

What is claimed is:

1. A data transmission method, performed by a network node, comprising:
configuring a first radio channel and a second radio channel for a first PDU session, or configuring a first radio channel and/or a second radio channel for at least one same QoS flow of a first PDU session;

wherein the first radio channel is configured to transmit first data to a UE;

the second radio channel is configured to transmit second data to the UE;

the first radio channel is one of a unicast radio channel, a broadcast or multicast radio channel, and the second radio channel is the other one of the unicast radio channel and the broadcast or multicast radio channel;

the first data represents first data of the first PDU session or first data of at least one QoS flow of the first PDU session;

the second data represents second data of the first PDU session or second data of at least one QoS flow of the first PDU session;

wherein the method further includes:

transmitting second indication information to the UE, wherein the second indication information is used to instruct the UE to report concurrent demand information, and the concurrent demand information includes first concurrent demand information for unicast service and broadcast or multicast service and/or second concurrent demand information for multiple broadcast or multicast services;

receiving the concurrent demand information transmitted by the UE according to the second indication information; and

allocating resources to the UE according to the concurrent demand information.

2. The method according to claim 1, wherein the configuring a first radio channel and/or a second radio channel for a first PDU session, or configuring a first radio channel and/or a second radio channel for at least one same QoS flow of a first PDU session, includes:

configuring at least one of a first SDAP configuration, a first PDCP configuration, a first RLC configuration, a first MAC configuration or a first physical configuration corresponding to the first radio channel; configuring at least one of a second SDAP configuration, a second PDCP configuration, a second RLC configuration, a second MAC configuration or a second physical configuration corresponding to the second radio channel;

wherein at least the first physical configuration is different from the second physical configuration;

the first radio channel and the second radio channel share one radio bearer or two independent radio bearers.

3. The method according to claim 2, wherein the configuring at least one of a first SDAP configuration, a first PDCP configuration, a first RLC configuration, a first MAC configuration or a first physical configuration corresponding to the first radio channel; configuring at least one of a second SDAP configuration, a second PDCP configuration, a second RLC configuration, a second MAC configuration or a second physical configuration corresponding to the second radio channel, includes:

configuring the first SDAP configuration, the first PDCP configuration, the first RLC configuration, the first MAC configuration and the first physical configuration corresponding to the first radio channel, and configuring the second PDCP configuration, the second RLC configuration, the second MAC configuration and the second physical configuration corresponding to the second radio channel; or,

configuring the first SDAP configuration, the first PDCP configuration, the first RLC configuration, the first MAC configuration and the first physical configuration corresponding to the first radio channel, and configuring the second PDCP configuration, the second RLC configuration and the second physical configuration corresponding to the second radio channel; or,

configuring the first SDAP configuration, the first PDCP configuration, the first RLC configuration, the first MAC configuration and the first physical configuration corresponding to the first radio channel, and configuring the second

RLC configuration, the second MAC configuration and the second physical configuration corresponding to the second radio channel; or,

configuring the first SDAP configuration, the first PDCP configuration, the first RLC configuration, the first MAC configuration and the first physical configuration corresponding to the first radio channel, and configuring the second RLC configuration and the second physical configuration corresponding to the second radio channel; or,

configuring the first SDAP configuration, the first PDCP configuration, the first RLC configuration, the first MAC configuration and the first physical configuration corresponding to the first radio channel, and configuring the second MAC configuration and the second physical configuration corresponding to the second radio channel; or,

configuring the first SDAP configuration, the first PDCP configuration, the first RLC configuration, the first MAC configuration and the first physical configuration corresponding to the first radio channel, and configuring the second physical configuration corresponding to the second radio channel.

4. The method according to claim 1, wherein before transmitting the second data to the UE through the second radio channel, the method further includes:

obtaining a PDCP transmission status report of the first radio channel.

5. The method according to claim 1, wherein the network node includes a base station of a first cell and a base station of a second cell; the first cell is a cell to which the first radio channel belongs, and the second cell is a cell to which the second radio channel belongs; the method further includes at least one of the following:

the base station of the first cell informs, the base station of the second cell, of sequence indexes of packets that have been transmitted, and/or sequence indexes of packets successfully received by the UE, and then the base station of the second cell uses a unicast connection to transmit to the UE, packets which are out of sync between the first cell and the second cell;

the base station of the second cell informs, the base station of the first cell, of sequence indexes of the next one or more packets to be transmitted and/or sequence indexes of packets still stored in an cache;

the base station of the second cell informs, the base station of the first cell, of sequence indexes of the next one or more packets to be transmitted and/or sequence indexes of packets still stored in an cache, together with carrying time information corresponding to transmission of the packets;

according to the received information, the base station of the first cell forwards packets which are out of sync between the first cell and the second cell;

according to the received information, the base station of the first cell forwards packets which are out of sync between the first cell and the second cell and which are not stored in a cache of the second cell;

the UE informs, the base station of the second cell, of sequence indexes of data packets successfully received in the first cell, and then the base station of the second cell uses a unicast connection to transmit to the UE, packets which are out of sync between the first cell and the second cell;

the UE maintains connection with the first cell and the second cell at the same time, and does not interrupt the connection with the first cell until the UE has received, from the first cell, packets which are out of sync between the first cell and the second cell;

the base station of the second cell informs, the base station of the first cell, of sequence indexes of the next one or more packets to be transmitted and/or sequence indexes of packets still stored in an cache, optionally together with carrying time information corresponding to transmission of the packets; the first cell informs the UE in handover information; the UE maintains connection with the first cell and the second cell at the same time, and does not interrupt the connection with the first cell until the UE has received, from the first cell, packets which are out of sync between the first cell and the second cell;

after the UE switches to the second cell, the UE continues to maintain the connection with the first cell and does not interrupt the connection with the first cell

until the UE finds that packets received in the second cell are continuous or repeated with packets received from the first cell.

6. The method according to claim 1, wherein the method further includes:

transmitting first indication information to the UE; wherein the first indication information is used to indicate the broadcast or multicast service which is being transmitted by the network node;

receiving the concurrent demand information transmitted by the UE according to the first indication information; and

allocating resources to the UE according to the concurrent demand information.

7. The method according to claim 6, wherein the concurrent demand information includes at least one of the following: demand information of a unicast service being transmitted, demand information of a broadcast or multicast service being transmitted, demand information of a unicast service to be transmitted in the future, or demand information of a broadcast or multicast service to be transmitted in the future.

8. The method according to claim 1, wherein before transmitting the second data to the UE through the second radio channel, the method further includes at least one of the following:

determining whether there is a condition or factor for switching between the first radio channel and the second radio channel, wherein the condition or factor includes at least one of the following:

the number of participating UEs, quality of service (QoS) information, quality of experience (QoE), channel quality information, a status of UE receiving data packets, or transmission mode information selected by UE, a big data analysis node, a core network, an artificial intelligence analysis node and/or a network management node;

in case that most of participating UEs of a multicast or broadcast are concentrated in a first beam and a second beam, if one or more UEs are unable to receive information on the first beam and the second beam, a unicast radio channel is

used for these UEs which are unable to receive information on the first beam and the second beam;

the number of data packets that the UE fails to receive is greater than or equal to a certain threshold or the number of data packets that the UE successfully receives is less than or equal to the certain threshold, multicast transmission is switched to unicast transmission; or,

if the number of data packets that the UE fails to receive is less than or equal to a certain threshold or the number of data packets that the UE successfully receives is greater than or equal to the certain threshold, unicast transmission is switched to multicast transmission.

9. A data transmission method, performed by a UE, comprising:

receiving first configuration information transmitted by a network node; and

according to the first configuration information, establishing and/or configuring a first radio channel and/or a second radio channel for a first PDU session, or, establishing and/or configuring a first radio channel and/or a second radio channel for at least one QoS flow of the first PDU session;

wherein the first radio channel is configured to receive first data transmitted by the network node through the first radio channel;

the second radio channel is configured to receive second data transmitted by the network node through the second radio channel;

the first radio channel is one of a unicast radio channel, a broadcast or multicast radio channel, and the second radio channel is the other one of the unicast radio channel and the broadcast or multicast radio channel;

the first data represents first data of the first PDU session or first data of at least one QoS flow of the first PDU session;

the second data represents second data of the first PDU session or second data of at least one QoS flow of the first PDU session;

wherein the method further includes:

receiving second indication information from the network node, wherein the second indication information is used to instruct the UE to report concurrent demand

information, and the concurrent demand information includes first concurrent demand information for unicast service and broadcast or multicast service and/or second concurrent demand information for multiple broadcast or multicast services;

transmitting the concurrent demand information to the network node according to the second indication information.

10. The method according to claim 9, wherein the method further includes:

establishing and/or configuring at least one of a first SDAP entity, a first PDCP configuration, a first RLC entity, a first MAC entity or a first physical layer, to be corresponding to the first radio channel; establishing and/or configuring at least one of a second SDAP entity, a second PDCP entity, a second RLC entity, a second MAC entity or a second physical layer, to be corresponding to the second radio channel;

wherein at least the first physical configuration is independent from the second physical configuration;

the first radio channel and the second radio channel share one radio bearer or two independent radio bearers.

11. The method according to claim 10, wherein the establishing and/or configuring at least one of a first SDAP entity, a first PDCP configuration, a first RLC entity, a first MAC entity or a first physical layer, to be corresponding to the first radio channel; establishing and/or configuring at least one of a second SDAP entity, a second PDCP entity, a second RLC entity, a second MAC entity or a second physical layer, to be corresponding to the second radio channel, includes:

establishing and/or configuring the first SDAP configuration, the first PDCP configuration, the first RLC configuration, the first MAC configuration and the first physical configuration corresponding to the first radio channel, and establishing and/or configuring the second PDCP configuration, the second RLC configuration, the second MAC configuration and the second physical configuration corresponding to the second radio channel; or,

establishing and/or configuring the first SDAP configuration, the first PDCP configuration, the first RLC configuration, the first MAC configuration and the first

physical configuration corresponding to the first radio channel, and establishing and/or configuring the second PDCP configuration, the second RLC configuration and the second physical configuration corresponding to the second radio channel; or,

establishing and/or configuring the first SDAP configuration, the first PDCP configuration, the first RLC configuration, the first MAC configuration and the first physical configuration corresponding to the first radio channel, and establishing and/or configuring the second RLC configuration, the second MAC configuration and the second physical configuration corresponding to the second radio channel; or,

establishing and/or configuring the first SDAP configuration, the first PDCP configuration, the first RLC configuration, the first MAC configuration and the first physical configuration corresponding to the first radio channel, and establishing and/or configuring the second RLC configuration and the second physical configuration corresponding to the second radio channel; or,

establishing and/or configuring the first SDAP configuration, the first PDCP configuration, the first RLC configuration, the first MAC configuration and the first physical configuration corresponding to the first radio channel, and establishing and/or configuring the second MAC configuration and the second physical configuration corresponding to the second radio channel; or,

establishing and/or configuring the first SDAP configuration, the first PDCP configuration, the first RLC configuration, the first MAC configuration and the first physical configuration corresponding to the first radio channel, and establishing and/or configuring the second physical configuration corresponding to the second radio channel.

12. The method according to claim 10, wherein when the second radio channel and the first radio channel belong to the same cell, relevant parameters of the first PDCP layer and the second PDCP layer are the same; the relevant parameters include at least one of security context information, security key, integrity protection configuration information, header compression algorithm and header compression context information.

13. The method according to claim 9, wherein relevant parameters of PDCP layers corresponding to unicast radio channels of the UE are the same as those of a first UE; the relevant parameters include at least one of security context information, security key, integrity protection configuration information, header compression algorithm and header compression context information; the first UE and the UE are UEs corresponding to the broadcast or multicast radio channel.

14. The method according to claim 9, wherein bandwidth parts (BWPs) corresponding to the broadcast or multicast radio channel include a first BWP and a second BWP;

the first BWP is a dedicated BWP, and the second BWP is an initial BWP; or, both the first BWP and the second BWP are initial BWPs;

configurations of the initial BWP include: an initial downlink BWP broadcast in SIB1, and/or, an initial downlink BWP in a serving cell configuration, and/or, an initial BWP corresponding to control resource set (coreset) 0.

15. The method according to claim 9, wherein the method further includes at least one of the following:

receiving an RRC message, MAC CE and/or physical control signaling, which is transmitted by the network node and is used to activate the first radio channel or the second radio channel, and activating the first radio channel or the second radio channel;

receiving an RRC message, MAC CE and/or physical control signaling, which is transmitted by the network node and is used to activate the first radio channel and the second radio channel, and activating the first radio channel and the second radio channel;

receiving an RRC message, MAC CE and/or physical control signaling, which is transmitted by the network node and is used to activate the first radio channel and deactivate the second radio channel, and activating the first radio channel and deactivating the second radio channel;

receiving an RRC message which is transmitted by the network node and is used to simultaneously establish and/or configure the first radio channel and the

second radio channel of the first PDU session, and simultaneously establishing and/or configuring the first radio channel and the second radio channel of the first PDU session;

receiving an RRC message which is transmitted by the network node and is used to establish and/or configure the first radio channel or the second radio channel of the first PDU session, and establishing and/or configuring the first radio channel or the second radio channel of the first PDU session;

receiving an RRC message which is transmitted by the network node and is used to establish and/or configure the first radio channel of the first PDU session and delete the second radio channel, and establishing and/or configuring the first radio channel of the first PDU session and deleting the second radio channel;

receiving an RRC message which is transmitted by the network node and is used to establish and/or configure the second radio channel of the first PDU session and delete the first radio channel, and establishing and/or configuring the second radio channel of the first PDU session and deleting the first radio channel.

16. The method according to claim 9, wherein before receiving the second data transmitted by the network node through the second radio channel, the method further includes: transmitting a PDCP status report of the first radio channel.

17. The method according to claim 9, wherein the receiving the second data transmitted by the network node through the second radio channel, includes:

within a preset time period of starting to receive the second data through the second radio channel, receiving a first PDCP PDU including an IR packet, wherein the first PDCP PDU is used to carry the second data.

18. The method according to claim 9, wherein in case that the second radio channel and the first radio channel belong to different cells, the receiving the second data transmitted by the network node to the UE through the second radio channel, includes:

receiving a second PDCP PDU configured to carry the second data; wherein a packet header of the second PDCP PDU includes information for indicating

encryption with a new key; or, the second PDCP PDU is packaged using a logical channel identifier corresponding to the second radio channel;

or,

in case that the second radio channel and the first radio channel belong to different cells, before receiving the second data transmitted by the network node to the UE through the second radio channel, the method further includes:

receiving an end packet transmitted by the network node, wherein the end packet is used to indicate that data of the first PDU session or data of at least one QoS flow of the first PDU session has been switched from the first radio channel to the second radio channel and is carried by the second radio channel.

19. A network node, comprising:

a radio channel configuration module configured to configure a first radio channel and/or a second radio channel for a first PDU session, or configure a first radio channel and/or a second radio channel for at least one same QoS flow of a first PDU session;

wherein the first radio channel is configured to transmit first data to a UE;

the second radio channel is configured to transmit second data to the UE;

the first radio channel is one of a unicast radio channel, a broadcast or multicast radio channel, and the second radio channel is the other one of the unicast radio channel and the broadcast or multicast radio channel;

wherein the network node further includes:

an indication information transmission module configured to transmit second indication information to the UE; where the second indication information is used to instruct the UE to report concurrent demand information, and the concurrent demand information includes first concurrent demand information for unicast service and broadcast or multicast service and/or second concurrent demand information for multiple broadcast or multicast services; receive the concurrent demand information transmitted by the UE according to the second indication information; and allocate resources to the UE according to the concurrent demand information.

20. A UE, comprising:

a configuration information receiving module configured to receive first configuration information transmitted by a network node;

an establishment and/or configuration module configured to, according to the first configuration information, establish and/or configure a first radio channel and/or a second radio channel for a first PDU session, or, establish and/or configure a first radio channel and/or a second radio channel for at least one QoS flow of the first PDU session;

wherein the first radio channel is configured to receive first data transmitted by the network node through the first radio channel;

the second radio channel is configured to receive second data transmitted by the network node through the second radio channel;

the first radio channel is one of a unicast radio channel, a broadcast or multicast radio channel, and the second radio channel is the other one of the unicast radio channel and the broadcast or multicast radio channel;

the first data represents first data of the first PDU session or first data of at least one QoS flow of the first PDU session;

the second data represents second data of the first PDU session or second data of at least one QoS flow of the first PDU session;

wherein the UE further includes:

a module configured to receive second indication information from the network node, wherein the second indication information is used to instruct the UE to report concurrent demand information, and the concurrent demand information includes first concurrent demand information for unicast service and broadcast or multicast service and/or second concurrent demand information for multiple broadcast or multicast services; transmit the concurrent demand information to the network node according to the second indication information.