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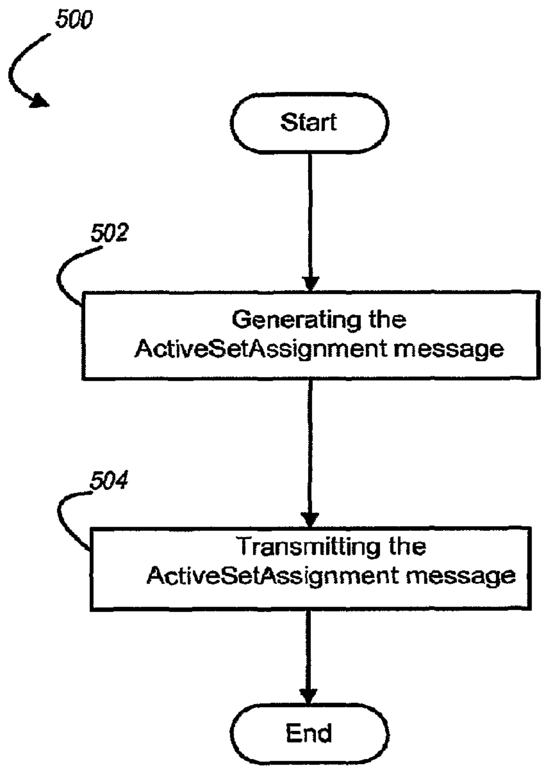
(54) **Title:** TRANSMITTING AND RECEIVING AN ACTIVE SET ASSIGNMENT MESSAGE IN A WIRELESS COMMUNICATION SYSTEM



(57) **Abstract:** A method and apparatus for transmitting an ActiveSetAssignment message in a wireless communication system, comprising generating the ActiveSetAssignment message comprising a 8 bit MessageID field, a 8 bit MessageSequence field wherein the MessageSequence field indicates a value 1 higher than the MessageSequence field of the last ActiveSetAssignment message sent to an access terminal and a 3 bit NumChannels field wherein the NumChannels field indicates a number of channels included in the message. The ActiveSetAssignment message is then transmitted over a communication link. A method and apparatus for receiving and processing the ActyiveSetAssignment message is further provided.

WO 2007/050890 A1

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TRANSMITTING AND RECEIVING AN ACTIVE SET ASSIGNMENT MESSAGE IN A WIRELESS COMMUNICATION SYSTEM

CLAIM OF PRIORITY UNDER 35 U.S.C. §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 October 27, 2005, assigned to the assignee hereof, and expressly incorporated herein by reference.

BACKGROUND

Field

[0002] The present disclosure relates generally to wireless communication and more particularly to method and apparatus for transmitting and receiving an ActiveSetAssignment message.

Background

[0003] 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.

[0004] 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.

[0005] 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.

[0006] 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.

[0007] 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

[0008] 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.

[0009] According to an embodiment, a method is provided for transmitting an ActiveSetAssignment message., the method comprising generating the ActiveSetAssignment message comprising a 8 bit MessageID field, a 8 bit MessageSequence field wherein the MessageSequence field indicates a value 1 higher than the MessageSequence field of the last ActiveSetAssignment message sent to an access terminal and a 3 bit NumChannels field wherein the NumChannels field indicates a number of channels included in the message and transmitting the ActiveSetAssignment message over a communication link.

[0010] According to another embodiment, a computer-readable medium is described having a first set of instructions for generating an ActiveSetAssignment message comprising a 8 bit MessageID field, a 8 bit MessageSequence field wherein the MessageSequence field indicates a value 1 higher than the MessageSequence field of the last ActiveSetAssignment message sent to the access terminal and a 3 bit NumChannels field wherein the NumChannels field indicates the number of channels included in the message and a second set of instructions for transmitting the ActiveSetAssignment message over a communication link.

[0011] According to yet another embodiment, an apparatus operable in a wireless communication system is described which includes means for generating an ActiveSetAssignment message comprising a 8 bit MessageID field, a 8 bit MessageSequence field wherein the MessageSequence field indicates a value 1 higher than the MessageSequence field of the last ActiveSetAssignment message sent to an access terminal and a 3 bit NumChannels field wherein the NumChannels field indicates number of channels included in the message and means for transmitting the ActiveSetAssignment message over a communication link.

[0012] According to yet another embodiment, a method is provided for receiving the ActiveSetAssignment message comprising a 8 bit MessageID field, a 8 bit MessageSequence field wherein the MessageSequence field is interpreted as a value 1 higher than the MessageSequence field of the last ActiveSetAssignment message sent to an access terminal and a 3 bit NumChannels field wherein the NumChannels field is interpreted as a number of channels included in the message and processing the ActiveSetAssignment message.

[0013] According to yet another embodiment, a computer-readable medium is described having a first set of instructions for receiving an ActiveSetAssignment message comprising a 8 bit MessageID field, a 8 bit MessageSequence field wherein the MessageSequence field is interpreted as a value 1 higher than the MessageSequence field of the last ActiveSetAssignment message sent to an access terminal and a 3 bit NumChannels field wherein the NumChannels field is interpreted as a number of channels included in the message and a second set of instructions for processing the ActiveSetAssignment message.

[0014] According to yet another embodiment, an apparatus operable in a wireless communication system is described which includes means for receiving the ActiveSetAssignment message comprising a 8 bit MessageID field, a 8 bit MessageSequence field wherein the MessageSequence field is interpreted as a value 1 higher than the MessageSequence field of the last ActiveSetAssignment message sent to an access terminal and a 3 bit NumChannels field wherein the NumChannels field is interpreted as a number of channels included in the message and means for processing the ActiveSetAssignment message.

[0015] 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

[0016] Fig. 1 illustrates aspects of a multiple access wireless communication system.

[0017] Fig. 2 illustrates aspects of a transmitter and receiver in a multiple access wireless communication system.

[0018] Figs. 3A and 3B illustrate aspects of superframe structures for a multiple access wireless communication system.

[0019] Fig. 4 illustrates aspect of a communication between an access terminal and an access network.

[0020] Fig. 5A illustrates a flow diagram of a process by an access network.

[0021] Fig. 5B illustrates one or more processors configured for generating and transmitting an ActiveSetAssignment message.

[0022] Fig. 6A illustrates a flow diagram of a process by an access terminal.

[0023] Fig. 6B illustrates one or more processors configured for receiving and decoding the ActiveSetAssignment message.

DETAILED DESCRIPTION

[0024] 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.

[0025] 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.

[0026] 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.

[0027] 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.

[0028] 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.

[0029] 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 US Patent Application Serial No. 11/260,895, entitled "Adaptive Sectorization in Cellular System."

[0030] 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.

[0031] 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.

[0032] 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) 222a through 222t. 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 222a through 222t are then transmitted from N_T antennas 224a through 224t, respectively.

[0033] At receiver system 250, the transmitted modulated signals are received by N_R antennas 252a through 252r 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.

[0034] 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.

[0035] 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.

[0036] 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 254a through 254r, and transmitted back to transmitter system 210.

[0037] 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.

[0038] 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.

[0039] 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).

[0040] 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.

[0041] The transmission techniques described herein may be implemented by various means. For example, these techniques may be implemented in hardware, firmware, software, or a combination thereof. For a hardware implementation, the processing units at a transmitter may be implemented within one or more application specific integrated circuits (ASICs), digital signal processors (DSPs), digital signal processing devices (DSPDs), programmable logic devices (PLDs), field programmable gate arrays (FPGAs), processors, controllers, micro-controllers, microprocessors, electronic devices, other electronic units designed to perform the functions described herein, or a combination thereof. The processing units at a receiver may also be implemented within one or more ASICs, DSPs, processors, and so on.

[0042] 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, 272x or 272y in FIG. 2) and executed by a processor (e.g., processor 232, 270x or 270y). The memory may be implemented within the processor or external to the processor.

[0043] 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.

[0044] Referring to Figs. 3A and 3B, aspects of superframe structures for a multiple access wireless communication system are illustrated. Fig. 3A illustrates aspects of superframe structures for a frequency division duplexed (FDD) multiple access wireless communication system, while Fig. 3B 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.

[0045] In both Figs. 3A and 3B, 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.

[0046] 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.

[0047] As shown in Figs. 3A and 3B, 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.

[0048] Fig. 4 illustrates communication between an access network 404 for transmitting an ActiveSetAssignment message in order to manage the active set of an access terminal 402. Using a communication link 406 and based upon predetermined timing, system conditions, or other decision criteria, the access network 404 transmits the ActiveSetAssignment message 410 to the access terminal 402 which then utilizes this to manage the active set. 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 (1X) 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.

[0049] The access network 404 is configured to generate the ActiveSetAssignment message 410 comprising a 8 bit MessageID field, a 8 bit MessageSequence field wherein the MessageSequence field indicates a value 1 higher than the MessageSequence field of the last ActiveSetAssignment message sent to an access terminal and a 3 bit NumChannels field wherein the NumChannels field indicates number of channels included in the message. The message further comprises a 1 bit ChannelIncluded field wherein the ChannelIncluded field is set to a value '1' upon including channel record for the pilots, a Channel field of length 0 or length based upon ChannelRecordType wherein the Channel field indicates a value of the channel record corresponding to the pilot if the ChannelIncluded field is set to '1' otherwise omitting the field for the pilot offset, a 2 bit CQIReportInterval field wherein the CQIReportingMode field specifies the configuration of MIMO CQI reports sent by the access terminal, a 4 bit VCQIReportInterval field wherein the VCQIReportInterval field indicates an interval at which the access terminal will send a VCQIReport message in units of 0.25 seconds, a 2 bit VCQIMeasureInterval field wherein the VCQIMeasureInterval field indicates a value to control VCQI reports and takes a value of (2*n+1) superframes, a 1 bit EnhancedPilotReportEnabled field wherein the EnhancedPilotReportEnabled field indicates a value to determine if enhanced pilot reports will be triggered, a 4 bit EnhancedPilotReportRatio field wherein the EnhancedPilotReportRatio field indicates a value in steps of -0.5dB to control pilot reports if EnhancedPilotReportEnabled field is set to '1', a 4 bit EnhacedPilotReportThreshold field wherein the EnhancedPilotReportThreshold field indicates a value in units of 1 dB to control pilot reports if EnhancedPilotReportEnabled is set to '1', a 2 bit MinRequestInterval field wherein the MinRequestInterval field indicates a value of minimum number of frames between two request transmission by the access terminal, a 2 bit CQIReportInterval field wherein the CQIReportInterval field determines the periodicity at which the access terminal will report a CQI value, a 2 bit CQIReportPhase field wherein the CQIReportPhase field determines the phase of the CQI reports that are transmitted with periodicity CQIReportInterval, a 2 bit CQIPilotInterval field wherein the CQIPilotInterval field determines the periodicity at which the access terminal will report a default CQICHPilot, a 2 bit CQIPilotPhase field wherein the CQIPilotPhase field determines the phase of the CQICHPilot reports that are transmitted with periodicity CQIPilotInterval, a 3 bit BFCHReportRate field wherein the BFCHReportRate field indicates a value of number of R-BFCH reports per super-frame, a 3 bit SFCHReportRate field wherein the SFCHReportRate field indicates a value of number of R-SFCH reports per super-frame, a 3 bit BFCHPowerOffset field wherein the BFCHPowerOffset field determines the power offset of the R-BFCH relative to the R-CQICH having units in dB, a 2 bit NumBFCHBits wherein the NumBFCHBits field determines the number and type of bits sent on the R-BFCH, a 3 bit SFCHPowerOffset field wherein the SFCHPowerOffset field determines the power offset of the R-SFCH relative to the R-CQICH in dB, a 2 bit NumSFCHBits field wherein the NumSFCHBits field determines the number and type of bits sent on the R-SFCH, a 3 bit MandatoryCQICHCTRLReportingPeriod field wherein the MandatoryCQICHCTRLReportingPeriod field determines the reporting period in multiples of CQIReportInterval where the access terminal is mandated to transmit R-CQICHCTRL report in the R-CQICH channel, a 3 bit NumPilots field wherein the NumPilots field indicates the number of pilots included in the message, a VCQIMeasureThreshold field wherein the VCQIMeasureThreshold field indicates a value to control VCQI reports, a MinVCQIReportInterval field wherein the MinVCQIReportInterval field indicates a value to control VCQI reports, and a MaxVCQIReportInterval field wherein the MaxVCQIReportInterval field indicates a value to control VCQI reports, a 12 bit PilotPN field wherein the PilotPN field indicates the PilotPN of the pilot included in the message, a 3 bit ActiveSetIndex wherein the ActiveSetIndex field indicates a value to enable CQI reporting to different sectors in the active set, a 1 bit GloballySynchronous field wherein the GloballySynchronous field is set to a value '1' if the sector transmitting the pilot is synchronous to global time, a 1 bit SynchronousWithNextPilot field wherein the SynchronousWithNextPilot field is set to a value '1' if the sector is synchronous with the next sector listed in the message or set to a value '0' if the sector is the last sector listed in the message or the sector is not synchronous with the next sector listed in the message, a 2 bit ControlSegment field wherein the ControlSegment field indicates the control segment used for sending reverse link control to the sector, a 11 bit MACID field wherein the MACID field indicates the MACID assigned to the user in the sector, a 1 bit AccessSequenceIDIncluded field wherein the AccessSequenceIDIncluded field is set to a value '1' if the AccessSequenceID is included with the message, a 0 or 4 bit AccessSequenceID field wherein the AccessSequenceID field indicates an access sequence used by the access terminal to acquire reverse link timing for the sector and takes the values from zero to eight and a 1 bit MIMOMode field.

[0050] The access network 404 may incorporate the ActiveSetAssignment message 410 into one or more data packets 412 which are transmitted on a forward link 406. In another aspect, the ActiveSetAssignment message 410 may be transmitted without being incorporated in to a packet. The data packets comprise header information that indicates whether the data packets 412 contain the ActiveSetAssignment message 410. The data packets 412 are transmitted on the forward link 406 using one or more channels.

[0051] The access terminal 402 is configured to receive the data packets on the communication link 406, one of which may comprise the ActiveSetAssignment message 410. Various methods may be used to extract the ActiveSetAssignment message 410 from the forward link. For example, once the access terminal 402 has extracted the data packets 412 from one of the channels of the forward link, the access terminal 402 may check the header information of the data packets 412 to determine if the data packets 412 comprise the ActiveSetAssignment message 410. If so, then the access terminal 402 extracts the designated bits of the message and stores the values in memory (such as memory 232 in Fig. 2). The access terminal 402 processes the received ActiveSetAssignment message.

[0052] Fig.5A illustrates a flow diagram of process 500, according to an embodiment. At 502, an ActiveSetAssignment message is generated which comprises a 8 bit MessageID field, a 8 bit MessageSequence field wherein the MessageSequence field indicates a value 1 higher than the MessageSequence field of the last ActiveSetAssignment message sent to an access terminal and a 3 bit NumChannels field wherein the NumChannels field indicates a number of channels included in the message. At 504, the ActiveSetAssignment message is transmitted over a communication link.

[0053] Fig. 5B illustrates a processor 550 for transmitting an ActiveSetAssignment message. The processors referred to may be electronic devices and may comprise one or more processors configured for transmitting the message according to the embodiment. A processor 552 is configured for generating the ActiveSetAssignment message comprising a 8 bit MessageID field, a 8 bit MessageSequence field wherein the MessageSequence field indicates a value 1 higher than the MessageSequence field of the last ActiveSetAssignment message sent to an access terminal and a 3 bit NumChannels field wherein the NumChannels field indicates a number of channels included in the message. Processor 554 is configured for transmitting the ActiveSetAssignment message over a communication link. The functionality of the discrete processors 552 and 554 depicted in the figure may be combined into a single processor 556. A memory 558 is also coupled to the processor 556.

[0054] In an embodiment, an apparatus is described which comprises means for generating a ActiveSetAssignment message comprising a 8 bit MessageID field, a 8 bit MessageSequence field wherein the MessageSequence field indicates a value 1 higher than the MessageSequence field of the last ActiveSetAssignment message sent to an access terminal and a 3 bit NumChannels field wherein the NumChannels field indicates a number of channels included in the message. The apparatus further comprises a means for transmitting the ActiveSetAssignment message over a communication link. The means described herein may comprise one or more processors.

[0055] Fig.6A illustrates a flow diagram of process 600, according to another embodiment. At 602, the ActiveSetAssignment message is received which comprises a 8 bit MessageID field, a 8 bit MessageSequence field wherein the MessageSequence field is interpreted as a value 1 higher than the MessageSequence field of the last ActiveSetAssignment message sent to an access terminal and a 3 bit NumChannels field wherein the NumChannels field is interpreted as a number of channels included in the message. At 604, the received ActiveSetAssignment message is processed.

[0056] Fig. 6B illustrates a processor 650 for receiving the ActiveSetAssignment message. The processors referred to may be electronic devices and may comprise one or more processors configured for transmitting the message according to the embodiment.

A processor 652 is configured for receiving the ActiveSetAssignment message comprising a 8 bit MessageID field, a 8 bit MessageSequence field wherein the MessageSequence field is interpreted as a value 1 higher than the MessageSequence field of the last ActiveSetAssignment message sent to an access terminal and a 3 bit NumChannels field wherein the NumChannels field is interpreted as a number of channels included in the message. A processor 654 is configured for processing the received ActiveSetAssignment message. The functionality of the discrete processors 652 and 654 depicted in the figure may be combined into a single processor 656. A memory 658 is also coupled to the processor 656.

[0057] In an embodiment, an apparatus is described which comprises means for receiving the ActiveSetAssignment message comprising a 8 bit MessageID field, a 8 bit MessageSequence field wherein the MessageSequence field is interpreted as a value 1 higher than the MessageSequence field of the last ActiveSetAssignment message sent to an access terminal and a 3 bit NumChannels field wherein the NumChannels field is interpreted as a number of channels included in the message. The apparatus further comprises a means for processing the received ActiveSetAssignment message. The means described herein may comprise one or more processors.

[0058] 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.

[0059] 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.

CLAIMS

We claim:

1. A method for transmitting an ActiveSetAssignment message in a wireless communication system, characterized in that:

generating the ActiveSetAssignment message comprising a 8 bit MessageID field, a 8 bit MessageSequence field wherein the MessageSequence field indicates a value 1 higher than the MessageSequence field of the last ActiveSetAssignment message sent to an access terminal and a 3 bit NumChannels field wherein the NumChannels field indicates a number of channels included in the message; and

transmitting the ActiveSetAssignment message over a communication link.

2. The method as claimed in claim 1, characterized in that generating the ActiveSetAssignment message to include a 1 bit ChannelIncluded field wherein the ChannelIncluded field is set to a value '1' upon including Channel record for pilots, a Channel field of length 0 or length based upon ChannelRecordType wherein the Channel field indicates a value of the channel record corresponding to the pilot if the ChannelIncluded field is set to '1' otherwise omitting the field for the pilot offset, a 2 bit CQIReportInterval field wherein the CQIReportingMode field specifies the configuration of MIMO CQI reports sent by the access terminal, a 4 bit VCQIReportInterval field wherein the VCQIReportInterval field indicates an interval at which the access terminal will send a VCQIReport message in units of 0.25 seconds, a 2 bit VCQIMeasureInterval field wherein the VCQIMeasureInterval field indicates a value to control VCQI reports and takes a value of (2*n+1) superframes, a 1 bit EnhancedPilotReportEnabled field wherein the EnhancedPilotReportEnabled field indicates a value to determine if enhanced pilot reports will be triggered, a 4 bit EnhancedPilotReportRatio field wherein the EnhancedPilotReportRatio field indicates a value in steps of -0.5dB to control pilot reports if EnhancedPilotReportEnabled field is set to '1', a 4 bit EnhacedPilotReportThreshold field wherein the EnhancedPilotReportThreshold field indicates a value in units of 1 dB to control pilot reports if EnhancedPilotReportEnabled is set to '1', a 2 bit MinRequestInterval field wherein the MinRequestInterval field indicates a value of minimum number of frames between two request transmission by the access terminal, a 2 bit CQIReportInterval

field wherein the CQIReportInterval field determines the periodicity at which the access terminal will report a CQI value, a 2 bit CQIReportPhase field wherein the CQIReportPhase field determines phase of the CQI reports that are transmitted with periodicity CQIReportInterval, a 2 bit CQIPilotInterval field wherein the CQIPilotInterval field determines the periodicity at which the access terminal will report a default CQICHPilot, a 2 bit CQIPilotPhase field wherein the CQIPilotPhase field determines the phase of the CQICHPilot reports that are transmitted with periodicity CQIPilotInterval, a 3 bit BFCHReportRate field wherein the BFCHReportRate field indicates a value of number of R-BFCH reports per super-frame, a 3 bit SFCHReportRate field wherein the SFCHReportRate field indicates a value of number of R-SFCH reports per super-frame, a 3 bit BFCHPowerOffset field wherein the BFCHPowerOffset field determines the power offset of the R-BFCH relative to the R-CQICH having units in dB, a 2 bit NumBFCHBits wherein the NumBFCHBits field determines the number and type of bits sent on the R-BFCH, a 3 bit SFCHPowerOffset field wherein the SFCHPowerOffset field determines the power offset of the R-SFCH relative to the R-CQICH in dB, a 2 bit NumSFCHBits field wherein the NumSFCHBits field determines the number and type of bits sent on the R-SFCH, a 3 bit MandatoryCQICHCTRLReportingPeriod field wherein the MandatoryCQICHCTRLReportingPeriod field determines the reporting period in multiples of CQIReportInterval where the access terminal is mandated to transmit R-CQICHCTRL report in the R-CQICH channel, a 3 bit NumPilots field wherein the NumPilots field indicates the number of pilots included in the message, a VCQIMeasureThreshold field wherein the VCQIMeasureThreshold field indicates a value to control VCQI reports, a MinVCQIReportInterval field wherein the MinVCQIReportInterval field indicates a value to control VCQI reports, and a MaxVCQIReportInterval field wherein the MaxVCQIReportInterval field indicates a value to control VCQI reports.

3. The method as claimed in claim 2, characterized in that generating the ActiveSetAssignment message to include a 12 bit PilotPN field wherein the PilotPN field indicates the PilotPN of the pilot included in the message, a 3 bit ActiveSetIndex wherein the ActiveSetIndex field indicates a value to enable the CQI reporting to different sectors in the active set, a 1 bit GloballySynchronous field wherein the GloballySynchronous field is set to a value '1' if the sector transmitting the pilot is

synchronous to global time, a 1 bit SynchronousWithNextPilot field wherein the SynchronousWithNextPilot field is set to a value '1' if the sector is synchronous with the next sector listed in the message or set to a value '0' if the sector is the last sector listed in the message or the sector is not synchronous with the next sector listed in the message, a 2 bit ControlSegment field wherein the ControlSegment field indicates the control segment used for sending reverse link control to the sector, a 11 bit MACID field wherein the MACID field indicates the MACID assigned to the user in the sector, a 1 bit AccessSequenceIDIncluded field wherein the AccessSequenceIDIncluded field is set to a value '1' if the AccessSequenceID is included with the message, a 0 or 4 bit AccessSequenceID field wherein the AccessSequenceID field indicates an access sequence used by the access terminal to acquire reverse link timing for the sector and takes the values from zero to eight and a 1 bit MIMOMode field..

4. The method as claimed in claim 2, characterized in that setting a value '00' in the CQIReportingMode field to indicate SISO, a value '01' in the CQIReportingMode field to indicate Single Code Word CQI Report, a value '10' in the CQIReportingMode field to indicate MultipleCodeWord CQI Report, a value '11' in the CQIReportingMode field to indicate a reserved value.

5. The method as claimed in claim 2, characterized in that setting a value '00' in the CQIReportInterval field to indicate Periodicity of CQI report in number of control segment periods equal to '1' , a value '01' in the CQIReportInterval field to indicate Periodicity of CQI report in number of control segment periods equal to '2', a value '10' in the CQIReportInterval field to indicate Periodicity of CQI report in number of control segment periods equal to '3', a value '11' in the CQIReportInterval field to indicate Periodicity of CQI report in number of control segment periods equal to '4'.

6. The method as claimed in claim 2, characterized in that setting a value '00' in the CQIPilotInterval field to indicate Periodicity of default CQI report in number of CQIReportIntervals is equal to '2', a value '01' in the CQIPilotInterval field to indicate Periodicity of default CQI report in number of CQIReportIntervals is equal to '4', a value '10' in the CQIPilotInterval field to indicate Periodicity of default CQI report in number of CQIReportIntervals is equal to '6', a value '11' in the CQIPilotInterval field

to indicate Periodicity of default CQI report in number of CQIReportIntervals is equal to '8'

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

a first set of instructions for generating an ActiveSetAssignment message comprising a 8 bit MessageID field, a 8 bit MessageSequence field wherein the MessageSequence field indicates a value 1 higher than the MessageSequence field of the last ActiveSetAssignment message sent to the access terminal and a 3 bit NumChannels field wherein the NumChannels field indicates the number of channels included in the message; and

a second set of instructions for transmitting the ActiveSetAssignment message over a communication link.

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

means for generating an ActiveSetAssignment message comprising a 8 bit MessageID field, a 8 bit MessageSequence field wherein the MessageSequence field indicates a value 1 higher than the MessageSequence field of the last ActiveSetAssignment message sent to an access terminal and a 3 bit NumChannels field wherein the NumChannels field indicates number of channels included in the message; and

means for transmitting the ActiveSetAssignment message over a communication link.

9. The apparatus as claimed in claim 8, characterized in that having means for generating the ActiveSetAssignment message to include a 1 bit ChannelIncluded field wherein the ChannelIncluded field is set to a value '1' upon including channel record for the pilots, a Channel field of length 0 or length based upon ChannelRecordType wherein the Channel field indicates a value of the channel record corresponding to the pilot if the ChannelIncluded field is set to '1' otherwise omitting the field for the pilot offset, a 2 bit CQIReportInterval field wherein the CQIReportingMode field specifies the configuration of MIMO CQI reports sent by the access terminal, a 4 bit VCQIReportInterval field wherein the VCQIReportInterval field indicates an interval at

which the access terminal will send a VCQIReport message in units of 0.25 seconds, a 2 bit VCQIMeasureInterval field wherein the VCQIMeasureInterval field indicates a value to control VCQI reports and takes a value of (2*n+1) superframes, a 1 bit EnhancedPilotReportEnabled field wherein the EnhancedPilotReportEnabled field indicates a value to determine if enhanced pilot reports will be triggered, a 4 bit EnhancedPilotReportRatio field wherein the EnhancedPilotReportRatio field indicates a value in steps of -0.5dB to control pilot reports if EnhancedPilotReportEnabled field is set to '1', a 4 bit EnhacedPilotReportThreshold field wherein the EnhancedPilotReportThreshold field indicates a value in units of 1 dB to control pilot reports if EnhancedPilotReportEnabled is set to '1', a 2 bit MinRequestInterval field wherein the MinRequestInterval field indicates a value of minimum number of frames between two request transmission by the access terminal, a 2 bit CQIReportInterval field wherein the CQIReportInterval field determines the periodicity at which the access terminal will report a CQI value, a 2 bit CQIReportPhase field wherein the CQIReportPhase field determines the phase of the CQI reports that are transmitted with periodicity CQIReportInterval, a 2 bit CQIPilotInterval field wherein the CQIPilotInterval field determines the periodicity at which the access terminal will report a default CQICHPilot, a 2 bit CQIPilotPhase field wherein the CQIPilotPhase field determines the phase of the CQICHPilot reports that are transmitted with periodicity CQIPilotInterval, a 3 bit BFCHReportRate field wherein the BFCHReportRate field indicates a value of number of R-BFCH reports per super-frame, a 3 bit SFCHReportRate field wherein the SFCHReportRate field indicates a value of number of R-SFCH reports per super-frame, a 3 bit BFCHPowerOffset field wherein the BFCHPowerOffset field determines the power offset of the R-BFCH relative to the R-CQICH having units in dB, a 2 bit NumBFCHBits wherein the NumBFCHBits field determines the number and type of bits sent on the R-BFCH, a 3 bit SFCHPowerOffset field wherein the SFCHPowerOffset field determines the power offset of the R-SFCH relative to the R-CQICH in dB, a 2 bit NumSFCHBits field wherein the NumSFCHBits field determines the number and type of bits sent on the R-SFCH, a 3 bit MandatoryCQICHCTRLReportingPeriod field wherein the MandatoryCQICHCTRLReportingPeriod field determines the reporting period in multiples of CQIReportInterval where the access terminal is mandated to transmit R-CQICHCTRL report in the R-CQICH channel, a 3 bit NumPilots field wherein the NumPilots field indicates the number of pilots included in the message, a

VCQIMeasureThreshold field wherein the VCQIMeasureThreshold field indicates a value to control VCQI reports, a MinVCQIReportInterval field wherein the MinVCQIReportInterval field indicates a value to control VCQI reports, and a MaxVCQIReportInterval field wherein the MaxVCQIReportInterval field indicates a value to control VCQI reports.

10. The apparatus as claimed in claim 9, characterized in that having means for generating the ActiveSetAssignment message to include a 12 bit PilotPN field wherein the PilotPN field indicates the PilotPN of the pilot included in the message, a 3 bit ActiveSetIndex wherein the ActiveSetIndex field indicates a value to enable CQI reporting to different sectors in the active set, a 1 bit GloballySynchronous field wherein the GloballySynchronous field is set to a value '1' if the sector transmitting the pilot is synchronous to global time, a 1 bit SynchronousWithNextPilot field wherein the SynchronousWithNextPilot field is set to a value '1' if the sector is synchronous with the next sector listed in the message or set to a value '0' if the sector is the last sector listed in the message or the sector is not synchronous with the next sector listed in the message, a 2 bit ControlSegment field wherein the ControlSegment field indicates the control segment used for sending reverse link control to the sector, a 11 bit MACID field wherein the MACID field indicates the MACID assigned to the user in the sector, a 1 bit AccessSequenceIDIncluded field wherein the AccessSequenceIDIncluded field is set to a value '1' if the AccessSequenceID is included with the message, a 0 or 4 bit AccessSequenceID field wherein the AccessSequenceID field indicates an access sequence used by the access terminal to acquire reverse link timing for the sector and takes the values from zero to eight and a 1 bit MIMOMode field.

11. The apparatus as claimed in claim 9, characterized in that having means for setting a value of '00' in the CQIReportingMode field to indicate SISO, a value of '01' in the CQIReportingMode field to indicate Single Code Word CQI Report, a value of '10' in the CQIReportingMode field to indicate MultipleCodeWord CQI Report, a value '11' in the CQIReportingMode field to indicate a reserved value.

12. The apparatus as claimed in claim 9, characterized in that having means for setting a value '00' in the CQIReportInterval field to indicate Periodicity of CQI report in number of control segment periods equal to '1' , a value '01' in the

CQIReportInterval field to indicate Periodicity of CQI report in number of control segment periods equal to '2', a value '10' in the CQIReportInterval field to indicate Periodicity of CQI report in number of control segment periods equal to '3', a value '11' in the CQIReportInterval field to indicate Periodicity of CQI report in number of control segment periods equal to '4'.

13. The apparatus as claimed in claim 9, characterized in that having means for setting a value '00' in the CQIPilotInterval field to indicate Periodicity of default CQI report in number of CQIReportIntervals is equal to '2', a value '01' in the CQIPilotInterval field to indicate Periodicity of default CQI report in number of CQIReportIntervals is equal to '4', a value '10' in the CQIPilotInterval field to indicate Periodicity of default CQI report in number of CQIReportIntervals is equal to '6', a value '11' in the CQIPilotInterval field to indicate Periodicity of default CQI report in number of CQIReportIntervals is equal to '8'.

14. A method for receiving an ActiveSetAssignment message in a wireless communication system, the method comprising:

receiving the ActiveSetAssignment message comprising a 8 bit MessageID field, a 8 bit MessageSequence field wherein the MessageSequence field is interpreted as a value 1 higher than the MessageSequence field of the last ActiveSetAssignment message sent to an access terminal and a 3 bit NumChannels field wherein the NumChannels field is interpreted as a number of channels included in the message; and

processing the ActiveSetAssignment message.

15. The method as claimed in claim 14, characterized in that processing the ActiveSetAssignment message to interpret a 1 bit ChannelIncluded field wherein the ChannelIncluded field is interpreted as a value '1' if Channel record for pilots is included, a Channel field of length 0 or length based upon ChannelRecordType wherein the Channel field is interpreted as a value of the channel record corresponding to the pilot if the ChannelIncluded field is set to '1' otherwise omitting the field for the pilot offset, a 2 bit CQIReportInterval field wherein the CQIReportingMode field is interpreted as the configuration of MIMO CQI reports, a 4 bit VCQIReportInterval field wherein the VCQIReportInterval field is interpreted as an interval at which the access terminal will send a VCQIReport message in units of 0.25 seconds, a 2 bit

VCQIMeasureInterval field wherein the VCQIMeasureInterval field is interpreted as a value to control VCQI reports and takes a value of (2*n+1) superframes, a 1 bit EnhancedPilotReportEnabled field wherein the EnhancedPilotReportEnabled field is interpreted as a value to determine if enhanced pilot reports will be triggered, a 4 bit EnhancedPilotReportRatio field wherein the EnhancedPilotReportRatio field is interpreted as a value in steps of -0.5dB to control pilot reports if EnhancedPilotReportEnabled field is set to '1', a 4 bit EnhacedPilotReportThreshold field wherein the EnhancedPilotReportThreshold field is interpreted as a value in units of 1 dB to control pilot reports if EnhancedPilotReportEnabled is set to '1', a 2 bit MinRequestInterval field wherein the MinRequestInterval field is interpreted as a value of minimum number of frames between two request transmission by the access terminal, a 2 bit CQIReportInterval field wherein the CQIReportInterval field is interpreted as the periodicity at which a CQI value is to be reported, a 2 bit CQIReportPhase field wherein the CQIReportPhase field is interpreted as phase of the CQI reports that are transmitted with periodicity CQIReportInterval, a 2 bit CQIPilotInterval field wherein the CQIPilotInterval field is interpreted as s the periodicity at which a default CQICHPilot is reported, a 2 bit CQIPilotPhase field wherein the CQIPilotPhase field is interpreted as the phase of the CQICHPilot reports that are transmitted with periodicity CQIPilotInterval, a 3 bit BFCHReportRate field wherein the BFCHReportRate field is interpreted as a value of number of R-BFCH reports per super-frame, a 3 bit SFCHReportRate field wherein the SFCHReportRate field is interpreted as a value of number of R-SFCH reports per super-frame, a 3 bit BFCHPowerOffset field wherein the BFCHPowerOffset field is interpreted as the power offset of the R-BFCH relative to the R-CQICH having units in dB, a 2 bit NumBFCHBits wherein the NumBFCHBits field is interpreted as the number and type of bits sent on the R-BFCH, a 3 bit SFCHPowerOffset field wherein the SFCHPowerOffset field is interpreted as the power offset of the R-SFCH relative to the R-CQICH in dB, a 2 bit NumSFCHBits field wherein the NumSFCHBits field is interpreted as the number and type of bits sent on the R-SFCH, a 3 bit MandatoryCQICHCTRLReportingPeriod field wherein the MandatoryCQICHCTRLReportingPeriod field is interpreted as the reporting period in multiples of CQIReportInterval where a R-CQICHCTRL report is to be transmitted in the R-CQICH channel, a 3 bit NumPilots field wherein the NumPilots field is interpreted as the number of pilots included in the message, a VCQIMeasureThreshold field wherein the VCQIMeasureThreshold field is interpreted as a value to control VCQI reports, a MinVCQIReportInterval field wherein the MinVCQIReportInterval field is interpreted as a value to control VCQI reports, and a MaxVCQIReportInterval field wherein the MaxVCQIReportInterval field is interpreted as a value to control VCQI reports.

16. The method as claimed in claim 15, characterized in that processing the ActiveSetAssignment message to interpret a 12 bit PilotPN field wherein the PilotPN field is interpreted as the PilotPN of the pilot included in the message, a 3 bit ActiveSetIndex wherein the ActiveSetIndex field is interpreted as a value to enable the CQI reporting to different sectors in the active set, a 1 bit GloballySynchronous field wherein the GloballySynchronous field is interpreted as a value '1' if the sector transmitting the pilot is synchronous to global time, a 1 bit SynchronousWithNextPilot field wherein the SynchronousWithNextPilot field is interpreted as a value '1' if the sector is synchronous with the next sector listed in the message or is interpreted as a value '0' if the sector is the last sector listed in the message or the sector is not synchronous with the next sector listed in the message, a 2 bit ControlSegment field wherein the ControlSegment field is interpreted as the control segment used for sending reverse link control to the sector, a 11 bit MACID field wherein the MACID field is interpreted as the MACID assigned to the user in the sector, a 1 bit AccessSequenceIDIncluded field wherein the AccessSequenceIDIncluded field is interpreted as a value '1' if the AccessSequenceID is included with the message, a 0 or 4 bit AccessSequenceID field wherein the AccessSequenceID field is interpreted as an access sequence to be used to acquire reverse link timing for the sector and takes the values from zero to eight and a 1 bit MIMOMode field.

17. The method as claimed in claim 15, characterized in that interpreting a value of '00' in the CQIReportingMode field as SISO, a value of '01' in the CQIReportingMode field as Single Code Word CQI Report, a value of '10' in the CQIReportingMode field as MultipleCodeWord CQI Report, a value of '11' in the CQIReportingMode field as a reserved value.

18. The method as claimed in claim 15, characterized in that interpreting a value of '00' in the CQIReportInterval field as Periodicity of CQI report in number of control

segment periods being equal to '1' , a value of '01' in the CQIReportInterval field as Periodicity of CQI report in number of control segment periods being equal to '2', a value of '10' in the CQIReportInterval field as Periodicity of CQI report in number of control segment periods being equal to '3', a value of '11' in the CQIReportInterval field as Periodicity of CQI report in number of control segment periods being equal to '4'.

19. The method as claimed in claim 15, characterized in that interpreting a value of '00' in the CQIPilotInterval field as Periodicity of default CQI report in number of CQIReportIntervals being equal to '2', a value of '01' in the CQIPilotInterval field as Periodicity of default CQI report in number of CQIReportIntervals being equal to '4', a value of '10' in the CQIPilotInterval as Periodicity of default CQI report in number of CQIReportIntervals being equal to '6', a value of '11' in the CQIPilotInterval field as Periodicity of default CQI report in number of CQIReportIntervals being equal to '8'.

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

a first set of instructions for receiving an ActiveSetAssignment message comprising a 8 bit MessageID field, a 8 bit MessageSequence field wherein the MessageSequence field is interpreted as a value 1 higher than the MessageSequence field of the last ActiveSetAssignment message sent to an access terminal and a 3 bit NumChannels field wherein the NumChannels field is interpreted as a number of channels included in the message; and

a second set of instructions for processing the ActiveSetAssignment message.

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

means for receiving an ActiveSetAssignment message comprising a 8 bit MessageID field, a 8 bit MessageSequence field wherein the MessageSequence field is interpreted as a value 1 higher than the MessageSequence field of the last ActiveSetAssignment message sent to an access terminal and a 3 bit NumChannels field wherein the NumChannels field is interpreted as a number of channels included in the message; and

means for processing the ActiveSetAssignment message.

22. The apparatus as claimed in claim 21, characterized in that having means for processing the ActiveSetAssignment message to interpret a 1 bit ChannelIncluded field wherein the ChannelIncluded field is interpreted as a value '1' if Channel record for pilots is included, a Channel field of length 0 or length based upon ChannelRecordType wherein the Channel field is interpreted as a value of the channel record corresponding to the pilot if the ChannelIncluded field is set to '1' otherwise omitting the field for the pilot offset, a 2 bit CQIReportInterval field wherein the CQIReportingMode field is interpreted as the configuration of MIMO CQI reports, a 4 bit VCQIReportInterval field wherein the VCQIReportInterval field is interpreted as an interval at which the access terminal will send a VCQIReport message in units of 0.25 seconds, a 2 bit VCQIMeasureInterval field wherein the VCQIMeasureInterval field is interpreted as a value to control VCQI reports and takes a value of (2*n+1) superframes, a 1 bit EnhancedPilotReportEnabled field wherein the EnhancedPilotReportEnabled field is interpreted as a value to determine if enhanced pilot reports will be triggered, a 4 bit EnhancedPilotReportRatio field wherein the EnhancedPilotReportRatio field is interpreted as a value in steps of -0.5dB to control pilot reports if EnhancedPilotReportEnabled field is set to '1', a 4 bit EnhacedPilotReportThreshold field wherein the EnhancedPilotReportThreshold field is interpreted as a value in units of 1 dB to control pilot reports if EnhancedPilotReportEnabled is set to '1', a 2 bit MinRequestInterval field wherein the MinRequestInterval field is interpreted as a value of minimum number of frames between two request transmission by the access terminal, a 2 bit CQIReportInterval field wherein the CQIReportInterval field is interpreted as the periodicity at which a CQI value is to be reported, a 2 bit CQIReportPhase field wherein the CQIReportPhase field is interpreted as phase of the CQI reports that are transmitted with periodicity CQIReportInterval, a 2 bit CQIPilotInterval field wherein the CQIPilotInterval field is interpreted as s the periodicity at which a default CQICHPilot is reported, a 2 bit CQIPilotPhase field wherein the CQIPilotPhase field is interpreted as the phase of the CQICHPilot reports that are transmitted with periodicity CQIPilotInterval, a 3 bit BFCHReportRate field wherein the BFCHReportRate field is interpreted as a value of number of R-BFCH reports per super-frame, a 3 bit SFCHReportRate field wherein the SFCHReportRate field is interpreted as a value of number of R-SFCH reports per super-frame, a 3 bit BFCHPowerOffset field wherein the BFCHPowerOffset field is interpreted as the

power offset of the R-BFCH relative to the R-CQICH having units in dB, a 2 bit NumBFCHBits wherein the NumBFCHBits field is interpreted as the number and type of bits sent on the R-BFCH, a 3 bit SFCHPowerOffset field wherein the SFCHPowerOffset field is interpreted as the power offset of the R-SFCH relative to the R-CQICH in dB, a 2 bit NumSFCHBits field wherein the NumSFCHBits field is interpreted as the number and type of bits sent on the R-SFCH, a 3 bit MandatoryCQICHCTRLReportingPeriod field wherein the MandatoryCQICHCTRLReportingPeriod field is interpreted as the reporting period in multiples of CQIReportInterval where a R-CQICHCTRL report is to be transmitted in the R-CQICH channel, a 3 bit NumPilots field wherein the NumPilots field is interpreted as the number of pilots included in the message, a VCQIMeasureThreshold field wherein the VCQIMeasureThreshold field is interpreted as a value to control VCQI reports, a MinVCQIReportInterval field wherein the MinVCQIReportInterval field is interpreted as a value to control VCQI reports, and a MaxVCQIReportInterval field wherein the MaxVCQIReportInterval field is interpreted as a value to control VCQI reports.

23. The apparatus as claimed in claim 22, characterized in that having means for processing the ActiveSetAssignment message to interpret a 12 bit PilotPN field wherein the PilotPN field is interpreted as the PilotPN of the pilot included in the message, a 3 bit ActiveSetIndex wherein the ActiveSetIndex field is interpreted as a value to enable the CQI reporting to different sectors in the active set, a 1 bit GloballySynchronous field wherein the GloballySynchronous field is interpreted as a value '1' if the sector transmitting the pilot is synchronous to global time, a 1 bit SynchronousWithNextPilot field wherein the SynchronousWithNextPilot field is interpreted as a value '1' if the sector is synchronous with the next sector listed in the message or is interpreted as a value '0' if the sector is the last sector listed in the message or the sector is not synchronous with the next sector listed in the message, a 2 bit ControlSegment field wherein the ControlSegment field is interpreted as the control segment used for sending reverse link control to the sector, a 11 bit MACID field wherein the MACID field is interpreted as the MACID assigned to the user in the sector, a 1 bit AccessSequenceIDIncluded field wherein the AccessSequenceIDIncluded field is interpreted as a value '1' if the AccessSequenceID is included with the message, a 0 or 4 bit AccessSequenceID field wherein the AccessSequenceID field is interpreted as an

access sequence to be used to acquire reverse link timing for the sector and takes the values from zero to eight and a 1 bit MIMOMode field.

24. The apparatus as claimed in claim 22, characterized in that having means for interpreting a value of '00' in the CQIReportingMode field as SISO, a value of '01' in the CQIReportingMode field as Single Code Word CQI Report, a value of '10' in the CQIReportingMode field as MultipleCodeWord CQI Report, a value of '11' in the CQIReportingMode field as a reserved value.

25. The apparatus as claimed in claim 22, characterized in that having means for interpreting a value of '00' in the CQIReportInterval field as Periodicity of CQI report in number of control segment periods being equal to '1' , a value of '01' in the CQIReportInterval field as Periodicity of CQI report in number of control segment periods being equal to '2', a value of '10' in the CQIReportInterval field as Periodicity of CQI report in number of control segment periods being equal to '3', a value of '11' in the CQIReportInterval field as Periodicity of CQI report in number of control segment periods being equal to '4'.

26. The apparatus as claimed in claim 22, characterized in that having means for interpreting a value of '00' in the CQIPilotInterval field as Periodicity of default CQI report in number of CQIReportIntervals being equal to '2', a value of '01' in the CQIPilotInterval field as Periodicity of default CQI report in number of CQIReportIntervals being equal to '4', a value of '10' in the CQIPilotInterval as Periodicity of default CQI report in number of CQIReportIntervals being equal to '6', a value of '11' in the CQIPilotInterval field as Periodicity of default CQI report in number of CQIReportIntervals being equal to '8

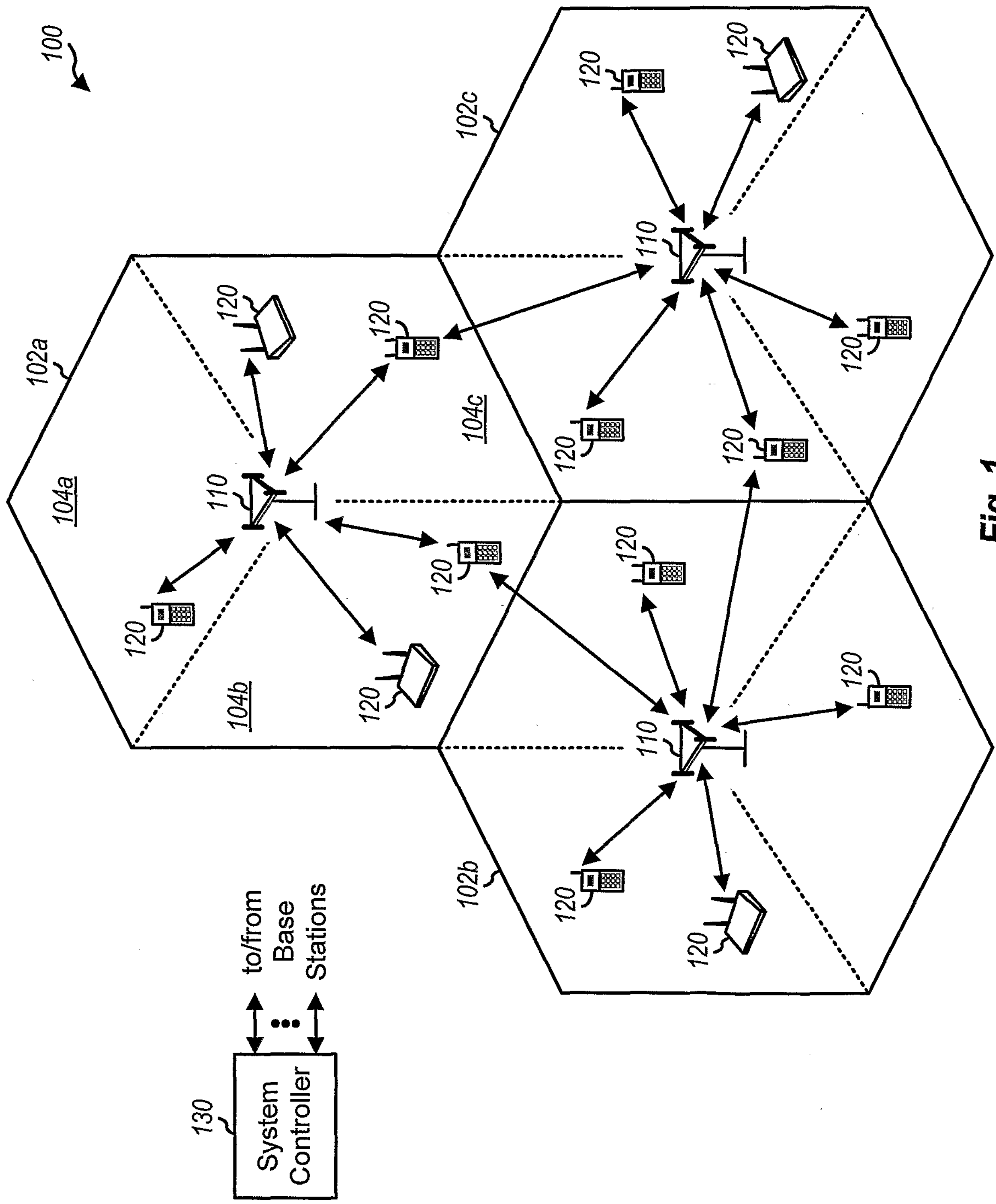
100
102a
102b
102c
104a
104b
104c
110
120
130
System Controller
to/from Base Stations

Fig. 1

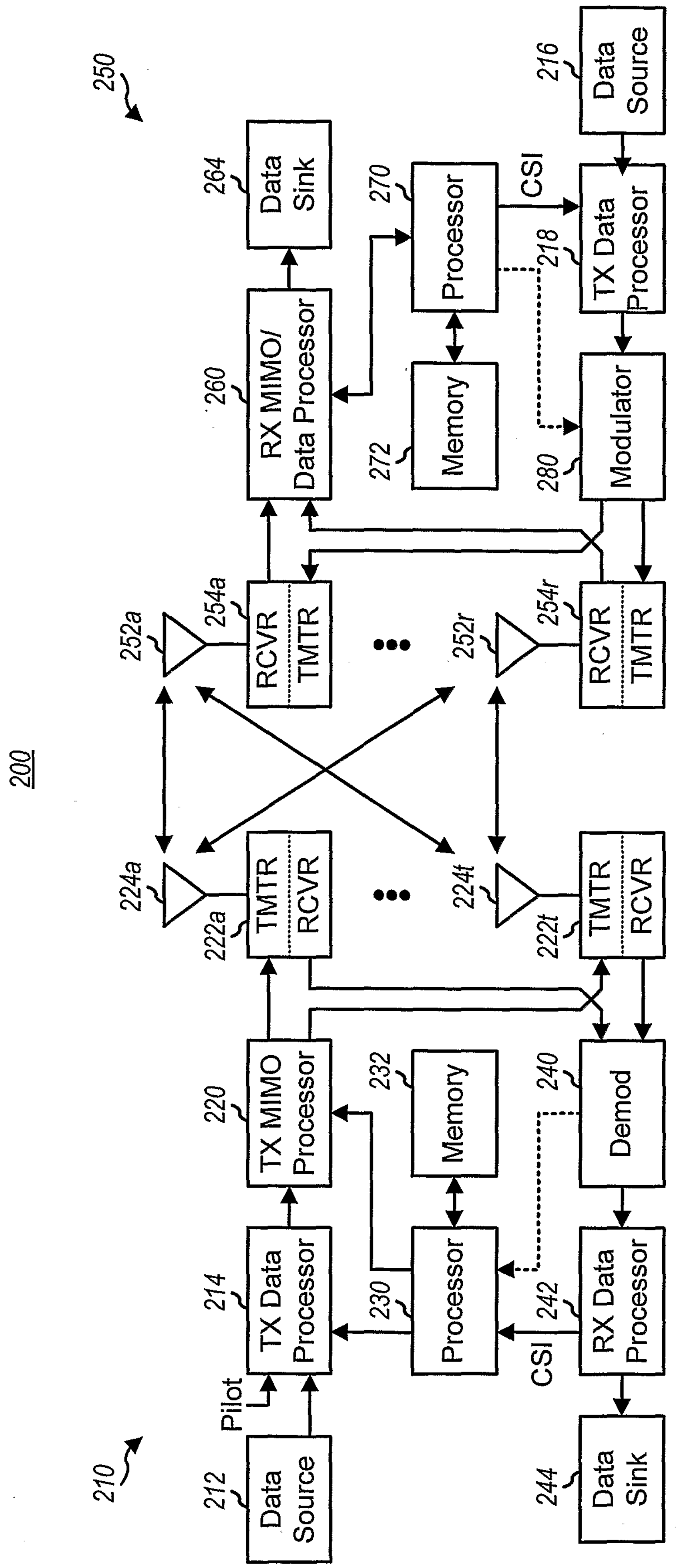
200
210
212
Data Source
Pilot
214
TX Data Processor
220
TX MIMO Processor
222a
TMTR
RCVR
224a
222t
224t
230
Processor
232
Memory
CSI
242
RX Data Processor
240
Demod
244
Data Sink
250
252a
254a
RCVR
TMTR
252r
254r
260
RX MIMO/ Data Processor
264
Data Sink
270
Processor
272
Memory
216
Data Source
218
TX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

Fig 2

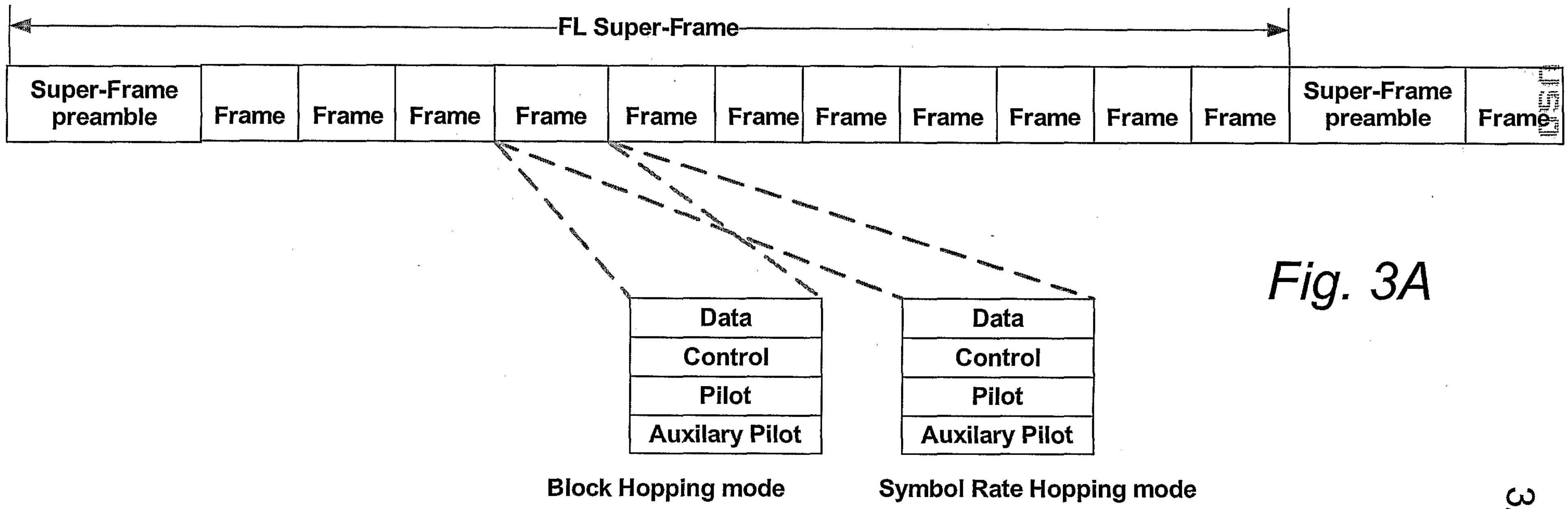
FL Super-Frame
Super-Frame preamble
Frame
Frame
Frame
Frame
Frame
Frame
Frame
Frame
Frame
Frame
Frame
Super-Frame preamble
Frame
Data
Control
Pilot
Auxilary Pilot
Data
Control
Pilot
Auxilary Pilot
Block Hopping mode
Symbol Rate Hopping mode

Fig. 3A

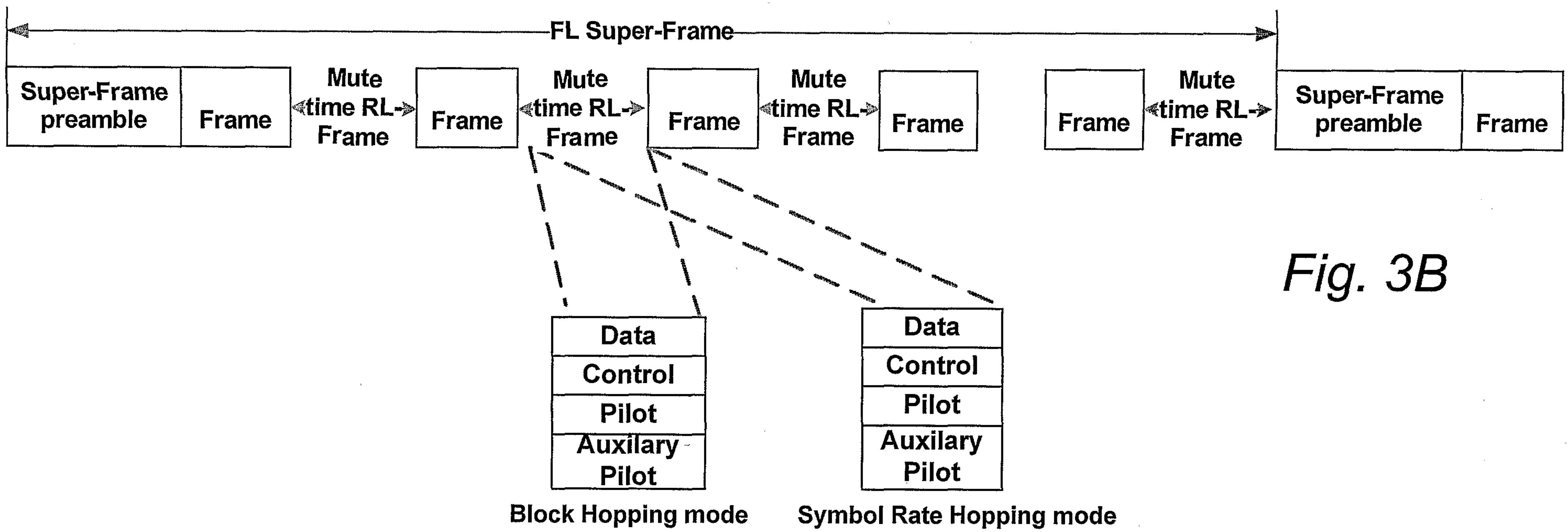
FL Super-Frame
Super-Frame preamble
Frame
Mute time RL-Frame
Frame
Mute time RL-Frame
Frame
Mute time RL-Frame
Frame
Frame
Mute time RL-Frame
Super-Frame preamble
Frame
Data
Control
Pilot
Auxilary Pilot
Data
Control
Pilot
Auxilary Pilot
Block Hopping mode
Symbol Rate Hopping mode

Fig. 3B

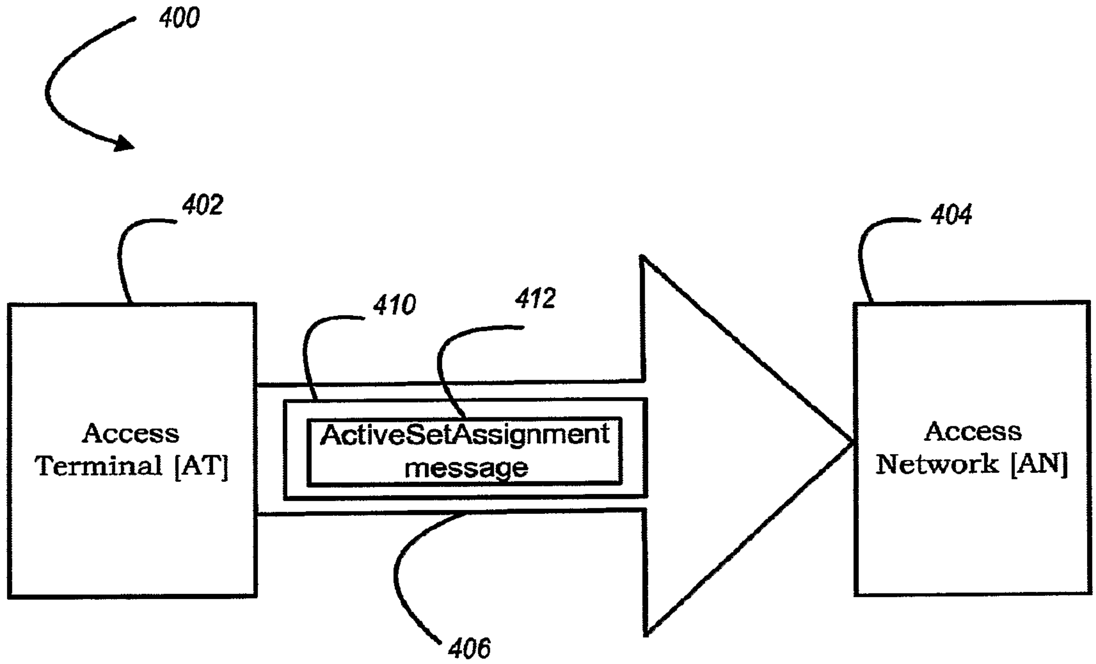
400
402
404
410
412
Access
Terminal [AT]
ActiveSetAssignment
message
Access
Network [AN]
406

Fig. 4

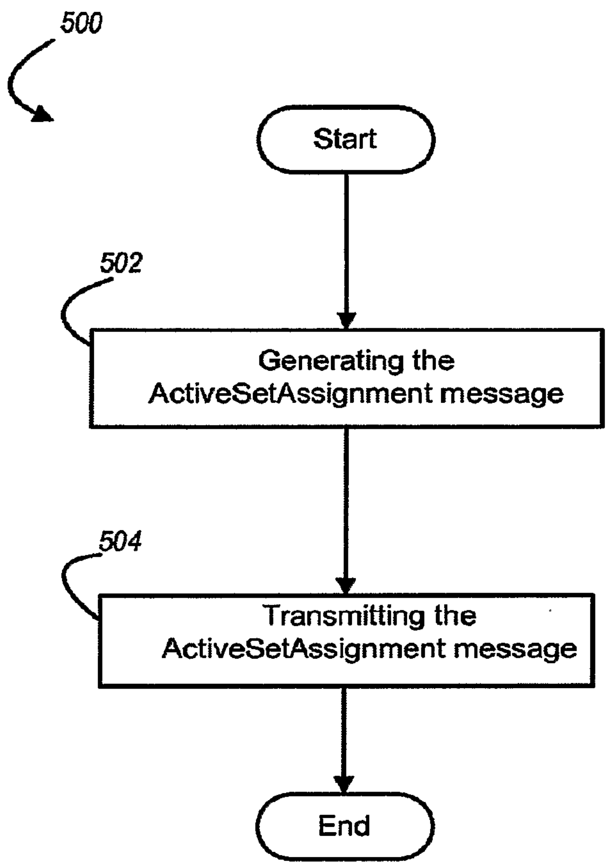
500
Start
502
Generating the ActiveSetAssignment message
504
Transmitting the ActiveSetAssignment message
End

Fig. 5A

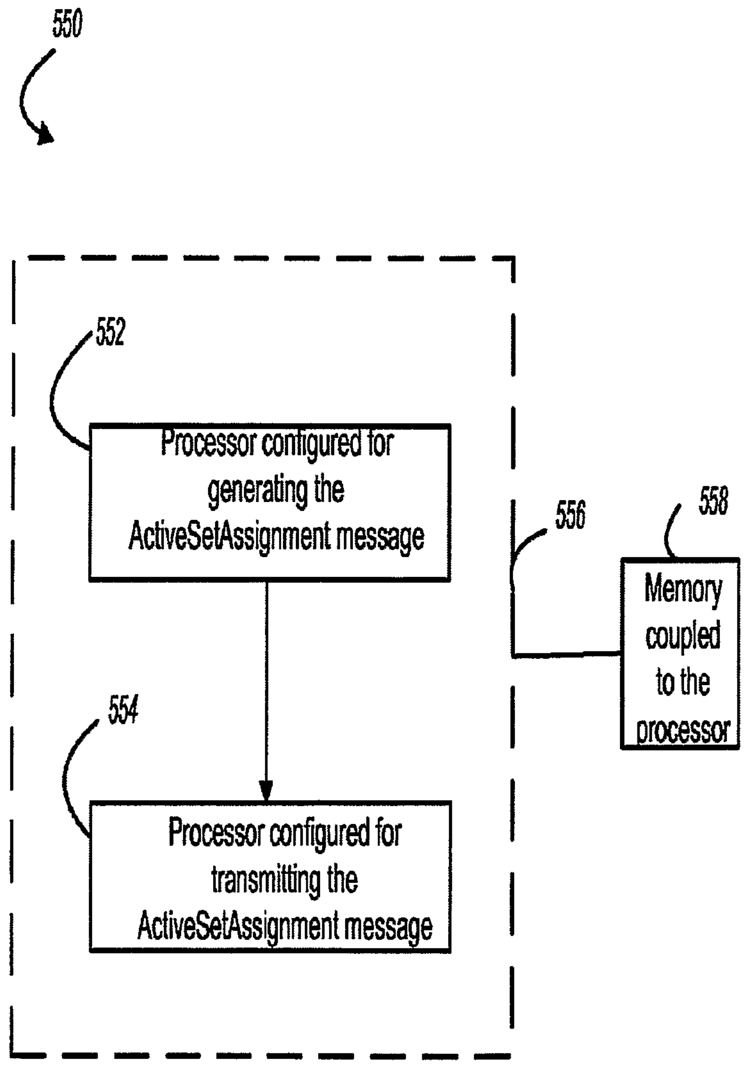
550
552
Processor configured for generating the ActiveSetAssignment message
554
Processor configured for transmitting the ActiveSetAssignment message
556
558
Memory coupled to the processor

Fig. 5B

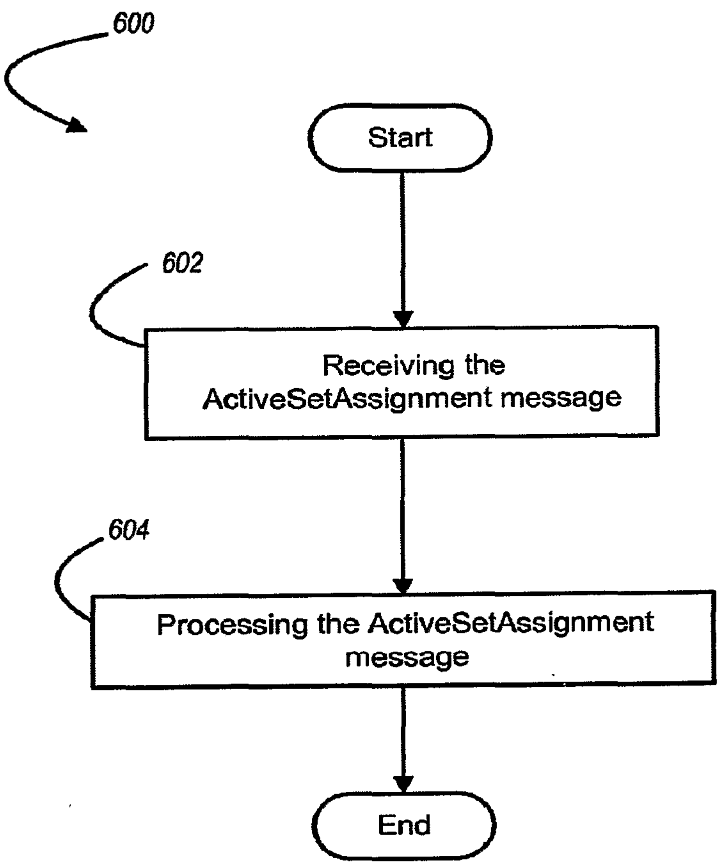
600
Start
602
Receiving the ActiveSetAssignment message
604
Processing the ActiveSetAssignment message
End

Fig. 6A

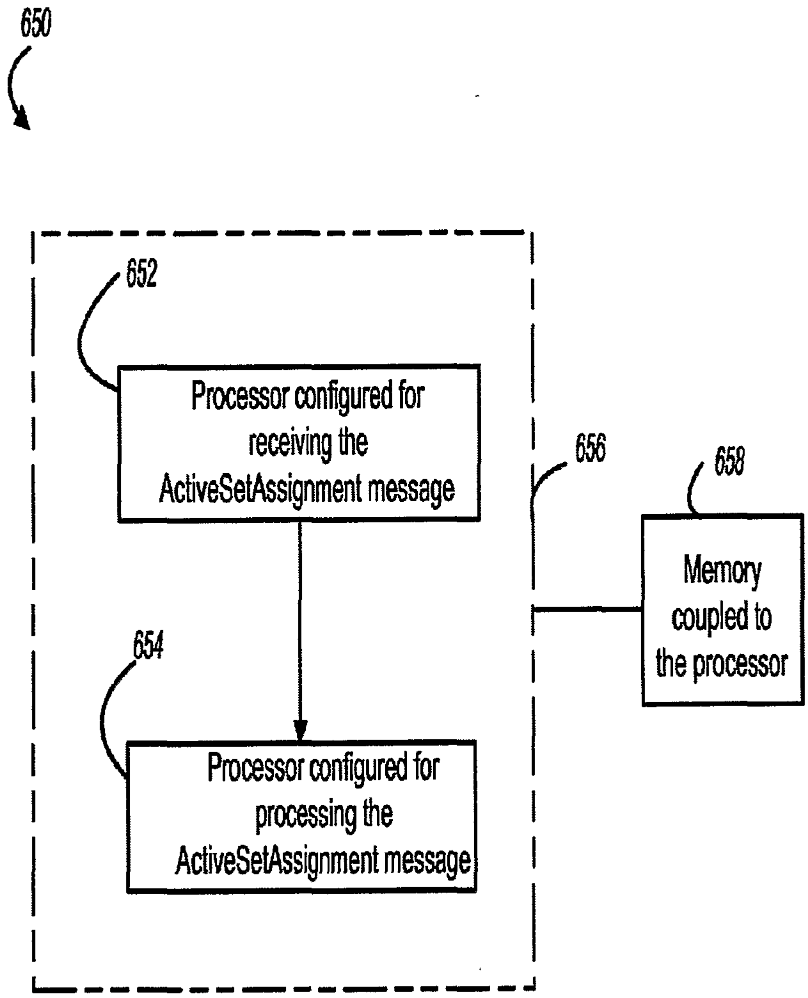
650
652
Processor configured for receiving the ActiveSetAssignment message
656
658
Memory coupled to the processor
654
Processor configured for processing the ActiveSetAssignment message

Fig. 6B

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2006/042002

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04Q7/38

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H04L H04Q H04B

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

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	3RD GENERATION PARTNERSHIP PROJECT 2-3GPP2: "cdma2000 High Rate Packet Data Air Interface Specification" 3RD GENERATION PARTNERSHIP PROJECT 2 3GPP2, XX, XX, 27 July 2005 (2005-07-27), pages 482-532,1179, XP002423741 paragraph 8.7.6.1.3.2; paragraph 8.7.6.2.2	1-26
P,X	TOMCIK J ET AL: "QFDD and QTDD: Proposed Draft Air Interface Specification, chapter 6, Lower MAC Control Sublayer" IEEE C802.20-05/69, XX, XX, 28 October 2005 (2005-10-28), pages I-XXXI,1, XP002423447 paragraphs 6.6.5.7.4-6.6.5.7.5; paragraphs 6.6.6.2-6.6.6.4; paragraph 6.6.8.4	1-26

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

[X] See patent family annex.

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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
19 March 2007	26/03/2007

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	MORENO-SOLANA, S

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2006/042002

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	ZHANG H ET AL: "Enhanced Feedback Method for Enhanced FAST FEEDBACK channels" IEEE C802.16E-04/547R1, IEEE,, US, 15 November 2004 (2004-11-15), XP002375925 the whole document	1-26
A	US 2005/201295 A1 (KIM JEE-HYUN [KR] ET AL) 15 September 2005 (2005-09-15) abstract	1-26
P,A	WO 2006/107835 A (QUALCOMM INC [US]; SAMPATH HEMANTH [US]; GOROKHOV ALEXEI [US]; KHANDEK) 12 October 2006 (2006-10-12) abstract paragraphs 0052-0086 figures 5,6	1-26
P,A	WO 2006/069302 A1 (QUALCOMM INC [US]; SAMPATH HEMANTH [US]; JI TINGFANG [US]) 29 June 2006 (2006-06-29) abstract	

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2006/042002

Patent document cited in search report		Publication date	Patent family member(s)			Publication date
US 2005201295	A1	15-09-2005	AU	2005222290	A1	22-09-2005
			CA	2557040	A1	22-09-2005
			EP	1575234	A2	14-09-2005
			WO	2005088870	A1	22-09-2005
			KR	20050091573	A	15-09-2005
WO 2006107835	A	12-10-2006	US	2006223449	A1	05-10-2006
WO 2006069302	A1	29-06-2006	AR	051854	A1	14-02-2007
			US	2006135169	A1	22-06-2006