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(54) **METHOD AND APPARATUS FOR PROCESSING IN A CONNECTED STATE BY AN ACCESS TERMINAL AND ACCESS NETWORK IN WIRELESS COMMUNICATION SYSTEMS**

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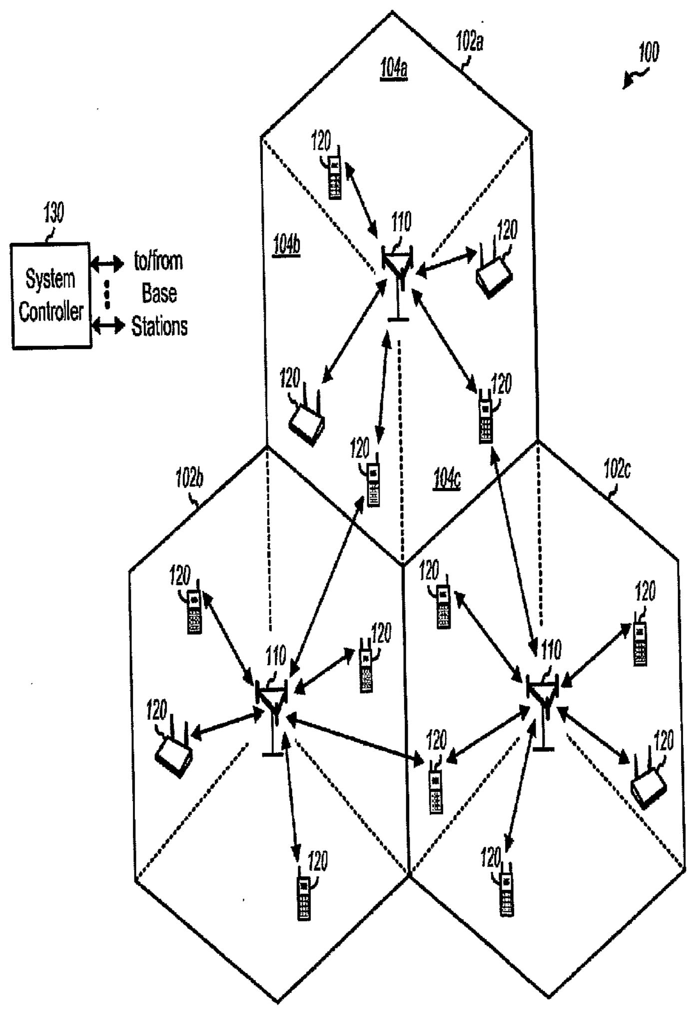
(57) **ABSTRACT**

A method and apparatus for processing on entering a Connected State by an access terminal and an access network is provided comprising issuing a ConnectedState.Activate command and an ActiveSetManagement.Open command, determining whether protocol receives an indication and determining whether protocol receives a Redirect message.



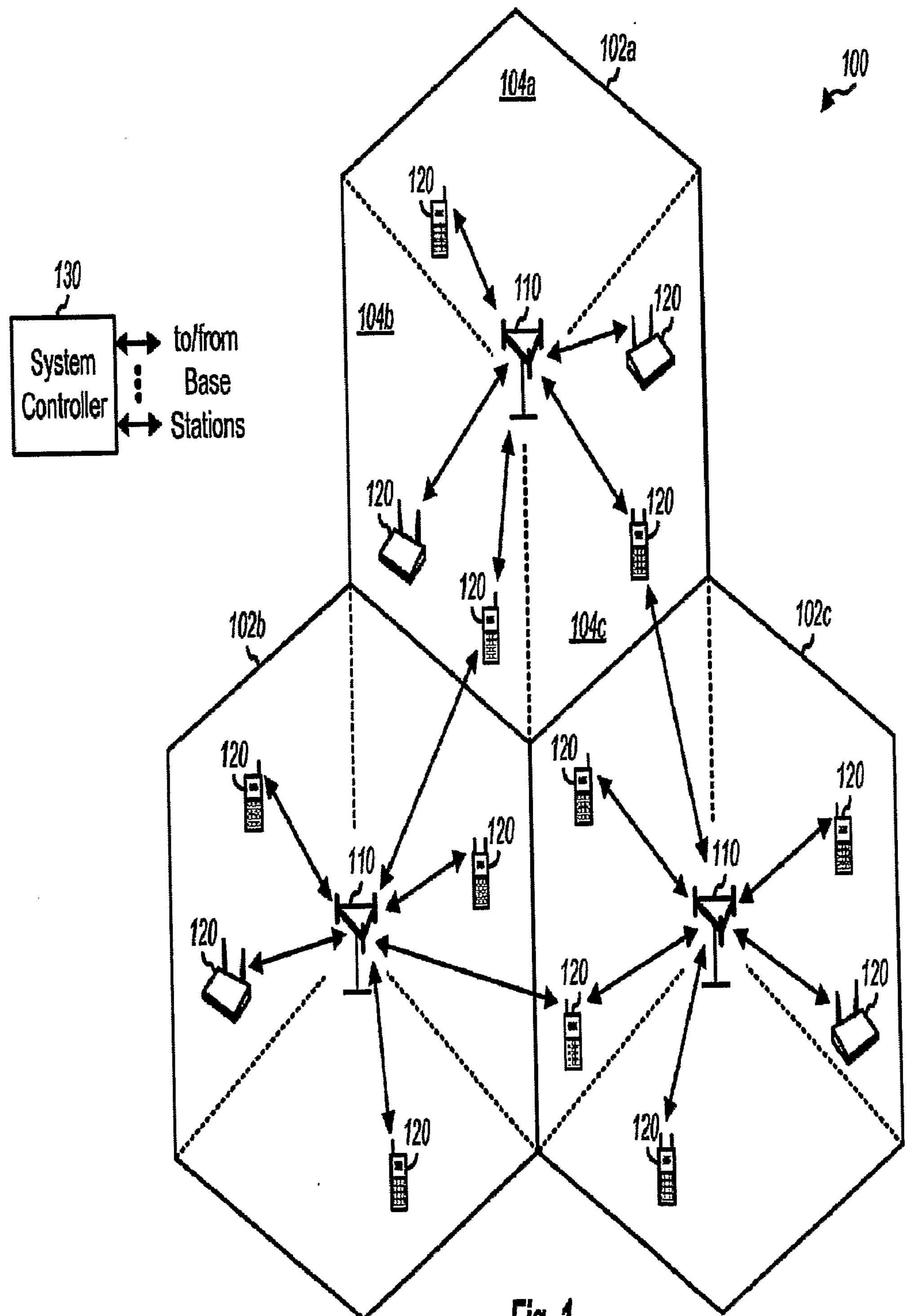

100
102a
104a
104b
104c
102b
102c
110
120
130
System Controller
to/from Base Stations

Fig. 1

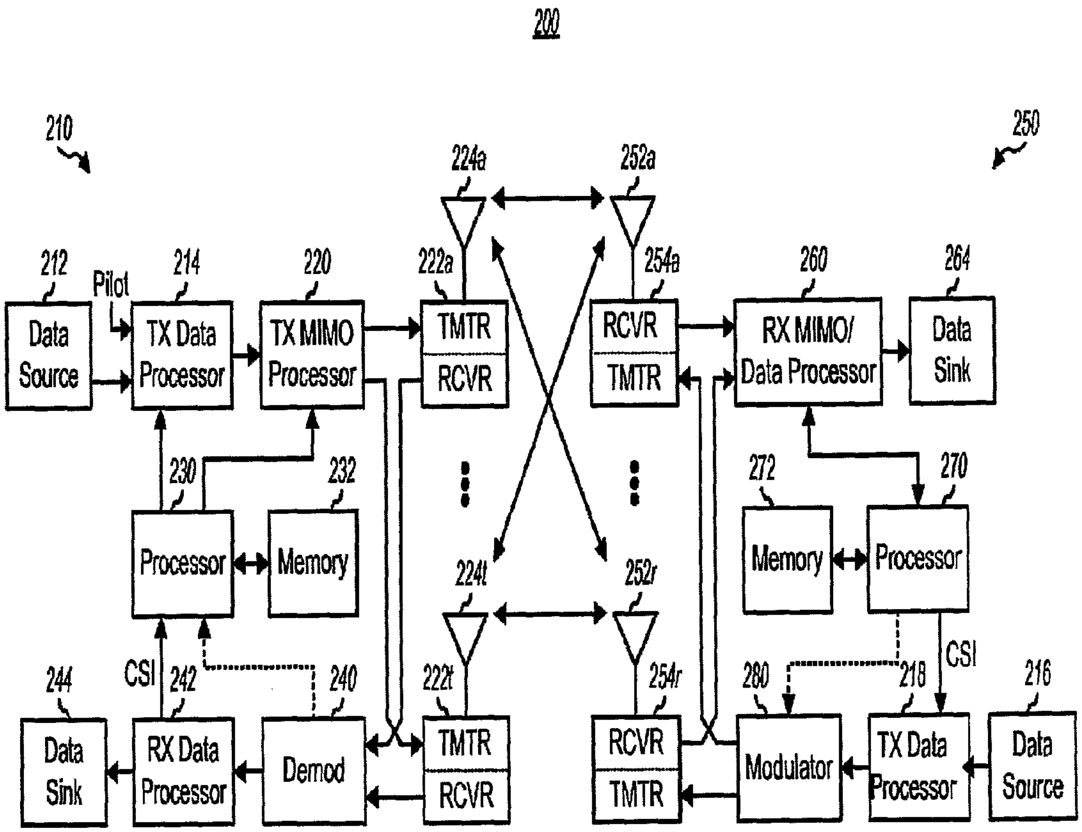

200
210
250
224a
252a
212
Pilot
214
220
222a
254a
260
264
Data Source
TX Data Processor
TX MIMO Processor
TMTR
RCVR
RCVR
TMTR
RX MIMO/ Data Processor
Data Sink
230
232
272
270
Processor
Memory
Memory
Processor
224t
252r
244
CSI
242
240
222t
254r
280
218
CSI
216
Data Sink
RX Data Processor
Demod
TMTR
RCVR
RCVR
TMTR
Modulator
TX Data Processor
Data Source

Fig 2

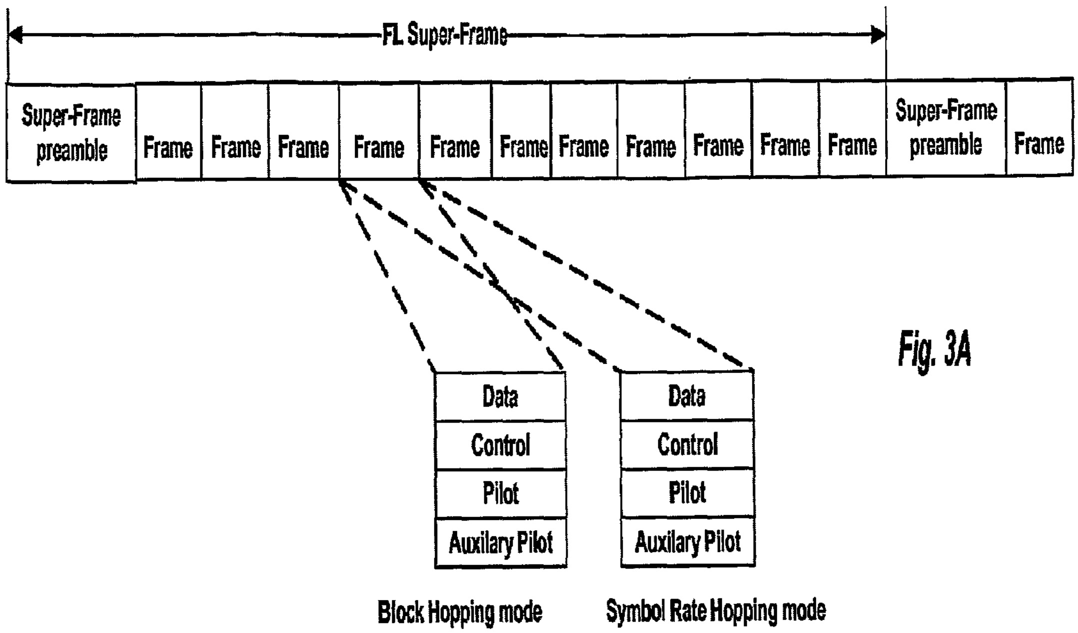

FL Super-Frame
Super-Frame preamble
Frame
Frame
Frame
Frame
Frame
Frame
Frame
Frame
Frame
Frame
Frame
Super-Frame preamble
Frame
Data
Control
Pilot
Auxilary Pilot
Data
Control
Pilot
Auxilary Pilot
Block Hopping mode
Symbol Rate Hopping mode

Fig. 3A

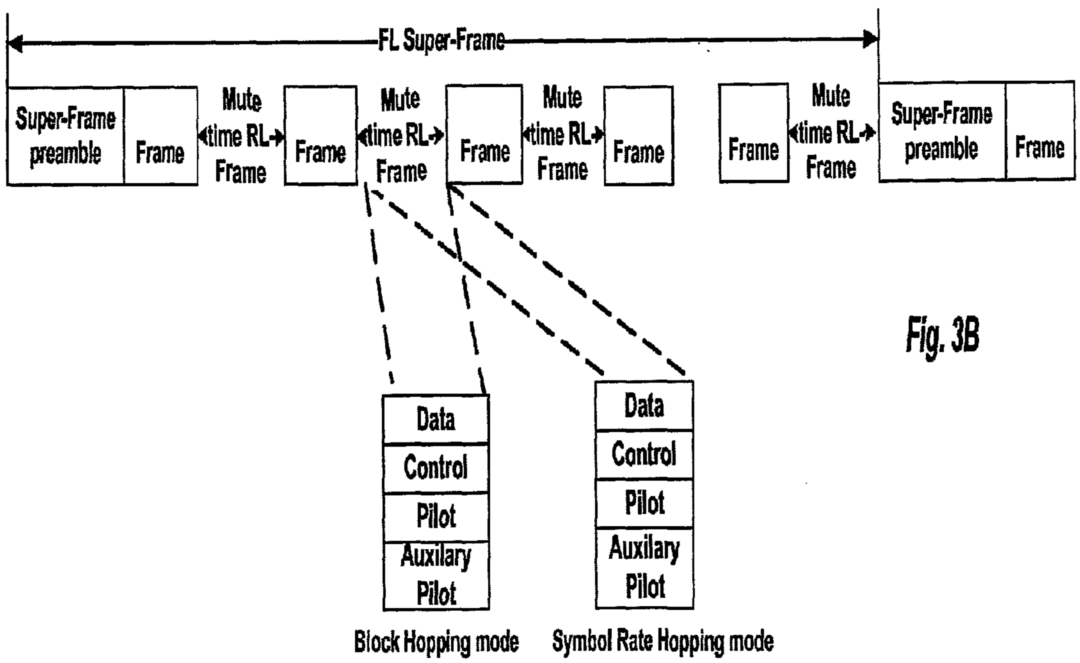

FL Super-Frame
Super-Frame preamble
Frame
Mute time RL Frame
Frame
Mute time RL Frame
Frame
Mute time RL Frame
Frame
Frame
Mute time RL Frame
Super-Frame preamble
Frame
Data
Control
Pilot
Auxilary Pilot
Data
Control
Pilot
Auxilary Pilot
Block Hopping mode
Symbol Rate Hopping mode

Fig. 3B

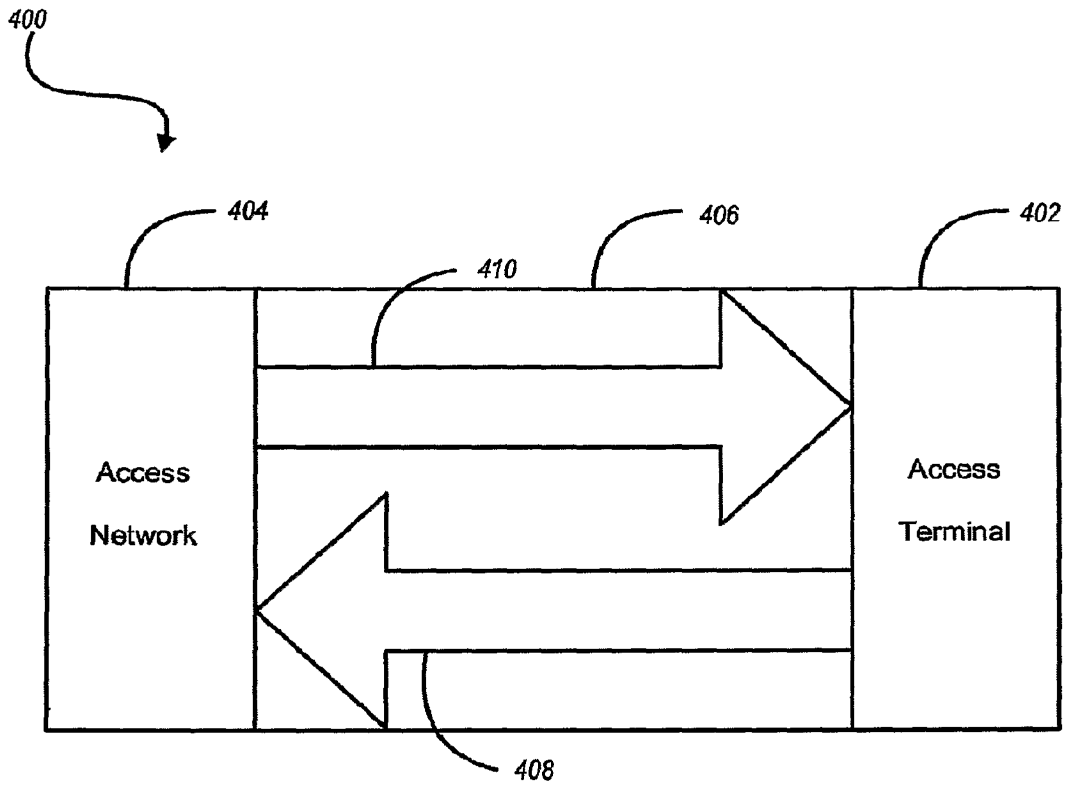


Fig. 4A

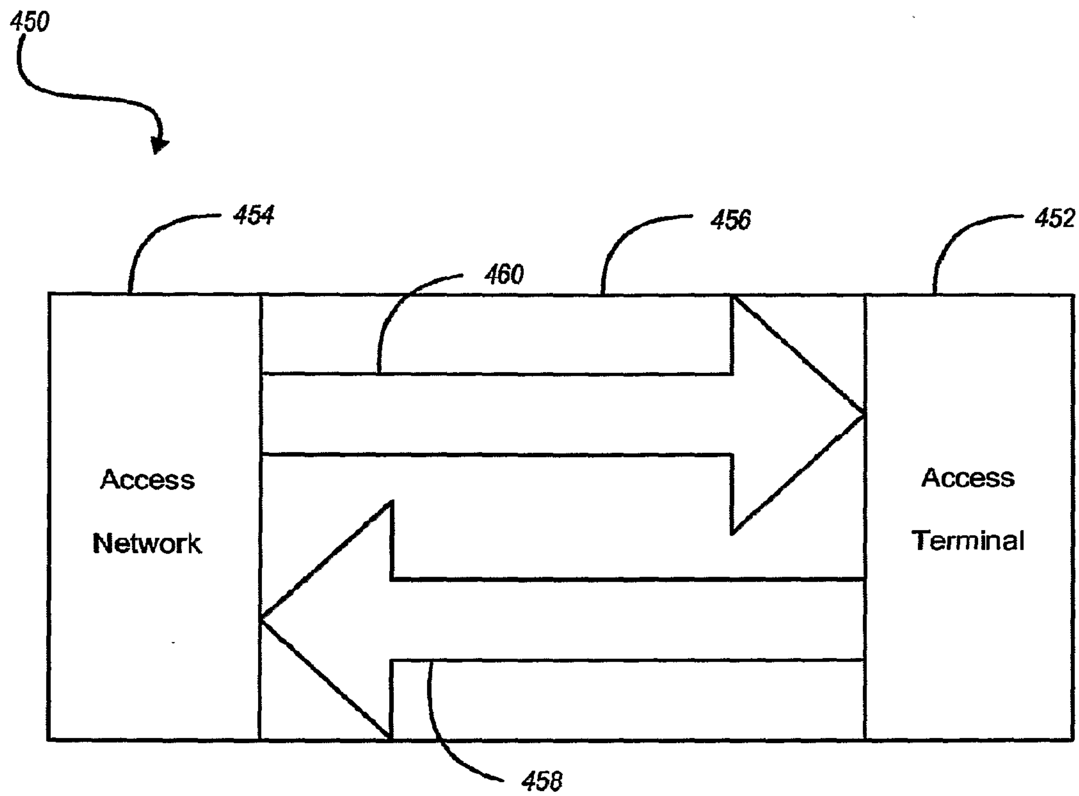


Fig. 4B

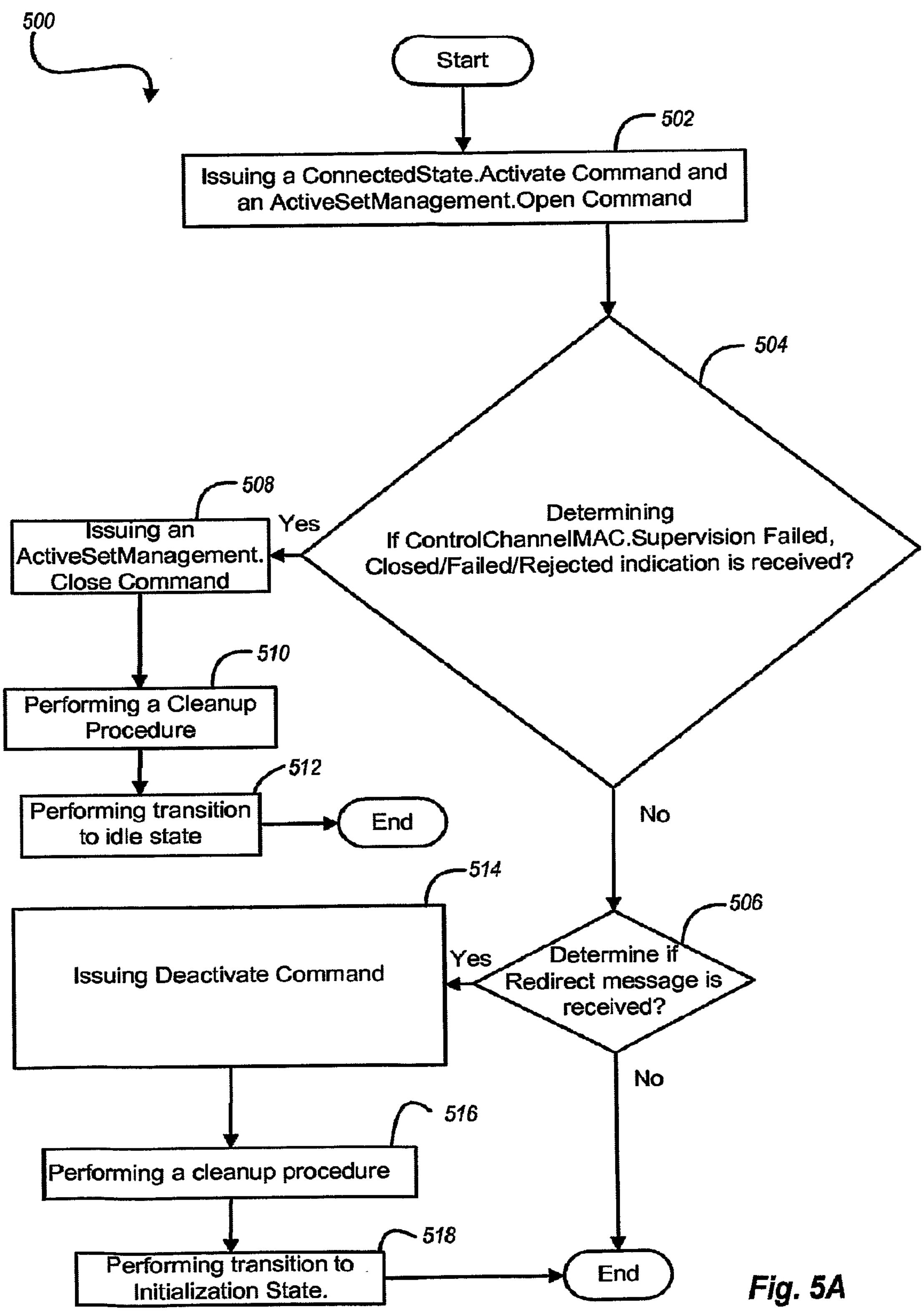

500
Start
502
Issuing a ConnectedState.Activate Command and an ActiveSetManagement.Open Command
504
Determining If ControlChannelMAC.Supervision Failed, Closed/Failed/Rejected indication is received?
Yes
508
Issuing an ActiveSetManagement. Close Command
510
Performing a Cleanup Procedure
512
Performing transition to idle state
End
No
514
Issuing Deactivate Command
Yes
506
Determine if Redirect message is received?
No
516
Performing a cleanup procedure
518
Performing transition to Initialization State.
End

Fig. 5A

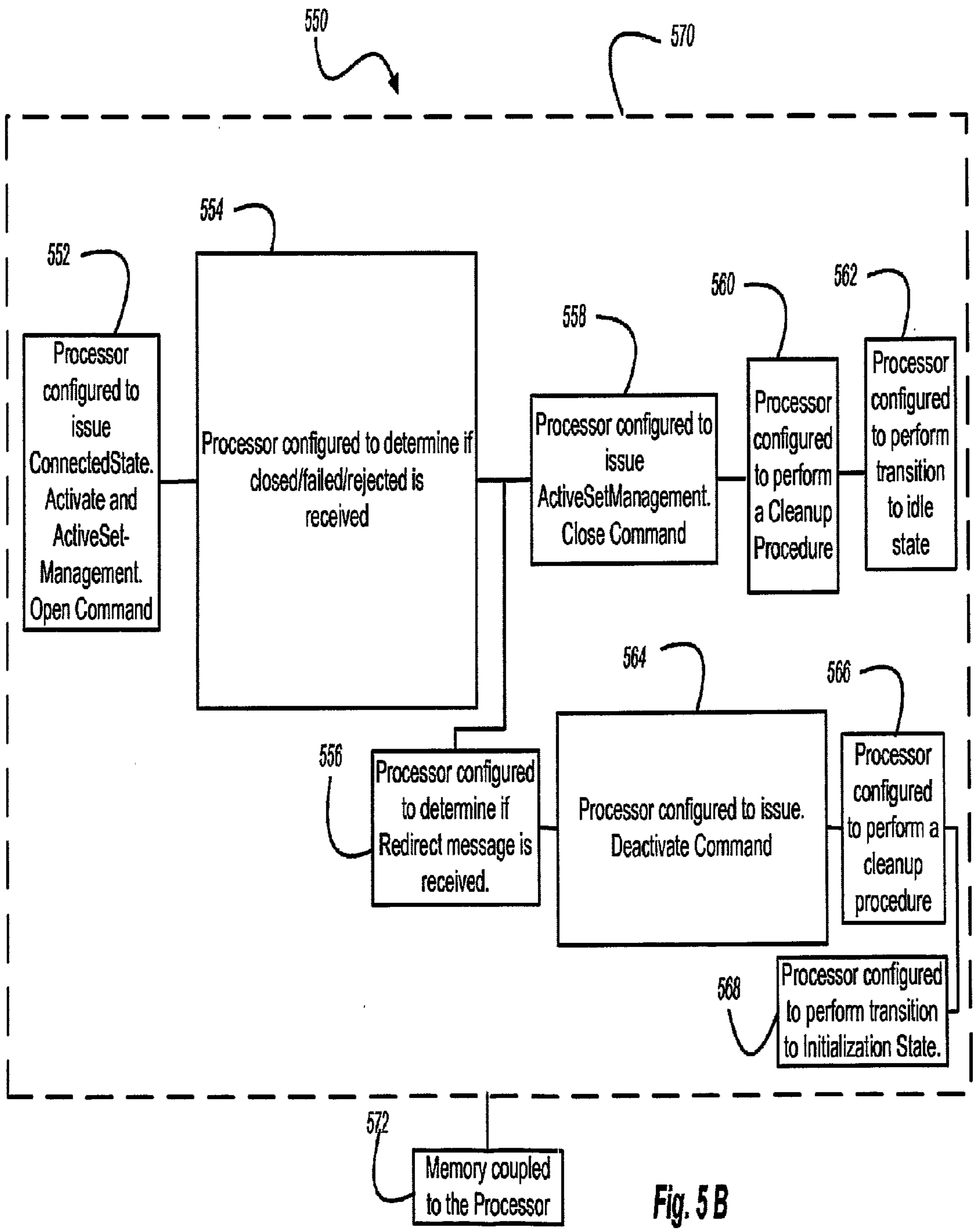

550
570
552
Processor configured to issue ConnectedState. Activate and ActiveSet-Management. Open Command
554
Processor configured to determine if closed/failed/rejected is received
558
Processor configured to issue ActiveSetManagement. Close Command
560
Processor configured to perform a Cleanup Procedure
562
Processor configured to perform transition to idle state
556
Processor configured to determine if Redirect message is received.
564
Processor configured to issue. Deactivate Command
566
Processor configured to perform a cleanup procedure
568
Processor configured to perform transition to Initialization State.
572
Memory coupled to the Processor

Fig. 5 B

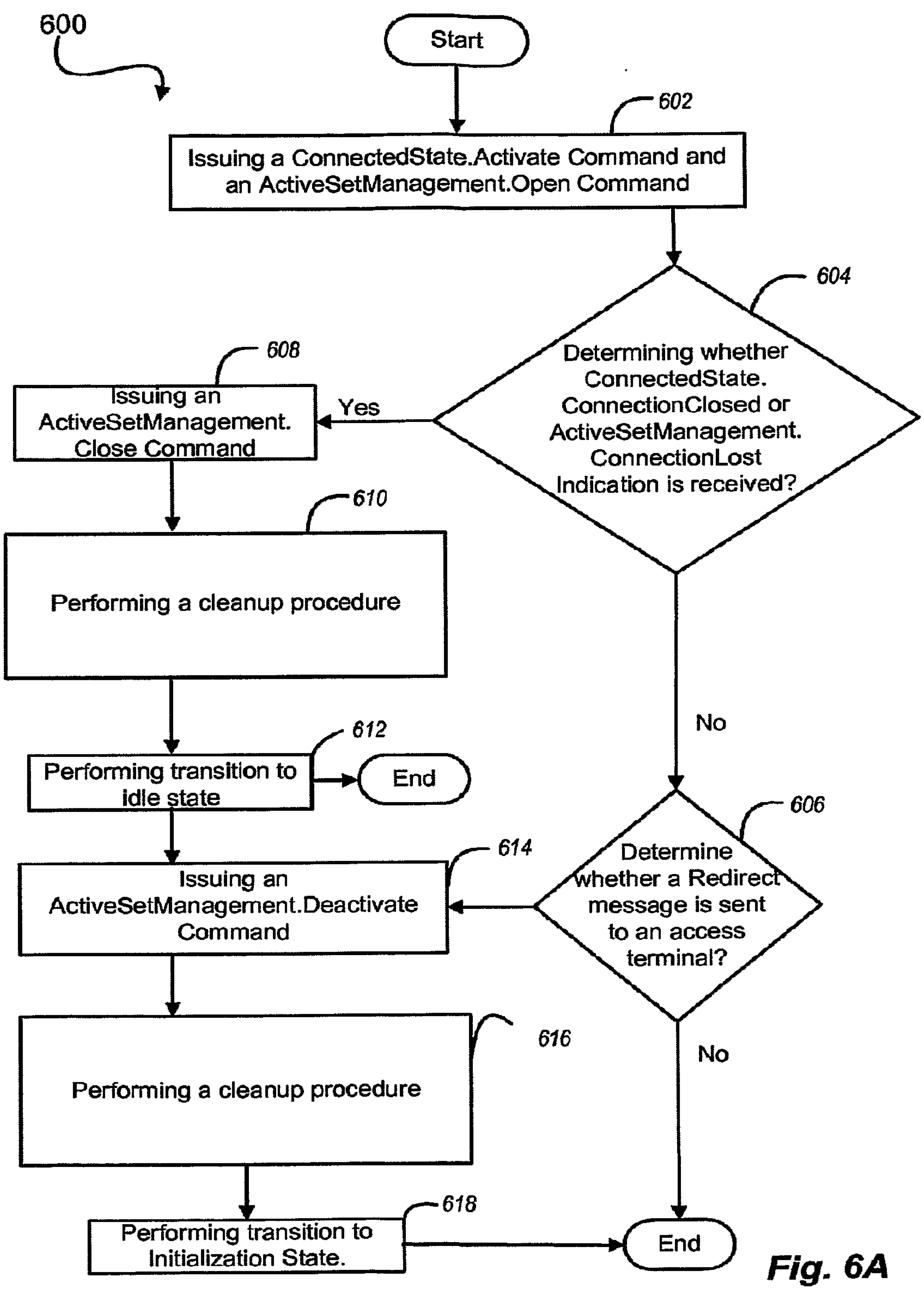

600
Start
602
Issuing a ConnectedState.Activate Command and an ActiveSetManagement.Open Command
604
Determining whether ConnectedState. ConnectionClosed or ActiveSetManagement. ConnectionLost Indication is received?
Yes
608
Issuing an ActiveSetManagement. Close Command
610
Performing a cleanup procedure
612
Performing transition to idle state
End
No
606
Determine whether a Redirect message is sent to an access terminal?
614
Issuing an ActiveSetManagement.Deactivate Command
616
Performing a cleanup procedure
No
618
Performing transition to Initialization State.
End

Fig. 6A

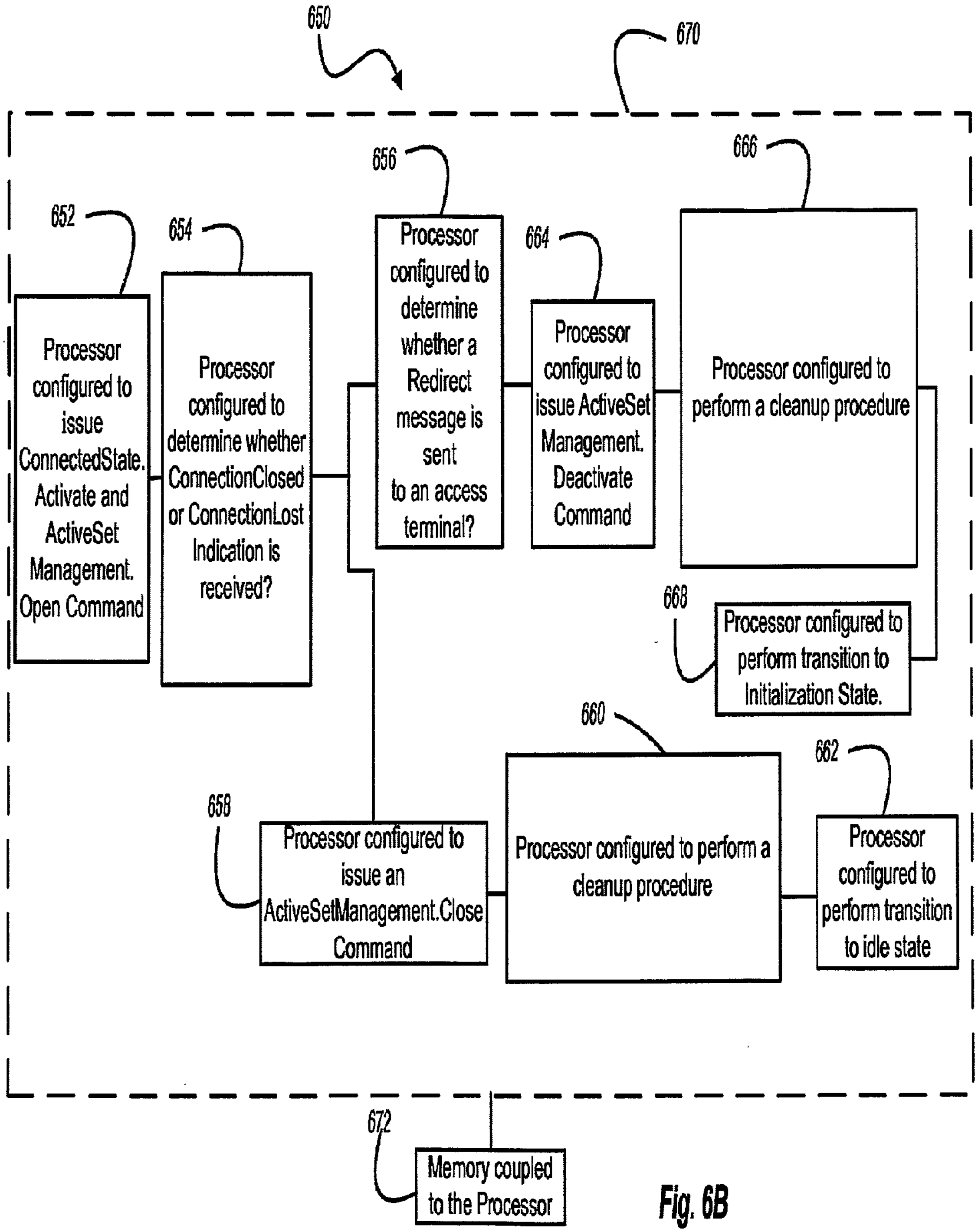

650
670
652
Processor configured to issue ConnectedState. Activate and ActiveSet Management. Open Command
654
Processor configured to determine whether ConnectionClosed or ConnectionLost Indication is received?
656
Processor configured to determine whether a Redirect message is sent to an access terminal?
664
Processor configured to issue ActiveSet Management. Deactivate Command
666
Processor configured to perform a cleanup procedure
668
Processor configured to perform transition to Initialization State.
660
Processor configured to perform a cleanup procedure
662
Processor configured to perform transition to idle state
658
Processor configured to issue an ActiveSetManagement.Close Command
672
Memory coupled to the Processor

Fig. 6B

METHOD AND APPARATUS FOR PROCESSING IN A CONNECTED STATE BY AN ACCESS TERMINAL AND ACCESS NETWORK IN WIRELESS COMMUNICATION SYSTEMS

CLAIM OF PRIORITY UNDER 35 U.S.C.S. 119

[0001] The present application for patent claims priority to Provisional Application Ser. No. 60/731,126, entitled "METHOD AND APPARATUS FOR PROVIDING MOBILE BROADBAND WIRELESS LOWER MAC", filed Oct. 27, 2005, assigned to the assignee hereof, and expressly incorporated herein by reference.

BACKGROUND

[0002] 1. Field

[0003] The present disclosure relates generally to wireless communications and more particularly to methods and apparatus for processing a connected state by an access network or an access terminal.

[0004] 2. Background

[0005] Wireless communication systems have become a prevalent means by which a majority of people worldwide have come to communicate. Wireless communication devices have become smaller and more powerful in order to meet consumer needs and to improve portability and convenience. The increase in processing power in mobile devices such as cellular telephones has lead to an increase in demands on wireless network transmission systems. Such systems typically are not as easily updated as the cellular devices that communicate there over. As mobile device capabilities expand, it can be difficult to maintain an older wireless network system in a manner that facilitates fully exploiting new and improved wireless device capabilities.

[0006] Wireless communication systems generally utilize different approaches to generate transmission resources in the form of channels. These systems may be code division multiplexing (CDM) systems, frequency division multiplexing (FDM) systems, and time division multiplexing (TDM) systems. One commonly utilized variant of FDM is orthogonal frequency division multiplexing (OFDM) that effectively partitions the overall system bandwidth into multiple orthogonal subcarriers. These subcarriers may also be referred to as tones, bins, and frequency channels. Each subcarrier can be modulated with data. With time division based techniques, a each subcarrier can comprise a portion of sequential time slices or time slots. Each user may be provided with a one or more time slot and subcarrier combinations for transmitting and receiving information in a defined burst period or frame. The hopping schemes may generally be a symbol rate hopping scheme or a block hopping scheme.

[0007] Code division based techniques typically transmit data over a number of frequencies available at any time in a range. In general, data is digitized and spread over available bandwidth, wherein multiple users can be overlaid on the channel and respective users can be assigned a unique sequence code. Users can transmit in the same wide-band chunk of spectrum, wherein each user's signal is spread over the entire bandwidth by its respective unique spreading code. This technique can provide for sharing, wherein one or more users can concurrently transmit and receive. Such sharing can be achieved through spread spectrum digital modulation, wherein a user's stream of bits is encoded and spread across a very wide channel in a pseudo-random fashion. The receiver is designed to recognize the associated unique sequence code and undo the randomization in order to collect the bits for a particular user in a coherent manner.

[0008] A typical wireless communication network (e.g., employing frequency, time, and/or code division techniques) includes one or more base stations that provide a coverage area and one or more mobile (e.g., wireless) terminals that can transmit and receive data within the coverage area. A typical base station can simultaneously transmit multiple data streams for broadcast, multicast, and/or unicast services, wherein a data stream is a stream of data that can be of independent reception interest to a mobile terminal. A mobile terminal within the coverage area of that base station can be interested in receiving one, more than one or all the data streams transmitted from the base station. Likewise, a mobile terminal can transmit data to the base station or another mobile terminal. In these systems the bandwidth and other system resources are assigned utilizing a scheduler.

[0009] The signals, signal formats, signal exchanges, methods, processes, and techniques disclosed herein provide several advantages over known approaches. These include, for example, reduced signaling overhead, improved system throughput, increased signaling flexibility, reduced information processing, reduced transmission bandwidth, reduced bit processing, increased robustness, improved efficiency, and reduced transmission power

SUMMARY

[0010] The following presents a simplified summary of one or more aspects in order to provide a basic understanding of such aspects. This summary is not an extensive overview of all contemplated aspects, and is intended to neither identify key or critical elements of all aspects nor delineate the scope of any or all aspects. Its sole purpose is to present some concepts of one or more aspects in a simplified form as a prelude to the more detailed description that is presented later.

[0011] According to an embodiment, a method is provided for processing a connected state by an access terminal, the method comprising issuing a ConnectedState.Activate command and issuing an ActiveSetManagement.Open command, determining whether a ConnectedState.ConnectionClosed, an OverheadMessages.Supervision Failed, a ControlChannelMAC.SupervisionFailed, a ActiveSetManagement.AssignmentRejected, or a ForwardTrafficChannelMAC.SupervisionFailed indication is received, determining whether protocol receives a Redirect message, issuing an ActiveSetManagement.Close command, performing a clean up procedure and performing transition to idle state on receiving at least one of the ConnectedState.ConnectionClosed, the OverheadMessages.Supervision Failed, the ControlChannelMAC.SupervisionFailed, the ActiveSetManagement.AssignmentRejected, or the ForwardTrafficChannelMAC.SupervisionFailed indication.

[0012] According to another embodiment, a computer-readable medium is described having a first set of instructions for issuing a ConnectedState.Activate command and issuing an ActiveSetManagement.Open command, a second set of instructions for determining whether a ConnectedState.ConnectionClosed, an OverheadMessages.Supervision Failed, a ControlChannelMAC.SupervisionFailed, a ActiveSetManagement.AssignmentRejected, or a ForwardTrafficChannelMAC.SupervisionFailed indication is received, a third set of instructions for determining whether protocol receives a

Redirect message, and a fourth set of instructions for issuing an ActiveSetManagement.Close command, performing a clean up procedure and performing transition to idle state on receiving at least one of the ConnectedState.ConnectionClosed, the OverheadMessages.Supervision Failed, the ControlChannelMAC.SupervisionFailed, the ActiveSetManagement.AssignmentRejected, or the ForwardTrafficChannelMAC.SupervisionFailed indication.

[0013] According to yet another embodiment, an apparatus operable in a wireless communication system is described which includes means for issuing a ConnectedState.Activate command and issuing an ActiveSetManagement.Open command, means for determining whether a ConnectedState.ConnectionClosed, an OverheadMessages.Supervision Failed, a ControlChannelMAC.SupervisionFailed, a ActiveSetManagement.AssignmentRejected, or a ForwardTrafficChannelMAC.SupervisionFailed indication is received, means for determining whether protocol receives a Redirect message, and means for issuing an ActiveSetManagement.Close command, performing a clean up procedure and performing transition to idle state on receiving at least one of the ConnectedState.ConnectionClosed, the OverheadMessages.Supervision Failed, the ControlChannelMAC.SupervisionFailed, the ActiveSetManagement.AssignmentRejected, or the ForwardTrafficChannelMAC.SupervisionFailed indication.

[0014] According to yet another embodiment, a method is provided for processing a connected state by an access network, the method comprising issuing a ConnectedState.Activate command and issuing an ActiveSetManagement.Open command, determining whether protocol receives a ConnectedState.ConnectionClosed or an ActiveSetManagement.ConnectionLost indication, determining whether a Redirect message is sent to an access terminal, and issuing an ActiveSetManagement.Close command, performing a clean up procedure and performing transition to idle state on receiving a ConnectedState.ConnectionClosed, or an ActiveSetManagement.ConnectionLost indication.

[0015] According to yet another embodiment, a computer-readable medium is described having a first set of instructions for issuing a ConnectedState.Activate command and issuing an ActiveSetManagement.Open command, a second set of instructions for determining whether protocol receives a ConnectedState.ConnectionClosed or an ActiveSetManagement.ConnectionLost indication, a third set of instructions for determining whether a Redirect message is sent to an access terminal, and a fourth set of instructions for issuing an ActiveSetManagement.Close command, performing a clean up procedure and performing transition to idle state on receiving a ConnectedState.ConnectionClosed, or an ActiveSetManagement.ConnectionLost indication.

[0016] According to yet another embodiment, an apparatus operable in a wireless communication system is described which includes means for issuing a ConnectedState.Activate command and issuing an ActiveSetManagement.Open command, means for determining whether protocol receives a ConnectedState.ConnectionClosed or an ActiveSetManagement.ConnectionLost indication, means for determining whether a Redirect message is sent to an access terminal, and means for issuing an ActiveSetManagement.Close command, performing a clean up procedure and performing transition to idle state on receiving a ConnectedState.ConnectionClosed, or an ActiveSetManagement.ConnectionLost indication.

[0017] To the accomplishment of the foregoing and related ends, the one or more aspects comprise the features hereinafter fully described and particularly pointed out in the claims. The following description and the annexed drawings set forth in detail certain illustrative aspects of the one or more aspects. These aspects are indicative, however, of but a few of the various ways in which the principles of various aspects may be employed and the described aspects are intended to include all such aspects and their equivalents.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] FIG. **1** illustrates aspects of a multiple access wireless communication system;

[0019] FIG. **2** illustrates aspects of a transmitter and receiver in a multiple access wireless communication system;

[0020] FIGS. **3**A and **3**B illustrate aspects of superframe structures for a multiple access wireless communication system;

[0021] FIGS. **4**A & **4**B illustrate aspect of a communication between an access terminal and an access network;

[0022] FIG. **5**A illustrates a flow diagram of a process by an access terminal;

[0023] FIG. **5**B illustrates one or more processors configured for processing by an access terminal on entering a connected state;

[0024] FIG. **6**A illustrates a flow diagram of a process by an access network; and

[0025] FIG. **6**B illustrates one or more processors configured for processing by an access network on entering a connected state.

DETAILED DESCRIPTION

[0026] Various aspects are now described with reference to the drawings, wherein like reference numerals are used to refer to like elements throughout. In the following description, for purposes of explanation, numerous specific details are set forth in order to provide a thorough understanding of one or more aspects. It may be evident, however, that such aspect(s) may be practiced without these specific details. In other instances, well-known structures and devices are shown in block diagram form in order to facilitate describing one or more aspects.

[0027] Referring to FIG. **1**, a multiple access wireless communication system according to one aspect is illustrated. A multiple access wireless communication system **100** includes multiple cells, e.g. cells **102**, **104**, and **106**. In the aspect of FIG. **1**, each cell **102**, **104**, and **106** may include an access point **150** that includes multiple sectors. The multiple sectors are formed by groups of antennas each responsible for communication with access terminals in a portion of the cell. In cell **102**, antenna groups **112**, **114**, and **116** each correspond to a different sector. In cell **104**, antenna groups **118**, **120**, and **122** each correspond to a different sector. In cell **106**, antenna groups **124**, **126**, and **128** each correspond to a different sector.

[0028] Each cell includes several access terminals which are in communication with one or more sectors of each access point. For example, access terminals **130** and **132** are in communication base **142**, access terminals **134** and **136** are in communication with access point **144**, and access terminals **138** and **140** are in communication with access point **146**.

[0029] Controller **130** is coupled to each of the cells **102**, **104**, and **106**. Controller **130** may contain one or more connections to multiple networks, e.g. the Internet, other packet based networks, or circuit switched voice networks that provide information to, and from, the access terminals in communication with the cells of the multiple access wireless communication system **100**. The controller **130** includes, or is coupled with, a scheduler that schedules transmission from and to access terminals. In other aspects, the scheduler may reside in each individual cell, each sector of a cell, or a combination thereof.

[0030] As used herein, an access point may be a fixed station used for communicating with the terminals and may also be referred to as, and include some or all the functionality of, a base station, a Node B, or some other terminology. An access terminal may also be referred to as, and include some or all the functionality of, a user equipment (UE), a wireless communication device, terminal, a mobile station or some other terminology.

[0031] It should be noted that while FIG. **1**, depicts physical sectors, i.e. having different antenna groups for different sectors, other approaches may be utilized. For example, utilizing multiple fixed "beams" that each cover different areas of the cell in frequency space may be utilized in lieu of, or in combination with physical sectors. Such an approach is depicted and disclosed in co-pending U.S. patent application Ser. No. 11/260,895, entitled "Adaptive Sectorization in Cellular System."

[0032] Referring to FIG. **2**, a block diagram of an aspect of a transmitter system **210** and a receiver system **250** in a MIMO system **200** is illustrated. At transmitter system **210**, traffic data for a number of data streams is provided from a data source **212** to transmit (TX) data processor **214**. In an aspect, each data stream is transmitted over a respective transmit antenna. TX data processor **214** formats, codes, and interleaves the traffic data for each data stream based on a particular coding scheme selected for that data stream to provide coded data.

[0033] The coded data for each data stream may be multiplexed with pilot data using OFDM, or other orthogonalization or non-orthogonalization techniques. The pilot data is typically a known data pattern that is processed in a known manner and may be used at the receiver system to estimate the channel response. The multiplexed pilot and coded data for each data stream is then modulated (i.e., symbol mapped) based on one or more particular modulation schemes (e.g., BPSK, QSPK, M-PSK, or M-QAM) selected for that data stream to provide modulation symbols. The data rate, coding, and modulation for each data stream may be determined by instructions performed on provided by processor **230**.

[0034] The modulation symbols for all data streams are then provided to a TX processor **220**, which may further process the modulation symbols (e.g., for OFDM). TX processor **220** then provides N_T modulation symbol streams to N_T transmitters (TMTR) **222***a* through **222***t*. Each transmitter **222** receives and processes a respective symbol stream to provide one or more analog signals, and further conditions (e.g., amplifies, filters, and upconverts) the analog signals to provide a modulated signal suitable for transmission over the MIMO channel. N_T modulated signals from transmitters **222***a* through **222***t* are then transmitted from N_T antennas **224***a* through **224***t*, respectively.

[0035] At receiver system **250**, the transmitted modulated signals are received by N_R antennas **252***a* through **252***r* and the received signal from each antenna **252** is provided to a respective receiver (RCVR) **254**. Each receiver **254** conditions (e.g., filters, amplifies, and downconverts) a respective received signal, digitizes the conditioned signal to provide samples, and further processes the samples to provide a corresponding "received" symbol stream.

[0036] An RX data processor **260** then receives and processes the N_R received symbol streams from N_R receivers **254** based on a particular receiver processing technique to provide N_T "detected" symbol streams. The processing by RX data processor **260** is described in further detail below. Each detected symbol stream includes symbols that are estimates of the modulation symbols transmitted for the corresponding data stream. RX data processor **260** then demodulates, deinterleaves, and decodes each detected symbol stream to recover the traffic data for the data stream. The processing by RX data processor **218** is complementary to that performed by TX processor **220** and TX data processor **214** at transmitter system **210**.

[0037] RX data processor **260** may be limited in the number of subcarriers that it may simultaneously demodulate, e.g. **512** subcarriers or 5 MHz, and such a receiver should be scheduled on a single carrier. This limitation may be a function of its FFT range, e.g. sample rates at which the processor **260** may operate, the memory available for FFT, or other functions available for demodulation. Further, the greater the number of subcarriers utilized, the greater the expense of the access terminal.

[0038] The channel response estimate generated by RX processor **260** may be used to perform space, space/time processing at the receiver, adjust power levels, change modulation rates or schemes, or other actions. RX processor **260** may further estimate the signal-to-noise-and-interference ratios (SNRs) of the detected symbol streams, and possibly other channel characteristics, and provides these quantities to a processor **270**. RX data processor **260** or processor **270** may further derive an estimate of the "operating" SNR for the system. Processor **270** then provides channel state information (CSI), which may comprise various types of information regarding the communication link and/or the received data stream. For example, the CSI may comprise only the operating SNR. In other aspects, the CSI may comprise a channel quality indicator (CQI), which may be a numerical value indicative of one or more channel conditions. The CSI is then processed by a TX data processor **278**, modulated by a modulator **280**, conditioned by transmitters **254***a* through **254***r*, and transmitted back to transmitter system **210**.

[0039] At transmitter system **210**, the modulated signals from receiver system **250** are received by antennas **224**, conditioned by receivers **222**, demodulated by a demodulator **240**, and processed by a RX data processor **242** to recover the CSI reported by the receiver system. The reported CSI is then provided to processor **230** and used to (1) determine the data rates and coding and modulation schemes to be used for the data streams and (2) generate various controls for TX data processor **214** and TX processor **220**. Alternatively, the CSI may be utilized by processor **270** to determine modulation schemes and/or coding rates for transmission, along with other information. This may then be provided to the transmitter which uses this information, which may be quantized, to provide later transmissions to the receiver.

[0040] Processors **230** and **270** direct the operation at the transmitter and receiver systems, respectively. Memories **232** and **272** provide storage for program codes and data used by processors **230** and **270**, respectively.

[0041] At the receiver, various processing techniques may be used to process the N_R received signals to detect the N_T transmitted symbol streams. These receiver processing techniques may be grouped into two primary categories (i) spatial and space-time receiver processing techniques (which are also referred to as equalization techniques); and (ii) "successive nulling/equalization and interference cancellation" receiver processing technique (which is also referred to as "successive interference cancellation" or "successive cancellation" receiver processing technique).

[0042] While FIG. **2** discusses a MIMO system, the same system may be applied to a multi-input single-output system where multiple transmit antennas, e.g. those on a base station, transmit one or more symbol streams to a single antenna device, e.g. a mobile station. Also, a single output to single input antenna system may be utilized in the same manner as described with respect to FIG. **2**.

[0043] For a software implementation, the transmission techniques may be implemented with modules (e.g., procedures, functions, and so on) that perform the functions described herein. The software codes may be stored in a memory (e.g., memory **230**, **272***x* or **272***y* in FIG. **2**) and executed by a processor (e.g., processor **232**, **270***x* or **270***y*). The memory may be implemented within the processor or external to the processor.

[0044] It should be noted that the concept of channels herein refers to information or transmission types that may be transmitted by the access point or access terminal. It does not require or utilize fixed or predetermined blocks of subcarriers, time periods, or other resources dedicated to such transmissions.

[0045] Referring to FIGS. **3**A and **3**B, aspects of superframe structures for a multiple access wireless communication system are illustrated. FIG. **3**A illustrates aspects of superframe structures for a frequency division duplexed (FDD) multiple access wireless communication system, while FIG. **3**B illustrates aspects of superframe structures for a time division duplexed (TDD) multiple access wireless communication system. The superframe preamble may be transmitted separately for each carrier or may span all of the carriers of the sector.

[0046] In both FIGS. **3**A and **3**B, the forward link transmission is divided into units of superframes. A superframe may consist of a superframe preamble followed by a series of frames. In an FDD system, the reverse link and the forward link transmission may occupy different frequency bandwidths so that transmissions on the links do not, or for the most part do not, overlap on any frequency subcarriers. In a TDD system, N forward link frames and M reverse link frames define the number of sequential forward link and reverse link frames that may be continuously transmitted prior to allowing transmission of the opposite type of frame. It should be noted that the number of N and M may be vary within a given superframe or between superframes.

[0047] In both FDD and TDD systems each superframe may comprise a superframe preamble. In certain aspects, the superframe preamble includes a pilot channel that includes pilots that may be used for channel estimation by access terminals, a broadcast channel that includes configuration information that the access terminal may utilize to demodulate the information contained in the forward link frame. Further acquisition information such as timing and other information sufficient for an access terminal to communicate on one of the carriers and basic power control or offset information may also be included in the superframe preamble. In other cases, only some of the above and/or other information may be included in this superframe preamble.

[0048] As shown in FIGS. **3**A and **3**B, the superframe preamble is followed by a sequence of frames. Each frame may consist of a same or a different number of OFDM symbols, which may constitute a number of subcarriers that may simultaneously utilized for transmission over some defined period. Further, each frame may operate according to a symbol rate hopping mode, where one or more non-contiguous OFDM symbols are assigned to a user on a forward link or reverse link, or a block hopping mode, where users hop within a block of OFDM symbols. The actual blocks or OFDM symbols may or may not hop between frames.

[0049] FIGS. **4**A & **4**B illustrate communication between an access terminal (**402**) and an access network **404** for processing on entering a connected state. Using a communication link **406** and based upon predetermined timing, system conditions, or other decision criteria, the access network **404** exchanges messages **408** & **410** with the access terminal **402** over a communication link **406**. The communication link may be implemented using communication protocols/standards such as World Interoperability for Microwave Access (WiMAX), infrared protocols such as Infrared Data Association (IrDA), short-range wireless protocols/technologies, Bluetooth® technology, ZigBee® protocol, ultra wide band (UWB) protocol, home radio frequency (HomeRF), shared wireless access protocol (SWAP), wideband technology such as a wireless Ethernet compatibility alliance (WECA), wireless fidelity alliance (Wi-Fi Alliance), 802.11 network technology, public switched telephone network technology, public heterogeneous communications network technology such as the Internet, private wireless communications network, land mobile radio network, code division multiple access (CDMA), wideband code division multiple access (WCDMA), universal mobile telecommunications system (UMTS), advanced mobile phone service (AMPS), time division multiple access (TDMA), frequency division multiple access (FDMA), orthogonal frequency division multiple (OFDM), orthogonal frequency division multiple access (OFDMA), orthogonal frequency division multiple FLASH (OFDM-FLASH), global system for mobile communications (GSM), single carrier (1×) radio transmission technology (RTT), evolution data only (EV-DO) technology, general packet radio service (GPRS), enhanced data GSM environment (EDGE), high speed downlink data packet access (HSPDA), analog and digital satellite systems, and any other technologies/protocols that may be used in at least one of a wireless communications network and a data communications network.

[0050] Referring to FIG. **4**A, according to one embodiment the access terminal **402** is configured for processing on entering a connected state. The access terminal receives message **410** which may comprise a ConnectedState.ConnectionClosed, an OverheadMessages.Supervision Failed, a ControlChannelMAC.SupervisionFailed, an ActiveSetManagement.AssignmentRejected, or a ForwardTrafficChannelMAC.Supervision Failed indication or a Redirect message **410**. The access terminal responds with commands **408** which may comprise a ConnectedState.Activate command and an ActiveSetManagement.Open command and an ActiveSetManagement.Close command, or an ActiveSetManagement.Deactivate command, an Overhead-

Messages.Deactivate command, a ForwardTrafficChannel.Deactivate command and a SharedSignallingMAC.Deactivate command.

[0051] Referring to FIG. 4B, according to another embodiment the access network **454** is configured for processing on entering a connected state. The access network receives message **458** which may comprise a ConnectedState.ConnectionClosed, or an ActiveSetManagement.ConnectionLost indication. The access network may respond with commands **460** which may comprise a ConnectedState.Activate command, ActiveSetManagement.Open command and an ActiveSetManagement.Close or ActiveSetManagement.Deactivate and ReverseTrafficChannel.Deactivate command, a ReverseControlChannel.Deactivate command, an ActiveSetManagement.Close and a ConnectedState.Deactivate command.

[0052] The messages **408**, **410**, **458** and **460** may be incorporated into one or more data packets **412** which are transmitted on a forward link **406**. In another aspect, the message **410** and **460** may be transmitted without being incorporated in to a packet. The data packet comprises header information that indicates whether that data packet contains the message **410** and **460** or **408** and **458**. The data packet is transmitted on the forward link **406** using one or more channels. In an aspect, the access network **404** and access terminal **402** may use a channel of the communication link **406** to transmit the message **410** and **460** or **408** and **458**. The access terminal **402** and access network **404** is configured to receive data packets on the communication link **406**, one of which may comprise the message **410** and **460** and **408** and **458** respectively. Various methods may be used to extract the message **410** & **460** and **408** & **458** from the forward link. For example, once the receiver (access terminal **402** or access network **404**) has extracted the data packet from one of the channels of the forward link, it may check the header information of the data packet to determine if the data packet comprises the message **408** and **458** or **410** and **460**. If so, then the receiver extracts the designated bits and stores the values in memory **272**.

[0053] FIG. 5A illustrates a flow diagram of process **500**, according at an embodiment. At **502**, the process commences with the access terminal issuing a ConnectedState.Activate command and an ActiveSetManagement. Open command. At **504**, the method performs the steps of determining whether a protocol receives a ConnectedState.ConnectionClosed, an OverheadMessages.SupervisionFailed, a ControlChannelMAC.SupervisionFailed, an ActiveSetManagement.AssignmentRejected, or a ForwardTrafficChannelMAC.SupervisionFailed indication. If any of the indication is received then at **508** the access terminal performs the step of issuing an ActiveSetManagement.Close command and performs the clean up procedure at **510** comprising issuing a ReverseTrafficChannel.Deactivate command, issuing a ReverseControlChannelMAC.Deactivate command, issuing an ActiveSetManagement.Close and issuing a ConnectedState.Deactivate command. At **512**, the method comprises performing transition to idle state. If no indication is received at **504**, then at **506** the process comprises determining whether the protocol receives a Redirect message. If a Redirect message is received then at **514** the process comprises steps of issuing an ActiveSetManagement.Deactivate command, issuing an OverheadMessages.Deactivate command, issuing a ForwardTrafficChannel.Deactivate command, issuing a SharedSignallingMAC.Deactivate command. Further at **516** (same as **510**), the process comprises the steps of performing a clean up procedure comprising issuing a ReverseTrafficChannel.Deactivate command, issuing a ReverseControlChannelMAC.Deactivate command, issuing an ActiveSetManagement.Close and issuing a ConnectedState.Deactivate command. Finally at **518** the method comprises performing transition to initialization state.

[0054] FIG. 5B illustrates a processor **550** for processing of connected state. The processors referred to may be electronic devices and may comprise one or more processors configured for processing connected state according to the embodiment. A processor **552** is configured to issue a ConnectedState.Activate command and an ActiveSetManagement. Open command. A processor **554** is configured to determine whether a protocol receives a ConnectedState.ConnectionClosed, an OverheadMessages.Supervision Failed, a ControlChannelMAC.SupervisionFailed, an ActiveSetManagement.AssignmentRejected, or a ForwardTrafficChannelMAC.SupervisionFailed indication. If any of the indication is received then a processor **558** is configured to issue an ActiveSetManagement.Close command and a processor **560** is configured to perform the clean up procedure comprising steps of issuing a ReverseTrafficChannel.Deactivate command, issuing a ReverseControlChannelMAC.Deactivate command, issuing an ActiveSetManagement.Close and issuing a ConnectedState.Deactivate command and a processor **562** is configured to perform transition to idle state. A processor **556** is configured to determine whether the protocol receives a Redirect message. If a Redirect message is received then a processor **564** is configured to issue an ActiveSetManagement.Deactivate command, an OverheadMessages.Deactivate command, a ForwardTrafficChannel.Deactivate command, and a SharedSignallingMAC.Deactivate command. Further a processor **566** is configured to perform a clean up procedure comprising issuing a ReverseTrafficChannel.Deactivate command, issuing a ReverseControlChannelMAC.Deactivate command, issuing an ActiveSetManagement.Close and issuing a ConnectedState.Deactivate command. A processor **568** is configured to perform transition to initialization state. The functionality of the discrete processors **552** to **568** depicted in the figure may be combined into a single processor **570**. A memory **572** is also coupled to the processor **570**.

[0055] In an embodiment, an apparatus is described which includes means for issuing a ConnectedState.Activate command and an ActiveSetManagement. Open command. A means is provided for determining whether a protocol receives a ConnectedState.ConnectionClosed, an OverheadMessages.Supervision Failed, a ControlChannelMAC.SupervisionFailed, an ActiveSetManagement.AssignmentRejected, or a ForwardTrafficChannelMAC.Supervision ailed indication. If any of the indication is received then a means is provided for issuing an ActiveSetManagement.Close command and a means is provided for performing the clean up procedure comprising steps of issuing a ReverseTrafficChannel.Deactivate command, issuing a ReverseControlChannelMAC.Deactivate command, issuing an ActiveSetManagement.Close and issuing a ConnectedState.Deactivate command and a means is provided for transitioning to idle state. A means is provided for determining whether the protocol receives a Redirect message. If a Redirect message is received then a means is provided for issuing an ActiveSetManagement.Deactivate command, an OverheadMessages.Deactivate command, a ForwardTrafficChannel.Deactivate command, and a SharedSignallingMAC.Deactivate command. Further, a means is provided for performing a clean up procedure comprising issuing a ReverseTrafficChannel.Deactivate command, issuing a ReverseControlChannelMAC. Deactivate command, issuing an ActiveSetManagement. Close and issuing a ConnectedState.Deactivate command. A means is further provided for transitioning to initialization state. The means described herein may comprise one or more processors.

[0056] FIG. 6A illustrates a flow diagram of process **600**, according to another embodiment. At **602**, the process commences with the access network issuing a ConnectedState. Activate command and an ActiveSetManagement.Open command. At **604**, the method performs the steps of determining whether a protocol receives a ConnectedState.ConnectionClosed, or an ActiveSetManagement.ConnectionLost indication. If any of the indication is received then at **608** the access terminal performs the step of issuing an ActiveSetManagement.Close command and performs a cleanup procedure at **610** comprising issuing a ReverseTrafficChannel.Deactivate command, issuing a ReverseControlChannel.Deactivate command, issuing an ActiveSetManagement.Close and issuing a ConnectedState.Deactivate command and at **612** the method comprises performing transition to idle state. If no indication is received at **604**, then at **606** the process comprises determining whether a Redirect message is sent to an access terminal. If a Redirect message is sent then at **614** the process comprises steps of issuing an ActiveSetManagement. Deactivate command. Further at **616** (same as **610**), the process comprises the steps of performing a cleanup procedure comprising issuing a ReverseTrafficChannel.Deactivate command, issuing a ReverseControlChannel.Deactivate command, issuing an ActiveSetManagement.Close and issuing a ConnectedState.Deactivate command. Finally at **618** the method comprises performing transition to initialization state.

[0057] FIG. 6B illustrates a processor **650** for processing by an access network on entering a connected state The processors referred to may be electronic devices and may comprise one or more processors configured for processing by an access network on entering a connected state according to the embodiment. A processor **652** is configured to issue a ConnectedState.Activate command and an ActiveSetManagement.Open command. A processor **654** is configured to determine whether a protocol receives a ConnectedState. ConnectionClosed or an ActiveSetManagement. ConnectionLost indication. If any of the indication is received then a processor **658** is configured to issue an ActiveSetManagement.Close command and a processor **660** is configured to perform a cleanup procedure comprising steps of issuing a ReverseTrafficChannel.Deactivate command, issuing a ReverseControlChannel.Deactivate command, issuing an ActiveSetManagement.Close and issuing a ConnectedState. Deactivate command and a processor **662** is configured to perform transition to idle state. A processor **656** is configured to determine whether the access network has sent a Redirect message to an access terminal. If a Redirect message is sent then a processor **664** is configured to issue an ActiveSetManagement.Deactivate command. Further a processor **666** is configured to perform the cleanup procedure comprising issuing a ReverseTrafficChannel.Deactivate command, issuing a ReverseControlChannel.Deactivate command, issuing an ActiveSetManagement.Close and issuing a ConnectedState.Deactivate command. A processor **668** is configured to perform transition to initialization state. The functionality of the discrete processors **652** to **668** depicted in the figure may be combined into a single processor **670**. A memory **672** is also coupled to the processor **670**.

[0058] In an embodiment, an apparatus is described which includes means for issuing a ConnectedState.Activate command and an ActiveSetManagement.Open command. A means is provided for determining whether a protocol receives a ConnectedState.ConnectionClosed or an ActiveSetManagement.ConnectionLost indication. If any of the indication is received then a means is provided for issuing an ActiveSetManagement.Close command and a means is provided for performing a cleanup procedure comprising steps of issuing a ReverseTrafficChannel.Deactivate command, issuing a ReverseControlChannel.Deactivate command, issuing an ActiveSetManagement.Close and issuing a ConnectedState.Deactivate command and a means is provided for performing transition to idle state. A means is provided for determining whether the access network has sent a Redirect message to an access terminal. If a Redirect message is sent then a means is provided for issuing an ActiveSetManagement.Deactivate command. Further, a means is provided for performing the cleanup procedure comprising issuing a ReverseTrafficChannel.Deactivate command, issuing a ReverseControlChannel.Deactivate command, issuing an ActiveSetManagement.Close and issuing a ConnectedState. Deactivate command. A means is provided for performing transition to initialization state. The means described herein may comprise one or more processors.

[0059] Furthermore, embodiments may be implemented by hardware, software, firmware, middleware, microcode, or any combination thereof. When implemented in software, firmware, middleware or microcode, the program code or code segments to perform the necessary tasks may be stored in a machine readable medium such as a separate storage(s) not shown. A processor may perform the necessary tasks. A code segment may represent a procedure, a function, a subprogram, a program, a routine, a subroutine, a module, a software package, a class, or any combination of instructions, data structures, or program statements. A code segment may be coupled to another code segment or a hardware circuit by passing and/or receiving information, data, arguments, parameters, or memory contents. Information, arguments, parameters, data, etc. may be passed, forwarded, or transmitted via any suitable means including memory sharing, message passing, token passing, network transmission, etc.

[0060] Various modifications to these aspects will be readily apparent to those skilled in the art, and the generic principles defined herein may be applied to other aspects. Thus, the description is not intended to be limited to the aspects shown herein but is to be accorded the widest scope consistent with the principles and novel features disclosed herein.

We claim:

1. A method of processing on entering a Connected State by an access terminal, characterized in that:

issuing a ConnectedStateActivate command and issuing an ActiveSetManagement.Open command;

determining whether a ConnectedState.ConnectionClosed, an OverheadMessages.Supervision Failed, a ControlChannelMAC.SupervisionFailed, an ActiveSetManagement.AssignmentRejected, or a ForwardTrafficChannelMAC.SupervisionFailed indication is received;

determining whether protocol receives a Redirect message;

issuing an ActiveSetManagement.Close command, performing a clean up procedure and performing transition to idle state on receiving at least one of the ConnectedState.ConnectionClosed, the OverheadMessages.Supervision Failed, the ControlChannelMAC.SupervisionFailed, the ActiveSetManagement.AssignmentRejected, or the ForwardTrafficChannelMAC.SupervisionFailed indication.

2. The method as claimed in claim **1**, characterized in that issuing an ActiveSetManagement.Deactivate command, issuing an OverheadMessages.Deactivate command, issuing a ForwardTrafficChannel.Deactivate command, issuing a SharedSignallingMAC.Deactivate command, performing a cleanup procedure and performing transition to initialization state on receiving a Redirect message.

3. The method as claimed in claim any of the preceding claims, characterized in that the step of performing the cleanup procedure comprises issuing a ReverseTrafficChannel.Deactivate command, issuing a ReverseControlChannelMAC.Deactivate command, issuing an ActiveSetManagement.Close and issuing a ConnectedState.Deactivate command.

4. A computer-readable medium including instruction stored thereon, characterized in that:

a first set of instructions for issuing a ConnectedState.Activate command and issuing an ActiveSetManagement.Open command;

a second set of instructions for determining whether a ConnectedState.ConnectionClosed, an OverheadMessages.Supervision Failed, a ControlChannelMAC.SupervisionFailed, an ActiveSetManagement.AssignmentRejected, or a ForwardTrafficChannelMAC.SupervisionFailed indication is received;

a third set of instructions for determining whether protocol receives a Redirect message; and

a fourth set of instructions for issuing an ActiveSetManagement.Close command, performing a clean up procedure and performing transition to idle state on receiving at least one of the ConnectedState.ConnectionClosed, the OverheadMessages.Supervision Failed, the ControlChannelMAC.SupervisionFailed, the ActiveSetManagement.AssignmentRejected, or the ForwardTrafficChannelMAC.SupervisionFailed indication.

5. An apparatus operable in a wireless communication system, characterized in that:

means for issuing a ConnectedState.Activate command and issuing an ActiveSetManagement.Open command;

means for determining whether a ConnectedState.ConnectionClosed, an OverheadMessages.Supervision Failed, a ControlChannelMAC.SupervisionFailed, an ActiveSetManagement.AssignmentRejected, or a ForwardTrafficChannelMAC.SupervisionFailed indication is received;

means for determining whether protocol receives a Redirect message; and

means for issuing an ActiveSetManagement.Close command, performing a clean up procedure and performing transition to idle state on receiving at least one of the ConnectedState.ConnectionClosed, the OverheadMessages.Supervision Failed, the ControlChannelMAC.SupervisionFailed, the ActiveSetManagement.AssignmentRejected, or the ForwardTrafficChannelMAC.SupervisionFailed indication.

6. The apparatus as claimed in claim **5**, characterized in that means for issuing an ActiveSetManagement.Deactivate command, issuing an OverheadMessages.Deactivate command, issuing a ForwardTrafficChannel.Deactivate command; means for performing a cleanup procedure and means for transiting to initialization state.

7. The apparatus as claimed in claim any of preceding claims, characterized in that means for issuing a ReverseTrafficChannel.Deactivate command, issuing a ReverseControlChannelMAC.Deactivate command, issuing an ActiveSetManagement.Close and issuing a ConnectedState.Deactivate command.

8. A method of processing on entering a Connected State by an access network, characterized in that:

issuing a ConnectedState.Activate command and issuing an ActiveSetManagement.Open command;

determining whether protocol receives a ConnectedState.ConnectionClosed or an ActiveSetManagement.ConnectionLost indication;

determining whether a Redirect message is sent to an access terminal; and

issuing an ActiveSetManagement.Close command, performing a clean up procedure and performing transition to idle state on receiving a ConnectedState.ConnectionClosed, or an ActiveSetManagement.ConnectionLost indication.

9. The method as claimed in claim **8**, characterized in that issuing an ActiveSetManagement.Deactivate command, performing a cleanup procedure and performing transition to initialization state on sending a Redirect message to the access terminal.

10. The method as claimed in claim any of preceding claims, characterized in that performing the cleanup procedure comprises issuing a ReverseTrafficChannel.Deactivate command, issuing a ReverseControlChannel.Deactivate command, issuing an ActiveSetManagement.Close and issuing a ConnectedState.Deactivate command.

11. A computer-readable medium including instructions stored thereon, characterized in that:

a first set of instructions for issuing a ConnectedState.Activate command and issuing an ActiveSetManagement.Open command;

a second set of instructions for determining whether protocol receives a ConnectedState.ConnectionClosed or an ActiveSetManagement.ConnectionLost indication;

a third set of instructions for determining whether a Redirect message is sent to an access terminal; and

a fourth set of instructions for issuing an ActiveSetManagement.Close command, performing a clean up procedure and performing transition to idle state on receiving a ConnectedState.ConnectionClosed, or an ActiveSetManagement.ConnectionLost indication.

12. An apparatus operable in a wireless communication system, characterized in that:

means for issuing a ConnectedStateActivate command and issuing an ActiveSetManagement.Open command;

means for determining whether protocol receives a ConnectedState.ConnectionClosed or an ActiveSetManagement.ConnectionLost indication;

means for determining whether a Redirect message is sent to an access terminal; and

means for issuing an ActiveSetManagement.Close command, performing a clean up procedure and performing transition to idle state on receiving a ConnectedState.ConnectionClosed, or an ActiveSetManagement.ConnectionLost indication.

13. The apparatus as claimed in claim **12** characterized in that means for issuing an ActiveSetManagement.Deactivate command, means for performing a cleanup procedure and means for performing transition to initialization state.

14. The apparatus as claimed in claim any of preceding claims, characterized in that means for issuing a ReverseTrafficChannel.Deactivate command, issuing a ReverseControlChannel.Deactivate command, issuing an ActiveSetManagement.Close and issuing a ConnectedState.Deactivate command.

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