

processors or DSP (Digital Signal Processing) components in addition to memory units to facilitate signal processing and/or protocol processing of related standards, etc.

[0085] Radio Frequency (RF)/Intermediate Frequency (IF) Subsystem is a portable radio unit with open interface to the main functional units of the integrated terminal of the present invention. This separate open radio subsystem is necessary to support various wireless standards running in different frequency bands, wherein the user may change this radio part in case of needs. Additionally, this open radio subsystem supports new wireless transceiver technologies, for example, smart antennas, MIMO (Multiple Input, Multiple Output), High efficiency power amplifiers, Improved RF modules allowing higher operating frequencies and improved receiver sensitivity, etc, but not intended to be limited to such technologies.

[0086] FIG. 2 shows the Call Processing Management System in Mobile Switching Center (MSC) or Mobile Gateway, associated with the integrated terminal of the present invention, wherein the key control procedures are:

[0087] The Connection Table (Conn_Table) is frequently updated by the integrated terminal, as set forth above, through specific network connections, wherein "Visitor IP address" is reported in case of wired network connection or short range wireless access connection (for example, WLAN or WPAN). If there are no such IP connections available with the aforementioned integrated terminal, the MSC, as set forth above, together with related base stations, communicates with this integrated terminal over mobile cellular networks, for example, CDMA networks or TDMA networks, but not limited thereto.

[0088] When an incoming mobile call request is received, the aforementioned MSC searches the Connection Table associated with the called integrated terminal (or destination terminal in this case) of the present invention. If a Visitor IP address is found, the MSC dials or re-synchronize this IP address, through IP Switch in MSC (or other IP system in different infrastructure), to establish the IP connection accordingly. If this Visitor IP address is not available, and the regular mobile cellular channel (for example, CDMA or TDMA) is found and associated with the called destination terminal number, the MSC connects the related base station to establish the communication with the destination terminal, as set forth above, over the mobile cellular air link/channel. This mobile cellular channel can be either static channel or dynamically assigned channel to optimize the wireless spectrum utilization.

[0089] However, it is emphasized that the system and method of the present invention utilizes the terms "MSC, Mobile Gateway, base station, etc", which in the context of the present invention, is meant to include the aforementioned existing CDMA system and TDMA/GSM system, or any other mobile communication infrastructure utilizing different network topology and/or network architecture with different terms which may or may not have all of the functional characteristics of existing CDMA or TDMA standards. As such, the system and method of the present invention is not meant to be limited to current mobile cellular communication infrastructure, and the subsequent specific description utilization and explanation of certain characteristics previously recited as being characteristics of a MSC or base station or Mobile Gateway are not intended to be limited to such technology.

[0090] If after searching the Connection Table, as set forth above, both Visitor IP address and mobile cellular channel (including CDMA or TDMA channel) are not found, the aforementioned MSC has to forward the incoming call, over IP connection through possible IP Switch for example, to the user's Virtual Mobile Server (User Home Computer Server with Internet connection), wherein a fixed Home IP address is stored in the aforementioned Connection Table.

[0091] Therefore, the call processing management system in MSC (or Mobile Gateway in packet mobile core networks) of the present invention is a minimum modification of the existing mobile communication infrastructure, wherein only the aforementioned Connection Table is updated, and a VoIP interface unit is employed for any voice call over the IP connection.

[0092] FIG. 3 describes the network access control method in the integrated terminal of the present invention, wherein a Wired/W-LAN/GSM/CDMA 4-in-1 integrated terminal is discussed for example.

[0093] After the integrated terminal is powered on, the system of the present invention automatically searches for available network accesses based on criteria and parameters of different communication standards. If a wired Internet connection is found, the integrated terminal of the present invention connects directly to the IP Switch (or other IP system in different communication infrastructure) in the aforementioned Mobile Switching Center (MSC), and sends the "Visitor IP Address", obtained from the local Internet access point, to the aforementioned Connection Table in MSC and sets the "Visitor IP" mode accordingly. Then, the connection may be established through the IP protocol, and the integrated terminal of the present invention becomes synchronized with the aforementioned MSC.

[0094] If the wired Internet connection is not available, the integrated terminal of the present invention searches for Wireless LAN (WLAN) access in the local short range area. Since WLAN is only the wireless extension of the wired network in a short range area, if such WLAN access is found, the integrated terminal of the present invention repeats the same procedures, as set forth above, to connect to the aforementioned MSC in the same manner as it does to the wired network.

[0095] If both wired network and WLAN are not available, the integrated terminal of the present invention switches back to the mobile cellular mode, for example GSM/TDMA mode or CDMA mode, wherein the specific base station is connected over the specific air channel link.

[0096] The aforementioned network access control of the integrated terminal of the present invention is in the priority order of Wired network, WLAN, GSM and CDMA, for example, to maximize the wireless spectrum utilization and broadband services. However, this access control order can be re-defined by the user with the integrated terminal of the present invention. Additionally, the system and the method of the present invention has the function to frequently search for the higher priority network access mode whenever the connection is in the low priority mode to optimize the network access control for the integrated terminal of the present invention.

[0097] It is emphasized again that the integrated terminal of the present invention utilizes the examples of "Wired/