FIG. 11A and FIG. 11B are a flowchart of another service setup method according to an embodiment of this application;

FIG. 12 is a schematic structural diagram of an access network device according to an embodiment of this application;

FIG. 13 is a schematic structural diagram of another access network device according to an embodiment of this application;

FIG. 14 is a schematic structural diagram of a service application server according to an embodiment of this application;

FIG. 15 is a schematic structural diagram of another service application server according to an embodiment of this application; and

FIG. 16 is a schematic structural diagram of another service application server according to an embodiment of this application.

DESCRIPTION OF EMBODIMENTS

In the specification, claims, and accompanying drawings of this application, the terms "first", "second", and the like are intended to distinguish between different objects but do not indicate a particular order. In addition, the terms "including", "comprising", or any other variant thereof are intended to cover a non-exclusive inclusion. For example, a process, a method, a system, a product, or a device that includes a series of steps or units is not limited to the listed steps or units, but optionally further includes an unlisted step or unit, or optionally further includes another inherent step or unit of the process, the method, the product, or the device.

The technical solutions of this application may be applied to a 2G network, a 3G network, a 4G network, and a 5G network. The technical solutions of this application are not only applicable to a VoLTE service and a video call service, but also applicable to another service having a similar requirement on network signal coverage. This application does not limit a service type of user equipment and a network in which the user equipment is located.

Referring to FIG. 1, FIG. 1 is a schematic diagram of a network architecture of a communications network according to an embodiment of this application. As shown in FIG. 1, the communications network may include an access network device 11, a service application server 12, and at least one user equipment (English: User Equipment, UE for short) 13. The access network device 11 may be connected to the UE 13 by using a wireless communications link. The service application server 12 is responsible for processing a service registration request, subscriber management, session control, service switching, service control, and the like of the UE. There may be another core network device between the access network device 11 and the service application

server 12, and the core network device is responsible for connecting a service between the UE 13 and the service application server 12.

As shown in FIG. 2, FIG. 2 shows an example in which the network architecture of the communications network shown in FIG. 1 is specifically a 4G network. An evolved NodeB (English: Evolved NodeB, eNB for short) in FIG. 2 is used as the access network device in FIG. 1, and the eNB may be in a communication connection to UE (to be specific, the UE 13 in FIG. 1) by using a radio link. A core network device in an LTE network of the network architecture shown in FIG. 2 may include a mobility management entity (English: Mobility Management Entity, MME for short), a serving gateway (English: Serving Gateway, SGW for short), a packet data network gateway (English: PDN Gateway, PGW for short), a policy and charging rules function (English: Policy and Charging Rules Function, PCRF for short) entity, or the like. The core network device may be responsible for connecting a VoLTE service and the like of the UE to an Internet Protocol Multimedia Subsystem (English: IP Multimedia Subsystem, IMS for short) network, and be responsible for transmitting signaling related to a VoLTE call and the like between the UE and the IMS network. In addition, the core network device may be further responsible for creating a related dedicated bearer (for example, a quality of service class identifier (English: QoS Class Identifier, QCI for short) =1), to transmit user plane data (media data) related to the VoLTE service.

An IMS network device shown in FIG. 2, for example, a proxy call session control function (English: Proxy Call Session Control Function, P-CSCF for short) entity, an interrogating/serving call session control function (English: Interrogating/Serving Call Session Control Function, S-CSCF for short) entity, or a service centralization and continuity application server (English: Service centralization and continuity application server, SCC AS for short), may be used as any service application server in the embodiments of this application.

The P-CSCF entity (which may be classified into a calling P-CSCF entity and a called P-CSCF entity) is a first contact point when the UE accesses the IMS network in a process of a VoLTE service or the like, and may be responsible for acting as a proxy of processing signaling related to the VoLTE service and the like, and implementing route control. The S-CSCF entity (which may be classified into a calling S-CSCF entity and a called S-CSCF entity) is a service switching center of the IMS network. The S-CSCF entity may be mainly responsible for receiving and processing the service registration request, subscriber management, session control, service switching, service control, Session Initiation Protocol (English: Session Initiation Protocol, SIP for short) message processing and charging, and the like of the UE. The SCC AS (which may be classified into a calling SCC AS and a called SCC AS) is configured to play a role of keeping service continuity when the UE moves between the LTE network and another network.

includes third indication information and the access network device determines that a third cell whose radio channel quality satisfies the service requirement of the first service exists, the access network device hands over the UE to the third cell.

The third indication information is used to indicate the access network device to: hand over the UE to the third cell when the radio channel quality of the first cell does not satisfy the service requirement of the first service.

Further, before S803 shown in FIG. 9, the method in this embodiment of this application further includes S809.

S809. The access network device determines that the radio channel quality of the first cell satisfies the service requirement of the first service.

It should be noted that in this embodiment of this application, a method for determining, by the access network device, that the second cell or the third cell whose radio channel quality satisfies the service requirement of the first service exists is similar to the method for determining, by the access network device, that the second cell whose radio channel quality satisfies the service requirement of the to-be-set up service exists, and details are not described in this embodiment of this application again.

Further, as shown in FIG. 10, after S802 shown in FIG. 9, the method in this embodiment of this application further includes S810.

S810. The access network device allocates a radio resource to the first service.

Further, when the second cell or the third cell whose radio channel quality satisfies the service requirement of the first service does not exist, as shown in FIG. 10, the method in this embodiment of this application may further include S811 and S812.

S811. If the access network device determines that the second cell or the third cell whose radio channel quality satisfies the service requirement of the first service does not exist, the access network device sends a second notification message to the first core network device or the first service application server.

The second notification message is used to notify the first core network device or the first service application server that the radio channel quality of the first cell does not satisfy the service requirement of the first service and the second cell or the third cell whose radio channel quality satisfies the service requirement of the first service does not exist. The second notification message carries at least one of the radio channel quality of the first cell, the terminal type information of the UE, the information about the carrier frequency accessed by the UE, the location information of the UE, the load information of the first cell, the RAT information of the first network, the recommended codec information, and the bandwidth information of the first service.

notification message to the IMS core network device by using the user plane data packet.

It should be noted that for a specific method for sending, by the eNB, the first notification message to the IMS core network device by using the interface between the eNB and the IMS core network device or by using the user plane data packet, reference may be made to the method for sending, by the eNB, the first setup response to the IMS core network device by using the interface between the eNB and the IMS core network device or by using the user plane data packet in the foregoing embodiment, and details are not described in this embodiment of this application again.

Further, the method in this embodiment of this application may further include:

if the eNB determines that the service requirement of the VoLTE service includes second indication information, and the eNB determines that a second cell whose radio channel quality satisfies the service requirement of the VoLTE service exists, handing over, by the eNB, the UE to the second cell; or

if the eNB determines that the service requirement of the VoLTE service includes third indication information, and the eNB determines that a third cell whose radio channel quality satisfies the service requirement of the VoLTE service exists, handing over, by the eNB, the UE to the third cell.

It should be noted that for a specific method for handing over, by the eNB, the UE to the second cell or the third cell in this embodiment of this application, reference may be made to the detailed descriptions in the foregoing embodiment, and details are not described in this embodiment of this application again.

The second cell or the third cell whose radio channel quality satisfies the service requirement of the VoLTE service may not exist. In this case, as shown in FIG. 11A and FIG. 11B, the method in this embodiment of this application may further include: if the eNB determines that the second cell or the third cell whose radio channel quality satisfies the service requirement of the VoLTE service does not exist, sending, by the eNB, a second notification message to the IMS core network device; and receiving, by the IMS core network device, the second notification message from the eNB. The second notification message is used to notify the IMS core network device that the radio channel quality of the first cell does not satisfy the service requirement of the VoLTE service and the second cell or the third cell whose radio channel quality satisfies the service requirement of the VoLTE service does not exist. The second notification message carries at least one of the radio channel quality of the 4G network cell (to be specific, the first cell) in which the UE is located, the terminal type information of the UE, the information about the carrier frequency accessed by the UE, the location information of the UE, the load information of the 4G network cell in which the UE is located, the RAT information of the 4G network in which the UE is located, and the bandwidth

CLAIMS

1. A service setup method, comprising:

receiving, by an access network device, a first setup request from a first core network device, wherein the first setup request carries a service requirement of a first service, and the service requirement of the first service is used to indicate, to the access network device, a radio channel quality requirement required for a user equipment (UE) to execute the first service;

sending, by the access network device, a first setup response to the first core network device, wherein the first setup response is used to notify the first core network device that the access network device accepts the first setup request; and

when the access network device determines that a radio channel quality of a first cell of a first network in which the UE is located does not satisfy the service requirement of the first service, handing over the UE to a second cell of the first network; or

handing over the UE to a third cell of a second network,

wherein the service requirement of the first service corresponds to codec information of the first service.

2. The method according to claim 1, wherein before the sending, by the access network device, a first setup response to the first core network device, the method further comprises:

determining, by the access network device, that the radio channel quality of the first cell satisfies the service requirement of the first service.

3. The method according to claim 1, wherein before the sending, by the access network device, a first setup response to the first core network device the method further comprises:

allocating, by the access network device, a radio resource to the first service.

4. The method according to any one of claims 1 to 3, wherein the handing over, by the access network device, the UE to a second cell of the first network comprises:

if the access network device determines that the service requirement of the first service comprises second indication information and the access network device determines that the second cell whose radio channel quality satisfies the service requirement of the first service exists, handing over, by the access network device, the UE to the second cell, wherein

the second indication information is used to indicate the access network device to hand over

the UE to the second cell when the radio channel quality of the first cell does not satisfy the service requirement of the first service.

5. The method according to any one of claims 1 to 3, wherein the handing over, by the access network device, the UE to a third cell of the second network comprises:

if the access network device determines that the service requirement of the first service comprises third indication information and the access network device determines that the third cell whose radio channel quality satisfies the service requirement of the first service exists, handing over, by the access network device, the UE to the third cell, wherein

the third indication information is used to indicate the access network device to hand over the UE to the third cell when the radio channel quality of the first cell does not satisfy the service requirement of the first service.

6. The method according to any one of claims 1 to 3, wherein after the sending, by the access network device, a first setup response to the first core network device, the method further comprises:

sending, by the access network device, a first measurement control command to the UE, wherein

the first measurement control command is used to indicate the UE to measure the radio channel quality of the first cell, and send a first measurement report to the access network device when the radio channel quality of the first cell does not satisfy the service requirement of the first service, and the first measurement report is used to indicate, to the access network device, that the radio channel quality of the first cell does not satisfy the service requirement of the first service.

7. The method according to any one of claims 1 to 3, wherein after the sending, by the access network device, a first setup response to the first core network device, the method further comprises:

receiving, by the access network device, a second setup request from a second core network device, wherein the second setup request carries a service requirement of a second service, and the service requirement of the second service is used to indicate, to the access network device, a radio channel quality requirement required for the UE to execute the second service;

determining, by the access network device, that the service requirement of the second service is higher than the service requirement of the first service; and

sending, by the access network device, a second measurement control command to the UE,

wherein

the second measurement control command is used to indicate the UE to measure the radio channel quality of the first cell, and send a second measurement report to the access network device when the radio channel quality of the first cell does not satisfy the service requirement of the second service, and the second measurement report is used to indicate, to the access network device, that the radio channel quality of the first cell does not satisfy the service requirement of the second service.

8. The method according to claim 3, wherein the method further comprises:

if the access network device determines that the second cell or the third cell whose radio channel quality satisfies the service requirement of the first service does not exist, deleting, by the access network device, the radio resource allocated to the first service.

9. The method according to claim 4, wherein the determining, by the access network device, that the second cell or the third cell whose radio channel quality satisfies the service requirement of the first service exists comprises:

sending, by the access network device, a third measurement control command to the UE, wherein the third measurement control command is used to indicate the UE to measure the radio channel quality of the second cell or the third cell;

receiving, by the access network device, a third measurement report reported by the UE, wherein the third measurement report carries a measurement result obtained after the UE measures the radio channel quality of the second cell or the third cell; and

determining, by the access network device based on the measurement result, that the second cell or the third cell whose radio channel quality satisfies the service requirement of the first service exists; or

sending, by the access network device, a third measurement control command to the UE, wherein the third measurement control command carries a measurement report condition determined based on the service requirement of the first service, the third measurement control command is used to indicate the UE to measure the radio channel quality of the second cell or the third cell, and the measurement report condition is used to indicate the UE to report a third measurement report to the access network device when the UE determines that the radio channel quality of the second cell or the third cell satisfies the measurement report condition; and

if the access network device receives the third measurement report reported by the UE, determining, by the access network device, that the second cell or the third cell whose radio channel

quality satisfies the service requirement of the first service exists.

10. The method according to any one of claims 1 to 3, wherein the first setup request is a bearer setup request, the bearer setup request corresponds to a bearer whose quality of service class identifier equals 1.

11. The method according to any one of claims 1 to 3, wherein the first service is a voice service.

12. The method according to any one of claims 1 to 3, wherein the radio channel quality requirement comprises: reference signal receiving power (RSRP) requirement, or reference signal receiving quality (RSRQ) requirement.

13. An access network device, comprising:

a receiver, configured to receive a first setup request from a first core network device, wherein the first setup request carries a service requirement of a first service, and the service requirement of the first service is used to indicate, to the access network device, a radio channel quality requirement required for user equipment (UE) to execute the first service;

a transmitter, configured to send a first setup response to the first core network device, wherein the first setup response is used to notify the first core network device that the access network device accepts the first setup request; and

a processor, configured to determine whether radio channel quality of a first cell of a first network in which the UE is located satisfies the service requirement of the first service, wherein

the processor is further configured to: when the processor determines that the radio channel quality of the first cell of the first network in which the UE is located does not satisfy the service requirement of the first service, hand over the UE to a second cell of the first network, or hand over the UE to a third cell of a second network,

wherein the service requirement of the first service corresponds to codec information of the first service.

14. The access network device according to claim 13, wherein the processor is further configured to: before the transmitter sends the first setup response to the first core network device, determine that the radio channel quality of the first cell satisfies the service requirement of the first service.

15. The access network device according to claim 13, wherein the processor is configured to hand over the UE to a second cell of the first network, comprises:

the processor is configured to: when determining that the service requirement of the first service comprises second indication information and determining that the second cell whose radio channel quality satisfies the service requirement of the first service exists, hand over the UE to the second cell, wherein

the second indication information is used to indicate the access network device to: hand over the UE to the second cell when the radio channel quality of the first cell does not satisfy the service requirement of the first service.

16. The access network device according to any one of claims 13 to 15, wherein the processor is configured to hand over the UE to the third cell, comprises:

the processor is configured to: if determining that the service requirement of the first service comprises third indication information and determining that the third cell whose radio channel quality satisfies the service requirement of the first service exists, hand over the UE to the third cell, wherein

the third indication information is used to indicate the access network device to: hand over the UE to the third cell when the radio channel quality of the first cell does not satisfy the service requirement of the first service.

17. The access network device according to any one of claims 13 to 15, wherein the receiver is further configured to: after the first setup response is sent to the first core network device, receive a second setup request from a second core network device, wherein the second setup request carries a service requirement of a second service, and the service requirement of the second service is used to indicate, to the access network device, a radio channel quality requirement required for the UE to execute the second service;

the processor is further configured to determine that the service requirement of the second service is higher than the service requirement of the first service; and

the transmitter is further configured to deliver a second measurement control command to the UE, wherein

the second measurement control command is used to indicate the UE to measure the radio channel quality of the first cell, and send a second measurement report to the access network device when the radio channel quality of the first cell does not satisfy the service requirement of the second

service, and the second measurement report is used to indicate, to the access network device, that the radio channel quality of the first cell does not satisfy the service requirement of the second service.

18. The access network device according to any one of claims 13 to 15, wherein the first setup request is a bearer setup request, and the bearer setup request corresponds to a bearer whose quality of service class identifier equals 1.

19. The access network device according to any one of claims 13 to 15, wherein the first service is a voice service.

20. The access network device according to any one of claims 13 to 15, wherein the radio channel quality requirement comprises: reference signal receiving power (RSRP) requirement, or reference signal receiving quality (RSRQ) requirement.

21. A computer readable storage medium, wherein the computer readable storage medium stores one or more programs, the one or more programs comprise an instruction, which when executed by at least one of processor of an access network device, enable the access network device to perform the service setup method according to any one of claims 1 to 3.

22. A communication system, comprising an access network device according to any one of claims 13 to 15 and a core network device coupled with the access network device.