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(54) **APPARATUS AND METHOD FOR PROVIDING, RETRIEVING, AND USING DATA GUIDE INFORMATION SUPPLIED IN A DIGITAL VESTIGIAL SIDEBAND SIGNAL**

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USPC 725/37–40, 49, 51, 56, 109, 110, 112, 725/136
See application file for complete search history.

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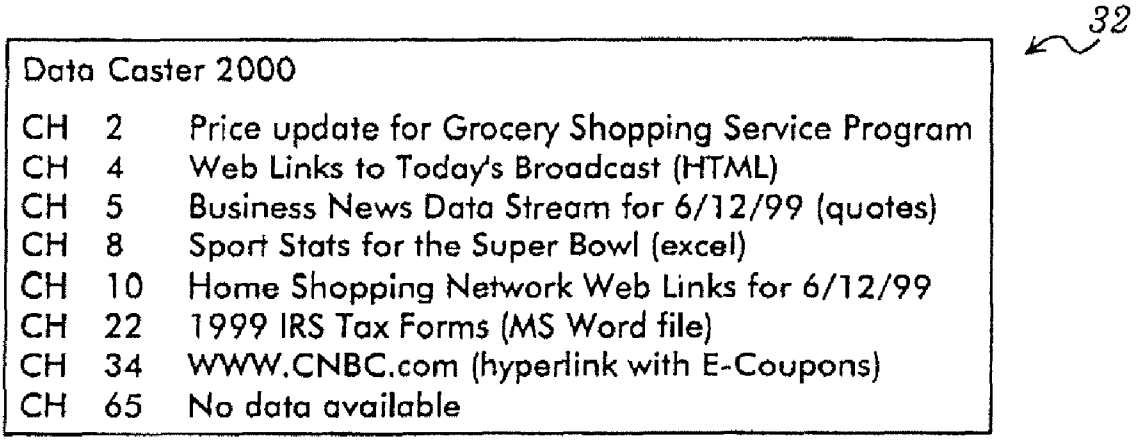
(57) **ABSTRACT**

A device for provisioning, retrieving, and using data guide information transmitted in a digital broadcast signal is disclosed. A receiver receives the digital broadcast signal which includes digital television programming packets multiplexed with data packets and thereafter routes the received signal to a demodulator. The demodulator provides a demodulated signal to a detector which identifies data packets contained therein. A processor then determines the types of data in the data packets, as well as the respective channels on which the identified types of data are transmitted. The processor prepares a menu for a display screen enabling a user to select the channel of interest, and enables the user to be connected accordingly.

6 Claims, 2 Drawing Sheets



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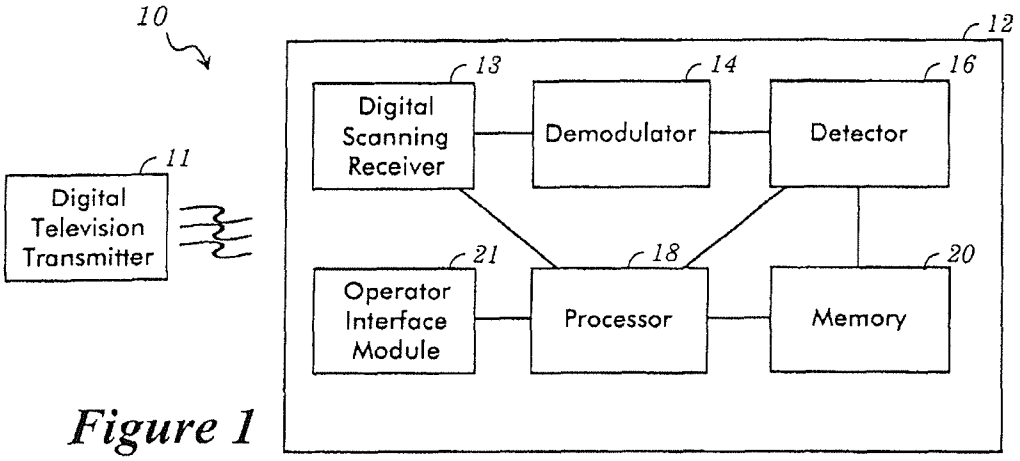

Figure 1

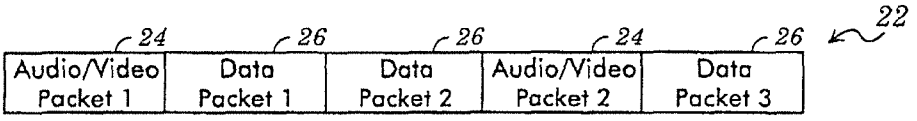

Figure 2

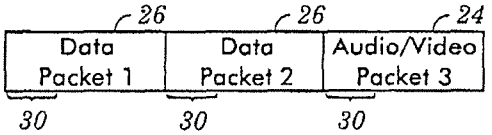

Figure 3

32

Data Caster 2000	
CH 2	Price update for Grocery Shopping Service Program
CH 4	Web Links to Today's Broadcast (HTML)
CH 5	Business News Data Stream for 6/12/99 (quotes)
CH 8	Sport Stats for the Super Bowl (excel)
CH 10	Home Shopping Network Web Links for 6/12/99
CH 22	1999 IRS Tax Forms (MS Word file)
CH 34	WWW.CNBC.com (hyperlink with E-Coupons)
CH 65	No data available

Figure 4

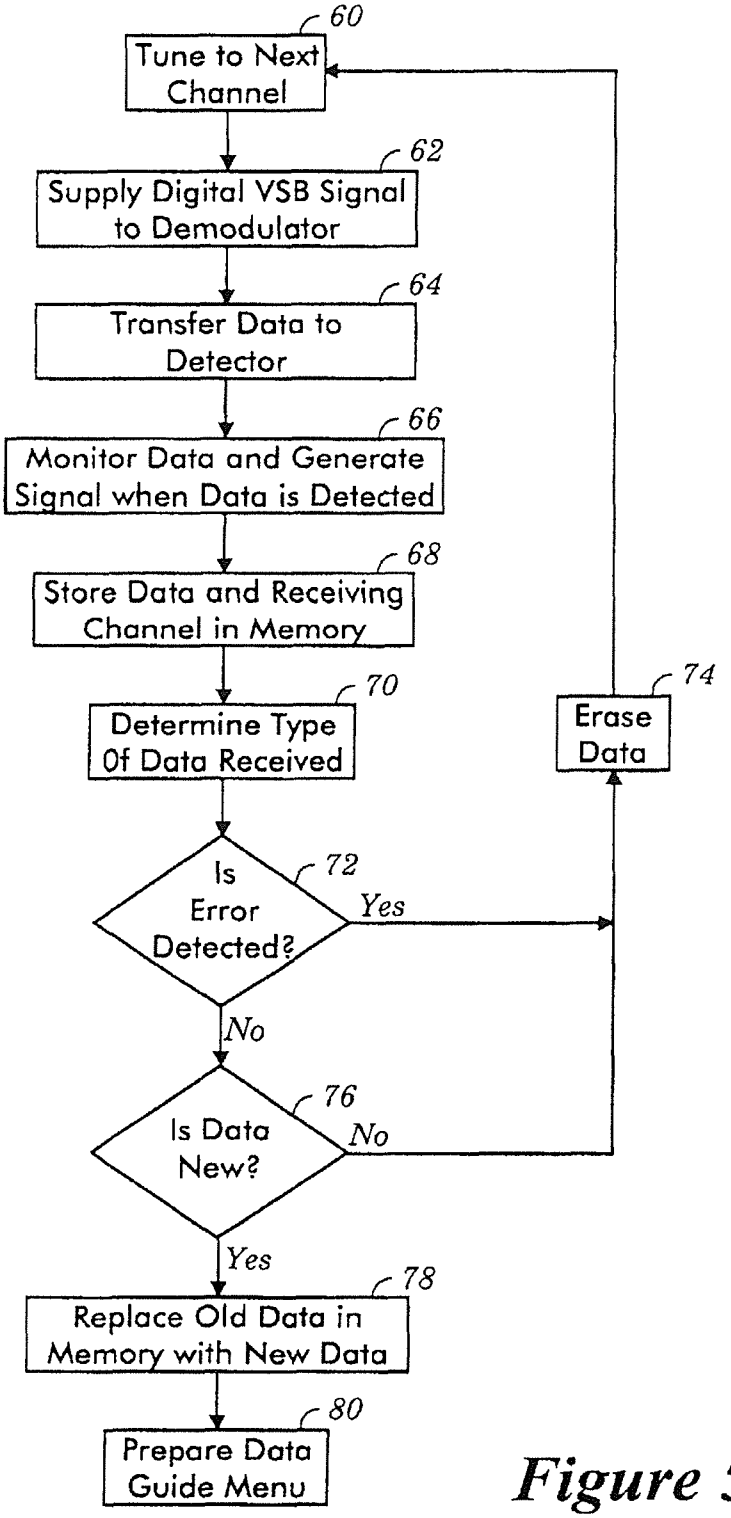
60
Tune to Next Channel
62
Supply Digital VSB Signal to Demodulator
64
Transfer Data to Detector
66
Monitor Data and Generate Signal when Data is Detected
68
Store Data and Receiving Channel in Memory
70
Determine Type Of Data Received
72
Is Error Detected?
Yes
No
74
Erase Data
76
Is Data New?
No
Yes
78
Replace Old Data in Memory with New Data
80
Prepare Data Guide Menu

Figure 5

APPARATUS AND METHOD FOR PROVIDING, RETRIEVING, AND USING DATA GUIDE INFORMATION SUPPLIED IN A DIGITAL VESTIGIAL SIDEBAND SIGNAL

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue; a claim printed with strikethrough indicates that the claim was canceled, disclaimed, or held invalid by a prior post-patent action or proceeding.

CROSS-REFERENCE TO RELATED APPLICATIONS

The present application is a continuation of co-pending reissue application Ser. No. 13/223,513, filed Sep. 1, 2011, which is a continuation of reissue application Ser. No. 11/526,292, filed Sep. 22, 2006,—now issued as U.S. Pat. No. Re. 42,838 on Oct. 11, 2011—which is a continuation of application Ser. No. 11/187,031, filed Jul. 21, 2005,—now issued as U.S. Pat. No. Re. 42,764 on Sep. 27, 2011—which is a reissue application for U.S. Pat. No. 6,598,226, which issued on Jul. 22, 2003.

The present application is related to co-pending reissue application Ser. No. 12/705,071, filed Feb. 12, 2010, which is a continuation of reissue application Ser. No. 11/187,031—now issued as U.S. Pat. No. Re. 42,764 on Sep. 27, 2001—which is a reissue application for U.S. Pat. No. 6,598,226, which issued on Jul. 22, 2003.

The present application is related to co-pending reissue application Ser. No. 12/705,017, filed Feb. 12, 2010, which is a continuation of reissue application Ser. No. 11/187,031, filed Jul. 21, 2005—now issued as U.S. Pat. No. Re. 42,764 on Sep. 27, 2001—which is a reissue application for U.S. Pat. No. 6,598,226, which issued on Jul. 22, 2003.

The present application is related to co-pending reissue application Ser. No. 13/719,644, filed Dec. 19, 2012, which is a continuation of reissue application Ser. No. 12/705,071, filed Feb. 12, 2010—now issued as U.S. Pat. No. Re. 44,514 on October 1, 201 —which is a continuation of reissue application Ser. No. 11/187,031—now issued as U.S. Pat. No. Re. 42,764 on Sep. 27, 2001—which is a reissue application for U.S. Pat. No. 6,598,226, which issued on Jul. 22, 2003.

TECHNICAL FIELD OF THE INVENTION

The present invention relates to an apparatus that enables a user to receive and utilize data which is broadcast via a digital vestigial sideband (VSB) broadcast signal.

BACKGROUND OF THE INVENTION AND PRIOR ART

The ATSC digital broadcast standard for digital television allows for the transmission of 19 Mbits/sec in an RF channel having a 6 MHZ bandwidth. Although this allocated bandwidth is adequate for a single analog NTSC television channel, the ATSC bit rate permits the same channel to support the concurrent transmission of several standard definition television (SDTV) programs (i.e., programs displayable with a resolution comparable to that of the NTSC analog program). Alternatively, the allocated bandwidth at the ATSC bit rate permits a channel to support the transmission of a single high definition television (HDTV) program at a time. Moreover, the ATSC digital broadcast standard permits data to be transmitted in the channel along with the digital program being transmitted. Therefore, data packets may be multiplexed in the channel with video and audio packets of one or more of the programs.

While channel guides in the form of a table displayed on a dedicated channel and providing channels, titles, and show times, currently exist for analog television programming, none exist which provide a similar guide or key for digital television as to the type of data transmitted on various channels. Moreover, no channel or data guides exists which enable various entries in the guide to be selected by a user for access to further information.

The present invention contemplates using the data transmission feature of the ATSC standard in order to transmit data guide information in the data packets. The data guide may include identifying information as to the channels under which data is transmitted with the digital VSB broadcast signals, as well as the type of data provided on each channel. The invention further contemplates displaying the transmitted data guide in a format enabling a user to select and access the data on any of the displayed channels.

SUMMARY OF THE INVENTION

In accordance with one aspect of the present invention, a device identifies types of data transmitted on multiple channels of a digital broadcast signal, displays the identified types of data transmitted on each channel, and enables a user to access the data transmitted on a particular channel. The device comprises a scanning receiver, a demodulator, a detector, a memory, a processor, and an operator interface module. The scanning receiver is adapted to tune to the digital broadcast signal on selected channels, and the digital broadcast signal includes at least one digital television programming packet and at least one data packet. The demodulator is coupled to the receiver and is adapted to demodulate the digital broadcast signal. The detector is coupled to the demodulator and is adapted to detect the at least one data packet. The memory is coupled to the detector, and the memory is adapted to store data guide software code for identifying the type of data contained in the at least one data packet and the channel on which the identified type of data is available. The data guide software is further adapted to enable the data on any channel selected by an operator to be accessed. The processor is coupled to the memory and is adapted to execute the data guide software code. The operator interface module is coupled to the processor, and is adapted to display the identified types of data and the channels on which the identified types of data are available. The operator interface module is further adapted to enable any displayed channel to be selected.

According to another aspect of the present invention, a method of providing a data guide summarizing types of data transmitted in a digital broadcast signal and the channels corresponding to the types of data is provided. The method includes the steps of receiving a digital broadcast signal containing digital programming packets and data packets, demodulating the digital broadcast signal, detecting the data packets, storing the data guide based on information contained in the data packets, and displaying the data guide.

According to another aspect of the present invention, a data casting system is provided which comprises a receiver, a detector coupled to the receiver, and a operator interface module coupled to the detector. The receiver is adapted to receive a digital broadcast signal containing at least one digital television programming packet and at least one data packet. The detector is adapted to detect the at least one data

packet and is further adapted to detect types of data transmitted within the at least one data packet and channels on which the detected types of data are available. The screen is adapted to display the detected types of data and the channels on which the detected types of data are available.

According to a further aspect of the present invention, a computer readable storage medium of a digital program receiver having a data guide stored thereon is provided, wherein the data guide contains a list of the types of data receivable by the digital program receiver and the corresponding RF channels in which the data is present.

BRIEF DESCRIPTION OF THE DRAWINGS

The features and advantages of the present invention will become more apparent from a detailed consideration of the invention taken in conjunction with the drawings in which:

FIG. **1** illustrates a data guide system according to one embodiment of the present invention;

FIG. **2** illustrates a sample portion of a digital vestigial sideband (VSB) signal having a set of digital programming packets multiplexed with a set of data packets;

FIG. **3** illustrates data packets and digital television programming packets having an identification header;

FIG. **4** illustrates a sample data guide display screen according to the present invention; and

FIG. **5** illustrates a flow chart of a method for retrieving a digital VSB broadcast signal, extracting at least one data packet from the digital VSB broadcast signal, determining the type of data received, and generating a data guide according to the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, wherein like reference numerals designate identical or corresponding parts throughout the several figures, and more particularly to FIG. **1**, a data guide system according to the present invention is generally depicted by reference numeral **10**. The data guide system **10** includes a digital vestigial sideband (VSB) broadcast signal transmitter **11** (such as a digital television provider), and a datacasting receiver **12**.

The datacasting receiver **12** includes a digital scanning receiver **13**, a demodulator **14**, a detector **16**, a processor **18**, a memory **20**, and an operator interface module **21**. The digital scanning receiver **13** is a tunable receiver which is able to scan through and be tuned to the RF channels within the bands allocated to the digital scanning receiver **13**, including, for example, any of the RF channels in any of the bands allocated for digital television viewing. In operation, the digital scanning receiver **13** receives a digital VSB broadcast signal which is defined to include any of a 2 digital VSB, a 4 digital VSB, an 8 digital VSB, an 8T digital VSB or a 16 digital VSB signal, transmitted via one of the RF channels. As will be discussed in further detail herein, the digital scanning receiver **13** may be an existing receiver of a device such as a digital television or personal computer, or may be a separate receiver dedicated to the data guide system **10**.

Referring to FIG. **2**, a sample portion of a digital VSB broadcast signal **22** to which the digital scanning receiver **13** may be tuned is depicted. As shown therein, the digital VSB broadcast signal **22** includes a set of digital television (DTV) programming packets **24** having audio and video components multiplexed with a set of data packets **26**. The DTV programming packets **24** and data packets **26** are both formatted in conformance with the ATSC standard and thus have symbols and symbol rates as specified therein.

The digital scanning receiver **13** scans through all available channels, and at each channel tunes to the corresponding digital VSB broadcast signal **22**. The demodulator **14** demodulates the digital VSB broadcast signal **22** from the digital scanning receiver **13**.

In accordance with the ATSC standard and as shown in FIG. **3**, each of the data packets **26** and each of the digital television programming packets **24** are identifiable via a predefined sequence of identification bits [not shown in detail] residing at a location allocated as a header **30**.

Preferably, the detector **16** is implemented with a software application that is stored in the memory **20**. The software application preferably has search engine capabilities, such that in order to enable identification of the DTV programming packets **24** and the data packets **26**, the software application compares the header **30** of each DTV programming packet **24** and each incoming data packet **26** to pre-defined bit sequences used to identify the relevant packets. The detector **16** then passes the identified DTV programming packets **24** to appropriate video and/or audio processors (not shown). When the detector **16** recognizes that a relevant data packet **26** is received on the particular channel to which the digital scanning receiving **13** is currently tuned, the detector **16** transmits an appropriate signal to the processor **18**.

The signal from the detector **16** to the processor **18** indicates to the processor **18** that the received data and channel on which it has been received should be stored in the memory **20**, and that the processor **18** must interpret the data packet **26** to determine the particular type of data received. This interpretation may be accomplished similar to the manner in which the presence of the data packet **26** is determined. More specifically, the header **30** or the data portions of a data packet may include a predetermined bit stream which the processor **18** may compare to a database of bit streams stored in memory **20**. For example, the bit streams may indicate that the data following the header comprises: price update information for a grocery shopping service program, addresses of relevant websites related to the digital television programming packet **24**, business news, sports statistics, government tax forms, etc. If website addresses are included, they may allow an HTML link program, such as a web browser, to seek out a website that is associated with the DTV programming packet **24**.

Alternatively, once the processor **18** receives the signal from the detector indicating that a data packet **26** has been received, the processor **18** may utilize a template stored in the memory **20** which automatically indicates the type of data received based on the channel to which the receiver **13** is tuned at the time of reception. In other words, it may be known that a particular channel always and only transmits business data, while another channel always and only transmits sports statistics. As a result, once the detector **16** determines that data is received, the processor **18** can reference the template to determine which type of data corresponds to the tuned channel.

Upon identifying the specific type of data received, the data packets **26** are checked for errors. The processor **18** uses an error checking program to examine the data packets **26** for errors, such as those typically caused by discontinuities from storms or multi-path interferences. If an error is detected, data is erased and the system tunes to the next channel to retrieve data. The data from the current channel can be retrieved the next time it is transmitted.

If no error is detected, the processor **18** determines if the data type corresponding to the data transmitted in the current

channel is new or updated since the last time that data type was received on that particular channel. Such checking can be performed through a comparison-of the received data packets **26** to the previous data type stored in the memory **20**. If the received data type of the data contained in the current channel is not new, it is erased. If this data type is new, the data type is stored in the memory **20**, replacing the previously stored data type.

Also, if the data type is determined to be new, the processor **18** executes data guide software to generate or update a menu **32** containing that data type. The operator interface module **21** can display the menu **32** at any time the user selects. The operator interface module **21** can be in the form of, for example, a computer monitor, a television screen, a liquid crystal display screen of a cellular telephone or personal digital assistant, or the like. The menu **32** could be displayed on a designated channel to which the user could tune when desired. Using a peripheral input device (not shown) associated with the operator interface module **21**, such as a mouse, trackball, keyboard, remote control, or touch screen, a user can scroll through the displayed menu **32** and select the channel of interest. Once a particular channel is selected the processor **18** then directly connects the user to the desired channel, or if a website is selected, to the desired website. A representative menu **32** generated by the processor **18** is depicted in FIG. **4**.

Referring now to FIG. **5**, the method by which the data guide system **10** may function is depicted. As shown, the method begins at a block **60** where the digital scanning receiver **13** tunes to a channel containing the digital VSB broadcast signal **22**. Once the signal **22** is tuned, control proceeds to a block **62** where the received VSB broadcast signal **22** is provided to the demodulator **14**. The demodulator **14** demodulates the VSB broadcast signal **22**. The digital television programming packets **24** and the data packets **26** are then transferred to the detector **16** at a block **64**.

At a block **66**, the detector **16** identifies the data packets **26**. As will be understood by one having ordinary skill in the art, the data packets **26** may be transmitted by the digital television transmitter **11** at selected times during the day and may be transmitted repeatedly at convenient intervals. If the digital receiver **12** contains a single tuner in the form of the digital scanning receiver **13**, the data monitoring step **66** may be performed during non-prime time hours so as not interfere with heavier prime time usage of the digital broadcast. Alternatively, the datacasting receiver **12** could include one tuner for normal usage and reception of the digital television broadcast, and a separate scanning tuner dedicated to scanning through all channels in search of data being received. Accordingly, the tuning step **60** and monitoring step **66** need not be limited to any particular period of usage.

As described earlier, the monitoring process preferably involves launching a search engine application that causes the detector **16** to search for a predefined sequence of identification bits located in the header **30** of each DTV programming packet **24** and each data packet **26** wherein the predefined sequence of bits indicate a data packet **26**.

If it is determined that a data packet **26** has been detected, the data and the channel on which this data packet **26** was received are stored in the memory **20** as indicated by a block **68**, and the detector **16** generates a signal which causes control to pass to a block **70** where the processor **18** determines the type of data detected. As indicated above this can be performed in numerous ways including performing a comparison of bit streams to a database of known bit streams, or using a template to determine the type of data always transmitted on the channel to which the receiver **13** is tuned.

Once the type of data is determined, the processor **18** performs an error checking routine, as indicated at a block **72**, to determine whether any of the received data has been tainted by, for example, discontinuities caused by storms or multipath interference. If an error is detected, the retrieved data is erased as indicated by a block **74** and control returns to the block **60** to enable the next channel to be checked. As described hereinbefore, since the data is transmitted periodically, error-free data packets **26** can be retrieved from a later transmission. In alternative embodiments, the error checking step can be performed at a different time, including before the storing step **68**.

If no error is detected at the block **72**, control proceeds to a block **76** where the processor **18** determines if the data type is new or updated since the last time the monitoring step **66** was performed. The processor **18** compares the data type determined at the block **70** to the data type contained in the menu **32** stored in the memory **20** corresponding to the tuned channel. If the data type is determined not to be new, the data type is erased at the block **74** and control returns to the block **60** wherein the next channel is checked.

If the data type is determined to be new, control passes to a block **78** wherein the received data type replaces the old data contained in the menu **32** stored in the memory **20**. The channel to which the receiver **13** is tuned at that time is also determined and stored in the memory **20**. The channel on which the current data is received may be utilized as an address into the memory **20** corresponding to the relevant line in the menu **32**.

At any time selected by the user, the processor **18** causes the menu **32** to be displayed by the operator interface module **21**, such as on a channel dedicated to providing a data guide. When tuned to the dedicated data guide channel, the user can scroll through the menu **32** and select any one of the displayed channels. The processor **18** responds to the received user input by connecting to the selected channel, or if web links are included in the selected channel, to the selected website assuming that the datacasting receiver **12** is web enabled.

In an alternative embodiment, data guide information as contained in the menu **32** could be transmitted on a single channel. As a result, the step of scanning all channels need not be performed, but rather the single channel on which the data is transmitted could be periodically checked and the memory **20** and menu **32** could be updated when new data is received.

Although it is suggested that the detector **16** be implemented using a software application having search engine capabilities, it may instead be implemented using hardware or firmware. For example, the detector **16** may be implemented using an ASIC device configured to behave like a gate array such that the device, when presented with the proper predefine data sequence, allows the data to pass therethrough.

Certain modifications of the present invention have been discussed above. Other modifications will occur to those practicing in the art of the present invention. For example, the present invention has been described above at least in part in relation to providing a data guide based upon data transmitted in a digital vestigial sideband (VSB) broadcast signal. However, it should be noted that the present invention also is applicable to providing a data guide based upon data transmitted in other types of digital broadcast signals such as COFDM signals, QAM signals, QPSK signals, and/or the like.

Accordingly, the description of the present invention is to be construed as illustrative only and is for the purpose of teaching those skilled in the art the best mode of carrying out the invention. The details may be varied substantially without

departing from the spirit of the invention, and the exclusive use of all modifications which are within the scope of the appended claims is reserved.

What is claimed is:

[1. A device for identifying types of data transmitted on multiple channels of a digital broadcast signal, displaying the identified types of data transmitted on each channel, and enabling a user to access the data transmitted on a particular channel, the device comprising:

a scanning receiver adapted to tune to the digital broadcast signal on selected channels, the digital broadcast signal including at least one digital television programming packet and at least one data packet;

a demodulator coupled to the receiver and adapted to demodulate the digital broadcast signal;

a detector coupled to the demodulator and adapted to detect the at least one data packet;

a memory coupled to the detector, the memory being adapted to store data guide software code for identifying the type of data contained in the at least one data packet and the channel on which the identified type of data is available, the data guide software further being adapted to enable the data on any channel selected by an operator to be accessed;

a processor coupled to the memory and adapted to execute the data guide software code; and,

an operator interface module coupled to the processor, the operator interface module being adapted to display the identified types of data and the channels on which the identified types of data are available, the operator interface module further being adapted to enable any displayed channel to be selected.]

[2. The device of claim 1 wherein the processor comprises a central processing unit of a personal computer, and the operator interface module comprises a video monitor and an input device.]

[3. The device of claim 1 wherein the operator interface module comprises a display of a personal digital assistant.]

[4. The device of claim 1 wherein the operator interface module comprises a display of a telephone.]

[5. The device of claim 4 wherein the telephone comprises a cellular telephone.]

[6. The device of claim 1 wherein the processor comprises a processing unit of a television, and the operator interface module comprises a display screen of the television.]

[7. The device of claim 1 wherein the at least one data packet includes at least one link to a website, the operator interface module enables the at least one website to be selected, and wherein the processor enables the at least one website to be accessed.]

[8. The device of claim 1 wherein the data guide software code generates a data guide in menu format for display on the operator interface module.]

[9. The device of claim 8 wherein the operator interface module enables the operator to scroll through the menu before selecting a particular channel.]

[10. A method of providing a data guide summarizing types of data transmitted in a digital broadcast signal and the channels corresponding to the types of data comprising the steps of:

receiving the digital broadcast signal containing digital programming packets and data packets;

demodulating the digital broadcast signal;

detecting the data packets;

storing the data guide based on information contained in the data packets; and,

displaying the data guide.]

[11. The method of claim 10 wherein the digital broadcast signal is transmitted in multiple channels, and wherein the receiving step is performed by scanning through the multiple channels.]

[12. The method of claim 10 further including the step of selecting one of the identified channels and gaining access to data transmitted on the selected channel.]

[13. The method of 10 performed by a central processing unit of a personal computer, wherein the displaying step is performed using a video monitor connected to the personal computer.]

[14. The method of claim 10 performed by a processor of a television, wherein the displaying step is performed using a video screen of the television.]

[15. The method of claim 10 wherein the displaying of the data guide comprises displaying the data guide on a display of a personal digital assistant.]

[16. The method of claim 10 wherein the displaying of the data guide comprises displaying the data guide on a display of a telephone.]

[17. The method of claim 16 wherein the telephone comprises a cellular telephone.]

[18. A data casting system comprising:

a receiver adapted to receive a digital broadcast signal containing at least one digital television programming packet and at least one data packet;

a detector coupled to the receiver and adapted to detect the at least one data packet, the detector further adapted to detect types of data transmitted within the at least one data packet and channels on which the detected types of data are available; and,

an operator interface module coupled to the detector and adapted to display the detected types of data and the channels on which the detected types of data are available.]

[19. The data casting system of claim 18 further including a processor coupled to the detector, the processor being adapted to execute data guide software, the data guide software generating a menu based on the types of data and channels detected by the detector, the menu being displayed on the operator interface module.]

[20. The data casting system of claim 19 wherein the operator interface module allows any of the displayed channels to be selected, and the data guide software and processor connect the operator interface module to the selected channel.]

[21. The data casting system of claim 20 wherein the at least one channel includes at least one link to a website.]

[22. A computer readable storage medium of a digital program receiver having a data guide stored thereon, wherein the data guide contains a list of the types of data receivable by the digital program receiver and the corresponding RF channels in which the data is present.]

[23. The computer readable storage medium of claim 22 wherein the data guide is a menu.]

[24. The computer readable storage medium of claim 23 wherein the menu contains selectable items.]

25. A method for controlling an error while processing data providing full information on a data broadcast in a digital receiver, the method comprising:

receiving the data providing full information on the data broadcast, wherein the data is transmitted repeatedly at specific intervals from a transmitter, the data comprising a header and a body, and further the header comprises information which is used to identify application types;

monitoring the data for the application types that the digital receiver can decode;

detecting an error located in a portion of the data providing full information on the data broadcast; and

discarding the portion having the detected error.

26. The method of claim 25, wherein the application is a functional implementation realized as software.

27. The method of claim 25, wherein the method further comprises a step of processing a next portion if there is the next portion.

28. The method of claim 25, wherein the method further comprises a step of processing the data having a new version.

29. The method of claim 28, wherein the step of processing replaces data having an old version in a memory with the data having the new version.

30. The method of claim 25, wherein the digital receiver corresponds to a digital television, a personal computer or a separate receiver.

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