Title: APPARATUS, SYSTEMS AND METHODS FOR PAIRING A CONTROLLED DEVICE WITH AN RF REMOTE CONTROL USING AN RFID TAG

Abstract: Systems and methods are operable to initiate a pairing process and a de-pairing process between a controlled device and a radio frequency (RF) remote control. An exemplary embodiment detects presence of a radio frequency identifier (RFID) tag in an interrogation zone established by an RFID tag reader, automatically initiates a pairing process in response to detecting the presence of the RFID tag in the interrogation zone, and completes the pairing process between the RF remote control and the controlled device, wherein the pairing process identifies a unique identifier associated with the RF remote control. A subsequently received RF signal emitted by the RF remote control includes at least one command configured to control operation of the controlled device and includes the unique identifier.

Diagram:

Figure 1: Diagram of the pairing process between a controlled device and an RF remote control using an RFID tag.
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BACKGROUND

[0001] Media devices, such as a set top box, a stereo, a television, a computer system, a game system, or the like, are often configured to receive operating instructions from a user via a remote control. When the remote control communicates user instructions to the media device using an infrared (IR) signal, the remote control must be within a line-of-sight range of the controlled media device so that the emitted IR signal is detectable by the controlled media device.

[0002] Recent advances in technology have resulted in remote controls that are configured to emit a radio frequency (RF) signal that is detectable by the controlled media device. Such RF remote controls no longer need to be within the line-of-sight range of the controlled media device, and thus provide the advantage of a wider area of delegability. For example, the user may adjust volume or change a channel from the next room using the RF remote control.

[0003] However, the emitted RF signal from the RF remote control may be detectable by a plurality of different controlled media devices in different locations. Unintentional detection of the emitted RF signal by other media devices may not be desirable.

[0004] For example, a set top box and a television are examples of controlled media devices that might be configured to receive and operate in accordance with an RF signal emitted by a particular RF remote control. However, since the strength of the emitted RF signal may be relatively great, the neighbor's set top box and/or television may detect the emitted RF signal, and accordingly, operate in accordance with the detected RF signal in an unintended manner (at least from the perspective of the neighbor).

[0005] As another example, the user may have a second set top box or television in another part of their residence. Another family member may be watching a TV program on the television in the other part of the residence. The set top box and/or television in the other

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part of the residence may detect the emitted RF signal, and accordingly, operate upon the detected RF signal in an unintended manner (at least from the perspective of the other family member).

[0006] To solve the issue where some media devices may unintentionally operate in accordance with detected RF signals emitted from an RF remote control, a pairing scheme is used to configure the media device to operate in accordance with a detected RF signal emitted from a "paired" RF remote control, and not operate in accordance with detected RF signals emitted from other "unpaired" RF remote controls. Such pairing schemes pair a particular RF remote control with a single media device, such as a set top box. Additionally, the particular RF remote control may be paired with other media devices, such as a television or other controlled media content presentation device located in the same media room. Also, a plurality of RF remote controls may be paired with one or more controlled media devices.

[0007] Pairing between an RF remote control and a controlled media device is accomplished by initially configuring the controlled media device to recognize a unique identifier (ID) associated with the RF remote control. For example, a MAC address or the like of the RF remote control may be used to uniquely identify the RF remote control. Emitted RF signals include the unique ID of the RF remote control. When an RF signal is detected by the controlled media device, the controlled media device checks the ID included in the detected RF signal with the previously stored unique ID associated with its paired RF remote control. If the two identifiers match, then the controlled media device will operate in accordance with the detected RF signal. On the other hand, if the ID included in the detected RF signal does not match with the previously stored unique ID associated with its paired RF remote control, then the controlled media device will ignore or otherwise disregard the detected RF signal.

[0008] Before a particular RF remote control may be used to control one or more media devices, the RF remote control must be initially paired with the controlled media device. The pairing process is typically a manually-performed process whereby the user must locate the RF remote control in proximity to the intended controlled media device, and then manually initiate the pairing process. Often, menus or other suitable graphical interfaces are
provided to assist the user in successfully initiating and completing the pairing process. Once the pairing process is completed, the controlled media device will operate in accordance with detected RF signals emitted by its paired RF remote control, and not operate in accordance with detected RF signals emitted by other remote controls.

[0009] The pairing process is often rather complex and may be difficult for the user to successfully complete. If the user makes a mistake in the pairing process, the pairing process may have to be manually reinitiated. In such situations, the user may become frustrated. Accordingly, there is a need in the arts to simplify the pairing process between a controlled media device and its paired RF remote control.

SUMMARY

[0010] Systems and methods of initiating one of a pairing process and a de-pairing process between a controlled device and a radio frequency (RF) remote control are disclosed. An exemplary embodiment detects presence of a radio frequency identifier (RFID) tag in an interrogation zone established by an RFID tag reader, automatically initiates a pairing process in response to detecting the presence of the RFID tag in the interrogation zone, and completes the pairing process between the RF remote control and the controlled device, wherein the pairing process identifies a unique identifier associated with the RF remote control. A subsequently received RF signal emitted by the RF remote control includes at least one command configured to control operation of the controlled device and includes the unique identifier.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] Preferred and alternative embodiments are described in detail below with reference to the following drawings:

[0012] FIGURE 1 is a block diagram of an embodiment of radio frequency identifier (RFID) pairing system comprising a controlled device and a radio frequency (RF) remote control with an RFID tag;

[0013] FIGURE 2 is a block diagram of an embodiment of the RFID pairing system implemented in an exemplary RF remote control and an exemplary controlled media device; and
FIGURE 3 is a block diagram of an embodiment of the RFID pairing system implemented in an alternative RF remote control and an alternative controlled media device.

**DETAILED DESCRIPTION**

FIGURE 1 is a block diagram of an embodiment of radio frequency identifier (RFID) pairing system 100 comprising a controlled device 102 and a radio frequency (RF) remote control 104 with an RFID tag 106. The RFID pairing system 100 facilitates pairing between the controlled device 102 and the RF remote control 104. Embodiments of the RFID pairing system may be implemented in any electronic-based device that is configured to receive communications from the RF remote control 104. Once the pairing process is completed, the controlled device 102 will act on detected RF signals emitted by its paired RF remote control 104, and not operate in accordance with commands in detected RF signals emitted by other RF remote controls.

An exemplary embodiment of the RFID pairing system 100 is configured to detect presence of the RFID tag 106 in an interrogation zone. In response to detecting the presence of the RFID tag 106, embodiments are configured to automatically initiate the pairing process between the controlled device 102 and the RF remote control 104.

Depending upon the embodiments, the pairing process may be implemented in a variety of manners. During an exemplary pairing process, an identity of the controlled device 102 and an identity of the RF remote control 104 are associated with each other. In an exemplary embodiment, a unique identifier associated with the RF remote control 104, such as its MAC address, serial number, user specified identifier, or the like, permits the controlled device 102 to recognize and to operate in accordance with commands in any detected RF signals emitted by the RF remote control 104. In another embodiment, the unique identifier of the controlled device 102 is provided to the RF remote control 104 so that RF signals emitted by the RF remote control 104 may include the unique identifier of the controlled device 102. In some embodiments, a unique identifier is defined during each pairing process, such as a short address or the like. Since both the controlled device 102 and the RF remote control 104 have the defined unique identifier, the RF signals emitted by the RF remote control 104 will include the defined unique identifier so that the controlled device 102 will recognize and...
operate in accordance with commands in any detected RF signals emitted by the RF remote control 104. Any suitable pairing scheme may be used by the various embodiments.

[0018] In the various embodiments, the interrogation zone 110 corresponds to a relatively short distance, or range, between the controlled device 102 and the RF remote control 104. The interrogation zone 110 is established by a component of the controlled device 102.

[0019] By way of example, the controlled device 102 is described as a media device that is configured to provide media content to a media content presentation device 128, such as a television or the like. In some embodiments, the media content presentation device 108 may be similarly paired with the RF remote control 104 during another pairing process. Alternatively, or additionally, the controlled device 102 may manage the pairing between the media content presentation device 108 and the RF remote control 104.

[0020] After completion of the pairing process, when the user is in an intended operating range 112 that encompasses a particular room 114 of the customer premises 116, detected RF signals emitted by the RF remote control 104 will be acted upon by the controlled device 102 and/or the media content presentation device 108. The operating range 112 corresponds to a range or distance between the controlled device 102 and the RF remote control 104 for which the user may intend to operate the controlled device 102 and/or the associated media content presentation device 108.

[0021] The RF remote control 104 is configured to emit RF signals that are detectable across a relatively long maximum detection range 118 that encompasses the customer premises 116, such as their residence, business, or the like. The maximum detection range 118 may extend beyond the customer premises 116, and may extend to one or more other customer premises 120. Since the RF signals emitted by the RF remote control 104 are detectable by other electronic devices within the maximum detection range 118, it is very undesirable for these other electronic devices to operate in accordance with commands in detected RF signals emitted by the RF remote control 104. Since the exemplary RF remote control 104 has not been paired with these other electronic devices, they will not operate in accordance with commands in any detected RF signals emitted by the RF remote control 104.
[0022] For example, the remote media devices 122 and/or their respective controlled media content presentation devices 124 located in the other residences 120 are not paired with the RF remote control 104. Accordingly, the remote media devices 122 and/or the media content presentation devices 124 will not operate in accordance with commands in detected RF signals emitted by the RF remote control 104.

[0023] Similarly, within the customer premises 116, an exemplary second media device 126 and/or another controlled media content presentation device 128 may be located in another room 130 of the customer premises 116. The exemplary second media device 126 and/or the media content presentation device 128 will not operate in accordance with commands in detected RF signals emitted by the RF remote control 104 since these devices 126, 128 are not currently paired with the RF remote control 104.

[0024] At times, the user may wish to use the RF remote control 104 to control the second media device 126 and/or the media content presentation device 128. For example, when the user is in an intended operating range of the second media device 126 and/or the media content presentation device 128, as conceptually illustrated by the control range 138 that encompasses the room 130 of the customer premises 116, detected RF signals emitted by the RF remote control 104 should be acted upon by the second media device 126 and/or the media content presentation device 128. However, before the second media device 126 and/or the media content presentation device 128 may operate in accordance with commands in any detected RF signals, the second media device 126 must be paired with the RF remote control 104. Further, the media content presentation device 128 may also be paired with the RF remote control 104 if the media content presentation device 128 is to be controlled by the RF remote control 104.

[0025] The exemplary embodiment of the RFID pairing system 100 is configured to automatically initiate the pairing process between the RF remote control 104 and the second media device 126 in response to locating the RF remote control 104 within the interrogation zone 140, which corresponds to the detection range of the RFID tag 106 by the second media device 126. The media content presentation device 128 may be similarly paired with the RF remote control 104 during another pairing process. Alternatively, or additionally, the second
media device 126 may manage the pairing between the media content presentation device
128 and the RF remote control 104. Thus, when the user is in an intended control range 138
that encompasses the room 130, detected RF signals emitted by the RF remote control 104
will be acted upon by the controlled second media device 126 and/or the media content
presentation device 128.

[0026] However, unless the controlled device 102 and/or the media content
presentation device 108 have been de-paired from the RF remote control 104, they may also
detect and act in accordance with any RF signals emitted from the RF remote control 104
when the user is using the RF remote control 104 in the room 130, and is intending to operate
the second media device 126 and/or the second media content presentation device 128. In this
situation, the controlled device 102 and/or the media content presentation device 108 will
continue to respond to detected RF signals emitted by the RF remote control 104, even
though such RF signals are intended only to operate the second media device 126 and/or the
media content presentation device 128. To prevent such unintended operation of the
controlled device 102 and/or the media content presentation device 108, the controlled device
102 and/or the media content presentation device 108 must be de-paired from the RF remote
control 104.

[0027] To initiate the de-pairing process, preferably before the user leaves the room
114 with the RF remote control 104, the user moves the RF remote control 104 into the
interrogation zone 110. Upon sensing the RFID tag 106, the controlled device 102
automatically initiates the de-pairing process. The user may also similarly automatically
initiate a de-pairing process with the media content presentation device 108, or alternatively,
the controlled device 102 may initiate the de-pairing process with the media content
presentation device 108. Once the de-pairing process has been completed, the controlled
device 102 and the media content presentation device 108 will not operate in accordance with
commands in any detected RF signals subsequently emitted by the RF remote control 104.

[0028] Depending upon the embodiments, the de-pairing process may be
implemented in a variety of manners. In an exemplary embodiment, the unique identifier of
the RF remote control 104 is not recognized by the controlled device 102, and the controlled
device 102 is reconfigured to not act on any detected RF wireless signals 242. In another embodiment, the RF remote control 104 omits the unique identifier of the controlled device 102 in the subsequently emitted RF wireless signals 242. Accordingly, the controlled device 102 will not recognize any detected RF wireless signals 242. In yet another embodiment, a subsequent pairing process defines a new unique identifier such that the previously used unique identifier is no longer included in any emitted RF wireless signals 242. Any suitable de-pairing scheme may be used by the various embodiments.

[0029] In some situations, such as within another room 132 of the customer premises 116, one or more remote RF devices 130 may be located and configured to control operation of one or more appliances 132. An exemplary appliance 132 is the illustrated oven. For example, the user may turn on, turn off, or adjust temperature of the exemplary oven in accordance with RF signals received by the remote RF device 134. Other non-limiting examples of a controllable appliance includes a refrigerator, a security system, one or more lights, or the like.

[0030] Assuming that the remote RF device 134 is not currently paired with the RF remote control 104, the remote RF device 134 will not act to control operation of the appliance 136 in the event that the remote RF device 134 detects RF signals emitted by the RF remote control 104. At times, the user may wish to use the RF remote control 104 to control operation of the appliance 136 using the RF remote control 104. Since the remote RF device 134 is within the maximum detection range 118 of the RF signals emitted by the RF remote control 104, the remote RF device 134 will operate in accordance with commands in such detected RF signals emitted by the RF remote control 104 when paired with the RF remote control 104.

[0031] The exemplary embodiment of the RFID pairing system 100 is configured to automatically initiate the pairing process between the RF remote control 104 and the remote RF device 134 in response to the user locating the RF remote control 104 in a interrogation zone 142, which corresponds to the detection range of the RFID tag 106 by the remote RF device 134. At other times, the user may similarly initiate a de-pairing process between the
RF remote control 104 and the remote RF device 134 by subsequently moving the RF remote
control 104 into the interrogation zone 142.

[0032] In the various embodiments, the range or distance encompassed by the
interrogation zones 110, 140 and 142 depends upon the characteristics of the RF tag 106 and
upon the components of the controlled device 102, the second media device 126, and the
remote RF device 134, respectively. In some embodiments, the interrogation zones 110, 140,
and 142 may be the same. However, the interrogation zones 110, 140, and/or 142 may be
different. In the various embodiments, the interrogation zones 110, 140, and 142 are
preferably of a relatively small size so that the pairing process and/or de-pairing process may
be intentionally initiated by the user.

[0033] If the interrogation zones 110, 140, and/or 142 are too large, then a pairing
process and/or de-pairing process may be unintentionally initiated. In an exemplary
embodiment, the interrogation zones 110, 140, and/or 142 are sufficiently small so as to
require physical contact between the RF remote control 104 and the controlled device 102,
the second media device 126, and/or the remote RF device 134. In some embodiments, a
predefined location on the controlled device 102, the second media device 126, and/or the
remote RF device 134 may be used. The predefined location may be visibly marked on the
surface of the controlled device 102, the second media device 126, and/or the remote RF
device 134 so that the user knows precisely where the RF remote control 104 must be placed
to automatically initiate the pairing process and/or de-pairing process.

[0034] In other embodiments, the range of the interrogation zones 110, 140, and/or
142 may be relatively large, such as a few inches, a few feet, or even spanning the area of a
media room or the customer premises 116. In an exemplary embodiment, the range of the
interrogation zones 110, 140, and/or 142 are adjustable. For example a physical controller
such as a dial or the like may be used to adjust the range of one or more of the interrogation
zones 110, 140, and/or 142. Alternatively, or additionally, a user menu or the like may be
presented to the user and receive input for a user selection of the range. Any suitable range of
the interrogation zones 110, 140, and/or 142 may be used in the various embodiments.
FIGURE 2 is a block diagram of an embodiment of the RFID pairing system 100 implemented in an exemplary RF remote control 104 and an exemplary controlled device 102. The exemplary RF remote control 104 comprises the RFID tag 106, an RF transceiver 202, a processor system 204, a memory 206, and a plurality of controllers 208 residing on a surface of the RF remote control 104. The memory 206 comprises portions for storing the remote logic 210 and the optional pairing logic 212. In some embodiments, the remote logic 210 and the pairing logic 212 may be integrated together, and/or may be integrated with other logic. Other RF remote controls may include some, or may omit some, of the above-described media processing components. Further, additional components not described herein may be included in alternative embodiments.

The non-limiting exemplary controlled device 102 is a media device, hereinafter referred to as the controlled device 102. A non-limiting example of the controlled device 102 is a set top box (STB) configured to receive media content, which is communicated to a media content presentation device 108 for presentation. Embodiments of the RFID pairing system 100 may be implemented in other media devices, such as, but not limited to, stereos, surround-sound receivers, radios, televisions (TVs), digital video disc (DVD) players, digital video recorders (DVRs), game playing devices, or personal computers (PCs) that are configured to receive communications from an RF remote control 104.

The exemplary controlled device 102 comprises a media content stream interface 214, a processor system 216, a memory 218, a program buffer 220, an optional digital video recorder (DVR) 222, a presentation device interface 224, a remote RF interface 226, an RFID tag reader 228, and communication system interface 230. The memory 218 comprises portions for storing the media device logic 232, remote control identifier (ID) database 234, and the pairing logic 236. In some embodiments, the media device logic 232 and the pairing logic 236 may be integrated together, and/or may be integrated with other logic. In other embodiments, some or all of these memory and other data manipulation functions may be provided by and using remote server or other electronic devices suitably connected via the Internet or otherwise to a client device. Other media devices may include
some, or may omit some, of the above-described media processing components. Further, additional components not described herein may be included in alternative embodiments.

[0038] The functionality of the controlled device 102, here a set top box, is now broadly described. A media content provider provides program content that is received in one or more multiple media content streams 238 multiplexed together in one or more transport channels. The transport channels with the media content streams 238 are communicated to the controlled device 102 from a media system sourced from a remote head end facility (not shown) operated by the media content provider. Non-limiting examples of such media systems include satellite systems, cable system, and the Internet. For example, if the media content provider provides programming via a satellite-based communication system, the controlled device 102 is configured to receive one or more broadcasted satellite signals detected by an antenna (not shown). Alternatively, or additionally, the media content stream 238 can be received from one or more different sources, such as, but not limited to, a cable system, a radio frequency (RF) communication system, or the Internet.

[0039] The one or more media content streams 238 are received by the media content stream interface 214. One or more tuners 240 in the media content stream interface 214 selectively tune to one of the media content streams 238 in accordance with instructions received from the processor system 216. The processor system 216, executing the media device logic 232 and based upon a request for a media content event of interest specified by the user, parses out media content associated with a media content event of interest. The media content event of interest is then assembled into a stream of video and/or audio information which may be stored by the program buffer 220 such that the media content event can be streamed out to the media content presentation device 108 via the presentation device interface 224. Alternatively, or additionally, the parsed out program content may be saved into the DVR 222 for later presentation. The DVR 222 may be directly provided in, locally connected to, or remotely connected to, the controlled device 102. In alternative embodiments, the media content streams 238 may stored for later decompression, processing and/or decryption.
[0040] The exemplary controlled device 102 is configured to receive (detect) commands from a user via the RF remote control 104. The RF remote control 104 includes a plurality of controllers 208 on its surface, such as the exemplary controllers 208. The user, by actuating one or more of the controllers 208, causes the RF remote control 104 to generate and transmit commands, via an RF wireless signal 242, to the controlled device 102. If the detected RF wireless signal 242 includes identifier information that indicates that the RF remote control 104 has been paired with the controlled device 102, the commands control the controlled device 102 and/or may control the media content presentation device 108.

[0041] The above processes performed by the controlled device 102 are generally implemented by the processor system 216 while executing the media device logic 232. Thus, the controlled device 102 may perform a variety of functions related to the processing of the media content stream 238 and processing operating instructions received from a paired RF remote control 104.

[0042] Embodiments of the RFID pairing system 100 are configured to automatically initiate the pairing process between the controlled device 102 and the RF remote control 104 in response to the user placing (locating) the RF remote control 104 within the interrogation zone 110. The interrogation zone 110 corresponds to a relatively short distance, or range, between the controlled device 102 and the RF remote control 104 wherein the RFID tag reader 228 is configured to detect the RFID tag 106 residing in or affixed to in the RF remote control 104. The effective distance associated with the interrogation zone 110 of the RFID tag reader 228 may be designed to any desirable distance based on the characteristics of the RFID tag 106 and the RFID tag reader 228.

[0043] The RFID tag 106 is configured to communicate information in an information signal 244 that is detectable by the RFID tag reader 228. In an exemplary embodiment, the information signal 244 includes information that uniquely identifies the RF remote control 104 to the detecting controlled device 102. The unique identifier of the RF remote control 104 may be any suitable identifier, such as a media access control (MAC) address or any other suitable identifier of the RF remote control 104. Alternatively, the unique identifier may be an identifier of the RFID tag 106. In some embodiments, the user
may define the unique identifier using one or more of the controllers 208 of the RF remote control 104 and/or by navigating about a graphical user interface that is presented on the media content presentation device 108 or another display.

[0044] Any suitable type of emitting device may be used, referred to herein generically as the RFID tag 106, in the various embodiments. In an exemplary embodiment, the RFID tag 106 is a passive device configured to initiate the identification information signal 244 based on proximity to an external magnetic field that is established by the RFID tag reader 228. The electromagnetic energy received by the passive RFID tag 106 results in a modulation of the magnetic field as the RFID tag 106 is energized. The modulated magnetic field is detectable by the RFID tag reader 228. The modulated magnetic field (i.e.; the information signal 244 with the unique identifier information) is detectable by the RFID tag reader 228.

[0045] In another exemplary embodiment, the RFID tag 106 is an active device that emits the wireless information signal 244 when in proximity to the RFID tag reader 228. A power source (not shown) in the RF remote control 104 provides power to the active RFID tag 106 for generation of the emitted wireless information signal 244.

[0046] In some embodiments, the RFID tag 106 is an integrated component of the RF remote control 104. In other embodiments, the RFID tag 106 may be a separate device that is affixed to the RF remote control 104 or later placed into the RF remote control 104. A separate RFID tag 106 that may be affixed to or placed in an existing RF remote control 104 may provide for the integration of a legacy RF remote control 104 into an embodiment of the RFID pairing system 100.

[0047] In the various embodiments, detection of the RFID tag 106 in the interrogation zone 110 automatically initiates the pairing process between the controlled device 102 and the RF remote control 104. The processor system 216, executing the pairing logic 236, receives the RF remote control identifier associated with that particular RF remote control 104, and then stores the received RF remote control identifier into the remote control ID database 234. Any suitable pairing algorithm, method, or process that is configured to pair the controlled device 102 and the RF remote control 104 may be used by the various
embodiments for the pairing process that is initiated by the user placing the RF remote control 104, and more particularly the RFID tag 106, into the interrogation zone 110 that is established by the RFID tag reader 228. In some embodiments, if the received RF remote control identifier is already saved into the remote control ID database 234 from a prior pairing, the pairing process is not automatically initiated.

[0048] After the pairing process is completed, the controlled device 102 will operate in accordance with commands in detected RF wireless signal 242 subsequently emitted by the RF remote control 104, and not operate in accordance with commands in detected RF signals emitted by other RF remote controls. When an RF wireless signal 242 is detected by the remote RF interface 226 of the controlled device 102, the processor system 216, executing the pairing logic 236, compares the identifier in the detected RF wireless signal 242 with the RF remote control identifiers stored in the remote control ID database 234. If the identifier in the RF wireless signal 242 corresponds to one of the stored RF remote control identifiers, the operating instructions in the received RF wireless signal 242 may be acted on to control operation of the controlled device 102 and/or to control the media content presentation device 108.

[0049] Embodiments of the RFID pairing system 100 may be similarly implemented in other electronic devices, such as the exemplary media content presentation device 108 and/or the exemplary remote RF device 134, that are configured to receive the RF wireless signal 242 emitted by the RF remote control 104. Such electronic devices would be similarly configured as the above-described controlled device 102. When the user places the RF remote control 104 into the interrogation zone of the RFID tag reader of the electronic device, the pairing process between the RF remote control 104 and the electronic device may be automatically initiated. The unique identifier associated with the RF remote control 104 is stored as the RF remote control identifier by the pairing electronic device. Accordingly, subsequently received RF wireless signals 242 emitted by the RF remote control 104 may then be acted on by the paired electronic device.

[0050] At various times, the user may not want the controlled device 102 and/or the media content presentation device 108 to operate in accordance with commands in the RF
wireless signal 242 emitted by the paired RF remote control 104, such as when the user takes the RF remote control 104 into another room where there are other electronic devices that are configured to be controlled by the RF remote control 104. To prevent any currently paired electronic devices from unintentionally operating on any future RF wireless signal 242 emitted by the paired RF remote control 104, a de-pairing process is performed wherein the RF remote control 104 is de-paired from the controlled device 102, the media content presentation device 108 and/or another paired controlled electronic device. Once the de-pairing process is completed, subsequently received RF wireless signals 242 emitted by the RF remote control 104 will not be acted on by the controlled device 102, the media content presentation device 108 and/or the other electronic device.

[0051] In the various embodiments, the de-pairing process is automatically initiated by the detection of the RFID tag 106 in the interrogation zone 110. The RFID tag reader 228 senses the proximity of the RF remote control 104, and more particularly, the proximity of the RFID tag 106, when the user places the RF remote control 104 within the interrogation zone 110 of the RFID tag reader 228. The RFID tag reader 228 communicates information corresponding to the unique identifier associated with the RF remote control 104 to the processor system 216.

[0052] The processor system 216, executing the pairing logic 236, receives the information that includes the RF remote control identifier associated with that particular RF remote control 104. If the RF remote control identifier, or other associated information, already resides in the remote control ID database 234, the de-pairing process is initiated. That is, since the RF remote control 104 is already actively paired with the controlled device 102, the unique identifier has already been stored into the remote control ID database 234. Presence of the unique identifier of the RF remote control 104 in the remote control ID database 234 indicates that the RF remote control 104 is currently paired with the controlled device 102.

[0053] Any suitable de-pairing algorithm, method, or process that is configured to de-pair the controlled device 102 and the RF remote control 104 may be used by the various embodiments. In an exemplary embodiment, the RF remote control identifier may be erased,
deleted or otherwise removed from the remote control ID database 234 to effect the de-pairing process. In another embodiment, the RF remote control identifier is retained in the remote control ID database 234, but is flagged or otherwise identified so that the RF remote control 104 is effectively unpaired from the controlled device 102. The de-pairing process may be similarly initiated in the media content presentation device 108 and/or the other electronic devices.

[0054] At a later time, the user may wish to re-pair the RF remote control 104 with the controlled device 102, the media content presentation device 108 and/or the other electronic devices to control their operation with the RF remote control 104. The pairing process can be automatically initiated by placing the RF remote control 104, and more particularly the RFID tag 106, into the interrogation zone 110 of the particular controlled device 102, media content presentation device 108 and/or other electronic device that the user wishes to control with the RF remote control 104.

[0055] Some embodiments of the RFID pairing system 100 may be configured to permit a plurality of different RF remote controls 104 to be concurrently paired with a single controlled device 102, media content presentation device 108 and/or other electronic device. For example, the media content presentation device 108 may have been provided with an original equipment manufacturer (OEM) RF remote control 104. A second OEM RF remote control 104 that was provided with the controlled device 102 may also be configurable to operate the media content presentation device 108. Additionally, or alternatively, a universal type RF remote control 104 may be configurable to operate the media content presentation device 108 and/or the controlled device 102. All of these different RF remote controls 104 may be concurrently paired with the controlled device 102 and/or the media content presentation device 108 such that they will operate in accordance with commands in the received RF wireless signals 242 emitted by any of the paired RF remote controls 104.

[0056] Some RFID pairing systems 100 are configured to automatically initiate pairing processes and/or de-pairing processes with other remote devices, such as the exemplary client media device (MD) 246. The controlled device 102 may be communicatively coupled to the client media device 246 via a communication network 248,
via the communication system interface 230. For example, the communication network may be a local area network (LAN), power line carrier system, or the like located in the customer premises 116 (FIGURE 1). The client media device 246 may be controlling operations of the exemplary media content presentation device 250. In an exemplary situation, a plurality of media content presentation devices 108 may be used to view the same media content event, such as a football game, news report, movie, or the like. Accordingly, a single RF remote control 104 may be paired with a plurality of electronic devices such that the electronic devices are all concurrently operated in accordance with the received RF wireless signals 242 emitted by the RF remote control 104. Such an embodiment may be desirable when the customer premises 116 corresponds to a business, such as a bar, a restaurant, or the like, where the plurality of media content presentation devices 108 and/or client media devices 246 are available for viewing by the patrons.

[0057] Further, the client media device 246 may include its own RFID tag reader 252 such that pairing or de-pairing between the RF remote control 104 and the client media device 246 and/or the media content presentation device 250 can be automatically initiated by placing the RF remote control 104 in the interrogation zone 254 of the client media device 246. Additionally, or alternatively, the client media device 246 may support pairing and/or de-pairing process between the RF remote control 104 and other electronic devices, such as the controlled device 102.

[0058] The various embodiments of the RFID pairing system 100 automatically initiate the pairing and/or de-pairing processes when the RFID tag 106 of the RF remote control 104 is placed within an interrogation zone established by an RFID tag reader of an electronic device. The degree of automation of the pairing and/or de-pairing processes may vary depending upon the embodiments. In an exemplary embodiment, the pairing and/or de-pairing processes is completed automatically based on the unique identifier provided by the RF remote control 104. In one embodiment, the unique identifier is included in the information signal 244 from the RFID tag 106. In another embodiment, once the pairing and/or de-pairing processes is automatically initiated, the RF remote control 104 provides the
identification information for completing the pairing and/or de-pairing processes in an RF wireless signal 242 emitted by the RF transceiver 202 of the RF remote control 104.

[0059] Further, the degree of interaction required of the user to complete the automatically initiated pairing and/or de-pairing processes may vary between the embodiments. In an exemplary embodiment, the user need only place the RF remote control 104 in the interrogation zone of the electronic device that is to be paired or de-paired. The embodiment automatically completes the pairing and/or de-pairing processes without further user involvement. Another embodiment receives a user confirmation corresponding to an intent to complete the pairing and/or de-pairing processes before such processes proceed to completion. For example, the user may be required to actuate one or more of the controllers 208 on the RF remote control 104 to confirm the user's intent to pair or de-pair the RF remote control 104 and the electronic device.

[0060] In some embodiments, the pairing and/or de-pairing processes may be relatively complex and require various user inputs. For example, a graphical user interface (GUI) may be presented on the media content presentation device 108 when the controlled device 102 is paired or de-paired with the RF remote control 104. The user may be required to navigate about the presented GUI so as to select among various options associated with the pairing and/or de-pairing processes by actuating the controllers 208.

[0061] FIGURE 3 is a block diagram of an embodiment of the RFID pairing system implemented in an alternative controlled media device 302 and an alternative RF remote control 304. In the exemplary embodiment, the RFID tag 306 resides in or is affixed to the controlled media device 302. The RFID tag reader 308 resides in the RF remote control 304. The exemplary RFID tag 306 automatically initiates the pairing and/or de-pairing processes between the controlled media device 302 and the RF remote control 304.

[0062] Whenever the RF remote control 304 is placed in proximity to the controlled media device 302, such that the RFID tag 306 is in the interrogation zone 310 established by the RFID tag reader 308, the pairing and/or de-pairing processes is automatically initiated. In this exemplary embodiment, the RF remote control 304 may provide its unique identifier to the controlled media device 302 using any suitable means, such as in the information signal
244 or in the RF wireless signal 242. The pairing logic 208 may be used by the processor system 204 of the RF remote control 304 to support the pairing and/or de-pairing processes.

[0063] RFID tags 306 are relatively inexpensive. Accordingly, it may be more cost effective to include an RFID tag 306 in each of a plurality of different media devices, media content presentation devices, and/or remote RF devices that are located in the customer premises 116. Once the RFID tag reader 308 in the RF remote control 304 detects the presence of a particular one of the RFID tags 306, subsequent communications can be used to complete the automatically initiated pairing and/or de-pairing processes.

[0064] In some embodiments, the RFID tag 106 and/or RFID tag 306 do not include a unique identifier, such as the unique identifier of its particular electronic device. The RFID tags 106, 306 may be configured to provide sufficient information such that the pairing and/or de-pairing processes between the RF remote controls 104, 304 and the controlled electronic device is automatically initiated. Once the pairing and/or de-pairing processes are automatically initiated when the particular one of the RFID tags 106, 306 is within the interrogation zone, the RF remote control 104, 304 communicates with its respective electronic device as necessary to complete the automatically initiated pairing and/or de-pairing process.

[0065] It should be emphasized that the above-described embodiments of the RFID pairing system 100 are merely possible examples of implementations of the invention. Many variations and modifications may be made to the above-described embodiments. All such modifications and variations are intended to be included herein within the scope of this disclosure and protected by the following claims.
Claims:

1. A method for pairing a radio frequency (RF) remote control with a controlled device, the method comprising:
   - detecting presence of a radio frequency identifier (RFID) tag in an interrogation zone established by an RFID tag reader;
   - automatically initiating a pairing process in response to detecting a presence of the RFID tag in the interrogation zone; and
   - completing the pairing process between the RF remote control and the controlled device, wherein the pairing process identifies a unique identifier associated with the RF remote control,
   wherein a subsequently received RF signal emitted by the RF remote control includes at least one command configured to control operation of the controlled device and includes the unique identifier.

2. The method of Claim 1, wherein detecting the RFID tag comprises:
   - detecting the unique identifier associated with the RF remote control in a magnetic field modulated by the RFID tag.

3. The method of Claim 1, wherein detecting the RFID tag comprises:
   - detecting the unique identifier associated with the RF remote control in a wireless signal emitted by the RFID tag.

4. The method of Claim 1, wherein detecting the RFID tag comprises:
   - receiving the unique identifier associated with the RF remote control in an RF identification signal emitted by the RF remote control.

5. The method of Claim 1, further comprising:
   - storing the unique identifier associated with the RF remote control in a memory of the controlled device.
6. The method of Claim 1, wherein the interrogation zone is a first interrogation zone established by a first RFID tag reader in the controlled device, and further comprising:

detecting presence of the RFID tag in a second interrogation zone established by a second RFID tag reader in a media content presentation device, wherein the media content presentation device is configured to receive media content from the controlled device; and

automatically initiating a second pairing process between the RF remote control and the second media content presentation device in response to detecting the presence of the RFID tag in the second interrogation zone;

receiving at the media content presentation device the unique identifier associated with the RF remote control; and

completing the second pairing process between the RF remote control and the media content presentation device,

wherein a subsequently received RF signal emitted by the RF remote control includes at least one command configured to control operation of the media content presentation device and includes the unique identifier.

7. The method of Claim 1, wherein detecting the presence of the RFID tag is detecting a first presence of the RFID tag, and further comprising:

detecting second presence of the RFID tag in the interrogation zone established by the RFID tag reader, wherein the controlled device is currently configured to operate in accordance with the at least one command in the subsequently received RF signal emitted by the RF remote control; and

automatically initiating a de-pairing process between the RF remote control and the controlled device in response to detecting the second presence of the RFID tag;

receiving at the controlled device the unique identifier associated with the RF remote control; and
completing the de-pairing process between the RF remote control and the
controlled device,
wherein the controlled device is reconfigured to not operate in accordance with
the at least one command in the subsequently received RF signal emitted by
the RF remote control.

8. The method of Claim 1, further comprising:
receiving a user confirmation corresponding to an intent to complete the pairing
process.

9. A radio frequency identification (RFID) pairing system, comprising:
an RFID tag;
an RFID tag reader configured to detect a presence of the RFID tag when the
RFID tag is in an interrogation zone established by the RFID tag reader;
a radio frequency (RF) remote control identifiable by a unique identifier; and
a controlled device, wherein the controlled device is configured to automatically
initiate at least one of a pairing process and a de-pairing process in response to
the RFID tag reader detecting presence of the RFID tag in the interrogation
zone,
wherein upon completion of the pairing process, the controlled device becomes
configured to operate in accordance with at least one command in a
subsequently received RF signal emitted by the RF remote control, and
wherein upon completion of the de-pairing process, the controlled device becomes
configured to not operate in accordance with the at least one command in the
subsequently received RF signal emitted by the RF remote control.

10. The RFID pairing system of Claim 9, wherein the RFID tag is a component of the
RF remote control.

11. The RFID pairing system of Claim 9, wherein the RFID tag is affixed to the RF
remote control.
12. The RFID pairing system of Claim 9, wherein the RFID tag is a component of the controlled device.

13. The RFID pairing system of Claim 9, wherein the RFID tag resides in the RF remote control and the RFID tag reader resides in the controlled device.

14. The RFID pairing system of Claim 9, wherein the RFID tag resides in the controlled device and the RFID tag reader resides in the RF remote control.

15. The RFID pairing system of Claim 9, further comprising:
   a memory residing in the controlled device, wherein the unique identifier associated with the RF remote control is stored into the memory during the pairing process; and
   a processor system in the controlled device, wherein the processor is configured to:
      compare an identifier in the subsequently received RF signal emitted by the RF remote control;
      retrieve the unique identifier from the memory; and
      compare the identifier in the subsequently received RF signal with the unique identifier,
   wherein the controlled device is configured to operate in accordance with at least one command in a subsequently received RF signal emitted by the RF remote control when the identifier in the subsequently received RF signal corresponds with the unique identifier, and
   wherein the controlled device is configured to not operate in accordance with the at least one command in the subsequently received RF signal emitted by the RF remote control when the identifier in the subsequently received RF signal does not correspond with the unique identifier.

16. A method for pairing a radio frequency (RF) remote control with controlled devices, the method comprising:
detecting presence of a radio frequency identifier (RFID) tag in a first interrogation zone established by a first RFID tag reader of a first controlled device;

automatically initiating a first pairing process between the first controlled device and an RF remote control in response to detecting the presence of the RFID tag in the first interrogation zone, wherein upon completion of the first pairing process, the first controlled device becomes configured to operate in accordance with a subsequently received RF signal emitted by the RF remote control;

detecting presence of the RFID tag in a second interrogation zone established by a second RFID tag reader of a second controlled device;

automatically initiating a second pairing process in response to detecting the presence of the RFID tag in the second interrogation zone, wherein upon completion of the second pairing process, the second controlled device becomes configured to operate in accordance with the subsequently received RF signal emitted by the RF remote control.

17. The method of Claim 16, further comprising:

receiving a unique identifier associated with the RF remote control after detecting the presence of a RFID tag in the first interrogation zone established by the first RFID tag reader; and

receiving the unique identifier associated with the RF remote control after detecting the presence of the RFID tag in the second interrogation zone established by the second RFID tag reader.

18. The method of Claim 16, wherein the first controlled device is currently configured to operate in accordance with the at least one command in the subsequently received RF signal emitted by the RF remote control, and further comprising:

subsequently detecting presence of the RFID tag in the first interrogation zone established by the first RFID tag reader;
automatically initiating a de-pairing process between the RF remote control and the first controlled device; and

completing the de-pairing process between the RF remote control and the first controlled device,

wherein the controlled device is reconfigured to not operate in accordance with the subsequently received RF signal emitted by the RF remote control.

19. The method of Claim 16, the de-pairing process between the RF remote control and the first controlled device occurs prior to the initiation of the pairing process of the RF remote control and the second controlled device.

20. The method of Claim 16, wherein the first controlled device is a controlled media device, and wherein the second controlled device is a media content presentation device configured to receive media content from the controlled media device.
### INTERNATIONAL SEARCH REPORT

**A. CLASSIFICATION OF SUBJECT MATTER**

INV. H04N21/422 H04N21/441

**ADD.**
According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)
H04N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

### C. DOCUMENTS CONSIDERED TO BE RELEVANT

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*X* Further documents are listed in the continuation of Box C.  

*Special categories of cited documents:

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**Date of the actual completion of the international search**

13 June 2012

**Date of mailing of the international search report**

20/06/2012

**Name and mailing address of the ISA**
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk  
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**Authorized officer**

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<td>WO 2005036325 A2</td>
<td>21-04-2005</td>
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