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(71) Applicant: **Pace Micro Technology PLC**
Shipley, West Yorkshire BD18 3LF (GB)

(72) Inventors:
- **Gee, Alan**
  Shipley BD18 3LF (GB)
- **Rogers, Tim**
  Shipley BD18 3LF (GB)

(74) Representative: **Wood, Graham**
Bailey Walsh & Co,
5 York Place
Leeds LS1 2SD (GB)

(54) Broadcast data receiver

(57) A broadcast data receiver (BDR) and a method of using the BDR (2) to monitor RF are provided. The BDR (2) receives and decodes data in the form of video, audio and/or auxiliary sent from a broadcaster at a remote location via cable, satellite and/or terrestrial communication means. The BDR (2) has two or more tuners for receiving data at particular radio frequencies relating to one or more channels. When the BDR is in a standby mode, the BDR (2) monitors a plurality of RF channels using the tuners, thereby providing an indication of the status of the RF channels which can then be communicated to a remotely located network operating system.

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Description

[0001] This invention relates to a broadcast data receiver, and particularly but not exclusively to a broadcast data receiver forming part of a television system.

[0002] Television systems typically include a television set connected to or integrally formed with a broadcast data receiver (BDR) (or set top box). The BDR receives digital data from a broadcaster at a remote location via cable, satellite and/or terrestrial means. The BDR decodes the data to provide video data for display on said television set, audio for listening via speakers and/or auxiliary data. BDRs are provided with one or two tuners to receive the digital signal from the satellite, cable and/or terrestrial communication means and isolate a channel at a particular radio frequency (RF). Conventionally, if two tuners are being used by the BDR, the BDR can only report data relating to the two RF channels to which they are tuned (i.e. DOCSIS (Data over cable service interface specification) and DVB (digital video broadcasting)). The two channels are typically selected from a total of about 100 channels, thereby providing only limited RF statistical data.

[0003] In order to improve the performance of the BDR, the network providers (hereinafter referred to as Multiple Service Operators (MSO)) operate to try to detect network problems before detection by their BDR customers/users. This improves the customer perception of the MSO and reduces truck rolls. A conventional method of detecting network problems is to monitor RF statistics from network nodes. The RF statistics provide information relating to the performance of the BDR at the user's premises, the traffic levels on the broadcast and return path networks, node failure or reconfiguration and/or any alerts relating to unusual activity on the network. The data on the RF status is collected by the MSO on a regular basis to determine whether the BDR is operational or not. A problem with the conventional method of monitoring the RF spectrum is that problems are only detected once they have occurred and the BDR is inoperable. Thus, although the MSO is informed that the BDR is inoperable, the customer is also likely to realise that there is a problem as well. This is undesirable and decreases the customer perception of the network provider.

[0004] It is therefore an object of the present invention to provide a broadcast data receiver and method of use thereof for allowing the MSO to be able to monitor and detect problems with the network and/or BDR before the customer does.

[0005] According to a first aspect of the present invention there is provided a broadcast data receiver (BDR), said BDR receiving and decoding data in the form of video, audio and/or auxiliary data sent from a broadcaster at a remote location via cable, satellite and/or terrestrial means, said BDR having two or more tuners for receiving data at particular radio frequencies relating to one or more channels, characterised in that when the BDR is in a standby mode the BDR monitors a plurality of RF channels using said tuners, thereby providing an indication of the status of the RF channels.

[0006] Preferably the tuners monitor the RF of channels across the RF spectrum (i.e. all the RF channels are monitored).

[0007] In this manner, the present invention allows the detection and monitoring of network issues or status affecting specific frequencies and characteristic trends that vary across the RF spectrum whilst in a standby mode (i.e., when the BDR is not in use). Any defects in the network can be attended to as soon as they are detected and thus the user is typically unaware of any RF issues that might be identified prior to them tuning into a particular channel.

[0008] Preferably the BDR stores data relating to the monitoring of said plurality of RF channels. This data is typically stored in memory in or associated with the BDR.

[0009] Preferably a network operation system (NOS) makes requests for RF channel monitoring data at predetermined time intervals. The BDR sends the NOS the latest RF status data stored, thereby allowing the NOS to detect any network issues arising before the BDR is next operated by the user. The NOS is typically located remotely from the BDR.

[0010] In one embodiment when the BDR is moved from a standby mode to an operational mode, the return path of the network is made operational and the RF monitoring data is transmitted to the NOS.

[0011] In one embodiment the BDR transmits RF monitoring data and statistics to the NOS at pre-determined time intervals.

[0012] In one embodiment, if the user moves the BDR from a standby mode to an operating mode before the RF monitoring is complete, the BDR suspends the RF monitoring until the BDR is moved back to the standby mode.

[0013] According to a second aspect of the present invention there is provided a method of RF monitoring using a broadcast data receiver (BDR), said BDR receiving and decoding data in the form of video, audio and/or auxiliary data sent from a broadcaster at a remote location via cable, satellite and/or terrestrial means, said BDR having two or more tuners for receiving data at particular radio frequencies relating to one or more channels, characterised in that said method includes the steps of the BDR monitoring a plurality of RF channels using said tuners when in a standby mode, thereby providing an indication of the status of the RF channels.

[0014] The advantage of the present invention is that the NOS can compile the collected RF monitoring data from the BDR and control the loading of the network traffic and/or modify or correct any unusual network issue or characteristic identified prior to the user requiring use of the network. As such, any problem with the network is corrected or reduced prior to the user using the BDR.

[0015] An embodiment of the present invention will now be described with reference to the accompanying figure wherein:

Figure 1 is a simplified view of a television system according to an embodiment of the present invention.

[0016] A broadcast data receiver (BDR) 2 is provided connected to a television set 4 as part of a television system. When the BDR (or set top box) is switched on, it operates normally.

[0017] At pre-determined time intervals, the BDR 2 receives a request for RF statistical data from an network operations centre (OC) 6. The BDR 2 has got no such data stored in memory thereof and informs the OC 6 of this via communication path 8.

[0018] At some future time the user places the BDR 2 into standby mode. With the BDR 2 in standby mode, the BDR suspends all normal operations and enters a scan mode. The RF tuners and demodulators in the BDR begin a scan across the RF spectrum. If any DVB carriers or channels are found, signal quality measurements are taken, such as Bit Rate Error (BER) measurements, signal power, signal to noise ratio (SNR) and/or the like. The measurements are stored in the BDR memory with a time stamp of when each measurement was taken.

[0019] In the event that a scan is not completed prior to a user bringing the BDR out of standby mode (i.e., prior to the user wishing to use the BDR in the conventional manner), the scan is suspended to allow the user to use the BDR. Once the user moves the BDR back to standby mode after use, the scan is continued from the last point in the scan. If the scan is then allowed to be continued without interruption, the scan continues to completion or continues in a repetitive manner until the BDR is moved from standby condition into a normal use condition.

[0020] When the OC requests the BDR for RF statistics and monitoring data, the BDR returns part of or all the data relating to signal quality for all frequencies.

[0021] This sequence of events (starting from when the BDR is switched into standby mode) can be repeated at pre-determined time intervals.

[0022] Once the BDR is switched back into scan mode in the standby position, any new RF data is updated in the memory of the BDR and typically overwrites the existing RF data.

[0023] For example, a particular network node is degrading, such that an abnormal frequency/attenuation slope is presented. In the customers premises, with marginal power levels, transport streams carried by certain RF channels would begin to exhibit errors, resulting in audio/visual degredation (i.e. audio break-up, macroblocking, picture freezing and/or similar). When the customer complains to the NOS, it may take a long time to repair as such an error is a difficult problem for a field engineer to trace. If the system of the present invention is employed, the error information is sent to the NOS and the defective network node is identified rapidly, thereby allowing corrective action to be taken prior to any customer complaints.

[0024] Conventional network monitoring systems or NOS can incorporate one or more alarms by linking together trends or changes in network data so that any errors or defects detected in the scanning are signalled to the NOS.

[0025] In addition, even when the BDR is in an operational mode, channel analysis and data gathering can take place for the current RF channel to which a tuner is tuned (i.e. the channel that is being watched in normal TV viewing). As the user surfs across RF channels, the RF data collection can be extended. This operational RF information would also represent a useful source of information to the NOS.

[0026] Thus the present invention allows the remote detection and monitoring of network issues affecting specific frequencies and characteristic trends that vary across the RF spectrum using the tuners of the BDR when in a standby mode.

Claims

1. A broadcast data receiver (BDR), said BDR (2) receiving and decoding data in the form of video, audio and/or auxiliary data sent from a broadcaster at a remote location via cable, satellite and/or terrestrial means, said BDR having two or more tuners for receiving data at particular radio frequencies relating to one or more channels, **characterised in that** when the BDR (2) is in a standby mode the BDR monitors a plurality of RF channels using said tuners, thereby providing an indication of the status of the RF channels.

2. A BDR according to claim 1 **characterised in that** the tuners monitor the RF of channels substantially across the RF spectrum.

3. A BDR according to claim 1 **characterised in that** data relating to the monitoring of the plurality of RF channels is stored in memory in or associated with the BDR (2).

4. A BDR according to any claim 3 **characterised in that** any updated RF channel monitoring data overwrites any existing stored RF monitoring data

5. A BDR according to claim 1 **characterised in that** a network operation system (NOS) (6) makes one or more requests to the BDR (2) for RF channel monitoring data at pre-determined time intervals.

6. A BDR according to claim 1 **characterised in that**

RF channel monitoring data is transmitted to a NOS (6) when the BDR (2) is moved from a standby mode to an operational mode.

7. A BDR according to claim 1 **characterised in that** the BDR (2) transmits RF channel monitoring data to a NOS (6) at pre-determined time intervals.

8. A BDR according to any preceding claim **characterised in that** the NOS (6), on receipt of the RF channel monitoring data, controls, modifies and/or adjusts one or more network characteristics.

9. A BDR according to claim 1 **characterised in that** if the BDR (2) is moved from a standby mode to an operational mode before the RF channel monitoring is complete, the BDR (2) suspends the RF channel monitoring until the BDR is moved back to the standby mode.

10. A BDR according to any preceding claim **characterised in that** the BDR (2) performs a complete scan of the RF spectrum at pre-determined time intervals.

11. A BDR according to any preceding claim **characterised in that** the BDR (2) performs repeated scans of the RF spectrum until the BDR is moved from the standby mode to an operational mode.

12. A BDR according to any preceding claim **characterised in that** an alarm is incorporated into the NOS (6) so that any errors or defects detected during RF channel monitoring are signalled to the NOS (6).

13. A BDR according to any preceding claim **characterised in that** the RF data is also collected relating to the channel which the tuners are tuned to when the BDR (2) is in an operational mode.

14. A method of RF monitoring using a broadcast data receiver (BDR), said BDR (2) receiving and decoding data in the form of video, audio and/or auxiliary data sent from a broadcaster at a remote location via cable, satellite and/or terrestrial means, said BDR (2) having two or more tuners for receiving data at particular radio frequencies relating to one or more channels, **characterised in that** said method includes the steps of the BDR (2) monitoring a plurality of RF channels using said tuners when in a standby mode, thereby providing an indication of the status of the RF channels.

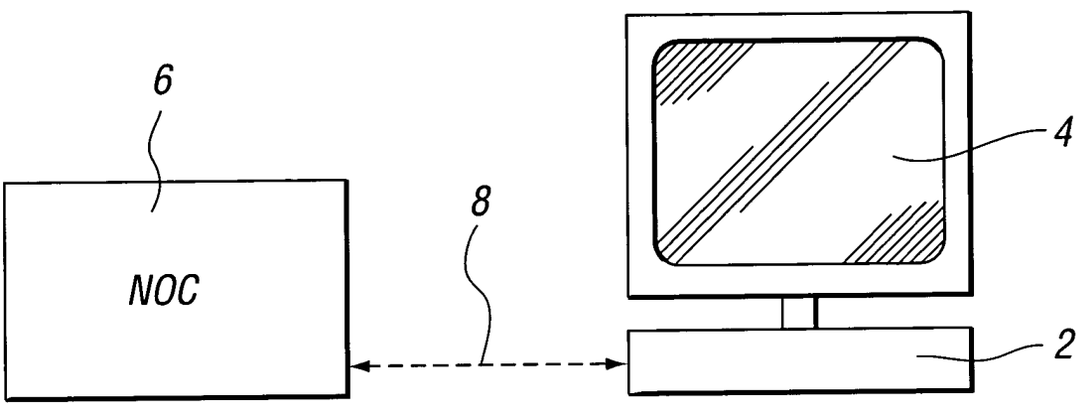

FIG. 1