

CLAIMS

What is claimed is:

1. A method for sending a sounding reference signal SRS, ~~applied to~~performed
by a terminal and comprising:

5 sending a sounding reference signal SRS for positioning based on discontinuous
reception DRX-related target information and/or a radio resource control RRC
status.

2. The method according to claim 1, wherein

10 the step of sending an SRS for positioning based on DRX-related target
information comprises:

 sending the SRS for positioning only in a DRX active time, or sending the SRS
for positioning in a DRX non-active time; or

 the step of sending an SRS for positioning based on an RRC status comprises:

15 sending the SRS for positioning only in an RRC connected state, or sending the
SRS for positioning in an RRC non-connected state.

3. The method according to claim 1 or 2, wherein the target information
comprises first information, and the method further comprises:

20 sending the first information to a location management device, wherein the first
information comprises at least one of the following: DRX configuration information,
configuration information of the SRS, a current period of the SRS, indication
information for indicating sending or not sending the SRS in the DRX non-active
time, indication information that the terminal has configured DRX, indication
information that a DRX cycle of the terminal has changed, indication information
that the terminal has cancelled DRX configuration, a relationship between sending of
25 the SRS and wake-up information, and indication information that the SRS in the
current period is not to be sent due to influence of a wake-up signal.

4. The method according to claim 1 or 2, wherein the target information
comprises first information, and the method further comprises:

receiving first information sent by a network-side device, wherein the first information comprises at least one of the following: DRX configuration information, configuration information of the SRS, a current period of the SRS, indication information for indicating sending or not sending the SRS in the DRX non-active time, indication information that the terminal has configured DRX, indication information that a DRX cycle of the terminal has changed, indication information that the terminal has cancelled DRX configuration, a relationship between sending of the SRS and wake-up information, and indication information that the SRS in the current period is not to be sent due to influence of a wake-up signal; and/or

the target information comprises second information, and the method further comprises: receiving second information sent by a location management device, wherein the second information comprises at least one of the following: indication information for indicating sending or not sending the SRS in the DRX non-active time, a current period of the SRS, and a relationship between sending of the SRS and wake-up information.

5. The method according to claim 4, wherein the sending an SRS for positioning based on DRX-related target information comprises:

in a slot in which the first information or the second information is received, or in an NT1 time after the first information or the second information is received, or in a next period of the SRS after a slot in which the first information or the second information is received, sending the SRS for positioning based on the DRX-related target information.

6. The method according to claim 3, wherein the DRX configuration information comprises at least one of the following: a DRX cycle, configuration information of a DRX onDuration timer, configuration information of a DRX inactivity timer, configuration information of a DRX downlink retransmission timer, configuration information of a DRX uplink retransmission timer, configuration information of a DRX long-cycle start offset timer, configuration information of a DRX short cycle, configuration information of a DRX short-cycle timer, configuration information of a DRX downlink HARQ round-trip transmission time

timer, configuration information of a DRX uplink HARQ round-trip transmission time timer, and configuration information of a DRX command MAC CE.

7. The method according to claim 3, wherein the current period of the SRS is one of the following:

5 T2 in a case that DRX has been configured;

T3 in a case that the DRX cycle has changed; and

T1 in a case that the DRX configuration has been cancelled; wherein

T1, T2, and T3 are different from each other.

8. The method according to claim 3, wherein the current period of the SRS is
10 determined based on a function of a configuration periodicity of the SRS and/or a function of the DRX cycle.

~~9. The method according to claim 8, wherein the function comprises one of the following:~~

~~Max (A, B); and~~

15 ~~lowest common multiple (A, B); wherein~~

~~A is a value determined based on the function of the configuration periodicity of the SRS, and B is a value determined based on the function of the DRX cycle.~~

~~109.~~ The method according to claim ~~12~~, wherein the sending an SRS for positioning in a DRX non-active time comprises:

20 sending the SRS only in the DRX non-active time; or

skipping sending the SRS for positioning in a DRX non-active time; or

sending the SRS for positioning in the DRX non-active time and a DRX active time.

~~110.~~ The method according to claim ~~109~~, wherein the sending the SRS only in
25 the DRX non-active time comprises:

if a time window for sending the SRS partially overlaps a time window of the DRX active time, cancelling sending the SRS in an overlapping portion.

~~1211.~~ The method according to claim 1 or ~~109~~, wherein the sending the SRS for positioning in the DRX active time comprises:

cancelling sending the SRS if the SRS conflicts with the following information:
a physical downlink control channel PDCCH, a physical uplink control channel
PUCCH, a physical uplink shared channel PUSCH, a PUCCH for dynamic
scheduling, a PUSCH for dynamic scheduling, a PUCCH carrying a scheduling
request SR, or retransmission.

~~43~~12. The method according to claim 1 or ~~40~~9, wherein the sending the SRS for
positioning in the DRX active time comprises:

if no wake-up signal is detected, sending, to a location management device,
indication information for indicating not sending the SRS in a current period due to
influence of a wake-up signal.

~~44~~13. The method according to claim 1, wherein behaviors are different for an
aperiodic SRS, a periodic SRS, and a semi-static SRS.

~~45~~14. The method according to claim ~~44~~13, wherein for the aperiodic SRS, the
SRS for positioning is sent in a DRX active time and a DRX non-active time.

~~46~~15. The method according to claim 1, wherein a periodicity of the SRS in an
RRC non-connected state is different from a periodicity of the SRS in an RRC
connected state.

~~47~~16. The method according to claim ~~46~~15, wherein the periodicity of the SRS
in the RRC non-connected state is greater than the periodicity of the SRS in the RRC
connected state.

~~48~~17. The method according to claim 1, further comprising:

sending RRC state indicator information to a location management device.

~~49~~18. The method according to claim ~~48~~17, wherein the RRC state indicator
information comprises at least one of the following: indication information for
indicating the location management device to cancel, reconfigure, or re-request
measurement on the SRS by a neighboring cell, relationship information between
sending of the SRS and an RRC connected state, and RRC connection state
information.

~~20. A method for configuring an SRS, applied to a network-side device and
comprising:~~

~~sending first information to a terminal, a location management device, or a neighboring cell, wherein the first information comprises at least one of the following: DRX configuration information, configuration information of the SRS, a current period of the SRS, indication information for indicating sending or not sending the SRS in a DRX non-active time, indication information that the terminal has configured DRX, indication information that a DRX cycle of the terminal has changed, indication information that the terminal has cancelled DRX configuration, a relationship between sending of the SRS and wake-up information, and indication information that the SRS in the current period is not to be sent due to influence of a wake-up signal; and the first information is used to determine at least one of the following: whether the terminal sends or does not send the SRS in the DRX non-active time and how to send the SRS; and/or~~

~~receiving second information sent by a location management device, wherein the second information comprises at least one of the following: indication information for indicating sending or not sending an SRS for positioning in a DRX non-active time, a current period of the SRS, and a relationship between sending of the SRS and wake-up information; or~~

~~sending third information to a terminal, a location management device, or a neighboring cell, wherein the third information comprises at least one of the following: configuration information of an SRS for positioning and RRC state indicator information; and the third information is used to determine: whether the terminal sends or does not send the SRS in an RRC non-connected state.~~

~~21. The method according to claim 20, wherein~~

~~the current period of the SRS is one of the following:~~

~~T2 in a case that the terminal has configured DRX;~~

~~T3 in a case that a DRX cycle of the terminal has changed; and~~

~~T1 in a case that the terminal cancels DRX configuration; wherein~~

~~T1, T2, and T3 are different from each other.~~

~~22. The method according to claim 20 or 21, wherein the current period of the SRS is determined based on a function of a configuration periodicity of the SRS and/or a function of the DRX cycle.~~

~~23. The method according to claim 22, wherein the function is one of the following:~~

~~Max (A, B); and~~

~~lowest common multiple (A, B); wherein~~

~~A is a value determined based on the function of the configuration periodicity of the SRS, and B is a value determined based on the function of the DRX cycle.~~

~~24. The method according to claim 20, wherein the RRC connected state indication information comprises one of the following:~~

~~indication information for indicating the location management device to cancel, reconfigure, or re-request measurement on the SRS by the neighboring cell;~~

~~relationship information between sending of the SRS and an RRC connected state; and~~

~~RRC connection state information.~~

~~25. A method for measuring an SRS, applied to a location management device and comprising:~~

~~receiving first information, wherein the first information comprises at least one of the following: DRX configuration information, configuration information of the SRS, a current period of the SRS, indication information for indicating sending or not sending the SRS in a DRX non active time, indication information that a terminal has configured DRX, indication information that a DRX cycle of the terminal has changed, indication information that the terminal has cancelled DRX configuration, a relationship between sending of the SRS and wake-up information, and indication information that the SRS in the current period is not to be sent due to influence of a wake-up signal; and~~

~~determining at least one of the following based on the first information: whether the terminal sends or does not send an SRS for positioning in the DRX non active time and how to send the SRS; and/or~~

~~sending second information to a network-side device or a terminal, wherein the second information comprises at least one of the following: indication information for indicating sending or not sending an SRS for positioning in a DRX non-active time, a current period of the SRS, and a relationship between sending of the SRS and wake-up information; or~~

~~receiving third information, wherein the third information comprises at least one of the following: configuration information of an SRS for positioning and RRC state indicator information; and the third information is used to determine whether the terminal sends or does not send the SRS in an RRC non-connected state; and~~

~~determining, based on the third information, whether the terminal sends or does not send the SRS for positioning in the RRC non-connected state.~~

~~26. The method according to claim 25, further comprising:~~

~~sending first indication information to a neighboring cell, wherein the first indication information is used to cancel, reconfigure, or re-request measurement on the SRS by the neighboring cell; and/or~~

~~sending a location request or a measurement request to a neighboring cell, wherein the request comprises a measurement period or a reporting period, and the measurement period or reporting period is the current period of the SRS or a period determined by the location management device.~~

~~27. A terminal, comprising:~~

~~a first sending module, configured to send an SRS for positioning based on DRX-related target information and/or an RRC status.~~

~~28. A network-side device, comprising:~~

~~a first sending module, configured to send first information to a terminal, a location management device, or a neighboring cell, wherein the first information comprises at least one of the following: DRX configuration information, configuration information of an SRS, a current period of the SRS, indication information for indicating sending or not sending the SRS in a DRX non-active time, indication information that the terminal has configured DRX, indication information that a DRX cycle of the terminal has changed, indication information that the~~

~~terminal has cancelled DRX configuration, a relationship between sending of the SRS and wake-up information, and indication information that the SRS in the current period is not to be sent due to influence of a wake-up signal; and the first information is used to determine at least one of the following: whether the terminal sends or does not send the SRS in the DRX non-active time and how to send the SRS; and/or~~

~~a receiving module, configured to receive second information sent by a location management device, wherein the second information comprises at least one of the following: indication information for indicating sending or not sending an SRS for positioning in a DRX non-active time, a current period of the SRS, and a relationship between sending of the SRS and wake-up information; or~~

~~a second sending module, configured to send third information to a terminal, a location management device, or a neighboring cell, wherein the third information comprises at least one of the following: configuration information of an SRS for positioning and RRC state indicator information; and the third information is used to determine: whether the terminal sends or does not send the SRS in an RRC non-connected state.~~

~~29. A location management device, comprising:~~

~~a first receiving module, configured to receive first information, wherein the first information comprises at least one of the following: DRX configuration information, configuration information of an SRS, a current period of the SRS, indication information for indicating sending or not sending the SRS in a DRX non-active time, indication information that a terminal has configured DRX, indication information that a DRX cycle of the terminal has changed, indication information that the terminal has cancelled DRX configuration, a relationship between sending of the SRS and wake-up information, and indication information that the SRS in the current period is not to be sent due to influence of a wake-up signal; and~~

~~a first determining module, configured to determine at least one of the following based on the first information: whether the terminal sends or does not send an SRS for positioning in the DRX non-active time and how to send the SRS; and/or~~

~~a sending module, configured to send second information to a network-side device or a terminal, wherein the second information comprises at least one of the following: indication information for indicating sending or not sending an SRS for positioning in a DRX non-active time, a current period of the SRS, and a relationship between sending of the SRS and wake-up information; or~~

~~a second receiving module, configured to receive third information, wherein the third information comprises at least one of the following: configuration information of an SRS for positioning and RRC state indicator information; and the third information is used to determine whether the terminal sends or does not send the SRS in an RRC non-connected state; and~~

~~a second determining module, configured to determine, based on the third information, whether the terminal sends or does not send the SRS for positioning in the RRC non-connected state.~~

~~3019.~~ A terminal, comprising a processor, a memory, and a computer program stored in the memory and capable of running on the processor, wherein when the computer program is executed by the processor, the steps of the method for sending an SRS according to any one of claims 1 to ~~19-18~~ are implemented.

~~3120.~~ A network-side device, comprising a processor, a memory, and a computer program stored in the memory and capable of running on the processor, wherein when the computer program is executed by the processor, the following steps ~~of the method for configuring an SRS according to any one of claims 20 to 24~~ are implemented:

sending first information to a terminal, a location management device, or a neighboring cell, wherein the first information comprises at least one of the following: DRX configuration information, configuration information of the SRS, a current period of the SRS, indication information for indicating sending or not sending the SRS in a DRX non-active time, indication information that the terminal

has configured DRX, indication information that a DRX cycle of the terminal has changed, indication information that the terminal has cancelled DRX configuration, a relationship between sending of the SRS and wake-up information, and indication information that the SRS in the current period is not to be sent due to influence of a
5 wake-up signal; and the first information is used to determine at least one of the following: whether the terminal sends or does not send the SRS in the DRX non-active time and how to send the SRS; and/or

receiving second information sent by a location management device, wherein the second information comprises at least one of the following: indication
10 information for indicating sending or not sending an SRS for positioning in a DRX non-active time, a current period of the SRS, and a relationship between sending of the SRS and wake-up information; or

sending third information to a terminal, a location management device, or a
15 neighboring cell, wherein the third information comprises at least one of the following: configuration information of an SRS for positioning and RRC state indicator information; and the third information is used to determine: whether the terminal sends or does not send the SRS in an RRC non-connected state.

~~32. A location management device, comprising a processor, a memory, and a computer program stored in the memory and capable of running on the processor,~~
20 ~~wherein when the computer program is executed by the processor, the steps of the method for measuring an SRS according to claim 25 or 26 are implemented.~~

~~33. A positioning method, applied to a communications device and comprising:~~
~~sending RRC state indicator information to a location management device,~~
~~wherein the communications device is a terminal or a network side device, and the~~
25 ~~RRC state indicator information comprises at least RRC connection state information.~~

~~34. The method according to claim 33, further comprising:~~
~~sending at least one of the following to the location management device:~~
~~positioning reference signal PRS measurement information and location information~~
30 ~~of the terminal.~~

~~35. A positioning method, applied to a location management device and comprising:~~

~~receiving RRC state indicator information sent by a terminal or a network side device, wherein the RRC state indicator information comprises at least RRC connection state information.~~

~~36. The method according to claim 35, further comprising:~~

~~receiving at least one of the following that is sent by the terminal or the network side device: PRS measurement information and location information of the terminal.~~

~~37. The method according to claim 35 or 36, further comprising:~~

~~determining at least one of the following based on the RRC state indicator information:~~

~~a positioning behavior of the terminal in the RRC connected state;~~

~~reporting or measurement information of the terminal in the RRC connected state; and~~

~~a confidence level of reporting or measurement information of the terminal in the RRC connected state.~~

~~38. A communications device, comprising:~~

~~a sending module, configured to send RRC state indicator information to a location management device, wherein the communications device is a terminal or a network side device, and the RRC state indicator information comprises at least RRC connection state information.~~

~~39. A location management device, comprising:~~

~~a receiving module, configured to receive RRC state indicator information sent by a terminal or a network side device, wherein the RRC state indicator information comprises at least RRC connection state information.~~

~~40. A communications device, comprising a processor, a memory, and a computer program stored in the memory and capable of running on the processor, wherein when the computer program is executed by the processor, the steps of the positioning method according to claim 33 or 34 are implemented.~~

~~41. A location management device, comprising a processor, a memory, and a computer program stored in the memory and capable of running on the processor, wherein when the computer program is executed by the processor, the steps of the positioning method according to any one of claims 35 to 37 are implemented.~~

~~42. A computer-readable storage medium, wherein the computer-readable storage medium stores a computer program, and when the computer program is executed by a processor, the steps of the method for sending an SRS according to any one of claims 1 to 19 are implemented; or when the computer program is executed by a processor, the steps of the method for configuring an SRS according to any one of claims 20 to 24 are implemented; or when the computer program is executed by a processor, the steps of the method for measuring an SRS according to claim 25 or 26 are implemented; or when the computer program is executed by a processor, the steps of the positioning method according to claim 33 or 34 are implemented; or when the computer program is executed by a processor, the steps of the positioning method according to any one of claims 35 to 37 are implemented.~~