

Dual Television Tuner

Reference to Related Applications

5 Reference is made to the earlier-filed applications USSN 10/508,646 filed 17
September 2004 for the invention "Portable Apparatus for Enabling Reproduction
of Television" and international application PCT/SG2004/000276 filed 1 September
2004 for the invention "Portable Apparatus for Enabling Reproduction of
Television" (the "Earlier Applications"), the contents of which are hereby
10 incorporated by reference.

Field of the Invention

This invention relates to a dual television tuner and refers particularly, though not
15 exclusively, to a portable apparatus for enabling reproduction of television that has
at least two separate television tuners.

Background of the Invention

20 In the Earlier Applications there is disclosed a portable apparatus for enabling
reproduction of television. However, it has been found that in certain areas, where
the television signal may be weak, that the reception is not of an acceptable
standard.

25 Also, it has been found that some of the operating characteristics of the earlier
Applications make it suitable for performing more than one function.

Summary of the Invention

30 In accordance with a first preferred aspect there is provided a dual television tuner
comprising a television tuner module and a wireless local area network module
both operatively connected to an antenna for receiving a television signal from the

antenna, and for passing the television signal for playing on a host to which the dual television tuner is able to be operatively connected.

At any one time only one of the television tuner module and the wireless local area network module may be able to pass the television signal for playing on the host.

The dual television tuner may further comprise a decoder for decoding the television signal received from the antenna.

10 Preferably, the wireless local area network module is activated only if there is no television signal received by the television tuner module, or if the television signal received by the television tuner module is below an acceptable quality.

Alternatively or additionally, both the wireless local area network module and the TV tuner module are able to be activated at the one time, a micro controller being provided for determining which of them has the better television signal and, following the determination, keeping activated that of the wireless local area network module and the TV tuner module having the better television signal, and deactivating the other.

20 The dual television tuner may further comprise a memory module and a micro-controller. The dual television tuner may be portable and may be able to be used with varying hosts.

25 According to a second aspect there is provided a method of tuning a television signal received from an antenna and for playing on a host. The method comprises activating a television tuner of a portable apparatus operatively connected to the host module; scanning for a signal from the television tuner module; and determining if the signal is available from the television tuner module. If there is no signal from the television tuner module, the television tuner module is deactivated, and a wireless local area network module of the portable apparatus is activated. Scanning for the signal from the wireless local area network module then takes place.

35 After the scanning of the TV tuner module further scanning may be conducted a predetermined number of times. If there is no signal from the wireless local area network, rescanning is conducted for the predetermined number of times. If there

is no signal from the wireless local area network module following rescanning the predetermined number of times, the wireless local area network module is deactivated and a no signal received message is sent to the host. If in either case there is the signal, a channel is selected and played on the host. If required, the
 5 signal may be decoded before being played on the host.

Accordingly to a third aspect there is provided a method of tuning a television signal received from an antenna and for playing on a host. The method comprises activating a television tuner module and a wireless local area network module, both
 10 being of a portable apparatus and both being operatively connected to the antenna. Scanning for a signal from both the television tuner module and the wireless local area network module takes place and, if both the television tuner module and the wireless local area network module provide the signal, which one
 15 of the television tuner module and the wireless local area network module provides a better signal is determined. That of the television tuner module and the wireless local area network module that provides the better signal is kept active. That of the television tuner module and the wireless local area network module that does not provide the better signal is deactivated.

20 If there is no signal from both of the television tuner module and the wireless local area network module, rescanning may take place for a predetermined number of times. If after rescanning takes place for the predetermined number of times there is still no signal from both of the television tuner module and the wireless local area network module, both the television tuner module and the wireless local area
 25 network module may be deactivated and a no signal received message may be sent to the host.

A channel may be selected and played on the host by that which remains active.

30 If required, the better signal may be decoded before being played on the host.

If the signal is from only one of the television tuner module and the wireless local area network module, that not providing the signal is deactivated and that providing the signal remains activated.
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If the better signal falls below an acceptable quality, the method is repeated. Preferably, that activated remains activated until the repeated method is complete.

Brief Description of the Drawings

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In order that the present invention may be fully understood and readily put into practical effect, there shall now be described by way of non-limitative example only preferred embodiments of the present invention, the description being with reference to the accompanying illustrative drawings.

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In the drawings:

Figure 1 is a block diagram of a preferred embodiment;

Figure 2 is a first flow chart of a first embodiment; and

Figure 3 is a second flow chart of a second embodiment.

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Detailed Description of the Preferred Embodiments

To first refer to Figure 1, there is shown a portable device 1 that consists of the following basic components:

- 20 a) a USB connector 10,
 b) a USB controller 12,
 c) a micro controller 14,
 d) a wireless LAN module 16,
 e) an optional MPEG decoder 18,
 25 f) a TV tuner module 20,
 g) a memory module 22, and
 h) an antenna 24.

30 This device 1 is able to function as a USB mass storage device, a TV signal receiver and tuner, and is wireless LAN enabled. The memory module 22 may be one or more of:

- a) NAND flash memory;
 b) AG and Flash memory, and
 c) a disk drive, preferably a hard disk drive.

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The TV tuner module 20 is as described in the Earlier Applications and is able to receive at least one of the standard digital television signals. These may be one or more of:

- a) DVB-t,
- 5 b) ATSC,
- c) ISDB-T, and
- d) DMB

If required or desired, an MPEG decoder 18 , or other form of decoder, is provided.

- 10 If any received signal is in an MPEG format, or other standard format, it will be decoded and sent to a host to enable viewing of a TV program on the host.

The wireless local area network ("WLAN") module 16 has at least one of the following wireless protocols.

- 15 a) IEEE802.11
- b) Bluetooth
- c) IrDA,
- d) WiMAX, and
- e) WUSB

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The WLAN module 20 is able to be configured to connect to Access Point, communicate with other device with wireless functionality, and is able to receive a TV signal.

- 25 In this way any television signal received by antenna 24 is passed to the WLAN module 16 as well as the TV tuner module 20. It is then processed by either or both modules 16, 24 and passed through controllers 14, 12 and connector 10 to enable viewing of the television program on the host (not shown).

- 30 The device may also be used for radio signals in the same manner.

Furthermore, the device can be used as a memory module in the usual manner with WLAN module 16, MPEG decoder 18, TV tuner module 20 and antenna 24 being deactivated.

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To now refer to Figure 2, when the connector 10 is connected (201) to a host such as, for example, a PC or a PDA, it waits on a command from the host (202). If a

command is received, the TV tuner 20 is activated (203). A check is made to determine TV signal availability (204). If yes (205) then a channel is selected (206). If no (207) the process described below is followed. From (206), the controller 14 then checks if decoding is required (208). If yes (209) it passes the TV signal (210) to MPEG decoder 18 for decoding. The decoded signal/encoded signal is then passed to the micro controller 14 (211) and the decoded signal/encoded signal is passed to the host (212) for the playing of the TV program (213) on the host. If no decoding (214) is required at (208), the process proceeds directly to step (211) from step (208).

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If no (207) at (204), the TV tuner module 20 rescans for a TV signal for a predetermined number of times (214). The predetermined number may be in the range 2 to 10, preferably 5. The cycle continues through steps (215), (216) and (217). As soon as a signal is available (218), the process reverts to (206). If no signal is available when the predetermined number is reached (219) the WLAN module 16 is activated and, preferably, the TV tuner module 20 is deactivated (220).

The WLAN module 20 then scans for a signal (221). If a signal is available (222) proceeds to select a channel (206). If no signal is available (223), rescanning for the same predetermined number of times takes place (224) to (227). If after the predetermined number of scans there is no signal, a "No Signal Found" message is generated and sent to the micro controller 14 (230), USB controller 12 then to the host (231) for display (232). The WLAN module 20 is then deactivated. If yes at (233), at (225) the process proceeds through (234) to (241). These are identical to (206) to (213) described above.

The decoding at (208) and (235) may be hardware, software or firmware.

Also, if at any time the signal from the TV tuner module 20 at (204) is not of an acceptable quality, the process may revert to (207). Preferably, the signal from the TV tuner module 20 is maintained until any replacement signal is processed.

To now refer to Figure 3, in (301) the connector 10 is operatively connected to a host (not shown) and receives a command from the host (302). The TV tuner module 20 and the WLAN module 16 are both activated at substantially the same time (303). A check is made to determine if a signal is available (304) from either

or both of them. If not (305), rescanning takes place (306) to (311) in the same manner as for the embodiment of Figure 2. If after the predetermined number of attempts there is no signal (312) the "No Signal Found" process of (313) to (315) takes place in the same manner as for the embodiment of Figure 2.

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If yes (316) at (307) or (304), a check is made to determine if the TV signal is from both TV tuner module 20 and WLAN module 16 (317). If not from both (318) a check is made (319) to determine if the signal is from TV tuner 20 or WLAN (321). If the signal is from TV tuner module 20, the WLAN 16 is deactivated (322) and the process goes to select channel (323). If from the WLAN module 16, the TV tuner 20 is deactivated (324) and the process goes to select channel (323).

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After the channel is selected at (323), a check is made to determine if decoding is needed (325). If yes (326) the TV signal is passed to MPEG decoder 18 to decode, and the decoded signal/encoded signal is passed to the micro controller 14 (328), and then to the host (329) to play the TV Program (330). If at (325) no decoding is needed (331) the process passes directly from (325) to (328).

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If at (317) the signal is from both the TV tuner 20 and the WLAN 16 (332), the signals are compared (333, 334) to determine which signal is better – the TV tuner 20 or the WLAN 16. If it is the TV tuner 20 (335), the process proceeds to (322) and the WLAN 16 is deactivated; but if it is the WLAN 16 (336), the process proceeds to (324), and the TV tuner 20 is deactivated. That not deactivated remains activated.

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The process then proceeds from step (323) to step (330), as is described above.

The received TV signal quality may be monitored on a regular basis and the process from (317) to (330) is followed. The monitoring may be by regular sampling of the TV signal and, if it drops below a preset or acceptable quality level, the process from (317) will be followed. In this way both the TV tuner 20 and the WLAN module 16 are not both active for any substantial period, thus reducing power consumption. They are both on only during the turning process, and not the playing time. If the signal does drop below the preset or acceptable quality level, it is maintained until the process (333, 334) is completed.

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Whilst there has been described in the foregoing description preferred embodiments of the present invention, it will be understood by those skilled in the technology concerned that many variations or modifications in details of design or construction may be made without departing from the present invention.

THE CLAIMS

1. A dual television tuner comprising a television tuner module and a wireless local area network module both operatively connected to an antenna for receiving a television signal from the antenna, and for passing the television signal for playing on a host to which the dual television tuner is able to be operatively connected.
2. A dual television tuner as claimed in claim 1, wherein at any one time only one of the television tuner module and the wireless local area network module is able to pass the television signal for playing on the host.
3. A dual television tuner as claimed in claim 1 or claim 2 further comprising a decoder for decoding the television signal from the antenna.
4. A dual television tuner as claimed in any one of claims 1 to 3, wherein the wireless local area network module is activated only if there is no television signal received by the television tuner module, or if the television signal received by the television tuner module is below an acceptable quality.
5. A dual television tuner as claimed in any one of claims 1 to 3, wherein both the wireless local area network module and the TV tuner module are able to be activated at the one time, there being further provided a microcontroller for determining which of them has the better television signal and, following the determination, keeping activated that of the wireless area Network module and the TV tuner module having the better television signal and deactivating the other.
6. A dual television tuner as claimed in any one of claims 1 to 4, further comprising a memory module and a micro-controller.
7. A dual television tuner as claimed in any one of claims 1 to 6, wherein the dual television tuner is portable and is able to be used with varying hosts.
8. A method of tuning a television signal received from an antenna and for playing on a host, the method comprising:
 - (a) activating a television tuner of a portable apparatus operatively connected to the host module;

(b) scanning for a signal from the television tuner module;

(c) determining if the signal is available from the television tuner module;

(d) if there is no signal from the television tuner module, deactivating the television tuner module and activating a wireless local area network module of the portable apparatus; and

(e) scanning for the signal from the wireless local area network module.

9. A method as claimed in claim 8, wherein after (a) the scanning of (b) is conducted a predetermined number of times before continuing to (d).

10. A method as claimed in or claim 9, wherein if in (e) there is no signal from the wireless local area network, rescanning is conducted for the predetermined number of times.

11. A method as claimed in claim 10, wherein if there is no signal from the wireless local area network module following rescanning the predetermined number of times, the wireless local area network module is deactivated and a no signal received message is sent to the host.

12. A method as claimed in any one of claims 8 to 11, wherein if in (c) if there is the signal, a channel is selected and played on the host.

13. A method as claimed in any one of claims 8 to 11, wherein if there is the signal from the wireless local area network module, a channel is selected and played on the host.

14. A method as claimed in claim 12 and claim 13 further comprising decoding the signal before being played on the host.

15. A method of tuning a television signal received from an antenna and for playing on a host, the method comprising:

(a) activating a television tuner module and a wireless local area network module, both being of a portable apparatus operatively connected to the host;

(b) scanning for a signal from both the television tuner module and the wireless local area network module;

(c) if both the television tuner module and the wireless local area network module provide the signal, determining which one of the television tuner
5 module and the wireless local area network module provides a better signal;

(d) keeping active that of the television tuner module and the wireless local area network module that provides the better signal and sending the better
signed for playing on the host; and

(e) deactivating that of the television tuner module and the wireless
10 local area network module that does not provide the better signal.

16. A method as claimed in claim 15, wherein if in (b) there is no signal from both of the television tuner module and the wireless local area network module, rescanning takes place for a predetermined number of times.

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17. A method as claimed in claim 16, wherein if after rescanning takes place for the predetermined number of times there is still no signal from either of the television tuner module and the wireless local area network module, both the television tuner module and the wireless local area network module are
20 deactivated and a no signal received message is sent to the host.

18. A method as claimed in any one of claims 15 to 17, wherein in (d) a channel is selected and played on the host.

25 19. A method as claimed in claim 18 further comprising decoding the better signal before being played on the host.

20. A method as claimed in any one of claims 15 to 18, wherein in (b) if the signal is from only one of the television tuner module and the wireless local area
30 network module, that not providing the signal is deactivated and that providing the signal remains activated.

21. A method as claimed in any one of claims 15 to 19, wherein if the better signal falls below an acceptable quality, steps (a) to (e) are repeated.

35 22. A method as claimed in claim 21, wherein during the repeating of steps (a) to (e) the process of (d) is maintained until the repeating reaches the end of (c).