data in EMM-IDLE mode, in which case the network may trigger the user equipment via a paging procedure.

[0004] If a service request is not accepted by the network, the network may send a service reject message to the user equipment. Moreover, a node in the network, such as a mobility management entity (MME), may define a reason for rejecting the service request from the user equipment. For example, if a service request from a user equipment cannot be accepted, the network may return a service reject message to the user equipment, and the service reject message may include a cause code for the rejection.

SUMMARY

[0005] Methods and apparatus, including computer program products, are provided for delaying service requests. In one aspect there is provided a method. The method may include receiving, at a user equipment, a message including a service rejection sent by a network; starting a timeout period in response to the received message including the service rejection; ~~and~~ waiting to send an attach request to the network until ~~at least one of~~ a radio resource control connection release is received from the network ~~or the timeout period expires~~; and sending, subsequent to the waiting, the attach request to a radio resource control connection, when the radio resource control connection release is received from the network and the timeout period has not expired.

[0005a] In another aspect, there is provided a method comprising receiving, at a user equipment, a message including a service rejection sent by a network; starting a timeout period in response to the received message including the service rejection; waiting to send an attach request to the network until the timeout period expires and

a radio resource control connection release is not received from the network; and sending, subsequent to the waiting, the attach request to a radio resource control connection when the timeout period expires and the radio resource control connection release is not received from the network.

[0006] In some example embodiments, one of more variations may be made as well as described in the detailed description below and/or as described in the following features. The waiting to send the attach request may prevent a race condition between the attach request and the radio resource control connection release. The attach request to the network may be sent after the waiting. The user equipment may autonomously initiate a release of a radio resource control connection between the user equipment and the network and establish, before the sending, another radio resource

control connection for carrying the attach request, when the timeout period expires without the radio resource control connection release being received at the user equipment. The user equipment may send the attach request to the radio resource control connection and the network, when the timeout period expires without the radio resource control connection release being received at the user equipment, the radio resource control connection may be established before the receiving of the message including the service rejection. The message may comprise a service rejection message including a first indication representative of a user equipment identity that is not derived and a second indication representative of the user equipment being implicitly detached. The message may comprise a service rejection message including at least one of a cause 9 and a cause 10.

[0006a] In yet another aspect, there is provided an apparatus comprising at least one processor; and at least one memory including computer program code for one or more programs, the at least one processor, the at least one memory, and the computer program code configured to cause the apparatus to at least: receive~~, at a user equipment,~~ a message including a service rejection sent by a network; start a timeout period in response to the received message including the service rejection; ~~and~~ wait to send an attach request to the network until ~~at least one of~~ a radio resource control connection release is received from the network~~ or the timeout period expires~~; and send, subsequent to the waiting, the attach request to a radio resource control connection, when the radio resource control connection release is received from the network and the timeout period has not expired.

[0006b] In yet another aspect, there is provided an apparatus comprising at least one processor; and at least one memory including computer program code for one or more programs, the at least one processor, the at least one memory, and the computer program code configured to cause the apparatus to at least: receive a message including a service rejection sent by a network; start a timeout period in response to the received message including the service rejection; wait to send an attach request to the network until the timeout period expires and a radio resource control connection release is not received from the network; and send, subsequent to the waiting, the attach request to a radio resource control connection, when the timeout period expires and the radio resource control connection release is not received from the network.

[0006c~~b~~] In yet another aspect, there is provided a computer-readable medium encoded with instructions that, when executed by a processor, perform at least the following: receiving, at a user equipment, a message including a service rejection sent by a network; starting a timeout period in response to the received message including the service rejection; ~~and~~ waiting to send an attach request to the network until ~~at least one of~~ a radio resource control connection release is received from the network ~~or the timeout period expires~~; and sending, subsequent to the waiting, the attach request to a radio resource control connection, when the radio resource control connection release is received from the network and the timeout period has not expired.

[0006d] In yet another aspect, there is provided a computer-readable medium encoded with instructions that, when executed by a processor, perform at least the following: receiving, at a user equipment, a message including a service rejection sent

by a network; starting a timeout period in response to the received message including the service rejection; waiting to send an attach request to the network until the timeout period expires and a radio resource control connection release is not received from the network; and sending, subsequent to the waiting, the attach request to a radio resource control connection, when the timeout period expires and the radio resource control connection release is not received from the network.

[0006ee] In yet another aspect, there is provided an apparatus comprising: means for receiving, at a user equipment, a message including a service rejection sent by a network; means for starting a timeout period in response to the received message including the service rejection; and means for waiting to send an attach request to the network until at least one of a radio resource control connection release is received from the network or the timeout period expires; and means for sending, subsequent to the waiting, the attach request to a radio resource control connection, when the radio resource control connection release is received from the network and the timeout period has not expired.

[0006f] In yet another aspect, there is provided an apparatus comprising: means for receiving a message including a service rejection sent by a network; means for starting a timeout period in response to the received message including the service rejection; means for waiting to send an attach request to the network until the timeout period expires and a radio resource control connection release is not received from the network; and means for sending, subsequent to the waiting, the attach request to a radio resource control connection, when the timeout period expires and the radio resource control connection release is not received from the network.

[0007] It is to be understood that both the foregoing general description and the following detailed description are exemplary and explanatory only and are not restrictive. Further features and/or variations may be provided in addition to those set forth herein. For example, the implementations described herein may be directed to various combinations and subcombinations of the disclosed features and/or combinations and subcombinations of several further features disclosed below in the detailed description.

DESCRIPTION OF THE DRAWINGS

[0008] The accompanying drawings, which are incorporated in and constitute a part of this specification, show certain aspects of the subject matter disclosed herein and, together with the description, help explain some of the principles associated with the subject matter disclosed herein. In the drawings,

WHAT IS CLAIMED IS

1. A method, comprising:

receiving, at a user equipment, a message including a service rejection sent by a network;

starting a timeout period in response to the received message including the service rejection; ~~and~~

waiting to send an attach request to the network until ~~at least one of~~ a radio resource control connection release is received from the network ~~or the timeout period expires~~; and~~.~~

sending, subsequent to the waiting, the attach request to a radio resource control connection, when the radio resource control connection release is received from the network and the timeout period has not expired.

2. A method, comprising:

receiving, at a user equipment, a message including a service rejection sent by a network;

starting a timeout period in response to the received message including the service rejection;

waiting to send an attach request to the network until the timeout period expires and a radio resource control connection release is not received from the network; and

sending, subsequent to the waiting, the attach request to a radio resource control connection when the timeout period expires and the radio resource control connection release is not received from the network.

23. The method of any one of claims 1 and 2, wherein the waiting to send the attach request prevents a race condition between the attach request and the radio resource control connection release.

3. A method as in claim 1-2 further comprising:

sending the attach request to the network after the waiting.

4. A The method as inof claim 1-32, wherein the user equipment autonomously initiates a release of a the radio resource control connection release between the user equipment and the network and establishes, before the sending, theanother radio resource control connection for carrying the attach request, when the timeout period expires without and the radio resource control connection release is notbeing received at the user equipmentfrom the network.

5. ~~A~~ The method as in claim ~~1~~2-~~4~~, wherein the sending further comprises:

sending, by the user equipment, the attach request to the radio resource control connection and the network~~,~~ when the timeout period expires ~~without~~ and the radio resource control connection release is not~~being~~ received from~~at~~ the network~~user equipment~~, the radio resource control connection being established before the receiving of the message including the service rejection.

6. ~~A~~ The method as in any one of claims 1 to ~~-~~5, wherein the message comprises a service rejection message including a first indication representative of a user equipment identity that is not derived and a second indication representative of the user equipment being implicitly detached.

7. ~~A~~ The method as in any one of claims 1 to ~~-~~6, wherein the message comprises a service rejection message including at least one of a cause 9 and a cause 10.

8. An apparatus comprising:

at least one processor; and

at least one memory including computer program code for one or more programs, the at least one processor, the at least one memory, and the computer program code configured to cause the apparatus to at least:

receive~~, at a user equipment,~~ a message including a service rejection sent by a network;

start a timeout period in response to the received message including the service rejection; ~~and~~

wait to send an attach request to the network until ~~at least one of~~ a radio resource control connection release is received from the network ~~or the timeout period expires~~; and

send, subsequent to the wait, the attach request to a radio resource control connection, when the radio resource control connection release is received from the network and the timeout period has not expired.

9. An apparatus comprising:

at least one processor; and

at least one memory including computer program code for one or more programs, the at least one processor, the at least one memory, and the computer program code configured to cause the apparatus to at least:

receive a message including a service rejection sent by a network;

start a timeout period in response to the received message including the service rejection;

wait to send an attach request to the network until the timeout period expires and a radio resource control connection release is not received from the network; and

send, subsequent to the wait, the attach request to a radio resource control connection, when the timeout period expires and the radio resource control connection release is not received from the network.

910. The apparatus of any one of claims 8 and 9, wherein the wait to send the attach request prevents a race condition between the attach request and the radio resource control connection release.

~~10. An apparatus as in claims 8-9, wherein the apparatus is further configured to at least:~~

~~send, in response to the wait, the attach request to the network.~~

11. ~~An~~ The apparatus ~~of~~as ~~in~~ claim~~s 8-10~~9, wherein the ~~user equipment~~apparatus autonomously initiates ~~a release of~~ the ~~a~~ radio resource control connection release between the ~~user equipment~~apparatus and the network and establishes, before the attach request is sent, the ~~another~~ radio resource control connection for carrying the attach request, when the timeout period expires ~~without~~ and the radio resource control connection release is not~~being~~ received from~~at~~ the network~~user equipment~~.

12. ~~An~~ The apparatus as in claim~~s 9-11~~, wherein the apparatus is further configured to at least:

send, by the user equipment, the attach request to the radio resource control connection and the network, when the timeout period expires and without the radio resource control connection release is not being received from at the user equipment network, the radio resource control connection being established before the message including the service rejection is received.

13. An The apparatus as in any one of claims 8 to 12, wherein the message comprises a service rejection message including a first indication representative of a user equipment identity that is not derived and a second indication representative of the user equipment apparatus being implicitly detached.

14. An The apparatus as in any one of claims 8 to 13, wherein the message comprises a service rejection message including at least one of a cause 9 and a cause 10.

15. A computer-readable medium encoded with instructions that, when executed by a processor, perform at least the following:

receiving, at a user equipment, a message including a service rejection sent by a network;

starting a timeout period in response to the received message including the service rejection; and

waiting to send an attach request to the network until ~~at least one of~~ a radio resource control connection release is received from the network ~~or the timeout period expires~~; and

sending, subsequent to the waiting, the attach request to a radio resource control connection, when the radio resource control connection release is received from the network and the timeout period has not expired.

16. A computer-readable medium encoded with instructions that, when executed by a processor, perform at least the following:

receiving, at a user equipment, a message including a service rejection sent by a network;

starting a timeout period in response to the received message including the service rejection;

waiting to send an attach request to the network until the timeout period expires and a radio resource control connection release is not received from the network; and

sending, subsequent to the waiting, the attach request to a radio resource control connection, when the timeout period expires and the radio resource control connection release is not received from the network.

~~16~~17. The computer-readable medium of any one of claims 15 and 16, wherein the waiting to send the attach request prevents a race condition between the attach request and the radio resource control connection release.

~~17. A computer-readable medium as in claim 15-16 further comprising:~~

~~sending the attach request to the network after the waiting.~~

18. ~~A~~The computer-readable medium as in claim ~~15-17~~16, wherein the user equipment autonomously initiates the ~~a release of a~~ radio resource control connection release between the user equipment and the network and establishes,~~-~~ before the sending, the~~another~~ radio resource control connection for carrying the attach request, when the timeout period expires and~~without~~ the radio resource control connection release is not~~being~~ received from~~at~~ the network~~user equipment~~.

19. ~~A~~The computer-readable medium as in claim ~~16-15-18~~, wherein the sending further comprises:

sending, by the user equipment, the attach request to the radio resource control connection and the network, when the timeout period expires

without and the radio resource control connection release being is not received fromat the networkuser equipment, the radio resource control connection being established before the receiving of the message including the service rejection.

20. A The computer-readable medium as in any one of claims 15 to 19, wherein the message comprises a service rejection message including a first indication representative of a user equipment identity that is not derived and a second indication representative of the user equipment being implicitly detached.

21. An apparatus comprising:

means for receiving, at a user equipment, a message including a service rejection sent by a network;

means for starting a timeout period in response to the received message including the service rejection; and

means for waiting to send an attach request to the network until at least one of a radio resource control connection release is received from the network or the timeout period expires; and

means for sending, subsequent to the waiting, the attach request to a radio resource control connection, when the radio resource control connection release is received from the network and the timeout period has not expired.

22. An apparatus comprising:

means for receiving a message including a service rejection sent by a network;

means for starting a timeout period in response to the received message including the service rejection;

means for waiting to send an attach request to the network until the timeout period expires and a radio resource control connection release is not received from the network; and

means for sending, subsequent to the waiting, the attach request to an existing radio resource control connection, when the timeout period expires and the radio resource control connection release is not received from the network.

~~22~~23. The apparatus of any one of claims 21 and 22, wherein the means for waiting to send the attach request prevents a race condition between the attach request and the radio resource control connection release.

~~23. The apparatus as in claim 21-22 further comprising:~~

~~means for sending the attach request to the network after the waiting.~~

24. The ~~-~~apparatus ~~of as in~~ claim ~~2221-23~~, wherein the ~~user equipment~~apparatus autonomously initiates ~~a a release of a~~ radio resource control connection ~~release~~ between the ~~user equipment~~apparatus and the network and establishes, ~~-~~before the sending, ~~the another~~ radio resource control connection for carrying the attach request, when the timeout period expires ~~and~~~~without~~ the radio resource control connection release ~~is not~~~~being~~ received ~~from~~~~at~~ the ~~network~~~~user equipment~~.

25. The ~~-~~apparatus as in claim ~~21-249~~, wherein the means for sending further comprises:

means for sending~~, by the user equipment,~~ the attach request to the radio resource control connection and the network, when the timeout period expires ~~and~~~~without~~ the radio resource control connection release ~~is not~~~~being~~ received ~~from~~~~at~~ the ~~network~~~~user equipment~~, the radio resource control connection being established before the receiving of the message including the service rejection.

26. The ~~-~~apparatus as in ~~any one of~~ claims 21 ~~to~~ ~~-~~25, wherein the message comprises a service rejection message including a first indication representative of a user equipment identity that is not derived and a second indication representative of the ~~user equipment~~apparatus being implicitly detached.