

CLAIMS

1. A method for saving power of a terminal, comprising:

receiving a first power saving indication information;

5 ~~in a case where a first preset condition is satisfied, switching a first carrier currently activated to a power saving state, wherein the first preset condition is satisfied for indicating a power saving operation to be performed.~~

10 wherein a bit corresponding to a designated carrier is configured in the first power saving indication information, and the bit is configured for indicating that a corresponding operation is to be performed on the designated carrier; and

wherein the designated carrier comprises a first carrier and wherein the first power saving indication information indicating that the first carrier is to be switched to a power saving state; and

15 switching a first bandwidth part currently activated in the first carrier to a second bandwidth part in the first carrier, wherein using the second bandwidth part consumes less power than using the first bandwidth part.

2. The method of claim 1, ~~wherein the switching the first carrier currently activated to the power saving state comprises~~further comprising:

20 ~~performing state switching on a first bandwidth part currently activated in the first carrier, and switching the first bandwidth part to the power saving state; or~~

before switching a the first bandwidth part currently activated in the first carrier to a the second bandwidth part in the first carrier, receiving, from a base station, a configuration of wherein the second bandwidth part has a higher as a power saving level than the first bandwidth part.

25 ~~3. The method of claim 2, wherein the performing the state switching on the first bandwidth part currently activated in the first carrier, and switching the first bandwidth part to the power saving state comprise:—~~

~~switching the first bandwidth part to a dormant state, wherein in a case where the first bandwidth part is in the dormant state, a dormant operation is performed on the first bandwidth part.~~

43. The method of claim 31, wherein ~~the~~ dormant operation is performed, the dormant operation comprising: not performing a control channel monitoring operation on the ~~first~~second bandwidth part, and performing at least one of channel state information (CSI) measurement, automatic gain control (AGC) or beam management.

5. ~~The method of claim 1, wherein the switching the first carrier currently activated to the power saving state further comprises:~~

~~in a case where the first carrier is switched to the power saving state, switching a second carrier to the power saving state, wherein a bundle relationship is configured between the first carrier and the second carrier.~~

6. ~~The method of claim 5, wherein in the case where the first carrier is switched to the power saving state, the switching the second carrier to the power saving state comprises at least one of:~~

~~in a case where the first carrier is switched to a first specified state, switching the second carrier to the first specified state; or~~

~~in a case where the first carrier is switched to a second specified state, switching the second carrier to the second specified state.~~

7. ~~The method of claim 5, wherein in the case where the first carrier is switched to the power saving state, the switching the second carrier to the power saving state comprises:~~

~~in the case where the first carrier is switched to the power saving state, switching a third bandwidth part currently activated in the second carrier to the power saving state; or~~

~~in the case where the first carrier is switched to the power saving state, switching a third bandwidth part currently activated in the second carrier to a fourth bandwidth part in the second carrier, wherein the fourth bandwidth part has a higher power saving level than the third bandwidth part.~~

8. ~~The method of claim 5, wherein in the case where the first carrier is switched to the power saving state, the switching the second carrier to the power saving state comprises:~~

~~in a case where a primary carrier is switched to the power saving state, switching a secondary carrier to the power saving state.~~

9. ~~The method of claim 8, wherein in the case where the primary carrier is switched to the power saving state, the switching the secondary carrier to the power saving state comprises:~~

~~in a case where the primary carrier is switched to a first power saving level, switching the secondary carrier to a second power saving level, wherein the second power saving level is higher than or equal to the first power saving level.~~

~~10. The method of claim 1, wherein the first preset condition comprises that first power saving indication information is received, and the first power saving indication information is configured for indicating that the first carrier is to be switched to the power saving state.~~

~~11. The method of claim 10, wherein the designated carrier further comprises a second carrier and the first power saving indication information is further configured for indicating that the second carrier is to be switched to the power saving state, wherein the first carrier and the second carrier belong to are configured for a same terminal.~~

~~12. The method of claim 10 or 11, wherein the first power saving indication information is configured with a bit corresponding to a designated carrier, and the bit is configured for indicating that a corresponding operation is to be performed on the designated carrier.~~

~~13. The method of claim 12, wherein the bit is configured for indicating that at least one of the following operations is to be performed on the designated carrier:~~

~~changing a state of the designated carrier, not changing a state of the designated carrier, switching a bandwidth part on the designated carrier, not switching a bandwidth part on the designated carrier, performing a control channel monitoring operation on the designated carrier or not performing a control channel monitoring operation on the designated carrier.~~

~~14. The method of claim 10 or 11, wherein the first power saving indication information is downlink control information carrying a power saving indication identifier.~~

~~15. The method of claim 10, wherein the first power saving indication information is received in a shared search space or a self-scheduled search space.~~

~~16. The method of claim 15, wherein the first power saving indication information further carries at least one of:~~

~~a first identifier for indicating whether the shared search space is enabled; or~~

~~a second identifier for indicating whether the self-scheduled search space is enabled.~~

~~17. The method of claim 15 or 16, wherein the first power saving indication information is radio resource control (RRC) signaling or a media access control element (MAC CE).~~

18. ~~The method of claim 15, wherein whether the shared search space or the self-scheduled search space is enabled is determined according to whether a first timer expires, and the first timer is activated in discontinuous receiving-ON (DRX-ON) duration.~~

19. ~~The method of claim 18, wherein the self-scheduled search space is enabled while the first timer is in operation, and the shared search space is enabled after the first timer expires.~~

20. ~~The method of claim 1, wherein the first preset condition is that a second timer expires, and the second timer is configured for indicating the switching of the first carrier to the power saving state.~~

21. ~~The method of claim 1, wherein before the switching the first carrier currently activated to the power saving state, the method further comprises:—~~

~~receiving a wake up indication; and~~

~~entering a DRX-ON state according to the wake up indication, wherein a DRX-OFF state is maintained before the wake up indication is received.~~

227. The method of claim 1, further comprising:

switching the first carrier in the power saving state to a non-power saving state.

238. The method of claim 227, wherein the switching the first carrier in the power saving state to the non-power saving state comprises:

~~in a case where a third timer expires, switching the first carrier in the power saving state to the non-power saving state, wherein the third timer is triggered and started after the first carrier is switched to the power saving state; or~~

~~receiving in a case where~~ a switching indication ~~is received,~~indicating switching of the first carrier in the power saving state to the non-power saving state; and

switching the first carrier in the power saving state to the non-power saving state.

249. The method of claim 227 or 238, wherein the switching the first carrier in the power saving state to the non-power saving state comprises:

after a preset time period starting from ~~at~~the time receiving the switching indication~~moment~~
~~when a second preset condition is satisfied~~, switching the first carrier in the power saving state to the non-power saving state;or

~~in a current slot after a preset time period starting from a time moment when a second preset condition is satisfied, switching the first carrier in the power saving state to the non-power saving state; or~~

~~in a next slot after a preset time period starting from a time moment when a second preset condition is satisfied, switching the first carrier in the power saving state to the non-power saving state;~~

~~wherein the second preset condition is satisfied for indicating the switching of the first carrier in the power saving state to the non-power saving state.~~

~~25. The method of claim 24, wherein the preset time period is n symbols, n is a positive integer and n is set according to sub-carrier space.~~

~~26. A method for sending information, comprising:~~

~~sending first power saving indication information to a terminal, wherein the first power saving indication information is configured for indicating that the a first carrier currently activated is to be switched to a power saving state by the terminal.~~

~~27. The method of claim 26, wherein the first power saving indication information being configured for indicating that the first carrier currently activated is to be switched to the power saving state by the terminal comprises:~~

~~the first power saving indication information being configured for indicating that state switching is to be performed on a first bandwidth part currently activated in the first carrier by the terminal and the first bandwidth part is switched to the power saving state; or~~

~~the first power saving indication information being configured for indicating that a first bandwidth part currently activated in the first carrier is to be switched to a second bandwidth part in the first carrier by the terminal, wherein the second bandwidth part has a higher power saving level than the first bandwidth part.~~

~~28. The method of claim 27, comprising:~~

~~configuring a dormant state, wherein the dormant state is configured for indicating that the first bandwidth part is to be switched to the dormant state by the terminal in a case where the first power saving indication information is received, wherein the power saving state comprises the dormant state.~~

~~29. The method of claim 26, further comprising:~~

configuring a bundle relationship for a carrier, wherein the bundle relationship is configured for indicating that the terminal to switch a second carrier is to be switched to the power saving state by the terminal in a case where the first carrier is switched to the power saving state, wherein the bundle relationship is configured between the first carrier and the second carrier.

5 30. The method of claim 29, wherein the bundle relationship comprises at least one of: in a case where the first carrier is switched to a first designated state, the bundle relationship being configured for indicating that the second carrier is to be switched to the first designated state by the terminal; or in a case where the first carrier is switched to a second designated state, the bundle relationship being configured for indicating that the second carrier is to be switched to the second designated state by the terminal.—

31. The method of claim 26, wherein the first power saving indication information is further configured for indicating that a second carrier is to be switched to the power saving state by the terminal, wherein the first carrier and the second carrier belong to a same terminal.

32. The method of claim 26 or 31, further comprising:

15 configuring a bit corresponding to a designated carrier in the first power saving indication information, wherein the bit is configured for indicating that a corresponding operation is to be performed on the designated carrier by the terminal.

33. The method of claim 32, wherein the bit is configured for indicating that at least one of the following operations is to be performed by the terminal on the designated carrier:

20 changing a state of the designated carrier, not changing a state of the designated carrier, switching a bandwidth part on the designated carrier, not switching a bandwidth part on the designated carrier, performing a control channel monitoring operation on the designated carrier or not performing a control channel monitoring operation on the designated carrier.

25 34. The method of claim 26 or 31, wherein the first power saving indication information is downlink control information carrying a power saving indication identifier.

35. The method of claim 26, further comprising:

configuring a shared search space or a self-scheduled search space; and

sending the first power saving indication information in the configured self-scheduled search space or the configured shared search space.

30 36. The method of claim 35, wherein the first power saving indication information is radio

resource control (RRC) signaling or a media access control element (MAC CE).

37. The method of claim 35, further comprising:

configuring a first timer, wherein the first timer is configured for indicating whether the shared search space or the self-scheduled search space is enabled, wherein the first timer is activated in discontinuous receiving ON (DRX-ON) duration.

38. The method of claim 37, wherein the self-scheduled search space is enabled while the first timer is in operation; and the shared search space is enabled after the first timer expires.

39. The method of claim 26, further comprising:

sending a wake-up indication to the terminal, wherein the wake-up indication is configured for instructing the terminal to enter a DRX-ON state after receiving the wake-up indication, wherein the terminal maintains a DRX-OFF state before receiving the wake-up indication.

40. The method of claim 26, further comprising:

sending a switching indication to the terminal, wherein the switching indication is configured for indicating that the first carrier in the power saving state is to be switched to a non-power saving state by the terminal.

41. The method of claim 26, further comprising:

configuring a third timer, wherein the third timer is configured for indicating that the first carrier in the power saving state is to be switched to a non-power saving state by the terminal in a case where the third timer expires, wherein the third timer is triggered and started after the first carrier is switched to the power saving state.

42. An apparatus for saving power, comprising a processor, the processor being configured to:

receive a first power saving indication information;

a first switching module, which is configured to: in a case where a first preset condition is satisfied, switch a first carrier currently activated to a power saving state, wherein the first preset condition is satisfied for indicating a power saving operation to be performed.

wherein the first power saving indication information is configured with a bit corresponding to a designated carrier, and the bit is configured for indicating that a corresponding operation is to be performed on the designated carrier;

wherein the designated carrier comprises a first carrier and wherein the first power saving indication information indicating that the first carrier is to be switched to a power saving state; and

switch a first bandwidth part currently activated in the first carrier to a second bandwidth part in the first carrier, wherein using the second bandwidth part consumes less power than using the first bandwidth part.

4311. The apparatus of claim 4210, wherein the ~~first switching module comprises~~ processor is further configured to:

~~a first switching sub-module, which is configured to perform state switching on a first bandwidth part currently activated in the first carrier and switch the first bandwidth part to the power saving state; or~~

~~a second switching sub-module, which is configured to~~ before switching a-the first bandwidth part currently activated in the first carrier to ~~a-the~~ second bandwidth part in the first carrier, receive, from a base station, a configuration of wherein the second bandwidth part ~~has a higher~~ as a power saving ~~level than the first~~ bandwidth part.

44. The apparatus of claim 43, wherein the ~~first switching sub-module comprises:~~

~~a first switching unit, which is configured to switch the first bandwidth part to a dormant state, wherein in a case where the first bandwidth part is in the dormant state, a dormant operation is performed on the first bandwidth part.~~

4512. The apparatus of claim 4411, wherein the processor is further configured to perform the dormant operation, the dormant operation comprises ing not performing a control channel monitoring operation on the ~~first~~ second bandwidth part, and performing at least one of channel state information (CSI) measurement, automatic gain control (AGC) or beam management.

46. The apparatus of claim 42, wherein the first switching module further comprises:

~~a third switching sub-module, which is configured to: in a case where the first carrier is switched to the power saving state, switch a second carrier to the power saving state, wherein a bundle relationship is configured between the first carrier and the second carrier.~~

47. The apparatus of claim 46, wherein the ~~third switching sub-module comprises at least one of:~~

~~a second switching unit, which is configured to: in a case where the first carrier is switched to a~~

~~first designated state, switch the second carrier to the first designated state; or~~

~~a third switching unit, which is configured to: in a case where the first carrier is switched to a second designated state, switch the second carrier to the second designated state.~~

~~48. The apparatus of claim 46, wherein the third switching sub-module further comprises:~~

5 ~~a fourth switching unit, which is configured to: in the case where the first carrier is switched to the power saving state, switch a third bandwidth part currently activated in the second carrier to the power saving state; or~~

~~a fifth switching unit, which is configured to: in the case where the first carrier is switched to the power saving state, switch a third bandwidth part currently activated in the second carrier to a fourth bandwidth part in the second carrier, wherein the fourth bandwidth part has a higher power saving level than the third bandwidth part.~~

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~~49. The apparatus of claim 46, wherein the third switching sub-module further comprises:~~

~~a sixth switching unit, which is configured to: in a case where a primary carrier is switched to the power saving state, switch a secondary carrier to the power saving state.~~

15 ~~50. The apparatus of claim 49, wherein the sixth switching unit comprises:~~

~~a first switching sub-unit, which is configured to: in a case where the primary carrier is switched to a first power saving level, switch the secondary carrier to a second power saving level, wherein the second power saving level is higher than or equal to the first power saving level.~~

20 ~~51. The apparatus of claim 42, wherein the first preset condition is that first power saving indication information is received, and the first power saving indication information is configured for indicating that the first carrier is to be switched to the power saving state.~~

~~5213. The apparatus of claim 1051,~~

25 ~~wherein the designated carrier further comprises a second carrier and the first power saving indication information is further configured for indicating switching of athe second carrier to the power saving state, wherein the first carrier and the second carrier ~~belong to~~are configured for a same terminal; or~~

~~53. The apparatus of claim 51 or 52, wherein the first power saving indication information is configured with a bit corresponding to a designated carrier, and the bit is configured for indicating that a corresponding operation is to be performed on the designated carrier.~~

~~54. The apparatus of claim 53, wherein the bit is configured for indicating that at least one of the following operations is to be performed on the designated carrier:~~

~~changing a state of the designated carrier, not changing a state of the designated carrier, switching a bandwidth part on the designated carrier, not switching a bandwidth part on the designated carrier, performing a control channel monitoring operation on the designated carrier or not performing a control channel monitoring operation on the designated carrier; or~~

~~55. The apparatus of claim 51 or 52, wherein the first power saving indication information is downlink control information carrying a power saving indication identifier.~~

~~56. The apparatus of claim 51, wherein the first power saving indication information is received in a shared search space or a self-scheduled search space.~~

~~57. The apparatus of claim 56, wherein the first power saving indication information further carries at least one of:~~

~~a first identifier for indicating whether the shared search space is enabled; or~~

~~a second identifier for indicating whether the self-scheduled search space is enabled.~~

~~58. The apparatus of claim 56 or 57, wherein the first power saving indication information is radio resource control (RRC) signaling or a media access control element (MAC CE).~~

~~59. The apparatus of claim 56, further comprising:~~

~~a determination module, which is configured to determine, according to whether a first timer expires, whether the shared search space or the self-scheduled search space is enabled, wherein the first timer is activated in discontinuous receiving ON (DRX-ON) duration.~~

~~60. The apparatus of claim 59, wherein the self-scheduled search space is enabled while the first timer is in operation; and the shared search space is enabled after the first timer expires.~~

~~61. The apparatus of claim 42, wherein the first preset condition is that a second timer expires, and the second timer is configured for indicating the switching of the first carrier to the power saving state.~~

~~62. The apparatus of claim 42, further comprising:~~

~~a receiving module, which is configured to receive a wake up indication before the first carrier currently activated is switched to the power saving state; and~~

a wake up module, which is configured to enter a DRX ON state according to the wake up indication, wherein a DRX OFF state is maintained before the wake up indication is received.

~~63~~14. The apparatus of claim ~~42~~10, wherein the processor is further ~~comprising~~configured to:

a ~~second switching module, which is configured to~~ switch the first carrier in the power saving state to a non-power saving state.;

~~64. The apparatus of claim 63,~~ wherein the ~~second switching module preferably~~ comprises:

a ~~fourth switching sub-module, which is configured to: in a case where a third timer expires, switch the first carrier in the power saving state to the non-power saving state, wherein the third timer is triggered and started after the first carrier is switched to the power saving state; or~~

a ~~fifth switching sub-module, which is configured to: in a case where~~receive a switching indication ~~is received, indicating~~ switching of the first carrier in the power saving state to the non-power saving state; and

switch the first carrier in the power saving state to the non-power saving state.

~~65~~15. The apparatus of claim ~~63 or 64~~14, wherein the ~~second switching module~~processor is further ~~comprises~~ configured to:

a ~~sixth switching sub-module, which is configured to: after a preset time period starting from~~the time receiving the switching indication ~~moment when a second preset condition is satisfied,~~ switch the first carrier in the power saving state to the non-power saving state; ~~or~~

a ~~seventh switching sub-module, which is configured to: in a current slot after a preset time period starting from a time moment when a second preset condition is satisfied, switch the first carrier in the power saving state to the non-power saving state; or~~

an ~~eighth switching sub-module, which is configured to: in a next slot after a preset time period starting from a time moment when a second preset condition is satisfied, switch the first carrier in the power saving state to the non-power saving state;~~

wherein the second preset condition is satisfied for indicating the switching of the first carrier in the power saving state to the non-power saving state.

~~66. The apparatus of claim 65, wherein the preset time period of time is n symbols, n is a positive integer and n is set according to sub-carrier space.~~

~~67. An apparatus for sending information, comprising:—~~

~~a first sending module, which is configured to send first power saving indication information to a terminal, wherein the first power saving indication information is configured for indicating that a first carrier currently activated is switched to a power saving state by the terminal.~~

5 ~~68. The apparatus of claim 67, wherein the first power saving indication information being configured for instructing the terminal to switch the first carrier currently activated to the power saving state comprises:~~

~~the first power saving indication information being configured for instructing the terminal to perform state switching on a first bandwidth part currently activated in the first carrier and switch the first bandwidth part to the power saving state; or~~

10 ~~the first power saving indication information being configured for instructing the terminal to switch a first bandwidth part currently activated in the first carrier to a second bandwidth part in the first carrier, wherein the second bandwidth part has a higher power saving level than the first bandwidth part.~~

~~69. The apparatus of claim 68, further comprising:~~

15 ~~a first configuration module, which is configured to configure a dormant state, wherein the dormant state is configured for indicating that the first bandwidth part is to be switched to the dormant state by the terminal in a case where the first power saving indication information is received, wherein the power saving state comprises the dormant state.~~

~~70. The apparatus of claim 67, further comprising:~~

20 ~~a second configuration module, which is configured to configure a bundle relationship for a carrier, wherein the bundle relationship is configured for indicating that a second carrier is to be switched to the power saving state by the terminal in a case where the first carrier is switched to the power saving state, wherein a bundle relationship is configured between the first carrier and the second carrier.~~

25 ~~71. The apparatus of claim 70, wherein the bundle relationship comprises at least one of: being further configured for: in a case where the first carrier is switched to a first designated state, indicating that the second carrier is to be switched to the first designated state by the terminal; or being further configured for: in a case where the first carrier is switched to a second designated state, indicating that the second carrier is to be switched to the second designated state by the terminal.~~

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~~72. The apparatus of claim 67, wherein the first power saving indication information is further configured for indicating that a second carrier is to be switched to the power saving state by the terminal, wherein the first carrier and the second carrier belong to a same terminal.~~

~~73. The apparatus of claim 67 or 72, further comprising:—~~

5 ~~a third configuration module, which is configured to configure a bit corresponding to a designated carrier in the first power saving indication information, wherein the bit is configured for indicating that a corresponding operation is to be performed on the designated carrier by the terminal.~~

10 ~~74. The apparatus of claim 73, wherein the bit is configured for indicating that at least one of the following operations is to be performed by the terminal on the designated carrier:~~

~~changing a state of the designated carrier, not changing a state of the designated carrier, switching a bandwidth part on the designated carrier, not switching a bandwidth part on the designated carrier, performing a control channel monitoring operation on the designated carrier or not performing a control channel monitoring operation on the designated carrier.~~

15 ~~75. The apparatus of claim 67 or 72, wherein the first power saving indication information is downlink control information carrying a power saving indication identifier.~~

~~76. The apparatus of claim 67, further comprising:—~~

~~a fourth configuration module, which is configured to configure a shared search space or a self-scheduled search space; and~~

20 ~~a first sending module, which is configured to send the first power saving indication information on the configured self-scheduled search space or the configured shared search space.~~

~~77. The apparatus of claim 76, wherein the first power saving indication information is radio resource control (RRC) signaling or a media access control element (MAC CE).~~

25 ~~78. The apparatus of claim 76, further comprising:—~~

~~a fifth configuration module, which is configured to configure a first timer, wherein the first timer is configured for indicating whether the shared search space or the self-scheduled search space is enabled, wherein the first timer is activated in discontinuous receiving ON (DRX ON) duration.~~

79. ~~The apparatus of claim 78, wherein the self-scheduled search space is enabled while the first timer is in operation; and the shared search space is enabled after the first timer expires.~~

80. ~~The apparatus of claim 67, further comprising:—~~

5 ~~a second sending module, which is configured to send a wake-up indication to the terminal, wherein the wake-up indication is configured for instructing the terminal to enter a DRX-ON state after receiving the wake-up indication, wherein the terminal maintains a DRX-OFF state before receiving the wake-up indication.~~

81. ~~The apparatus of claim 67, further comprising:—~~

10 ~~a third sending module, which is configured to send a switching indication to the terminal, wherein the switching indication is configured for instructing the terminal to switch the first carrier in the power saving state to a non-power saving state.~~

82. ~~The apparatus of claim 67, further comprising:—~~

15 ~~a sixth configuration module, which is configured to configure a third timer, wherein the third timer is configured for indicating that the first carrier in the power saving state is to be switched to a non-power saving state by the terminal in a case where the third timer expires, wherein the third timer is triggered and started after the first carrier is switched to the power saving state.~~

83. ~~A storage medium, which stores a computer program, wherein when the computer program is executed, the method of any one of claims 1 to 25 is performed.~~

20 ~~84. A storage medium, which stores a computer program, wherein when the computer program is executed, the method of any one of claims 26 to 41 is performed.~~

85. ~~An electronic apparatus, comprising a memory and a processor, wherein the memory stores a computer program, and the processor is configured to execute the computer program to perform the method of any one of claims 1 to 25.—~~

25 ~~86. An electronic apparatus, comprising a memory and a processor, wherein the memory stores a computer program, and the processor is configured to execute the computer program to perform the method of any one of claims 26 to 41.—~~