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(54) **TELEPHONE WITH AUTOMATIC SWITCHING BETWEEN CELLULAR AND VOIP NETWORKS**

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H04W 36/00 (2009.01)
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CPC H04W 88/06; H04W 36/14; H04W 8/005; H04W 48/18; H04W 48/20; H04W 60/04;
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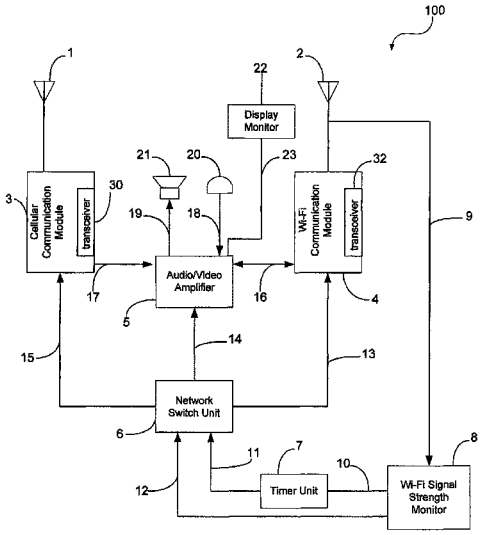
(57) **ABSTRACT**

A mobile communication device includes, in part, a cellular communication module, a first antenna adapted to receive and transmit data between the mobile communication module and a cellular network, a Wireless Fidelity (Wi-Fi) communication module, a second antenna adapted to receive and transmit data between the Wi-Fi communication module and a VoIP network, a signal monitoring circuit, and a switching circuit adapted to switch an existing communication from the cellular communication module to the Wi-Fi communication module or vice versa.

45 Claims, 2 Drawing Sheets



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continuation of application No. 13/899,303, filed on May 21, 2013, now Pat. No. 9,125,128, which is a continuation of application No. 13/168,585, filed on Jun. 24, 2011, now Pat. No. 8,467,789, which is a continuation of application No. 11/031,498, filed on Jan. 6, 2005, now Pat. No. 7,991,399.

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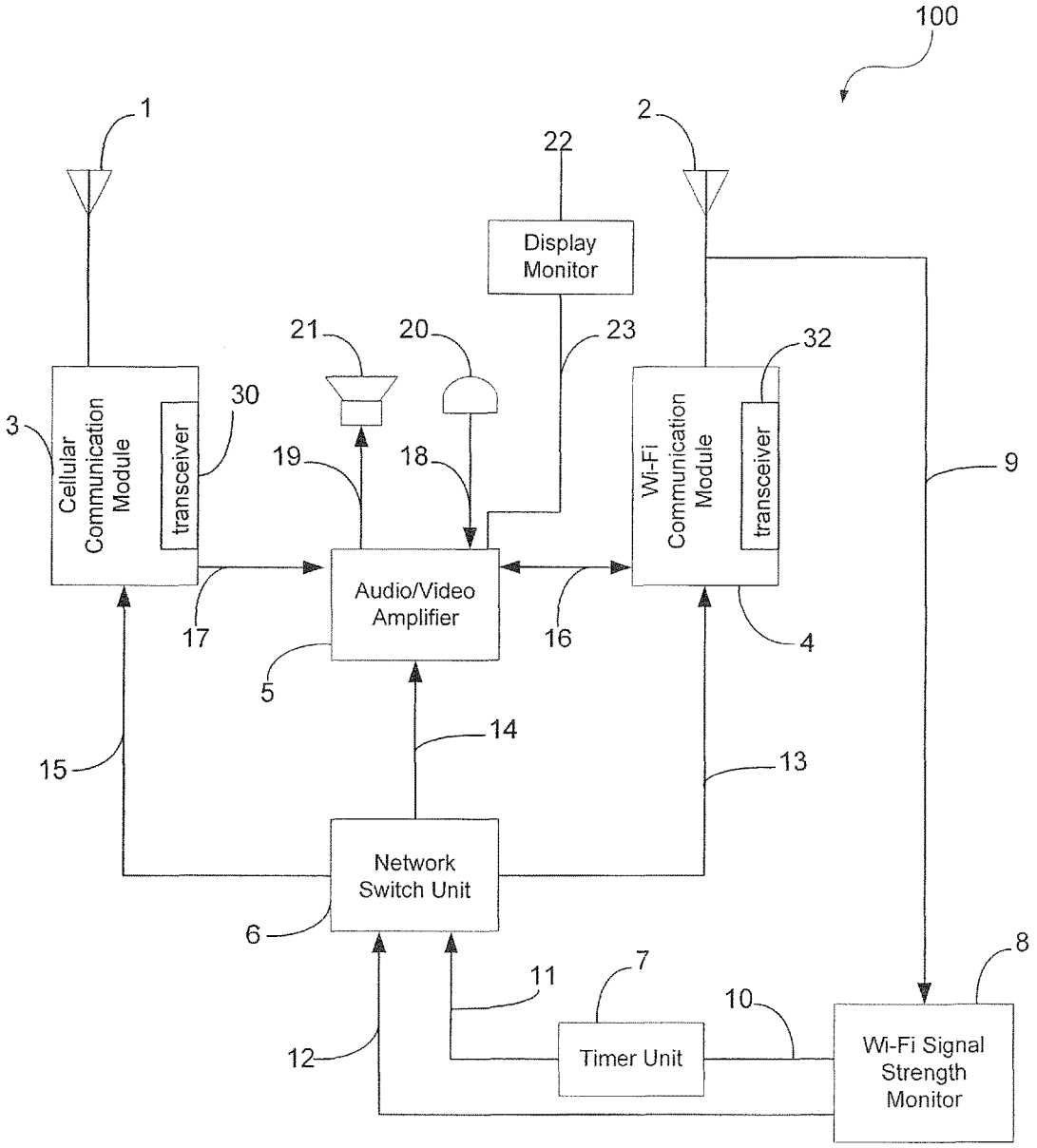
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2
22
Display Monitor
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Wi-Fi Communication Module
transceiver
9
Audio/Video Amplifier
17
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Network Switch Unit
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Timer Unit
Wi-Fi Signal Strength Monitor

FIG. 1

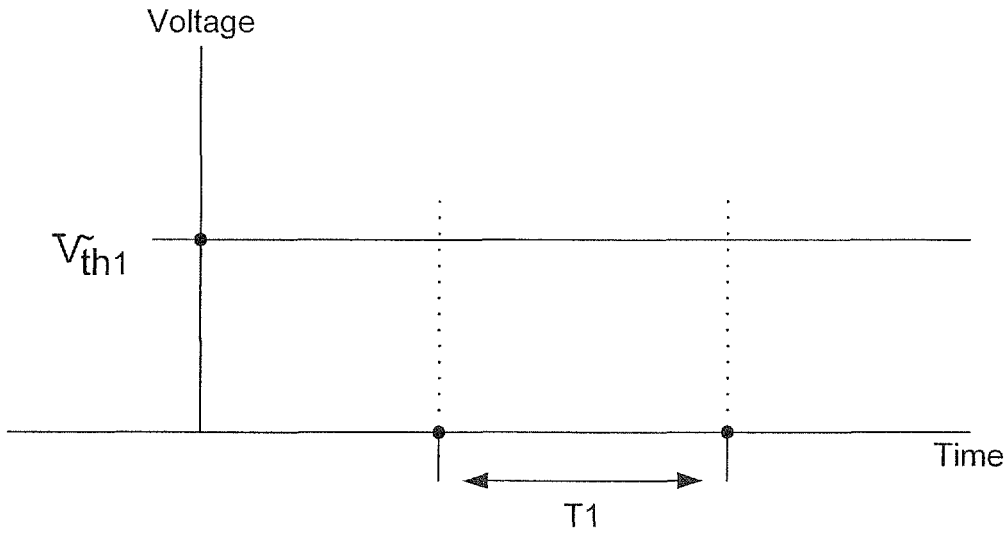

FIG. 2

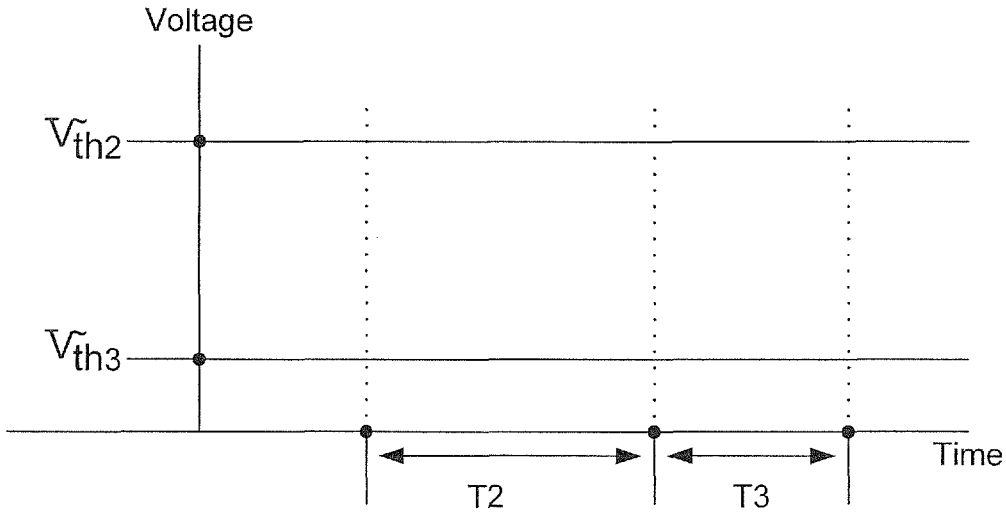

FIG. 3

TELEPHONE WITH AUTOMATIC SWITCHING BETWEEN CELLULAR AND VOIP NETWORKS

CROSS-REFERENCES TO RELATED APPLICATIONS

This Patent Application is a continuation application of co-pending U.S. patent application Ser. No. 14/806,482, filed on Jul. 22, 2015, and entitled "TELEPHONE WITH AUTOMATIC SWITCHING BETWEEN CELLULAR AND VOIP NETWORKS," which is a continuation application of U.S. patent application Ser. No. 13/899,303, filed on May 21, 2013, and entitled "TELEPHONE WITH AUTOMATIC SWITCHING BETWEEN CELLULAR AND VOIP NETWORKS," which is a continuation application of U.S. patent application Ser. No. 13/168,585, filed on Jun. 24, 2011, and entitled "TELEPHONE WITH AUTOMATIC SWITCHING BETWEEN CELLULAR AND VOIP NETWORKS," which is a continuation application of U.S. Pat. No. 7,991,399, filed on Jan. 6, 2005, and entitled "TELEPHONE WITH AUTOMATIC SWITCHING BETWEEN CELLULAR AND VOIP NETWORKS," which claims benefit under 35 USC 119(e) of the filing date of U.S. provisional application No. 60/534,466, filed on Jan. 6, 2004, entitled "Radiotelephone With Automatic Switching Between Cellular And Wi Fi Networks Using Wi-Fi Signal Strength Values." The content of all of the above is incorporated herein by reference in its entirety.

BACKGROUND OF THE INVENTION

A small portion of the radio frequency (RF) spectrum is assigned to each communications carrier. The assigned spectrum, therefore, must be used efficiently in order to allow the maximum number of frequency users to have access to this spectrum. Multiple access modulation techniques have been developed to provide optimum utilizing of the RF spectrum. Examples of such modulation techniques include time division multiple access (TDMA), frequency division multiple access (FDMA), and code division multiple access (CDMA).

There is a wide variance in the performance of wireless networks. A conventional wireless cellular network, covers a relatively large geographical area but provides a relatively low bandwidth. Such wireless networks use regulated portions of the radio spectrum and are shared by many users. The infrastructure costs of wireless networks are relatively high due to the size and complexity of the cellular network equipment.

Other wireless networks, such as CDMA2000-EV-DO/DV networks, offer higher bandwidth and enhanced data services, such as web browsing. However, these networks also pack many users into a relatively small portion of the regulated spectrum. Other types of radio networks are adapted to improve spectral efficiency with increased and smaller coverage areas. For example, an IEEE 802.11x (or Wi-Fi) network may transmit at speeds up to 11 Mbps using a Direct Sequence Spread Spectrum (DSSS) mode or at speeds up to 54 Mbps using an Orthogonal Frequency Division Multiplexing (OFDM) mode.

An access point conforming to an IEEE 802.11x (e.g., IEEE 802.11b) network may cover an area of a few hundred feet in diameter. Each such access point is connected to a larger network (e.g., Internet). In order to cover larger geographical areas, a relatively large number of IEEE 802.11x network access points and a relatively large wireline back haul networks are required. In part, due to the back haul costs, the resulting IEEE 802.11x based network may thus be more expensive to set up and operate than a similarly based wireless network. In other words, many tradeoffs often exist between and among the coverage areas, the maximum bit-rates, and the costs associated with different types of wireless networks.

Demand for high bandwidth and quality of service (QoS) associated with mobile communication devices with full roaming capability is on the rise. One known communication device includes a cellular communication module adapted to enable communication using wireless cellular networks as well as a Wi-Fi communication module adapted to enable communication using a Voice over IP (VoIP) protocol. In such devices, to change the communication mode from cellular to VoIP or vice versa, the user has to manually change the device's setting by, e.g., pressing one ore more keys.

In yet other communication devices known to be under development, to switch the communication mode from, for example, cellular to VoIP, the cellular network first detects the position of the mobile communication device to determine whether the mobile communication device is in a Wi-Fi area. If it so detects, the cellular network sends a switching signal to the mobile communication device to enable the communication to continue the communication using the VoIP protocol. However, obtaining and maintaining accurate position of many mobile communication devices concurrently poses a challenging task. Consequently, in such systems, the switching of the call from cellular to VoIP or vice versa may result in the loss of the call.

BRIEF SUMMARY OF THE INVENTION

In accordance with the present invention, a mobile communication device is configured so as to automatically switch a communication that is already in progress using a wireless cellular network (hereinafter alternatively referred to as cellular network) to a wireless Voice over IP (VoIP) network or vice versa. The mobile communication devices is adapted to include, in part, a cellular communication module, a first antenna adapted to receive and transmit data between the mobile communication module and a cellular network, a Wireless Fidelity (Wi-Fi) communication module, a second antenna adapted to receive and transmit data between the Wi-Fi communication module and a VoIP network, a signal monitoring circuit, and a switching circuit adapted to switch an existing in-progress communication between the cellular communication module and the Wi-Fi communication module. The second antenna and associated circuitry are maintained in on-states continuously to monitor and detect Wi-Fi signals.

If the mobile communication device is in an in-progress (i.e., pre-established) communication via its cellular communication module and through a cellular network, and the Wi-Fi antenna system detects a Wi-Fi signal having a first predefined level (strength), a timer disposed in the mobile communication device is activated to establish a first time window of a first predefined size. If the Wi-Fi signal level detected during the first time window remains equal to or greater than the first predefined level, at the expiration of the first time window, the switching circuit causes the in-progress communication to be switched from its cellular communication module to its Wi-Fi communication module and through a VoIP network without losing the in-progress communication.

In some embodiments, upon activating the timer, the Wi-Fi communication module is caused to change state from a sleep mode, during which the Wi-Fi communication module consumes relatively small amount of power, to a stand-by mode during which the Wi-Fi communication module consumes an intermediate amount of power. Subsequently, before the communication is switched to the Wi-Fi communication module, the Wi-Fi communication module is caused to be placed in a full active mode, during which the Wi-Fi communication module consumes an amount of power larger than the intermediate amount of power.

If the mobile communication device is in a pre-established communication via its Wi-Fi communication module and through a VoIP network, and the Wi-Fi antenna system detects that the level of the received Wi-Fi signal is below a second predefined value, the timer is activated to establish a second time window of a second predefine size. If the Wi-Fi signal level detected during the second time window is equal to or greater than a third predefined value, the pre-established communication via the Wi-Fi communication module is maintained without any change. If the Wi-Fi signal level detected during the second time window is less than the third predefined value, the timer is reset and reactivated to establish a third time window of a third size. If the Wi-Fi signal level detected during the third time window is less than the third predefined value, at the expiration of the third time window, the switching circuit causes the in-progress communication to be switched from its Wi-Fi communication module to its cellular communication module and through a cellular network without losing the in-progress communication.

In some embodiments, upon activating the timer to establish the second time window, the cellular communication module is caused to change state from a sleep mode, during which the cellular communication module consumes relatively small amount of power, to a stand-by mode during which the cellular communication module consumes an intermediate amount of power. Subsequently, before the communication is switched to the Wi-Fi communication module, the cellular communication module is caused to be placed in a full active mode, during which the cellular communication module consumes an amount of power larger than the intermediate amount of power.

In some embodiments, the Wi-Fi communication module is adapted to communicate with an access point of a Wi-Fi local are network using an 802.11x wireless protocol, and the cellular communication module is adapted to communicate with a base station of a wireless cellular network using any one of GSM, CDMA, or CDMA2000 protocols.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a simplified high-level block diagram of a mobile communication device, in accordance with one embodiment of the present invention.

FIG. **2** shows Wi-Fi signal threshold level and timing window used to determine whether to switch a communication from the cellular communication module to the Wi-Fi communication module of the communication device of FIG. **1**, in accordance with one embodiment.

FIG. **3** shows Wi-Fi signal threshold levels and timing windows used to determine whether to switch a communication from the Wi-Fi communication module to the cellular communication module of the communication device of FIG. **1**, in accordance with one embodiment.

DETAILED DESCRIPTION OF THE INVENTION

In accordance with the present invention, a mobile communication device is configured so as to automatically switch an existing communication from a wireless cellular network (hereinafter alternatively referred to as cellular network) to a wireless Voice over IP (VoIP) network, or to switch an existing communication from a VoIP network to a cellular network. It is understood that the Wireless Fidelity (Wi-Fi) signals, as defined, for example, in IEEE 802.11x standards or other equivalent standards may be used to communicate with a Voice over IP (VoIP) network. The mobile communication device is adapted to include, in part, a cellular communication module, a first antenna adapted to receive and transmit data between the mobile communication module and a cellular network, a Wi-Fi communication module, a second antenna adapted to receive and transmit data between the Wi-Fi communication module and a VoIP network, a signal monitoring circuit, and a switching circuit adapted to switch an existing in-progress communication between the cellular communication module and the Wi-Fi communication module. The second antenna and associated circuitry are maintained in on-states continuously to monitor and detect Wi-Fi signals.

It is understood the wireless cellular network includes, in part, a multitude of base stations. Each such base station is adapted to communicate with the mobile communication device when the mobile communication device is located within the coverage area of the base station via RF signals carried over cellular network. It is also understood that each such coverage area is defined by an area centered at the base station and having a radius of, e.g., several miles. It is further understood that a Wi-Fi network may include, in part, a multitude of access points. Each such access point is adapted to communicate with the mobile communication device, when the mobile communication device is located within the coverage area of the access point, via VoIP packets. It is also understood that the mobile communication device may also include blocks adapted for computation and thus be a communication/computation device.

If the mobile communication device is in an in-progress (i.e., pre-established) communication via its cellular communication module and through a cellular network, and the Wi-Fi antenna system detects a Wi-Fi signal having a first predefined level (strength), a timer disposed in the mobile communication device is activated to establish a first time window of a first predefined size. If the Wi-Fi signal level detected during the first time window remains equal to or greater than the first predefined level, at the expiration of the first time window, the switching circuit causes the in-progress communication to be switched from its cellular communication module to its Wi-Fi communication module and through a VoIP network without losing the in-progress communication.

In some embodiments, upon activating the timer, the Wi-Fi communication module is caused to change state from a sleep mode, during which the Wi-Fi communication module consumes relatively small amount of power, to a stand-by mode during which the Wi-Fi communication module consumes an intermediate amount of power. Subsequently, before the communication is switched to the Wi-Fi communication module, the Wi-Fi communication module is caused to be placed in a full active mode, during which the Wi-Fi communication module consumes an amount of power larger than the intermediate amount of power.

If the mobile communication device is in a pre-established communication via its Wi-Fi communication module and through a VoIP network, and the Wi-Fi antenna system detects that the level of the received Wi-Fi signal is below a second predefined value, the timer is activated to establish a second time window of a second predefine size. If the Wi-Fi signal level detected during the second time window is equal to or greater than a third predefined value, the pre-established communication via the Wi-Fi communication module is maintained without any change. If the Wi-Fi signal level detected during the second time window is less than the third predefined value, the timer is reset and reactivated to establish a third time window of a third size. If the Wi-Fi signal level detected during the third time window is less than the third predefined value, at the expiration of the third time window, the switching circuit causes the in-progress communication to be switched from its Wi-Fi communication module to its cellular communication module and through a cellular network without losing the in-progress communication.

In some embodiments, upon activating the timer to establish the second time window, the cellular communication module is caused to change state from a sleep mode, during which the cellular communication module consumes relatively small amount of power, to a stand-by mode during which the cellular communication module consumes an intermediate amount of power. Subsequently, before the communication is switched to the Wi-Fi communication module, the cellular communication module is caused to be placed in a full active mode, during which the cellular communication module consumes an amount of power larger than the intermediate amount of power.

FIG. **1** is a simplified high-level block diagram of a mobile communication device **100**, in accordance with one embodiment of the present invention. Mobile communication device **100**, which is adapted to automatically switch communication between cellular and VoIP networks, is shown as including, in part, a cellular communication module (hereinafter alternatively referred to as cellular module) **3** coupled to a cellular antenna **1**, a Wi-Fi communication module (hereinafter alternatively referred to as Wi-Fi module) **4** coupled to a Wi-Fi antenna **2**, an audio/video amplifier **5**, a network switch unit **6**, a timer unit **7**, a Wi-Fi signal level monitor **8**, a microphone **20**, a speaker **21**, and a display monitor **22**. Mobile communication device **100** is adapted to establish and maintain communication via either a cellular module **3**, through a wireless network (not shown), and/or via Wi-Fi module **4**, through a VoIP network (not shown). Cellular module **3** further includes a transceiver **30** adapted to transmit signal to and receive signal from a cellular network. Wi-Fi module **4** further includes a transceiver **32** adapted to transmit signal to and receive signal from a VoIP network. Depending on the level of detected Wi-Fi signal emitted from a Wi-Fi access point, a call initially established via cellular module **3** may be switched to be handle by Wi-Fi module **4**, or a call initially established via Wi-Fi module **4** may be switched to be handled by cellular module **3**.

Assume that mobile communication device **100** is in communications with a cellular network and is entering the coverage area of a Wi-Fi access point adapted to transmit and receive Wi-Fi signals. As is known, a Wi-Fi access point may be used to gain access to a VoIP network. Wi-Fi antenna **2** together with Wi-Fi module **4** and Wi-Fi signal monitor **8** continuously monitor for to detect Wi-Fi signals. If a detected Wi-Fi signal level is greater than a predefined threshold value V_{th1}, Wi-Fi signal level monitor **8** activates timer **7** via signal line **10** and sends a wake-up signal to network switch unit **6** via signal line **12**, thereby to change the state of network switch unit **6** from a sleep mode, during which network switch unit consumes relatively small power, to a stand-by mode, during which network switch unit consumes an intermediate amount of power. Network switch unit **6**, in turn, supplies wake-up switching signals to cellular module **3** via signal line **15** and to Wi-Fi module **4** via signal line **13**. This causes phone cellular module **3** and Wi-Fi module **4** to activate their respective switching modules. The detected Wi-Fi signal level may be determined, for example, by taking multiple samples of the incoming Wi-Fi signal(s) and computing a signal level from these samples. In one embodiment, an average of the amplitudes/phases of the sampled signals may be used to detect the Wi-Fi signal level.

If the detected Wi-Fi signal level is greater than V_{th1}, timer unit **7** is activated to establish a first time window of a first predefined size T_1, as shown in FIG. **2**. During time window T_1, Wi-Fi antenna **2** together with Wi-Fi module **4** and Wi-Fi signal monitor **8** continue to monitor and detect the level of received Wi-Fi signal. If the Wi-Fi signal level detected during time window T_1 remains equal to or greater than V_{th1}, at the expiration of time window T_1, timer unit **7** sends a cellular tear-down signal and a Wi-Fi link-up signal to the network switch unit **6** via signal line **11**. In response, network switch unit **6** sends the tear-down signal to cellular module **3** via signal line **15**, and sends the link-up signal to Wi-Fi module **4** via signal line **13**. Network switch unit **6** also instructs audio/video amplifier **5**, via signal line **14**, to generate an audio/video alert signal. The generated audio alter signal is subsequently reproduced by speaker **21** via signal line **18**, and the generated video alert signal is subsequently reproduced by display monitor **22** via signal line **23**. The audio/video alert tones are adapted to notify the mobile communication device user of a network switch from cellular to Wi-Fi.

Cellular module **3** is adapted to terminate connection to the cellular network and to switch off connection to audio/video amplifier **5** after receiving the tear-down signal. Wi-Fi module **4** is adapted to activate connection to VoIP network and to switch on connection to audio/video amplifier **5**—for passing voice signal to audio amplifier **5** and video signal to display monitor **22**—after receiving a Wi-Fi link-up signal. The previously established communication link is thus continued uninterrupted via the VoIP network and through loudspeaker **21**, microphone **20** and display monitor **23**.

Assume that mobile communication device **100** is in communications with a VoIP network and may be leaving the coverage area of the Wi-Fi access point. Wi-Fi antenna **2** together with Wi-Fi module **4** and Wi-Fi signal monitor **8** continuously monitor for to detect Wi-Fi signals. If the detected Wi-Fi signal level falls below a second predefined threshold value V_{th2}, Wi-Fi signal level monitor **8** activates timer **7** and sends a wake-up signal to network switch unit **6** to change the state of network switch unit **6** from the sleep mode to stand-by mode. Network switch unit **6**, in turn, supplies wake-up switching signals to cellular module **3** and to Wi-Fi module **4** to enable these modules to activate their respective switching procedures.

Once activated, timer unit **7** establishes a second time window of a second predefined size T_2, as shown in FIG. **3**. During time window T_2, Wi-Fi antenna **2** together with Wi-Fi module **4** and Wi-Fi signal monitor **8** continue to monitor and detect the level of received Wi-Fi signal. If the Wi-Fi signal level detected during time window T_2 is equal to or greater than a third predefined threshold value V_{th3}, where V_{th3} is smaller than V_{th2}, the previously established VoIP communication continues without switching.

If the Wi-Fi signal level detected during time window T_2 is smaller than V_{th3}, at the expiration of time window T_2, timer unit **7** is reset and activated to establishes a third time window of a third predefined size T_3, where T_3 is smaller than T_2. If the Wi-Fi signal level detected during time window T_3 is equal to or greater than V_{th3}, the previously established VoIP communication continues without switching.

If the Wi-Fi signal level detected during time window T_3 is less than V_{th3}, at the expiration of time window T_3, timer unit **7** sends a Wi-Fi tear-down signal and a cellular link-up signal to network switch unit **6**. In response, network switch unit **6** sends the tear-down signal to Wi-Fi module **3**, and sends the link-up signal to cellular module **4**. Network switch unit **6** also instructs audio/video amplifier **5** to generate an audio/video alert signals. The generated audio alter signals is subsequently reproduced by speaker **21**, and the generated video alert signal is subsequently reproduced by display monitor **22**. The audio/video alert tones are adapted to notify the mobile communication device user of a network switch from Wi-Fi to cellular

Wi-Fi module **4** is adapted to terminate connection to the VoIP network and to switch off connection to audio/video amplifier **5** after receiving the tear-down signal. Cellular module **4** is adapted to activate connection to the cellular network and to switch on connection to audio/video amplifier **5** after receiving a Wi-Fi link-up signal. The previously established communication link is thus continued uninterrupted and through loudspeaker **21**, microphone **20** and display monitor **23**.

In accordance with some embodiments, if the mobile communication device detects both an Wi-Fi signal from an access point and a cellular signal from a mobile cellular base station before establishing a communication link, the mobile communication device first attempts to establish communication with the Wi-Fi access point using Wi-Fi module **4**.

The above embodiments of the present invention are illustrative and not limiting. Various alternatives and equivalents are possible. It is understood that the functionality associated with any blocks described above may be centralized or distributed, whether locally or remotely. It is also understood that one or more blocks of each mobile communication device may be performed by hardware, firmware or software, or some combinations thereof. The invention is not limited by the type of cellular network, e.g., CDMA, GSM, otherwise used to carry communication. Nor is the invention limited by the VoIP network. The invention is not limited by the Wi-Fi signals, such as those defined by IEEE 802.11x, where x may be a, b, g, or WiMAX used to carry VoIP communication. The invention is not limited by the type of integrated circuit(s) in which the present invention may be disposed. Nor is the invention limited to any specific type of process technology, e.g., CMOS, Bipolar, or BICMOS that may be used to manufacture the present invention. Other additions, subtractions or modifications are obvious in view of the present invention and are intended to fall within the scope of the appended claims.

What is claimed is:

1. A device comprising:

a switching system to switch operation between a first communication module and a second communication module, wherein during an established communication if a context changes, the established communication is switched to a second communication over a second network, wherein switching is based on detecting a second context being preferred over the context within a set of networks, wherein upon activation of a timer, the switching system causes the second communication module to change state from a sleep mode to an active mode, wherein the timer is activated to establish a time window of a predefined size, wherein if a Wi-Fi signal monitor detects that a Wi-Fi signal level is below a second predefined threshold value V_{th2}, the timer is activated to establish a second time window of a second predefined size T_2, wherein a third predefined threshold value V_{th3} is smaller than V_{th2}.

2. The device of claim **1**, wherein a tear-down signal causes the communication module to go into a sleep mode.

3. The device of claim **1** wherein if during time window T_2, the Wi-Fi signal monitor detects that the Wi-Fi signal level is smaller than V_{th3}, upon expiration of time window T_2, the timer unit is activated to establish a third time window of a third predefined size T_3, where T_3 is smaller than T_2, wherein if during time window T_3 the Wi-Fi signal monitor detects that the Wi-Fi signal level is smaller than V_{th3}, the switching circuit sends a tear-down signal to the Wi-Fi communication module and a link-up signal to the cellular communication module, wherein said tear-down signal causes the Wi-Fi communication module to discontinue handling a previously established communication over the Wi-Fi network and wherein said link-up signal causes the cellular communication module to handle the previously established communication over the Wi-Fi network via a cellular network.

4. The device of claim **3** wherein at the expiration of the predefined time period T_2, the network switching circuit causes the cellular communication module to change state from a sleep mode to an active mode.

5. The device of claim **1**, wherein the communications comprise a telephone call.

6. The device of claim **1**, wherein the communications comprise a transmission of content.

7. The device of claim **6**, wherein the content comprises at least one of fixed and mobile.

8. The device of claim **1**, wherein the communications comprise a data exchange.

9. The device of claim **1** wherein the previously established communication comprises: a cellular communication, a VoIP communication/session, a voice communication/session, a video communication/session, a multimedia communication/session, a data communication/session, a SIP or IMS based communication and/or a WiFi communication.

10. The device of claim **9** wherein the previously established communication is proprietary or standard.

11. The device of claim **1** wherein the established communication comprises a cellular communication or a WiFi communication, and the second communication comprises a cellular communication or a WiFi communication.

12. A method comprising:

determining a first context;

activating a timer to establish a first time window of a first predefined size T_1 based on the detected first context;

determining a second context during the first time window;

automatically switching a communication in progress via a wireless network to a communication via a Wi-Fi network based on the second detected context;

detecting a third context;

establishing a second time window of a second predefined size T_2 if the third detected context falls below a second predefined threshold value V_{th2};

detecting a fourth context during the second time window; and

continuing a Wi-Fi communication without change if the fourth detected context is equal to or greater than a third predefined threshold value V_{th3}, wherein V_{th3} is smaller than V_{th2}.

13. The method of claim **12**, wherein the communication comprises a telephone call.

14. The method of claim **12**, wherein the communication comprises a transmission of content.

15. The method of claim **14**, wherein the content comprises at least one of fixed and mobile.

16. The method of claim **12** wherein the determining and switching are performed, in part, by a mobile communication device.

17. The method of claim **12** wherein the determining and switching are performed, in part, by a server.

18. The method of claim **17** wherein the server comprises a network-based device.

19. The method of claim **17** wherein the server comprises a switch and/or router.

20. The method of claim **17** wherein the server comprises a network-based switch and/or router.

21. The method of claim **17** wherein the server comprises an access point or a base station.

22. The method of claim **17** wherein the server comprises software, firmware and/or hardware.

23. A mobile communication device comprising:

a first communication module adapted to communicate with a first wireless network;

a second communication module adapted to communicate with an access point associated with a second network; and

a switching system to switch operation between the first communication module and the second communication module, wherein if a context changes, the second communication module is activated and a second communication type is initiated, wherein if the context does not change, the second communication type is continued without switching, wherein switching is based on detecting a second context being preferred over the context within a set of known networks or from a newly discovered network, wherein upon activation of a timer, the switching system causes the second communication module to change state from a sleep mode to an active mode, wherein the timer is activated to establish a time window of a predefined size, wherein if a Wi-Fi signal monitor detects that a Wi-Fi signal level is below a second predefined threshold value V_{th2}, the timer is activated to establish a second time window of a second predefined size T_2, wherein a third predefined threshold value V_{th3} is smaller than V_{th2}.

24. The mobile communication device of claim **23**, wherein the first communication module comprises a first Wi-Fi communication module, and the first wireless network comprises a first Wi-Fi network access point.

25. The mobile communication device of claim **24**, wherein the second communication module comprises a second Wi-Fi communication module, and the second wireless network comprises a second Wi-Fi network access point.

26. The mobile communication device of claim **23**, wherein the communication comprises a telephone call.

27. The mobile communication device of claim **23**, wherein the communication comprises a transmission of content.

28. The mobile communication device of claim **27**, wherein the content comprises at least one of fixed and mobile.

29. The mobile communication device of claim **23**, wherein the communication comprises a data exchange.

30. The mobile communication device of claim **23** wherein the context comprises a signal level.

31. A method comprising:

determining, with a server, a first signal level;

activating, with the server, a timer to establish a first time window of a first predefined size T_1 if the detected first signal level is greater than a first predefined threshold value;

determining, with the server, a second signal level during the first time window;

if the second detected signal level falls below the first predefined threshold value, then searching for alternative Wi-Fi signals having signal level above the first predefined threshold value, with the server;

if an alternative signal level is above the first predefined threshold value, then switching a Wi-Fi communication in progress to a source of the alternative Wi-Fi signal, with the server; and

if no alternative signal level is above the first predefined threshold value, then switching a Wi-Fi communication in progress to the wireless network, with the server, wherein if a signal monitor detects that the alternative signal level is below a second predefined threshold value, a timer is activated to establish a second time window of a second predefined size, wherein a third predefined threshold value is smaller than a second predefined threshold value.

32. The method of claim **31**, further comprising:

continuing a Wi-Fi communication without change if the second detected signal is equal to or greater than the first predefined threshold value.

33. The method of claim **31**, wherein the communication comprises a telephone call.

34. The method of claim **31**, wherein the communication comprises a transmission of content.

35. The method of claim **34**, wherein the content comprises at least one of fixed and mobile.

36. The method of claim **31**, wherein the communication comprises a data exchange.

37. A device comprising:

a switching system to switch operation between a first communication module and a second communication module, wherein during an established communication if a monitor detects that a context changes, the established communication is switched to a second communication over a network, wherein switching is based on detecting a second context being preferred over the context within a set of known networks, wherein upon activation of a timer, the switching system causes the second communication module to change state from a sleep mode to an active mode, wherein the timer is activated to establish a time window of a predefined size, wherein if the monitor detects that a signal level is below a second predefined threshold value V_{th2}, the timer is activated to establish a second time window of a second predefined size T_2, wherein a third predefined threshold value V_{th3} is smaller than V_{th2}.

38. The device of claim **37** wherein the network is operated by a different network provider.

39. The device of claim **37** wherein the network includes a plurality of access points, and the established communication is switched between the plurality of access points.

40. The device of claim **37** wherein the device comprises a terminal, a mobile device, a sensor, an access point, and/or a controller device.

41. The device of claim 37 wherein the first communication comprises a first WiFi communication and the second communication comprises a second WiFi communication.

42. The device of claim 37 wherein the first communication comprises a first cellular communication and the second communication comprises a second cellular communication.

43. The device of claim 37 wherein the first communication comprises a cellular communication and the second communication comprises a WiFi communication, or the first communication comprises the WiFi communication and the second communication comprises the cellular communication.

44. The device of claim 37 wherein the first communication and the second communication comprise at least one of: a cellular communication, a VoIP communication/session, a voice communication/session, a video communication/session, a multimedia communication/session, a data communication/session, a SIP or IMS based communication and/or a WiFi communication.

45. A method comprising:

monitoring a context of a first communication link;

when a network is detected as available with a second communication link with a context preferable to the first communication link, notifying an interface server and establishing the second communication link between the interface server and an end destination device without disrupting the first communication link; and

re-directing the second communication link from the interface server to a mobile communication device, thereby establishing the second communication link between the communication device and a second network, wherein upon activation of a timer, a switching system causes a second communication module to change state from a sleep mode to an active mode, wherein the timer is activated to establish a time window of a predefined size, wherein if a Wi-Fi signal monitor detects that a Wi-Fi signal level is below a second predefined threshold value V_{th2}, the timer is activated to establish a second time window of a second predefined size T_2, wherein a third predefined threshold value V_{th3} is smaller than V_{th2}.

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