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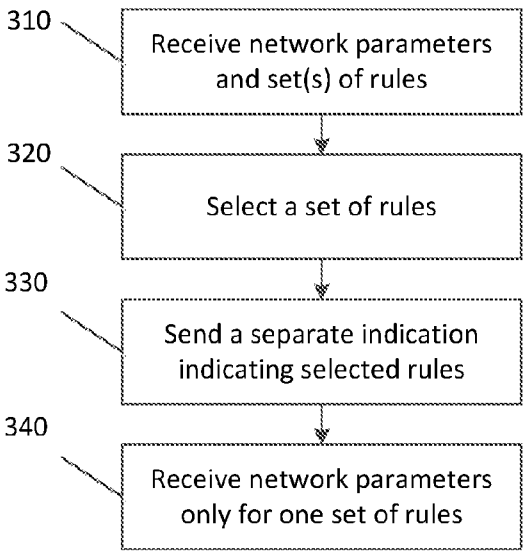

Figure 3

(57) Abstract: Certain embodiments may generally relate to wireless communication networks, and to 3rd Generation Partnership Project (3GPP) wireless local area network (WLAN) interworking enhancement for usage of radio access network (RAN) rules and access network discovery and selection function (ANDSF) policies. A method may include receiving, at a terminal, network parameters, and at least one set of rules among a plurality of different sets of rules under which the terminal utilizes the network parameters. The method may also include selecting a set of rules, among the plurality of different sets of rules, under which the terminal utilizes the network parameters. The method may further include sending a separate indication to a network indicating which set of rules, among the plurality of different sets of rules, under which the terminal selected in the utilization of the network parameters.

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USAGE OF RADIO ACCESS NETWORK RULES AND ACCESS NETWORK DISCOVERY AND SELECTION FUNCTION POLICIES

CROSS-REFERENCE TO RELATED APPLICATIONS:

This application claims priority to United States provisional application no. 62/101,188, filed on January 8, 2015. The entire contents of this earlier filed application are hereby incorporated by reference in its entirety.

BACKGROUND:

Field:

Embodiments of the invention generally relate to wireless communication networks, such as, but not limited to, the Universal Mobile Telecommunications System (UMTS) Terrestrial Radio Access Network (UTRAN), Long Term Evolution (LTE) Evolved UTRAN (E-UTRAN), LTE-Advanced (LTE-A) and/or future 5G radio access technology. For example, certain embodiments may relate to 3rd Generation Partnership Project (3GPP) wireless local area network (WLAN) interworking enhancement for usage of radio access network (RAN) rules and access network discovery and selection function (ANDSF) policies.

Description of the Related Art:

Universal Mobile Telecommunications System (UMTS) Terrestrial Radio Access Network (UTRAN) refers to a communications network including base stations, or Node-Bs, and radio network controllers (RNC). UTRAN allows for connectivity between the user equipment (UE) and the core network. The RNC provides control functionalities for one or more Node-Bs. The RNC and its corresponding Node-Bs are called the Radio Network Subsystem (RNS).

Long Term Evolution (LTE) refers to improvements of the UMTS through improved efficiency and services, lower costs, and use of new spectrum opportunities. In particular, LTE is a 3rd Generation Partnership Project (3GPP) standard that provides for uplink peak rates of at least 75 megabits per second (Mbps) and downlink peak rates of at least 300 Mbps. LTE supports scalable carrier bandwidths from 20 MHz down to 1.4 MHz and supports both Frequency Division Duplexing (FDD) and Time Division Duplexing (TDD).

As mentioned above, LTE may also improve spectral efficiency in networks, allowing carriers to provide more data and voice services over a given bandwidth. Therefore, LTE is designed to fulfill the needs for high-speed data and multimedia transport in addition to high-capacity voice support. Advantages of LTE include, for example, high throughput, low latency,

FDD and TDD support in the same platform, an improved end-user experience, and a simple architecture resulting in low operating costs. In addition, LTE is an all internet protocol (IP) based network, supporting both IPv4 and Ipv6.

Generally, a radio access network (RAN) may be part of a mobile telecommunication system that implements a radio access technology (RAT) including 3G, 4G or LTE, LTE-A, 5G, Bluetooth, Wi-Fi, etc. The radio access network may reside between devices such as a mobile terminal, a computer, or any remotely controlled machine and may provide connection and/or access to the core network (CN). Further, an access network discovery and selection function (ANDSF) may generally relate to an entity that is within an evolved packet core (EPC) of a system architecture evolution (SAE) for 3GPP compliant mobile networks. The ANDSF may assist the UE to discover non-3GPP access networks such as, for example, Wi-Fi or worldwide interoperability for microwave access (WIMAX), that can be used for data communications in addition to 3GPPP access networks, such as, for example, high speed packet access (HSPA) or LTE.

SUMMARY

One embodiment is directed to a method that may include receiving, at a terminal, network parameters, and at least one set of rules among a plurality of different sets of rules under which the terminal utilizes the network parameters. The method may also include selecting a set of rules, among the plurality of different sets of rules, under which the terminal utilizes the network parameters. The method may further include sending a separate indication to a network indicating which set of rules, among the plurality of different sets of rules, under which the terminal selected in the utilization of the network parameters.

According to an embodiment, the selection of the set of rules by the terminal under which the terminal utilizes the network parameters may include setting a bit to true. According to another embodiment, setting the bit may be based on signaling from a network. In an embodiment, the plurality of different sets of rules may include a set of radio access network rules, and a set of access network discovery selection function rules. According to an embodiment, the terminal may be configured to support both the set of radio access network rules and the set of access network discovery and selection function rules.

According to another embodiment, the method may include receiving network parameters that are only utilized by one specific set of rules. In an embodiment, the separate indication may be included in a user equipment capability message or a UEInformationResponse, indicating whether the terminal would apply access network discovery selection function or radio access

network rules when both rules have been signaled.

Another embodiment is directed to an apparatus that may include at least one processor, and at least one memory including computer program code. The at least one memory and the computer program code may be configured, with the at least one processor, to cause the apparatus at least to receive, at a terminal, network parameters, and at least one set of rules among a plurality of different sets of rules under which the terminal utilizes the network parameters. The at least one memory and the computer program code may also be configured, with the at least one processor, to cause the apparatus at least to select a set of rules, among the plurality of different sets of rules, under which the terminal utilizes the network parameters. The at least one memory and the computer program code may further be configured, with the at least one processor, to cause the apparatus at least to send a separate indication to a network indicating which set of rules, among the plurality of different sets of rules, under which the terminal selected in the utilization of the network parameters.

Another embodiment is directed to an apparatus that may include selecting means for selecting a set of rules, among the plurality of different sets of rules, under which the terminal utilizes the network parameters. The apparatus may also include sending means for sending a separate indication to a network indicating which set of rules, among the plurality of different sets of rules, under which the terminal selected in the utilization of the network parameters.

According to an embodiment, the selection of the set of rules by the terminal under which the terminal utilizes the network parameters may include setting a bit to true. According to another embodiment, setting the bit may be based on signaling from a network. In an embodiment, the plurality of different sets of rules may include a set of radio access network rules, and a set of access network discovery selection function rules.

According to an embodiment, the terminal may be configured to support both the set of radio access network rules and the set of access network discovery and selection function rules. According to another embodiment, the apparatus may further include receiving means for receiving network parameters that are only utilized by one specific set of rules. In an embodiment, the separate indication is included in a user equipment capability message or a UEInformationResponse, indicating whether the terminal would apply access network discovery selection function or radio access network rules when both rules have been signaled.

Another embodiment is directed to a method that may include sending, to a terminal,

network parameters and a set of rules, among a plurality of different sets of rules, under which the terminal utilizes the network parameters. The method may also include receiving a separate indication indicating which set of rules, among the plurality of different sets of rules, under which the terminal is following in the utilization of the network parameters.

According to an embodiment, the method may also include sending the terminal network parameters that are only utilized by one specific set of rules. According to another embodiment, the plurality of different sets of rules comprises a set of radio access network rules, and a set of access network discovery and selection function rules. In an embodiment, the method may further include signaling similar values for each of the plurality of different sets of rules.

Another embodiment is directed to an apparatus that may include at least one processor, and at least one memory including computer program code. The at least one memory and the computer program code may be configured, with the at least one processor, to cause the apparatus at least to send, to a terminal, network parameters and a set of rules, among a plurality of different sets of rules, under which the terminal utilizes the network parameters. The at least one memory and the computer program code may also be configured, with the at least one processor, to cause the apparatus at least to receive a separate indication indicating which set of rules, among the plurality of different sets of rules, under which the terminal is following in the utilization of the network parameters.

Another embodiment is directed to an apparatus. The apparatus may include sending means for sending, to a terminal, network parameters and a set of rules, among a plurality of different sets of rules, under which the terminal utilizes the network parameters. The apparatus may also include receiving means for receiving a separate indication indicating which set of rules, among the plurality of different sets of rules, under which the terminal is following in the utilization of the network parameters.

According to an embodiment, the apparatus may further include another sending means for sending the terminal network parameters that are only utilized by one specific set of rules. According to another embodiment, the plurality of different sets of rules may include a set of radio access network rules, and a set of access network discovery and selection function rules. In an embodiment, the apparatus may further include signaling means for signaling similar values for each of the plurality of different sets of rules.

Another embodiment is directed to a computer program, embodied on a non-transitory

computer readable medium, the computer program configured to control a processor to perform the method according to any one of the methods described above.

BRIEF DESCRIPTION OF THE DRAWINGS:

For proper understanding of the invention, reference should be made to the accompanying drawings, wherein:

Figure 1 illustrates an example signal diagram, according to certain embodiments.

Figure 2 illustrates an example of a system, according to certain embodiments.

Figure 3 illustrates an example flow diagram of a method, according to certain embodiments.

Figure 4 illustrates an example flow diagram of another method, according to certain embodiments.

Figure 5 illustrates an example of an apparatus, according to certain embodiments.

Figure 6 illustrates an example of an apparatus, according to certain embodiments.

DETAILED DESCRIPTION:

The features, structures, or characteristics of the invention described throughout this specification may be combined in any suitable manner in one or more embodiments. For example, the usage of the phrases "certain embodiments," "some embodiments," or other similar language, throughout this specification refers to the fact that a particular feature, structure, or characteristic described in connection with the embodiment may be included in at least one embodiment of the present invention.

Thus, appearances of the phrases "in certain embodiments," "in some embodiments," "in other embodiments," or other similar language, throughout this specification do not necessarily all refer to the same group of embodiments, and the described features, structures, or characteristics may be combined in any suitable manner in one or more embodiments. Additionally, if desired, the different functions discussed below may be performed in a different order and/or concurrently with each other. Furthermore, if desired, one or more of the described functions may be optional or may be combined. As such, the following description should be considered as merely illustrative of the principles, teachings and embodiments of this invention, and not in limitation thereof.

Generally, E-UTRAN may provide assistance parameters via broadcast and dedicated radio resource control (RRC) signaling to the UE. The RAN assistance parameters may include E-UTRAN signal strength thresholds, WLAN channel utilization thresholds, WLAN backhaul data

rate thresholds, WLAN signal strength thresholds and Offload Preference Indicator (OPI). E-UTRAN may also provide a list of WLAN identifiers to the UE via broadcast signaling.

The UE may use the RAN assistance parameters in the evaluation of access network selection and traffic steering rules defined in TS 36.304 of 3GPP, or ANDSF policies defined in TS 24.312 of 3GPP. The OPI may be used in ANDSF policies as specified in TS 24.312 of 3GPP.

Further, WLAN identifiers may be used in access network selection and traffic steering rules defined in TS 36.304 of 3GPP. If the UE is provisioned with ANDSF policies, it may forward the received RAN assistance parameters to upper layers. Otherwise, the UE may use them in the access network selection and traffic steering rules defined in section 23.6.2 and TS 36.304 of 3GPP. The access network selection and traffic steering rules defined in section 23.6.2 and TS 36.304 of 3GPP may be applied to the WLANs of which identifiers are provided by the E-UTRAN.

3GPP RAN WG agreed separate capability bits RAN rules and RAN assistance ANDSF functionality may include: (1) wlan-IW-RAN-Rules that indicate whether the UE supports RAN-assisted WLAN interworking based on access network selection and traffic steering rules; and (2) wlan-IW-ANDSF-Policies that indicate whether the UE supports RAN-assisted WLAN interworking based on ANDSF policies.

If the UE supports both RAN rules and ANDSF policies, the network may not be able to know which rules the UE is following because signaling for both functionalities may contain the same parameters. This would make the UE behavior unreliable or undeterminable. For example, there may be a situation where the ANDSF policies may indicate that traffic should be kept in 3GPP; however, the RAN rules may indicate that the UE should move the traffic to WLAN. As such, it may be unclear as to what the UE should do in such a situation. In particular, it may be unclear as to whether the UE should follow RAN rules or ANDSF policies.

According to certain embodiments of the invention, a mechanism may be provided to address the above problem(s) that may arise when the UE supports both RAN rules and ANDSF policies/rules. The mechanism may be valid for various communication networks. For example, the mechanism may be valid for, but not limited to, E-UTRAN and/or UTRAN.

In an embodiment, if the network wants to use ANDSF polices, the network may determine not to provide any WLAN identifiers to the UE. This way, RAN rules would not be utilized by the UE because the RAN rules are valid only for WLAN identifiers indicated by RAN. This network

signaling limitation could be defined in the 3GPP specifications, for example, so that network should not provide WLAN identifiers if the network wants UE(s) to utilize ANDSF policies. The UE may be forced to use RAN rules or not to use ANDSF policies if WLAN identifiers are provided.

If the network wants to use ANDSF policies, the network may determine to provide an Offload Preference Indicator. This way, the UE would be able determine that ANDSF policies shall be followed, because the Offload Preference Indicator is used only with ANDSF policies (i.e., not with RAN rules). The UE may be forced not to use RAN rules if the Offload Preference Indicator is provided.

Further, the UE may set a bit corresponding to either wlan-IW-RAN-Rules or wlan-IW-ANDSF-Policies, as supported. Alternatively, the network may signal which bit the UE may set to true if any. Moreover, setting the bit may be based on signaling from the network, or it may be specified in the 3GPP specification(s), which bit the UE should set to true if any. Thus, in one embodiment, the bit that is set by the UE may be predetermined.

In an embodiment, the network may provide information, via dedicated and/or broadcast signaling, which rules the UE may use. For example, the network may signal a plurality of different sets of rules to the UE. The rules may include RAN rules and/or ANDSF rules. The network may also provide various network parameters, such as, for example RAN assistance parameters to the UE. The network may indicate with broadcast or dedicated signaling to the UE which rules the UE shall use, such as, for example, RAN rules or ANDSF policies. For example, the information may be in the same message that RAN rules are given or in new message, which indicates which rules the UE should follow if the UE supports both RAN and ANDSF rules, if both rules are signaled.

In an embodiment, the UE may indicate to the network, with a separate indication (e.g., medium access control (MAC), RRC or non-access-stratum (NAS) signaling message), which rules or polices the UE is using, going to use, or requesting to use. In an embodiment, the UE may indicate, for example, in a UE capability message or more dynamically, a UEInformationResponse (or whatever signaling message), whether the UE would apply ANDSF or RAN rules for example in case of both rules are available in the UE.

According to another embodiment, the network may have limitations to only provide either RAN or ANDSF rules for the UE. Further, the 3GPP specification(s), such as, for example, TS 36.331, could be written to include a network limitation(s), and if the network does not obey this

limitation(s), the UE behavior would be left unspecified. For example, the UE could follow ANDSF policies or RAN rules or any other manufacturer specific network selection mechanism to select best available network .

The network may also signal similar values in RAN and ANDSF for all of the parameters. In this regard, the specification, such as, for example, 3GPP TS 36.331, could also be written to include a network limitation(s), and if the network does not obey this limitation(s), the UE behavior would be left unspecified.

Further, the 3GPP specification(s) may be fixed to determine which rule overrides another. For example, the 3GPP specification(s) may be fixed to specify that RAN will always override ANDSF or vice versa. The specification(s), such as, for example, 3GPP TS 36.331, may be written to include network limitations, and specify that if the network does not obey the UE behavior may be left unspecified. The specification(s), such as, for example, 3GPP TS 36.331, may be written to specify that in the case of where the UE has both rules given, the UE in such a case, should use parameters from RAN rules, or ANDSF rules. In certain embodiments, the rules may be a subset of parameters with RAN rules or ANDSF rules. For example, if only reference signal receiver power (RSRP) threshold overlaps, then that may be considered as the "rule."

Figure 1 illustrates an example of a signaling diagram of UE capabilities signaling between the UE and the E-UTRAN, according to certain embodiments. In particular, at 1, the E-UTRAN may inquire the UE of its capabilities by sending the UE a UECapabilityEnquiry message. In response to the E-UTRAN's request, at 2, the UE may send a UECapabilityInformation message to the E-UTRAN identifying the UE's capabilities to the E-UTRAN.

Figure 2 illustrates an example of a system according to certain embodiments. In one embodiment, a system may include multiple devices, such as, for example, at least one UE 210, and at least one network node 220. The network node 220 may represent one node among many in various communication networks, such as, for example, but not limited to, E-UTRAN and UTRAN. The network node 220 may also represent, for example, a base station, node B (NB), radio network controller (RNC), evolved node B (eNB), mobility management entity (MME), ANDSF server, or a WLAN base station.

Each of these devices may include at least one processor, respectively indicated as 214 and 224. At least one memory can be provided in each device, and indicated as 215 and 225, respectively. The memory may include computer program instructions or computer code contained

therein. The processors 214 and 224, and memories 215 and 225, or a subset thereof, can be configured to provide means corresponding to the various blocks and processes of Figures 1, 3, and 4.

As shown in Figure 2, transceivers 216 and 226 can be provided, and each device may also include an antenna, respectively illustrated as 217 and 227. Other configurations of these devices, for example, may be provided as well. For example, network node 220 may be configured for wired communication, in addition to wireless communication, and in such a case, antenna 227 can illustrate any form of communication hardware, without requiring a conventional antenna.

Transceivers 216 and 226 can each, independently, be a transmitter, a receiver, or both a transmitter and a receiver, or a unit or device that is configured both for transmission and reception. For example, the transceivers 216 and 226 may be configured to modulate information onto a carrier waveform for transmission by the antennas 217 and 227, and demodulate information received via the antennas 217 and 227 for further processing by other elements of the system shown in Figure 2. In other embodiments, transceivers 216 and 226 may be capable of transmitting and receiving signals or data directly.

Processors 214 and 224 can be embodied by any computational or data processing device, such as a central processing unit (CPU), application specific integrated circuit (ASIC), or comparable device. The processors can be implemented as a single controller, or a plurality of controllers or processors. The processors may also perform functions associated with the operation of the system including, without limitation, precoding of antenna gain/phase parameters, encoding and decoding of individual bits forming a communication message, formatting of information, and overall control of the system, including process related to management of communication resources.

Memories 215 and 225 can independently be any suitable storage device, such as a non-transitory computer-readable medium. A hard disk drive (HDD), random access memory (RAM), flash memory, or other suitable memory can be used. The memories can be combined on a single integrated circuit as the processor, or may be separate from the one or more processors. Furthermore, the computer program instructions stored in the memory and which may be processed by the processors can be any suitable form of computer program code, for example, a compiled or interpreted computer program written in any suitable programming language.

The memory and the computer program instructions can be configured, with the processor for the particular device, to cause a hardware apparatus such as UE 210 and network node 220, to

perform any of the processes described herein (see, for example, Figures 1, 3, and 4). Therefore, in certain embodiments, a non-transitory computer-readable medium can be encoded with computer instructions that, when executed in hardware, perform a process such as one of the processes described herein. Alternatively, certain embodiments of the invention can be performed entirely in hardware. Furthermore, although Figure 2 illustrates a system including a UE and network node, embodiments of the invention may be applicable to other configurations, and configurations involving additional elements.

As mentioned above, according to one embodiment, the system shown in Figure 2 may include a UE 210 and network node 220, for example. In an embodiment, the UE may be controlled by memory 215 and processor 214 to receive network parameters and a set of rules, among a plurality of different sets of rules, under which the UE 210 utilizes the network parameters. The network parameters may include RAN assistance parameters, which may further include E-UTRAN signal strength thresholds, WLAN channel utilization thresholds, WLAN backhaul data rate thresholds, WLAN signal strength, Offload Preference Indicators, and WLAN identifiers. Further, the plurality of different sets of rules may include a set of radio access network rules (RAN rules), and a set of access network discovery and selection function (ANDSF) rules. Additionally, the network may include, but is not limited to E-UTRAN and UTRAN. Moreover, the network may provide information to indicate which rules the UE should follow for example if the UE supports both RAN and ANDSF rules, if both rules are signaled. The information may be provided in the signaling message, such as, for example, where RAN assistance parameters are given.

The UE 210 may also be controlled by the memory 215 and processor 214 to select a set of rules, among the plurality of different sets of rules, under which the UE 210 utilizes the network parameters. The UE 210 may further be controlled by the memory 215 and processor 214 to send a separate indication to the network indicating which set of rules, among the plurality of different sets of rules, under which the UE 210 selected in the utilization of the network parameters. Moreover, the separate indication may be included in a UE capability message or a UEInformationResponse, indicating whether the terminal would apply ANDSF or RAN rules when both rules have been signaled.

In another embodiment, the selection of the set of rules or policies by the UE 210 may include setting a (capability) bit, corresponding to the selected set of rules, to true. Further, in an embodiment, setting the (capability) bit may be based on signaling from the network (i.e., network may command which rules / policies the UE shall follow). Alternatively, setting the bit could be specified in the 3GPP specification(s), which bit the UE should set to true if both RAN rules and

ANDSF policies are available at the UE. Thus, in an embodiment, the bit that is set by the UE 210 may be predetermined.

According to one embodiment, the UE 210 may be configured to support both the set of radio access network rules and the set of access network discovery and selection function rules. In an embodiment, the UE 210 may receive network parameters that are only utilized by one specific set of rules.

According to another embodiment, the network node 220 may be controlled by memory 225 and processor 224 to send to the UE 210, network parameters and a set of rules, among a plurality of different sets of rules, under which the UE 210 utilizes the network parameters. As mentioned above, the network parameters may include RAN assistance parameters, which may further include E-UTRAN signal strength thresholds, WLAN channel utilization thresholds, WLAN backhaul data rate thresholds, WLAN signal strength, Offload Preference Indicators, and WLAN identifiers. Further, the plurality of different sets of rules may include a set of radio access network rules (RAN rules), and a set of access network discovery and selection function (ANDSF) rules. Additionally, the network node may be part of a network that may include, but is not limited to E-UTRAN and UTRAN.

The network node 220 may also be controlled by the memory 225 and processor 224 to receive a separate indication from the UE 210 indicating which set of rules, among the plurality of different sets of rules, under which the terminal is following in the utilization of the network parameters. In an embodiment, the network may further be controlled by the memory 225 and processor 224 to send the UE 210 network parameters that may only be utilized by one specific set of rules. In another embodiment, the network may be controlled by the memory 225 and processor 224 to signal similar values for each of the plurality of different sets of rules.

Figure 3 illustrates an example of a flow diagram of a method, according to one embodiment. In an embodiment, the method of Figure 3 may be performed by a terminal, such as a UE, for example. The method may include, at 310, may include receiving, at the UE, network parameters, and at least one set of rules among a plurality of different sets of rules under which the terminal utilizes the network parameters. The method may also include, at 320, selecting a set of rules, among the plurality of different sets of rules, under which the terminal utilizes the network parameters. The method may further include, at 330, sending a separate indication to a network indicating which set of rules, among the plurality of different sets of rules under which the terminal selected in the utilization of the network parameters. Further, the method may include, at 340,

receiving network parameters that are only utilized by one specific set of rules.

In an embodiment, the selection of the set of rules by the UE under which the UE utilizes the network parameters may include setting a bit to true. In another embodiment, setting the bit may be based on signaling from the network. Further, according to an embodiment, the bit that is set by the UE may be predetermined. Additionally, in an embodiment, the plurality of different sets of rules may include a set of radio access network rules, and a set of access network discovery and selection function rules. In another embodiment, the UE may be configured to support both the set of radio access network rules and the set of access network discovery and selection function rules.

Figure 4 illustrates an example of a flow diagram of a method, according to one embodiment. In an embodiment, the method of Figure 4 may be performed by a network node of a network, such as, but not limited to, for example, E-UTRAN and UTRAN. The method may include, at 410, sending to a terminal, network parameters and a set of rules, among a plurality of different sets of rules, under which the terminal utilizes the network parameters. Further, the method may include, at 420, signaling similar values for each of the plurality of different sets of rules. Additionally, in an embodiment, the plurality of different sets of rules may include a set of radio access network rules, and a set of access network discovery and selection function rules. The method may also include, at 430, receiving a separate indication indicating which set of rules, among the plurality of different sets of rules under which the terminal is following in the utilization of the network parameters. The method may further include, at 440, sending the terminal network parameters that are only utilized by one specific set of rules. In an embodiment, the sending of network parameters and the set of rules at 410 may be performed in parallel with signaling similar values for each of the plurality of different sets of rules at 420.

Figure 5 illustrates an example of an apparatus 510 according to an embodiment. In one embodiment, the apparatus 510 may be a UE, discussed above in connection with Figures 1 and 2. It should be noted that one of ordinary skill in the art would understand that the apparatus 510 may include components or features not shown in Figure 5.

As illustrated in Figure 5, the apparatus 510 may include a receiving unit 514 that may be configured to receive network parameters, and at least one set of rules among a plurality of different sets of rules under which the apparatus 510 utilizes the network parameters. The receiving unit 514 may be a transceiver or similar device, as described above with respect to apparatus 210, which may further be configured to transmit and receive information.

The apparatus 510 may also include a selecting unit 515 that may be configured to select a set of rules, among the plurality of different sets of rules, under which the apparatus 510 utilizes the network parameters. The selecting unit 515 may be a processor or similar device, such as the processor described above with respect to apparatus 210.

The apparatus 510 may further include a sending unit 516 that may be configured to send a separate indication to the network indicating which set of rules, among the plurality of different sets of rules, under which the apparatus 510 selected in the utilization of the network parameters. The sending unit 516 may be a transceiver or similar device, such as the transceiver described above with respect to apparatus 210, which may further be configured to transmit and receive information. Additionally, the apparatus 510 may also include one or more antennas 517 for transmitting and receiving signals and/or data to and from the apparatus 510.

Figure 6 illustrates an apparatus 610, according to an embodiment. In one embodiment, the apparatus 610 may be a network node, such as the network node described above in connection with Figure 2. It should be noted that one of ordinary skill in the art would understand that the apparatus 610 may include components or features not shown in Figure 6. For example, additional network nodes may also be included.

As illustrated in Figure 6, the apparatus 610 may include a sending unit 614. The sending unit 614 may be configured to send to a terminal, network parameters and a set of rules, among a plurality of different sets of rules, under which the terminal utilizes the network parameters. The sending unit 614 may also be configured to send the terminal network parameters that are only utilized by one specific set of rules, and may be configured to signal similar values for each of the plurality of different sets of rules. The sending unit 614 may be a transceiver or similar device, such as the transceiver described above with respect to apparatus 220, which may further be configured to transmit and receive information.

The apparatus 610 may also include a receiving unit 616. The receiving unit 616 may be configured to receive a separate indication indicating which set of rules, among the plurality of different sets of rules under which the terminal is following in the utilization of the network parameters. The receiving unit 616 may be a transceiver or similar device, as described above with respect to apparatus 220, which may further be configured to transmit and receive information. Additionally, the apparatus 610 may also include one or more antennas 617 for transmitting and receiving signals and/or data to and from the apparatus 610.

One having ordinary skill in the art will readily understand that the invention as discussed above may be practiced with steps in a different order, and/or with hardware elements in configurations which are different than those which are disclosed. Therefore, although the invention has been described based upon these preferred embodiments, it would be apparent to those of skill in the art that certain modifications, variations, and alternative constructions would be apparent, while remaining within the spirit and scope of the invention. In order to determine the metes and bounds of the invention, therefore, reference should be made to the appended claims.

Glossary

3GPP	3rd Generation Partnership Project
ANDSF	Access Network Discovery and Selection Function
ASIC	Application Specific Integrated Circuit
CPU	Central Processing Unit
CN	Core Network
EPC	Evolved Packet Core
FDD	Frequency Division Duplexing
HDD	Hard Disk Drive
HSPA	High Speed Packet Access
IP	Internet Protocol
LTE	Long Term Evolution
LTE-A	LTE-Advanced
Mbps	Megabits Per Second
OPI	Offload preference Indicator
RAM	Random Access Memory
RAN	Radio Access Network
RAT	Radio Access Technology
RNC	Radio Network Controllers
RNS	Radio network Subsystem
RRC	Radio Resource Control
RSRP	Reference Signal Receiver Power
SAE	System Architecture Evolution
TDD	Time Division Duplexing
UE	User Equipment
UMTS	Universal Mobile Telecommunications System
U-TRAN	Universal Mobile Telecommunications system

	Terrestrial Radio Access Network
WIMAX	Worldwide Interoperability for Microwave Access
WLAN	Wireless Local Area Network

CLAIMS

WE CLAIM:

1. A method, comprising:

receiving, at a terminal, network parameters, and at least one set of rules among a plurality of different sets of rules under which the terminal utilizes the network parameters;

selecting a set of rules, among the plurality of different sets of rules, under which the terminal utilizes the network parameters; and

sending a separate indication to a network indicating which set of rules, among the plurality of different sets of rules, under which the terminal selected in the utilization of the network parameters.

2. The method according to claim 1, wherein the selection of the set of rules by the terminal under which the terminal utilizes the network parameters comprises setting a bit to true.

3. The method according to claim 2, wherein setting the bit is based on signaling from a network.

4. The method according to any one of claims 1-3, wherein the plurality of different sets of rules comprises a set of radio access network rules, and a set of access network discovery selection function rules.

5. The method according to any one of claims 1-4, wherein the terminal is configured to support both the set of radio access network rules and the set of access network discovery and selection function rules.

6. The method according to any one of claims 1-5, further comprising receiving network parameters that are only utilized by one specific set of rules.

7. The method according to any one of claims 1-6, wherein the separate indication is included in a user equipment capability message or a UEInformationResponse, indicating whether the terminal would apply access network discovery selection function or radio access network rules when both rules have been signaled.

8. An apparatus, comprising:

at least one processor; and

at least one memory including computer program code,

wherein the at least one memory and the computer program code are configured, with the at least one processor, to cause the apparatus at least to

receive, at a terminal, network parameters, and at least one set of rules among a plurality of different sets of rules under which the terminal utilizes the network parameters;

select a set of rules, among the plurality of different sets of rules, under which the terminal utilizes the network parameters; and

send a separate indication to a network indicating which set of rules, among the plurality of different sets of rules, under which the terminal selected in the utilization of the network parameters.

9. The apparatus according to claim 8, wherein the selection of the set of rules by the terminal under which the terminal utilizes the network parameters comprises setting a bit to true.

10. The apparatus according to claim 9, wherein setting the bit is based on signaling from a network.

11. The apparatus according to any one of claims 8-10, wherein the plurality of different sets of rules comprises a set of radio access network rules, and a set of access network discovery selection function rules.

12. The apparatus according to any one of claims 8-11, wherein the terminal is configured to support both the set of radio access network rules and the set of access network discovery and selection function rules.

13. The apparatus according to any one of claims 8-12, wherein the apparatus is further configured to receive network parameters that are only utilized by one specific set of rules.

14. The apparatus according to any one of claims 8-13, wherein the separate indication is included in a user equipment capability message or a UEInformationResponse, indicating whether the terminal would apply access network discovery selection function or radio access network rules when both rules have been signaled.

15. A method, comprising:

sending, to a terminal, network parameters and a set of rules, among a plurality of different sets of rules, under which the terminal utilizes the network parameters; and

receiving a separate indication indicating which set of rules, among the plurality of different

sets of rules, under which the terminal is following in the utilization of the network parameters.

16. The method according to claim 15, further comprising sending the terminal network parameters that are only utilized by one specific set of rules.

17. The method according to any one of claims 15 or 16, wherein the plurality of different sets of rules comprises a set of radio access network rules, and a set of access network discovery and selection function rules.

18. The method according to any one of claims 15-17, further comprising signaling similar values for each of the plurality of different sets of rules.

19. An apparatus, comprising:

at least one processor; and

at least one memory including computer program code,

wherein the at least one memory and the computer program code are configured, with the at least one processor, to cause the apparatus at least to

send, to a terminal, network parameters and a set of rules, among a plurality of different sets of rules, under which the terminal utilizes the network parameters; and

receive a separate indication indicating which set of rules, among the plurality of different sets of rules, under which the terminal is following in the utilization of the network parameters.

20. The apparatus according to claim 19, wherein the apparatus is further configured to send the terminal network parameters that are only utilized by one specific set of rules.

21. The apparatus according to any one of claims 19 or 20, wherein the plurality of different sets of rules comprises a set of radio access network rules, and a set of access network discovery and selection function rules.

22. The apparatus according to any one of claims 19-21, wherein the apparatus is further configured to signal similar values for each of the plurality of different sets of rules.

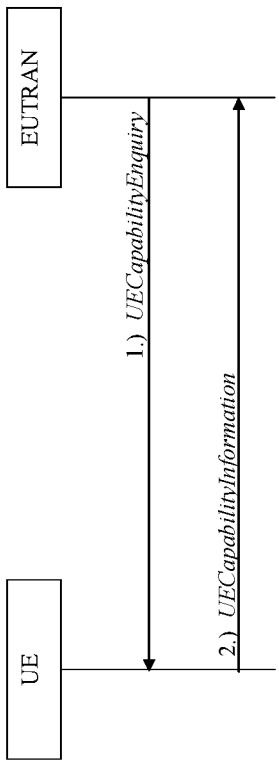
EUTRAN
UE
1.) UECapabilityEnquiry
2.) UECapabilityInformation

Figure 1

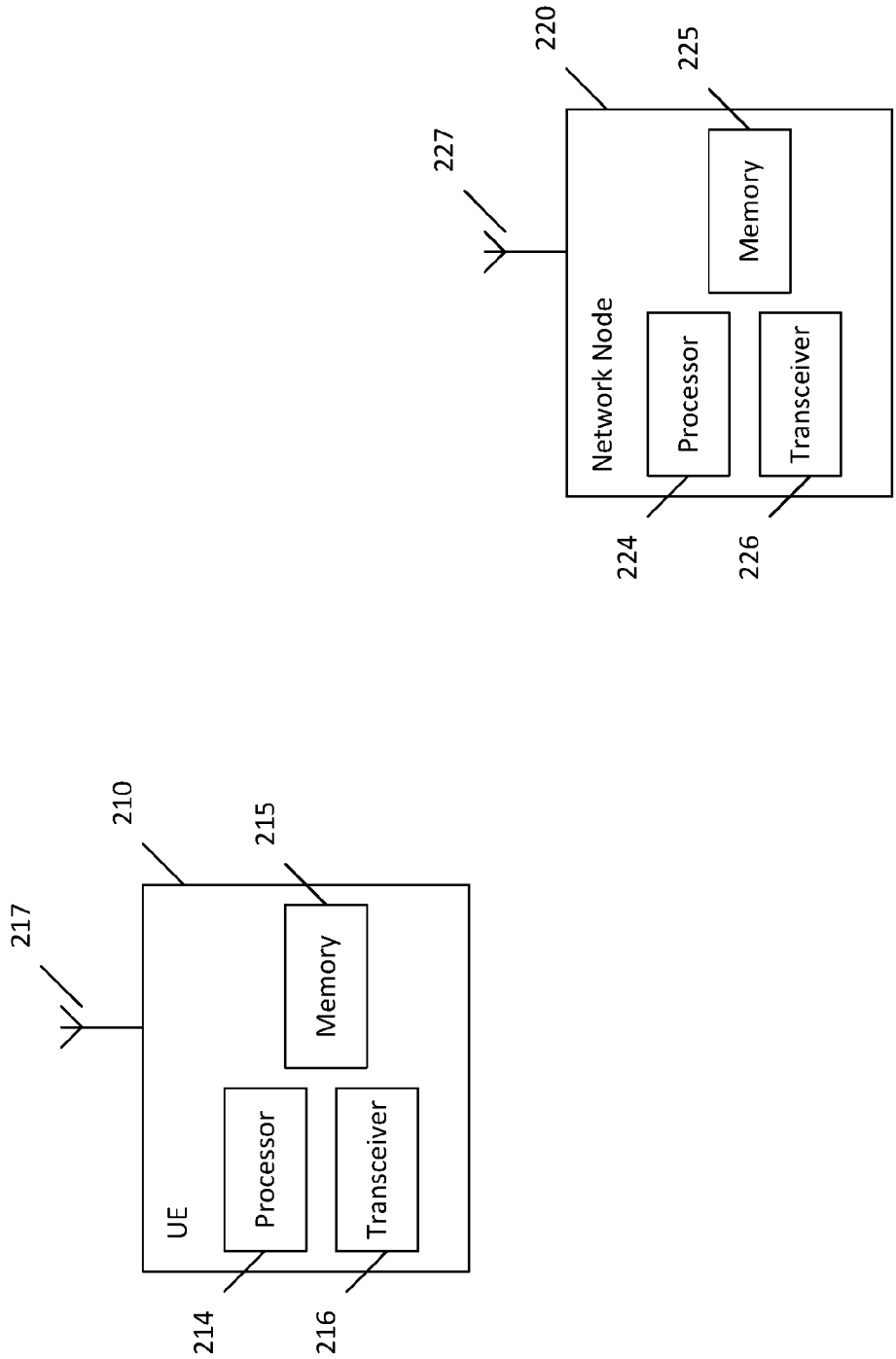
220
225
227
Memory
Network Node
Processor
Transceiver
224
226
210
215
217
Memory
UE
Processor
Transceiver
214
216

Figure 2

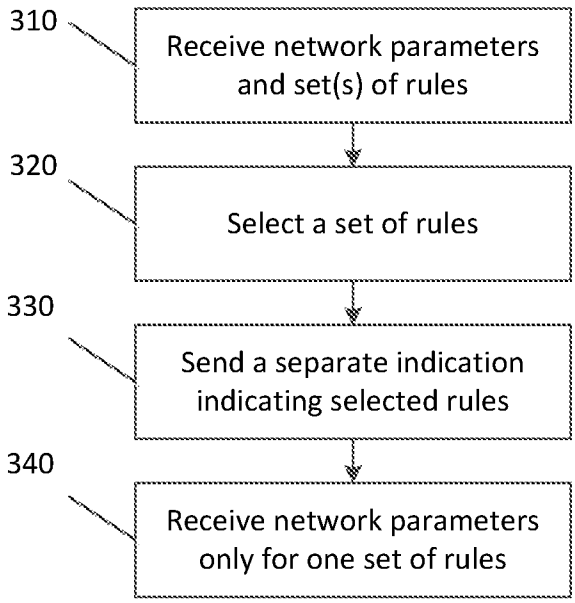

Figure 3

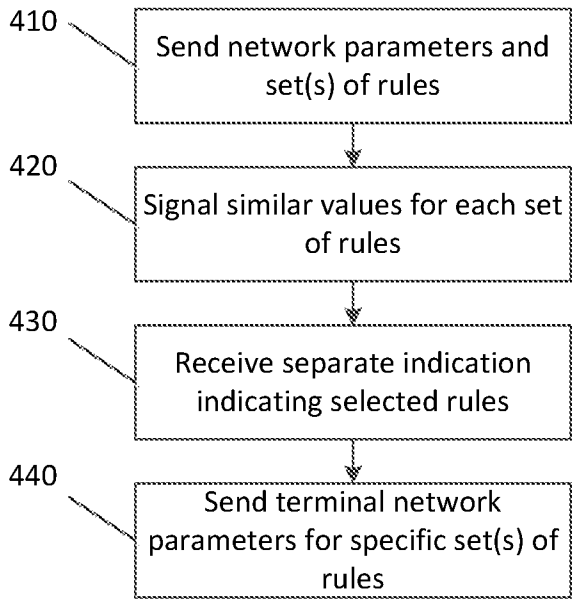

Figure 4

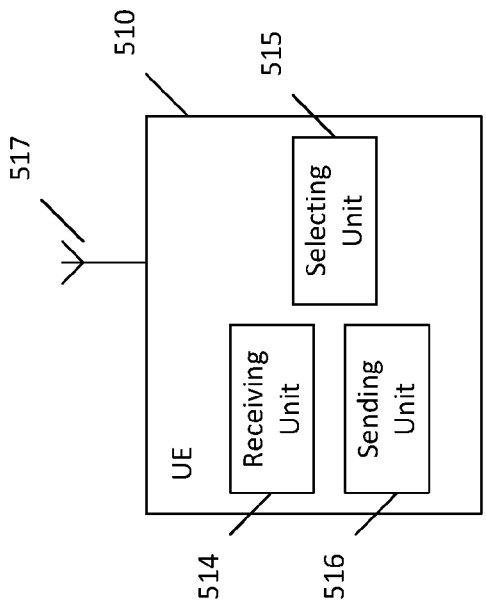
510
515
517
Selecting Unit
Receiving Unit
Sending Unit
UE
514
516

Figure 5

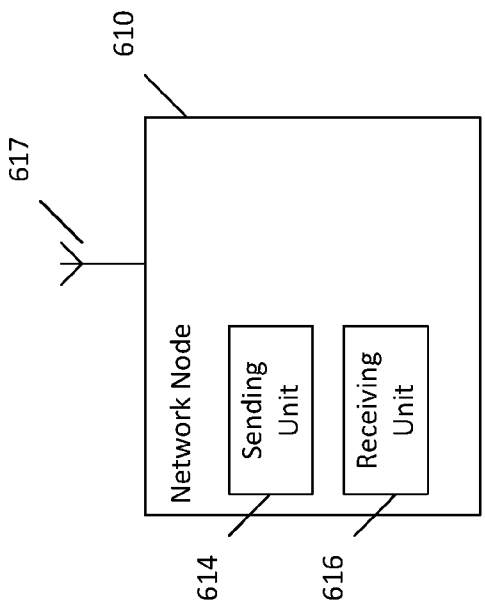

Figure 6

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2015/059950

A. CLASSIFICATION OF SUBJECT MATTER

IPC: see extra sheet

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)

IPC: H04W

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

SE, DK, FI, NO classes as above

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

EPO-Internal, PAJ, WPI data, COMPENDEX, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 20050066050 A1 (DHARAMSHI GAUTAM), 24 March 2005 (2005-03-24); abstract; claims 1-29; [0004]-[0011]	1, 3, 6, 8, 10, 13, 15-16, 19-20
Y	--	2, 4-5, 9, 11-12
Y	WO 2014005654 A1 (NOKIA SIEMENS NETWORKS OY ET AL), 9 January 2014 (2014-01-09); abstract; page 12, line 11 - page 14, line 28; claims 4,17	2, 4-5, 9, 11-12
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A	US 20100159976 A1 (MAROCCHI JAMES A ET AL), 24 June 2010 (2010-06-24); abstract	1-22
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☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"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
26-04-2016	26-04-2016

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2015/059950

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2013022219 A1 (LG ELECTRONICS INC ET AL), 14 February 2013 (2013-02-14); abstract --	1-22
A	WO 2014198320 A1 (GOBY GROUP HB), 18 December 2014 (2014-12-18); abstract --	1-22
A	WO 0172111 A2 (THEMOMENT INC ET AL), 4 October 2001 (2001-10-04); abstract --	1-22
A	US 20040128543 A1 (BLAKE KENNETH W ET AL), 1 July 2004 (2004-07-01); abstract --	1-22
P, X	US 20150046310 A1 (PEARSON DAVE ET AL), 12 February 2015 (2015-02-12); abstract --	1-22
P, Y	EP 2943005 A2 (BROADCOM CORP), 11 November 2015 (2015-11-11); abstract --	4-7, 11-14, 17, 21
P, A	WO 2015148507 A1 (GUPTA, VIVEK (US)), 1 October 2015 (2015-10-01); abstract --	1-22
P, A	EP 2953397 A1 (LG ELECTRONICS INC), 9 December 2015 (2015-12-09); abstract --	1-22
P, A	US 20150098331 A1 (YE SHIANG-RUNG), 9 April 2015 (2015-04-09); abstract --	1-22
A	3GPP TSG-RAN WG2 Meeting #82 Fukuoka (Japan); [81bis#12][Joint/WiFi] Relation of RAN mechanisms to ANDSF; 2013-05-20; abstract -- --------	1-22

International application No.
PCT/IB2015/059950

Continuation of: second sheet

International Patent Classification (IPC)

H04W 36/14 (2009.01)
H04W 88/06 (2009.01)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/IB2015/059950

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				US	7694339	B2	06/04/2010
				US	7412723	B2	12/08/2008
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				US	20150304922	A1	22/10/2015
WO	2015148507	A1	01/10/2015	NONE			
EP	2953397	A1	09/12/2015	KR	20150117257	A	19/10/2015
				US	20150373603	A1	24/12/2015
				WO	2014119966	A1	07/08/2014
US	20150098331	A1	09/04/2015	CN	104519532	A	15/04/2015
				TW	201515494	A	16/04/2015