CLAIMS

What is claimed is:

1. A computer program product, comprising a non-transitory computer readable storage medium having a computer readable program code embodied therein, the computer readable program code adapted to be executed to implement a method for authorizing access to a transmission station for a mobile device, comprising:

receiving at the mobile device extended access barring (EAB) configuration information in a system information block (SIB) transmitted in a broadcast control channel (BCCH) from a transmission station; and

barring the mobile device from accessing the transmission station by the mobile device configured for EAB and having characteristics identified in the EAB configuration information for barring.

2. The computer program product of claim 1, wherein the EAB configuration information is selected from the group consisting of a barring category, a barring factor, a barring time, and combinations thereof.

3. The computer program product of claim 2, wherein the barring category represents categories of mobile devices, where a first category represents mobile devices configured for EAB, a second category represents mobile devices configured for EAB not in mobile device's home public land mobile network (HPLMN) or a public land mobile network (PLMN) equivalent to the mobile device's HPLMN, and a third category represents mobile devices configured for EAB not in a preferred PLMN, mobile device's HPLMN, or the PLMN equivalent to mobile device's HPLMN.

4. The computer program product of claim 1, wherein the SIB is modifiable within a modification period.

5. The computer program product of claim 1, wherein the SIB includes a dedicated SIB for EAB or an existing SIB.

6. The computer program product of claim 1, wherein the SIB is selected from the group consisting of a SIB type 2 in a long term evolution (LTE) system, a SIB type 14 in the LTE system, a SIB type 3 in a universal mobile telecommunications system (UMTS), and a SIB type 21 in the UMTS.

7. The computer program product of claim 1, further comprising:

updating the EAB configuration information at the mobile device periodically, wherein receiving EAB configuration information further comprises:

receiving periodically a system information block (SIB) having scheduling information for a SIB with EAB configuration information; and

receiving the SIB with EAB configuration information.

8. The computer program product of claim 7, wherein the SIB having scheduling information is provided by a SIB type 1 in a long term evolution (LTE) system and a master information block (MIB) in a universal mobile telecommunications system (UMTS), and the SIB with EAB configuration information includes a dedicated SIB for EAB or an existing SIB.

9. The computer program product of claim 1, further comprising:

requesting at the mobile device a radio resource control (RRC) connection establishment for delay tolerant access from the transmission station; and

updating the EAB configuration information at the mobile device prior to requesting RRC connection establishment for delay tolerant access,

wherein receiving EAB configuration information further comprises:

receiving a system information block (SIB) having scheduling information for a SIB with EAB configuration information; and

receiving the SIB with EAB configuration information.

10. The computer program product of claim 9, wherein the SIB having scheduling information is provided by a SIB type 1 in a long term evolution (LTE) system and a master information block (MIB) in a universal mobile telecommunications system (UMTS), and the SIB with EAB configuration information includes a dedicated SIB for EAB or an existing SIB.

11. The computer program product of claim 1, further comprising:

requesting at the mobile device a radio resource control (RRC) connection establishment for delay tolerant access from the transmission station;

updating the EAB configuration information at the mobile device prior to requesting RRC connection establishment for delay tolerant access,

wherein receiving EAB configuration information further comprises receiving a paging message with an EAB indication.

12. The computer program product of claim 11, wherein the EAB indication indicates a SIB with EAB configuration information, and receiving EAB configuration information further comprises receiving the SIB with EAB configuration information.

13. The computer program product of claim 11, wherein the SIB with EAB configuration information includes a dedicated SIB for EAB or an existing SIB.

14. The computer program product of claim 11, wherein the EAB indication includes barring category information.

15. The computer program product of claim 1, further comprising:

sending by the mobile device to the transmission station a radio resource control (RRC) connection establishment request including an EAB classification for the mobile device configured for EAB.

16. The computer program product of claim 15, wherein the EAB classification for the mobile device configured for EAB is included in an EAB configuration information element (IE).

17. The computer program product of claim 15, wherein the EAB classification defines the mobile device's roaming category.

18. A computer program product, comprising a non-transitory computer readable storage medium having a computer readable program code embodied therein, the computer readable program code adapted to be executed to implement a method for barring a mobile device from accessing a transmission station, comprising:

receiving at the transmission station from the mobile device a radio resource control (RRC) connection establishment request;

configuring a system information block (SIB) with extended access barring (EAB) configuration information; and

broadcasting the SIB with EAB configuration information to the mobile device.

19. The computer program product of claim 18, wherein the SIB includes a dedicated SIB for EAB or an existing SIB.

20. The computer program product of claim 18, wherein the RRC connection establishment request includes an EAB classification for the mobile device configured for EAB.

21. The computer program product of claim 20, further comprising sending from the transmission station to the mobile device a RRC connection establishment rejection message for the mobile device configured for EAB having the EAB classification defined for EAB in the EAB configuration information for the transmission station, wherein the EAB classification defines the mobile device's roaming category.

22. The computer program product of claim 18, further comprising receiving at the transmission station an overload start message from a core network prior to configuring the SIB with EAB configuration information.

23. The computer program product of claim 18, further comprising:

receiving at the transmission station an overload stop message from a core network;

disabling the SIB with EAB configuration information or removing the EAB configuration information from the SIB with EAB configuration information; and

broadcasting SIBs without EAB configuration information to the mobile device.

24. The computer program product of claim 18, further comprising receiving at the transmission station from the core network a priority class indicator information element (IE), wherein the priority class indicator IE defines the mobile device's roaming category used for configuring the SIB with EAB configuration information.

25. The computer program product of claim 18, further comprising receiving at the transmission station from the core network an EAB indicator information element (IE), wherein the EAB indicator IE defines the mobile device's roaming category used for configuring the SIB with EAB configuration information.

26. A mobile station configured for extended access barring (EAB), comprising:

a transceiver module configured to receive EAB configuration information in a system information block (SIB) from a transmission station; and

a processing module configured to bar transmissions to the transmission station for the mobile device configured for EAB and having characteristics identified in the EAB configuration information for barring.

27. The mobile station of claim 26, wherein the transceiver module is further configured to receive periodically a system information block (SIB) type 1 in a long term evolution (LTE) system and a master information block (MIB) in a universal mobile telecommunications system (UMTS), and receive a dedicated SIB for EAB associated with the SIB type 1 in the LTE system or a dedicated SIB for EAB associated with the MIB in the UMTS; and the processing module is further configured to update the EAB configuration information periodically.

28. The mobile station of claim 26, wherein the transceiver module is further configured to receive a system information block (SIB) type 1 in a long term evolution (LTE) system and a master information block (MIB) in a universal mobile telecommunications system (UMTS) and receive a dedicated SIB for EAB associated with the SIB type 1 in the LTE system and a dedicated SIB for EAB associated with the MIB in the UMTS prior to a request for a radio resource control (RRC) connection establishment for delay tolerant access with the transmission station; and the processing module is further configured to update the EAB configuration information prior to the request for the RRC connection establishment.

29. The mobile station of claim 26, wherein the transceiver module is further configured to receive a paging message with an EAB indication and receive a dedicated system information block (SIB) for EAB associated with the EAB indication in a long term evolution (LTE) system and a dedicated SIB for EAB associated with the EAB indication in a universal mobile telecommunications system (UMTS) prior to a request for a radio resource control (RRC) connection establishment for delay tolerant access with the transmission station; and the processing module is further configured to update the EAB configuration information prior to the request for the RRC connection establishment.

30. The mobile station of claim 26, wherein the transceiver module is further configured to receive a paging message with an EAB indication prior to a request for a radio resource control (RRC) connection establishment for delay tolerant access with the transmission station, wherein the EAB indication includes barring category information; and the processing module is further configured to update the EAB configuration information prior to the request for the RRC connection establishment.

31. The mobile station of claim 26, wherein the transceiver module is further configured to send to the transmission station a radio resource control (RRC) connection establishment request including an EAB classification for the mobile device configured for EAB, wherein the EAB classification defines the mobile device's roaming category.

32. The mobile station of claim 26, wherein the mobile device is configured to connect to at least one of a wireless local area network (WLAN), a wireless personal area network (WPAN), and a wireless wide area network (WWAN), and the UE includes an antenna, a touch sensitive display screen, a speaker, a microphone, a graphics processor, an application processor, internal memory, a non-volatile memory port, or combinations thereof.

33. A transmission station configured for extended access barring (EAB), comprising:

a transceiver module configured to receive from the mobile device a radio resource control (RRC) connection establishment request and broadcast a system information block (SIB) with extended access barring (EAB) configuration information to the mobile device; and

a processing module configured to configure the SIB with EAB configuration information.

34. The transmission station of claim 33, wherein the RRC connection establishment request includes an EAB classification for the mobile device configured for EAB, the transceiver module is further configured to send to the mobile device a RRC connection establishment rejection message for the mobile device configured for EAB and having the EAB classification defined for EAB in the EAB configuration information for the transmission station, wherein the EAB classification defines the mobile device's roaming category.

35. The transmission station of claim 33, wherein the transceiver module is further configured to receive a priority class indicator information element (IE) or an EAB indicator IE from a core network, wherein the priority class indicator IE defines the mobile device's roaming category used for configuring the SIB with EAB configuration information, and the EAB indicator IE defines the mobile device's roaming category used for configuring the SIB with EAB configuration information.

CLAIMS

What is claimed is:

1. A transmission station to control network overload, the transmission station comprising:

a processing module to configure a system information block (SIB) type 14 with extended access barring (EAB) configuration information according to a radio access network (RAN) overload state; and

a transceiver module configured to broadcast the SIB type 14, and to receive from a user equipment (UE) a radio resource control (RRC) connection request, wherein the transmission station is configured to reject the RRC connection request based on the RAN overload state.

2. The transmission station of claim 1 wherein the SIB type 14 includes an EAB category field to indicate a category of the UE where the EAB is applied.

3. The transmission station of claim 1 being configured to receive an overload start message via an S1 interface, the overload start message comprising an indication that the RAN is overloaded.

4. The transmission station of claim 3, wherein the overload start message comprises a list of Globally Unique Mobility Management Entity Identifiers (GUMMEIs), and wherein the transmission station is configured to select at least one RRC connection request to be rejected based on the list of GUMMEIs.

5. The transmission station of claim 1 being configured to receive an overload stop message via the S1 interface, the overload stop message including a list of Globally Unique Mobility Management Entity Identifiers (GUMMEIs), and wherein the transmission station is configured to stop rejecting the RRC connection request based on a GUMMEI value.

6. The transmission station of claim 5 being configured to stop ongoing EAB actions based on a content of the overload stop message.

7. The transmission station of claim 1, being configured to send to the UE a paging message, the paging message indicating an EAB configuration information presented in the SIB type 14.

8. The transmission station of claim 1 comprising an evolved Node B (eNB) configured to operate in a long term evolution (LTE) system.

9. A long term evaluation (LTE) system configured to control a network overload, the LTE system comprising:

an evolved node B (eNB) including:

a processing module to configure a system information block (SIB) type 14 with extended access barring (EAB) configuration information according to a radio access network (RAN) overload state; and

a transceiver module configured to broadcast the SIB type 14, and to receive from a user equipment (UE) a radio resource control (RRC) connection request, wherein the transmission station is configured to reject the RRC connection request based on the RAN overload state.

10. The LTE system of claim 9 wherein the SIB type 14 includes an EAB category field to indicate a category of the UE where the EAB is applied.

11. The LTE system of claim 9, wherein the eNB being configured to receive an overload start message via an S1 interface, the overload start message comprising an indication that the RAN is overloaded.

12. The LTE system of claim 11, wherein the overload start message comprises a list of Globally Unique Mobility Management Entity Identifiers (GUMMEIs), and wherein the transmission station is configured to select at least one RRC connection request to be rejected based on the list of GUMMEIs.

13. The LTE system of claim 9, wherein the eNB being configured to receive interface an overload stop message via the S1 interface, the overload stop message including a list of Globally Unique Mobility Management Entity Identifiers (GUMMEIs), and wherein the transmission station is configured to stop rejecting the RRC connection request based on a GUMMEI value.

14. The LTE system of claim 13, wherein the eNB is configured to stop ongoing EAB actions based on the overload stop message content.

15. The LTE system of claim 9, wherein the eNB is configured to send to the UE a paging message, the paging message indicating an EAB configuration information presented in the SIB type 14.

16. At least one non-transitory machine readable storage medium having instructions embodied thereon for controlling an overload of a radio access network (RAN), the instructions when executed perform the following:

configuring, using at least one processor, a system information block (SIB) type 14 with extended access barring (EAB) configuration information according to a RAN overload state;

broadcasting, using the at least one processor, the SIB type 14;

receiving, using the at least one processor, from a user equipment (UE) a radio resource control (RRC) connection request; and

rejecting, using the at least one processor, the RRC connection request based on the RAN overload state.

17. The at least one non-transitory machine readable storage medium of claim 16, further comprising instructions which when executed by the at least one processor performs the following:

receiving an overload start message via an S1 interface, the overload start message including an indication that the RAN is overloaded.

18. The at least one non-transitory machine readable storage medium of claim 17, further comprising instructions which when executed by the at least one processor performs the following:

selecting at least one RRC to be rejected based on a list of Globally Unique Mobility Management Entity Identifiers (GUMMEIs) wherein the overload start message includes the list of GUMMEIs.

19. The at least one non-transitory machine readable storage medium of claim 16, further comprising instructions which when executed by the at least one processor performs the following:

receiving an overload stop message via the S1 interface, the overload stop message including a list of Globally Unique Mobility Management Entity Identifiers (GUMMEIs); and

stopping rejecting the RRC connection request based on a GUMMEI value.

20. The at least one non-transitory machine readable storage medium of claim 19, further comprising instructions which when executed by the at least one processor performs the following: stopping ongoing EAB actions based on the overload stop message content.

21. The at least one non-transitory machine readable storage medium of claim 16, further comprising instructions which when executed by the at least one processor performs the following: sending to the UE a paging message, the paging message indicating an EAB configuration information presented in the SIB type 14.

22. The at least one non-transitory machine readable storage medium of claim 16 wherein the SIB type 14 includes an EAB category field to indicate a category of the UE where the EAB is applied.

23. A processing module to control network overload, the processing module comprising:

a hardware circuit to configure a system information block (SIB) type 14 with extended access barring (EAB) configuration information according to a radio access network (RAN) overload state; and

a hardware circuit configured to send to broadcast the SIB type 14, and to receive from a user equipment (UE) a radio resource control (RRC) connection reques, and configured to reject the RRC connection request based on the RAN overload state.

24. The processing module of claim 23 wherein the SIB type 14 includes an EAB category field to indicate a category of the UE where the EAB is applied.

25. The processing module of claim 23 being configured to receive an overload start message via an S1 interface, the overload start message comprising an indication that the RAN is overloaded.

26. The processing module of claim 25, wherein the overload start message comprises a list of Globally Unique Mobility Management Entity Identifiers (GUMMEIs), and wherein the transmission station is configured to select at least one RRC connection request to be rejected based on the list of GUMMEIs.

27. The processing module of claim 23 being configured to receive an overload stop message via the S1 interface, the overload stop message including a list of Globally Unique Mobility Management Entity Identifiers (GUMMEIs), and wherein the transmission station is configured to stop rejecting the RRC connection request based on a GUMMEI value.

28. The processing module of claim 27 being configured to stop ongoing EAB actions based on a content of the overload stop message.

29. The processing module of claim 23, being configured to send to the UE a paging message, the paging message indicating an EAB configuration information presented in the SIB type 14.