting essentially of: text; animation; audio files; video files; and/or other data associated with one or more media items.

9. The method of claim **8**, wherein said program information items have a size that is at least in part smaller than one or more associated media items.

10. A system for dynamically adjusting the polling frequency of a client computer, the system comprising:

means for sending polling interval information from a server to a client computer, the polling interval information indicating to the client computer at least in part when to request that program information items be transmitted by the remote computer to the client computer, wherein said program information items relate at least in part to one or more media items;

means for periodically requesting from the server whether the server has new media items, the requesting period based at least in part upon the polling interval;

means for transmitting new media items to a media renderer in the client computer based at least in part upon a determination that the server has new media content data items and/or based at least in part upon request from the client computer; and

means for displaying the transmitted media items with the client computer.

11. The system of claim **10**, additionally comprising means for modifying the polling interval information based at least in part upon one or more events.

12. The system of claim **10**, additionally comprising means for customizing the polling interval based at least in part upon one or more actions of a user.

13. A method of adjusting a client computer polling frequency, the method comprising:

periodically requesting, based at least in part on a first polling frequency, whether a media server has new media items;

at a client computer, receiving response data from the media server relating at least in part to one or more new media items, the response data comprising polling data at least in part representing a second polling frequency, the polling data indicating to the client computer when to request that media items be transmitted by the media server to the client computer via a network;

at the client computer, reading the polling data;

periodically requesting, in accordance with the second polling frequency, whether the media server has new media items, the second polling frequency representing a period of time different than the first polling frequency; and

displaying the new media items.

14. The method of claim **13**, wherein the response data further comprises one or more indications of that new media content data items are available.

15. The method of claim **13**, additionally comprising storing the polling data on the client computer.

16. The method of claim **13**, wherein the received response data is received via a telephone line.

17. The method of claim **13**, wherein the received response data is received via a high bandwidth connection.

18. The method of claim **13**, wherein the client computer, at least in part, in accordance with the first polling frequency, receives the response data, reads the polling data, and periodically determines, in accordance with the second polling frequency whether the media server has new media content data items.

19. A method of transferring content data items between a client electronic device and a remote computer comprising:

receiving a polling interval information from the remote computer that at least in part indicates to the client electronic device when to periodically request that a content data item be transmitted by the remote computer to the client electronic device;

periodically transmitting a request to the remote computer to indicate to the remote computer to transmit one or more additional content data items to the client electronic device, the transmission of the request being based at least in part upon the received polling interval information;

at least in part in response to a request from the client electronic device, receiving the one or more additional content data items and a uniform resource locator (URL) indicating the address or location of one or more other content data items and/or other information related to the content data item; and

displaying the received content data items and/or a URL related thereto.

20. The method of claim 19, additionally comprising storing the polling interval in the client electronic device.

21. The method of claim 19 further comprising receiving the polling interval information via a telecommunication line.

22. The method of claim 19 further comprising receiving polling interval information via a high bandwidth connection.

23. The method of claim 19, additionally comprising:

receiving a second polling interval information, said second polling interval information based at least in part on an aspect of the remote computer; and

periodically determining whether a remote computer has new content data items available for transmission to the client electronic device, the determining based at least in part upon the received second polling interval information.

24. A computer readable storage medium storing instructions that when executed perform the method comprising:

receiving a request from a client computer for one or more new program information items;

determining a new polling interval for the client computer;

transmitting the determined new polling interval from a server computer to the client computer;

receiving a request from the client computer, based at least in part on said determined new polling interval, for one or more new program information items; and

based at least in part on a request generated by the client computer, transmitting one or more of the new media items relate to the one or more new program information items, said request based at least in part on one or more user actions.

25. The device of claim 24, further comprising determining the new polling interval based at least in part on the content of the request for the one or more new program information items.

26. The device of claim 24, wherein determining the new polling interval comprises generating a new poling interval based at least in part on an action of a system administrator.

27. The device of claim 24, wherein the request is received via a telecommunications line.

28. The device of claim 24, wherein the request is received via a high bandwidth connection.

29. A client electronic device, comprising;

a module to receive a polling interval information from a server computer via a network, said polling interval information operative to indicate to the client electronic device when to transmit a request indicating that one or more content indicators relating at least in part to one or more new content information items be transmitted by the server computer to the electronic device, the module further to periodically requesting the server computer to transmit said one or more content indicators to the electronic device, using the received polling interval information to determine a time to request said one or more content indicators, and the module to receive said one or more content indicators and/or one or more new content information items and to cause, at least in part in response to a user request, the display of the new content information items sent from the server computer.

30. The client electronic device of claim 29, further comprising an element configured to receive the polling interval information via a telephone line.

31. The client electronic device of claim 29, further comprising an element to receive the polling interval information via high bandwidth connection.

32. The client electronic device of claim 29, additionally comprising a processor for executing the module.

33. The client electronic device of claim 29, wherein said one or more content indicators comprise content selected from the group consisting essentially of: text; animation; audio files; video files; and/or other data associated with one or more media items.

34. The client electronic device of claim 33, wherein said one or more content indicators have a size that is at least in part smaller than one or more associated new content information items.

35. A server computer, the server computer comprising:

a module to receive a request from a client computer for one or more new content indicators and/or one or more new content information items for display or rendering, the module to determine a new polling interval information for the client computer, said polling interval information operative to indicate to the client computer when to request that one or more content indicators be transmitted by the server computer to the client computer, and the module to transmit the determined new polling interval information from the server computer to the client computer via a network, the polling interval information to be used by the client computer for requesting and displaying new content indicators and/or new program information items.

36. The server of claim 35, additionally comprising an element to transmit the requested one or more new content indicators and/or the requested one or more new content information items to the client computer.

37. The server of claim 35, additionally comprising an element to determine the new polling interval information at least in part from the content of the request for the one or more new content indicators and/or the one or more new content information items.

38. The server of claim 35, wherein the new polling interval information is capable of being provided by a system administrator.

39. The server of claim 35, additionally comprising an element configured to receive the polling interval information via a telephone line.

40. The server of claim **35**, comprising an element to receive the polling interval information via a high bandwidth connection.

41. The server of claim **35**, wherein said one or more new content indicators comprise content selected from the group consisting essentially of: text; animation; audio files; video files; and/or other data associated with one or more new content information items.

42. The server of claim **41**, wherein said one or more new content indicators have a size that is at least in part smaller then one or more associated new content information items.

43. A method of dynamically adjusted the polling frequency between a remote computer and an electronic device, the method comprising:

assessing network conditions:

determining polling interval information based at least in part upon the assessed network conditions, said polling interval information operative to indicate to the electronic device when to transmit a request indicating that one or more content indicators be transmitted by the remote computer to the electronic device, said one or more content indicators comprising information at least in part relating to one or more media items;

sending the determined polling interval information from the remote computer to the electronic device;

periodically receiving requests for one or more content indicators and/or one or more media items at the remote computer from the electronic device via a network, wherein a length of time between requests being based at least in part upon the determined polling interval information; and

transmitting media items to the electronic device for display in response to one or more requests.

44. The method of claim **43**, wherein the one or more media items comprise news information.

45. The method of claim **43**, wherein the one or more media items comprise sports information.

46. A computer readable storage medium storing instructions that when executed performs the method comprising:

assessing network conditions;

determining polling interval information based at least in part upon the assessed network conditions, the polling interval information indicating to a client computer when to request that one or more content indicators be transmitted by a remote computer to the client computer, said one or more content indicators comprising information at least in part relating to one or more media items;

sending the polling interval information relating to the determined periodic polling interval from the remote computer to the client computer;

periodically receiving requests for one or more content indicators and/or media items from the client computer, the length of time between request being based at least in part upon the polling interval information; and

transmitting one or more media items to the client computer in response to one or more requests.

47. The device of claim **46**, wherein the one or more media items comprise sports information.

48. The device of claim **46**, wherein the one or more media items comprise sports information.

49. A computer readable storage media storing instructions that when executed perform the method comprising:

receiving a polling interval information from a remote computer that indicates to a client electronic device when to periodically request one or more content indictors and/or one or more content data item be transmitted by the remote computer to the client electronic device;

periodically requesting from the remote computer, based at least in part upon the received polling interval information, that the remote computer transmit at least an additional content indicator and/or content data item to the client electronic device;

receiving the additional content indicator and/or content data item and a uniform resource locator (URL) indicating the address or location of other information related to the content data item; and

displaying the received content indicator and/or content data items and the URL related thereto.

50. The computer readable media of claim **49**, wherein the content data items comprise sports information.

51. The computer readable media of claim **49** further comprising:

receiving a signal indicating a selection of URL; and

requesting additional content data from a remote computer in response to receiving the signal.

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