respect to those figures is for explanatory purposes only and is not intended in any way to limit the scope of the invention. For example, while a cable television system is shown and described, the present invention may also be used in a satellite, over-the-air broadcast, subscription television system or other television system known in the art. Also, while the present invention is described for use in the provision of sports and weather text channels, those skilled in the art will appreciate that these text channels are only examples of the limitless types of text channels which may be provided to a viewer in accordance with the invention. Accordingly, any questions regarding the scope of the invention should be resolved by referring to the appended claims.

Figure 1 illustrates an EPG and text information service in accordance with the invention. As shown, the local cable television company's billing vendor 10 communicates via a billing link to an RS-232 port of a system manager 12 located at the cable head end. Billing vendor 10 includes a subscriber database and generates a monthly bill for the subscribers in the system based on the level of service and any pay-per-view purchases. Billing vendor 10 may comprise a personal computer or other data processing device known in the art. Billing vendor 10 informs system manager 12 as to which cable television subscribers are authorized to receive the available cable television channels. System manager 12 is also a personal computer or other processing device which receives viewer authorization transactions from billing vendor 10 and generates transactions for delivery to the distribution apparatus or the subscribers. Such transactions include text channel definition transactions which instruct the subscriber's tuner which group of channels it is entitled to receive, which frequency to tune for a particular text data channel, whether to mute the audio for that text channel, the pagination delay between pages, and the like.

System manager 12 also communicates via a head end link to an RS-232 port of a head end controller (HEC) 14 which controls the transmission of television programming to the subscribers. As will be described in more detail with respect to Figure 2, HEC 14 communicates via a control link to an RS-232 port of an information services processor (or data controller) 16 which manages the flow of EPG and text data in accordance with the invention. As shown by dotted line in Figure 1, information services processor (ISP) 16 is preferably located at the cable head end with system manager 12, HEC 14 and the signal scramblers. However, those skilled in the art will appreciate that all of the head end equipment need not be located at one site.

As shown in Figure 1, EPG data is supplied from one or more local or remote EPG suppliers 18 via a satellite link, modem link or other communication link to an RS-232 port of ISP 16. Similarly, text data from one or more text channel suppliers 20 is provided via a satellite link, modem link, or other communication link to another RS-232 port of ISP 16. In preferred embodiments, ISP 16 has a plurality of identical RS-232 ports for accepting data from a plurality of EPG suppliers 18 and text channel suppliers 20. Also, as shown, one of these RS-232 ports is preferably used for a control link to HEC 14 as well. As will be described in more detail below with respect to Figure 2, ISP 16 manages EPG and text source databases in response to control signals from HEC 14 in order to provide EPG data and/or text channel data to selected viewers.

As shown in Figure 1, HEC 14 also provides control data directly to the viewer's television tuner via an RS-485 output port. Preferably, the control data from HEC 14 includes the aforementioned text channel definition transactions as well as EPG definition transactions for instructing the tuner at which frequency to tune for the EPG data and the like. The control data may also include software for downloading into the viewer's tuner for reprogramming the viewer's tuner as necessary. In a

preferred embodiment, the control data from HEC 14 is inserted into the vertical blanking interval of the selected cable television signal by daisy-chained scramblers 22, 24 and 26 using known in-band techniques, although the control data from HEC 14 may also be modulated on an out-of-band carrier or an in-band audio carrier for transmission as described in related U.S. Patent Application Serial No. 07/983,766, filed December 1, 1992 and assigned to the present assignee, the contents of which are hereby incorporated by reference. Preferably, scramblers 22-26 are daisy-chained so that the scramblers may be addressed individually or globally. Similarly, EPG data and text channel data from ISP 16 are provided to the viewer's television tuner via an RS-485 output port of ISP 16. EPG data and text channel data are similarly inserted into the vertical blanking intervals of selected cable television signals by EPG scrambler 28 and text channel scramblers 30 and 32, respectively, using, for example, the in-band vertical blanking interval insertion techniques described in the aforementioned patent application serial no. 07/983,766 filed December 1, 1992. Of course, if desired, scramblers 22-32 may insert the control data, EPG data, and text channel data into other portions of the video signals such as the horizontal blanking intervals or else replace the video entirely. Those skilled in the art will also appreciate that a number of scramblers may be provided in accordance with the volume of data received from HEC 14 and ISP 16. Typically, however, the number of scramblers depends on the number of premium channels for which scrambling is used.

Preferably, EPG scrambler 28 and text channel scramblers 30 and 32 are identical to control data scramblers 22-26 and are similarly daisy-chained for individual or global addressing. As shown in Figure 1, scramblers 28-32 receive a single serial data channel which carries the combined EPG data and text data and display control transactions (to be described in more detail with respect to Figure 2) for all data streams in use. Each scrambler is

also equipped with memory for storing a predetermined amount of this data in an internal memory so as to minimize the number of database accesses. Preferably, scramblers 28-32 have internal memory sufficient to store a significant number of transactions. For example, scrambler 30 may have enough internal memory to score a day's sports scores for display on a sports text channel. The data received and stored in scramblers 28-32 is preferably in RS-485 format, and the protocol in a preferred embodiment is SDLC. All data transactions to scramblers 28-32 are sent on individual data streams specifying the target scrambler (station addresses in SDLC protocol), and the control data is sent on a global data stream which is filtered in the scramblers 28-32 based on the address of the scrambler so that the data streams can be configured by a transaction from ISP 16. The individual EPG data and text data streams are preferably generic in the scramblers so that they can be allocated as desired. Preferably, scramblers 28-32 have baud rates of at least 9600.

Preferably, the subscriber's tuner is a set top tuner 34 which comprises an EPG memory 36 for storing the EPG data from ISP 16. For example, EPG memory 36 may store one or two weeks of EPG data for selective access by the viewer via a menu of the set top tuner 34. This menu preferably allows the viewer to scroll through the EPG data stored in EPG memory 36 using the key pads of the viewer's television remote control device. Set top tuner 34 may also comprise a nonvolatile template memory 38 for storing the template in which the EPG data is to be inserted for display to the viewer on the viewer's television 40. In this manner, a video signal containing the template display data need not be continuously retransmitted to the set top tuner 34, thereby saving more bandwidth. Instead, the EPG data only needs to be updated every 30 minutes or when there is a program change. Of course, different set top tuners 34 may have a varied amounts of memory and processing capabilities for such

purposes in accordance with the acceptable memory costs during manufacture of the set top tuner 34.

As shown in Figure 1, set top tuner 34 may also comprise a text data memory 42 for storing a page of text data for presentation to the screen. Thus, while one page of text data is displayed to the subscriber, the next page of text data may be loaded into the text data memory 42.

As noted above, ISP 16 of the invention manages the flow of text data and EPG data from the data service provider to the viewer's set top tuner 34. ISP 16 manages this data by accepting data only from one or more authorized text data and/or EPG data sources, processing the text data and EPG data in its internal database manager, and formatting the processed data into a common data transaction format for output to the scramblers for transmission to the set top tuner 34. Provision of EPG data and text data to the subscribers is controlled by the head end controller 14 via the control link as will be described in more detail below.

In a preferred embodiment, ISP 16 comprises an IBM PS2 model 7546 personal computer having a plurality of RS-232 serial input ports for EPG data and/or text data inputs and at least one RS-485 HDLC serial link at its output of the type used by HEC 14. As shown in Figure 1, the control link will be a single RS-232 serial port. The hardware and software components of ISP 16 are then configured as illustrated in Figure 2.

As shown in Figure 2, ISP 16 preferably comprises a plurality of RS-232 ports which provide a common interface for the EPG data and text channel data asynchronously provided by the EPG supplier(s) 18 and text channel suppliers 20. The EPG data and text channel data is transmitted to ISP 16 via a satellite link (when the interface is operated in simplex mode) or by modem (when the interface is operated in half duplex mode). Preferably, the data is transmitted at a baud rate of at least 1200.

ISP 16 functions as a "gate keeper" which only allows access by authorized data sources. Accordingly, when

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