

**METHOD AND APPARATUS FOR CONTROLLING SIDELINK COMMUNICATION,
DEVICE AND STORAGE MEDIUM**~~**DIRECT COMMUNICATION CONTROL
METHOD AND APPARATUS, DEVICES, AND STORAGE MEDIUM THEREOF**~~

TECHNICAL FIELD

[0001] The disclosure relates to the field of mobile communication technology, in particular to a sidelink control method, a sidelink control apparatus, a communication device and a storage medium thereof.

BACKGROUND

[0002] The emergence of new generation Internet applications has placed higher demands on wireless communication technologies, which drives the evolution of wireless communication technologies to meet the needs of applications. Vehicle to Everything (V2X) communication can effectively enhance traffic safety, improve traffic efficiency and enrich people's travel experience. Using existing cellular communication technologies to support V2X communication can effectively utilize existing base station deployments, reduce device overhead, and facilitate the provision of Quality of Service (QoS)-guaranteed services to meet the needs of V2X services.

[0003] With the development of next-generation 5G mobile communication technology, 5G New Radio (NR) technology is used in 3GPP Release 16 (Rel-16) to support new V2X communication services and scenarios, such as fleet management, perception extension, advanced driving, and remote driving, etc.. In general, 5G V2X sidelink can provide higher communication rate, shorter communication delay, and more reliable communication quality. Based on the Rel-16V2X technology, Rel-17 Sidelink (SL) will be further optimized, considering more scenarios such as commercial or public security scenarios, and proposing new optimization goals such as reducing energy consumption of user equipment.

SUMMARY

[0004] According to a first aspect of embodiments of the disclosure, a method for controlling a sidelink communication performed by a transmission device is provided. The method includes: sending a sidelink control signaling, in which the sidelink control signaling includes first indication information for controlling Discontinuous Reception (DRX) of a reception device.

[0005] Optionally, the sidelink control signaling is a physical-layer sidelink control

in the following descriptions, become apparent in part from the following descriptions, or be learned from the practice of the embodiments of the disclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

[0050] ~~The foregoing and/or additional aspects and advantages of the disclosure will become apparent and easily understood from the following description of the~~Example embodiments of the disclosure will be described in detail below in combination with the accompanying drawings.

[0051] FIG. 1 is a flowchart illustrating a method for controlling a sidelink communication according to an embodiment of the disclosure.

[0052] FIG. 2 is a flowchart illustrating another method for controlling a sidelink communication according to an embodiment of the disclosure.

[0053] FIG. 3 is a schematic diagram illustrating an apparatus for controlling a sidelink communication according to an embodiment of the disclosure.

[0054] FIG. 4 is a schematic diagram illustrating another apparatus for controlling a sidelink communication according to an embodiment of the disclosure.

[0055] FIG. 5 is a block diagram illustrating a communication device according to an embodiment of the disclosure.

DETAILED DESCRIPTION

[0056] Embodiments of the disclosure are described in detail below, examples of which are shown in the drawings, wherein the same or similar reference numerals designate the same or similar elements or elements having the same or similar functions throughout. The embodiments described below by reference to the accompanying drawings are examples and are intended to explain the disclosure and should not be construed as limiting the disclosure.

[0057] In the related art, in order to realize the discontinuous reception (DRX) energy saving of the R17 NR sidelink, the relevant User Equipment (UE) enters a sleep mode by turning off a receiver for energy saving. In the sleep state, the UE may not perform sidelink transmission reception and channel measurement operations to save energy.

[0058] For the DRX energy saving, the UE can periodically run the DRX on timer. When the DRX on timer is running, the UE is in an active state to carry out downlink control channel detection and reception. When the DRX on timer expires, the UE can switch to an inactive state

WHAT IS CLAIMED IS:

1. A method for controlling a sidelink communication, performed by a transmission device, comprising:

sending a sidelink control signaling, wherein the sidelink control signaling comprises first indication information for controlling a Discontinuous Reception (DRX) operation of a reception device; the first indication information is to indicate a time when the reception device enters an active state; and the first indication information comprises indication information regarding a time/frequency location of a reserved resource.

~~2. The method of claim 1, wherein,~~

~~the sidelink control signaling is physical layer sidelink control information (SCI); or~~

~~the sidelink control signaling is a Media Access Control Control Element (MAC CE).~~

~~3. The method of claim 1, wherein the first indication information comprises information for indicating a time when the reception device enters an active state.~~

~~4.~~ 2. The method of claim 3, wherein the first indication information is to indicate at least one of:

the reception device to enter the active state at a time T before the reserved resource;

the reception device to enter the active state at a time T before a slot of the reserved resource;

a time when the reception device enters the active state at the reserved resource; or

a time when the reception device enters the active state at a slot of the reserved resource

~~the sidelink control signaling is a physical layer sidelink control information (SCI), and the physical layer SCI comprises:~~

~~second indication information regarding time/frequency location(s) of reserved resource(s), wherein the second indication information is to indicate the time when the reception device enters the active state.~~

~~5. The method of claim 4, wherein the second indication information is to indicate to enter the active state at a time T before the time/frequency location(s) of reserved resource(s).~~

3. The method of claim 2, further comprising at least one of:

the time T being a fixed value; or

a value of the time T being 0.

~~64. The method of claim 52 or 3, further comprising: determining information of the T~~
~~by~~wherein a value of the time T is determined based on at least one of:

device capabilities;

~~receiving~~ a downlink signaling sent by a network device side; ~~or~~

~~reading~~ pre-configuration information;

indication information carried by physical-layer sidelink control information; or

information for indicating a value of the time T comprised in the sidelink control signaling.

~~7. The method of claim 5, wherein the physical-layer SCI comprises information for indicating the T.~~

5. The method of any one of claims 1 to 4, wherein,

the sidelink control signaling is physical-layer sidelink control information (SCI).

~~86. The method of claim 45, wherein the physical-layer SCI comprises: an indication on whether the second indication information regarding the time/frequency location of the reserved resource~~ is used to indicate whether the reception device enters the active state.

~~97. The method of any one of claims 1 to 6-3, wherein the first indication information further comprises at least one of:~~

information for indicating an offset of the time when the reception device enters the active state;

information for indicating a length of time within which the reception device is in the active state; or

information for indicating a DRX cycle of the reception device; wherein the information for indicating the DRX cycle of the reception device comprises: information for indicating an offset by which the DRX cycle of the reception device changes; or, information for indicating a value of the DRX cycle of the reception device.

8. The method of any one of claims 1 to 7, wherein the indication information indicates a resource reservation period by a periodic resource reservation field.

~~10. The method of claim 9, further comprising: determining the information for indicating the offset by:~~

~~receiving a downlink signaling sent by a network device side; or~~

~~reading pre-configuration information.~~

~~11. The method of claim 9, wherein the sidelink control signaling further comprises an indication on whether the offset of the time when the reception device enters the active state is carried.~~

~~12. The method of any one of claims 1 to 11, wherein the first indication information further comprises: information for indicating a length of time within which the reception device is in the active state.~~

~~13. The method of claim 12, wherein the information for indicating the length of time within which the reception device is in the active state comprises:~~

~~information for indicating an offset by which the length of time within which the reception device is in the active state changes; or,~~

~~information for indicating a value of the length of time within which the reception device is in the active state.~~

~~14. The method of claim 13, wherein the information for indicating the offset by which the length of time within which the reception device is in the active state changes is determined by:~~

~~receiving a downlink signaling sent by the network device side; or~~

~~reading pre-configuration information.~~

~~15. The method of claim 13, wherein the information for indicating the value of the length of time within which the reception device is in the active state is determined by:~~

~~receiving a downlink signaling sent by the network device side; or~~

~~reading pre-configuration information.~~

~~16. The method of claim 12, wherein the sidelink control signaling further comprises indication information on whether the information for indicating the length of time within which the reception device is in the active state is carried.~~

~~17. The method of claim 1, wherein the first indication information further comprises: information for indicating a DRX cycle of the reception device.~~

~~18. The method of claim 17, wherein the information for indicating the DRX cycle of the reception device comprises:~~

~~information for indicating an offset by which the DRX cycle of the reception device~~

changes; or,

~~information for indicating a value of the DRX cycle of the reception device.~~

~~19. The method of claim 18, wherein the information for indicating the offset by which the DRX cycle of the reception device changes is determined by:~~

~~receiving a downlink signaling sent by a network device side; or~~

~~reading pre-configuration information.~~

~~20. The method of claim 18, wherein the information for indicating the value of the DRX cycle of the reception device is determined by:~~

~~receiving a downlink signaling sent by a network device side; or~~

~~reading pre-configuration information.~~

~~21. The method of claim 17, wherein the sidelink control signaling further comprises information on whether the information for indicating the DRX cycle of the reception device is carried.~~

229. A method for controlling a sidelink communication, performed by a reception device, comprising:

receiving a sidelink control signaling, wherein the sidelink control signaling comprises first indication information for controlling a Discontinuous Reception (DRX) operation of the reception device, the first indication information is to indicate a time when the reception device enters an active state; and the first indication information comprises indication information regarding a time/frequency location of a reserved resource; and

performing a the DRX operation based on the first indication information.

2310. The method of claim 229, wherein the first indication information is to indicate at least one of:

the reception device to enter the active state at a time T before the reserved resource;

the reception device to enter the active state at a time T before a slot of the reserved resource;

a time when the reception device enters the active state at the reserved resource; or

a time when the reception device enters the active state at a slot of the reserved resource;

wherein performing the DRX operation based on the first indication information

comprises:

entering an the active state based on information of a the time, indicated by the first indication information, when the reception device enters the active state indicated by the first indication information at the reserved resource; or entering the active state based on the time, indicated by the first indication information, when the reception device enters the active state at the slot of the reserved resource.

11. The method of claim 10, further comprising at least one of:

the time T being a fixed value; or

a value of the time T being 0.

~~24. The method of claim 23, wherein the sidelink control signaling is physical-layer sidelink control information (SCI), the physical-layer SCI comprises second indication information regarding time/frequency location(s) of reserved resource(s),~~

~~wherein the time when entering the active state is determined based on the time/frequency location(s) of reserved resource(s) indicated by the second indication information.~~

~~25. The method of claim 24, further comprising:~~

~~entering the active state at a time T before the time/frequency location(s) of reserved resource(s).~~

~~26~~12. The method of claim 10 or 11~~claim 25, wherein information of the time T is obtained by at least one of~~a value of the time T is determined based on at least one of:

device capabilities;

~~receiving~~a downlink control signaling sent by a network device side;

~~reading~~pre-configuration information; or

~~receiving~~indication information for indicating a value of the time T carried by the physical-layer SCI; or

information for indicating a value of the time T comprised in the sidelink control signaling.

13. The method of any one of claims 9 to 12, wherein the sidelink control signaling is physical-layer sidelink control information (SCI).

14. The method of claim 13, wherein the physical-layer SCI comprises: an indication

on whether the indication information regarding the time/frequency location of the reserved resource is used to indicate whether the reception device enters the active state.

~~2715. The method of any one of claims 9 to 2314, wherein entering the active state based on the information of the time when the reception device enters the active state indicated by the first indication information comprises~~further comprising at least one of:

~~adjusting the time when the reception device enters the active state in subsequent DRX cycle(s), based on an offset of the time when the reception device enters the active state indicated by the first indication information;~~

~~controlling an active duration in a DRX cycle based on information of a length of time within which the reception device is in the active state indicated by the first indication information; or~~

~~determining a DRX cycle based on information of the DRX cycle of the reception device indicated by the first indication information.~~

16. The method of any one of claims 9 to 15, wherein the indication information indicates a resource reservation period by a periodic resource reservation field.

~~28. The method of claim 27, wherein adjusting the time when the reception device enters the active state in the subsequent DRX cycle(s) comprises:~~

~~adjusting, by the reception device, the time when entering the active state in a next DRX cycle based on the first indication information;~~

~~adjusting, by the reception device, the time when entering the active state in each DRX cycle within a subsequent preset time period based on the first indication information; or~~

~~adjusting, by the reception device, the time when entering the active state in each subsequent DRX cycle based on the first indication information.~~

~~29. The method of claim 28, wherein adjusting the time when entering the active state in each DRX cycle within the subsequent preset time period comprises:~~

~~determining the preset time period by receiving a downlink signaling sent by a network device side or reading pre-configuration information.~~

~~30. The method of claim 27, further comprises:~~

~~in response to receiving a plurality of pieces of information for indicating an offset of the time when the reception device enters the active state within a DRX cycle, adjusting the~~

time when entering the active state in each subsequent DRX cycle based on a last received piece of information for indicating the offset.

31. The method of claim 22, wherein performing the DRX operation based on the first indication information comprises:

controlling an active duration in a DRX cycle based on information of a length of time within which the reception device is in the active state indicated by the first indication information.

32. The method of claim 31, wherein controlling the active duration in the DRX cycle based on the information of the length of time within which the reception device is in the active state indicated by the first indication information comprises:

extending or shortening the active duration in the DRX cycle based on information for indicating an offset by which the length of time within which the reception device is in the active state changes; or,

determining the active duration in the DRX cycle based on information for indicating a value of the length of time within which the reception device is in the active state.

33. The method of claim 31, wherein controlling the active duration in the DRX cycle comprises:

controlling, by the reception device, the active duration in a current DRX cycle based on the first indication information;

controlling, by the reception device, an active duration in a next DRX cycle based on the first indication information;

controlling, by the reception device, an active duration in each DRX cycle within a subsequent preset time period based on the first indication information; or

controlling, by the reception device, an active duration in each subsequent DRX cycle.

34. The method of claim 33, wherein controlling the active duration in each DRX cycle within the subsequent preset time period comprises:

determining the preset time period by receiving a downlink signaling sent by a network device side or reading pre-configuration information.

35. The method of claim 22, wherein performing the DRX operation based on the first indication information comprises:

determining a DRX cycle based on information of the DRX cycle of the reception device indicated by the first indication information.

~~36. The method of claim 35, wherein determining the DRX cycle based on the information of the DRX cycle of the reception device indicated by the first indication information comprises:~~

~~extending or shortening the DRX cycle based on information for indicating an offset by which the DRX cycle of the reception device changes; or,~~

~~determining the DRX cycle based on information for indicating a value of the DRX cycle of the reception device.~~

~~37. The method of claim 35, wherein determining the DRX cycle comprises:~~

~~determining, by the reception device, a current DRX cycle based on the first indication information;~~

~~determining, by the reception device, a next DRX cycle based on the first indication information;~~

~~determining, by the reception device, each DRX cycle within a subsequent preset time period based on the first indication information; or~~

~~determining, by the reception device, all subsequent DRX cycles based on the first indication information.~~

~~38. The method of claim 37, wherein determining each DRX cycle in the subsequent preset time period comprises:~~

~~determining the preset time period by receiving a downlink signaling sent by a network device side; or reading pre-configuration information.~~

~~39~~17. An apparatus for controlling a sidelink communication, comprising:

a sending module, configured to send a sidelink control signaling, wherein the sidelink control signaling comprises first indication information for controlling a Discontinuous Reception (DRX) operation of a reception device; the first indication information is to indicate a time when the reception device enters an active state; and the first indication information comprises indication information regarding a time/frequency location of a reserved resource.

~~40. An apparatus for controlling a sidelink communication, comprising:~~

~~an indicating module, configured to receive a sidelink control signaling, wherein the sidelink control signaling comprises first indication information for controlling Discontinuous Reception (DRX) of a reception device; and~~

~~an operating module, configured to perform DRX operation based on the first indication information.~~

~~4118. A communication transmission device, comprising:~~

~~a processor;~~

~~a transceiver;~~ and

~~a memory, and storing a computer program stored on the memory executable by the processor, wherein when the computer program is executed by the processor, the method for controlling a sidelink communication of any one of claims 1 to 21 is implemented~~the processor is configured to perform the method of any one of claims 1 to 8.

~~4219. A communication reception device, comprising:~~

~~a processor;~~

~~a transceiver;~~

~~a memory, and storing a computer program stored on the memory executable by the processor, wherein when the computer program is executed by the processor, the method for controlling a sidelink communication of any one of claims 22 to 38 is implemented~~the processor is configured to perform a method of any one of claims 9 to 16.

~~2043. A non-transitory processor computer-readable storage medium, having a computer program stored thereon, wherein the computer program is configured to cause a processor to perform a method for controlling a sidelink communication of any one of claims 1 to 21~~8 or the method for controlling a sidelink communication of any one of claims 22-9 to 3816.