

WHAT IS CLAIMED IS:

1. A method for configuring Random Access (RA), applicable to a base station, comprising:

grouping multiple Synchronization Signal Blocks (SSBs) and selecting a primary SSB from each SSB group;

sending indication information to User Equipment (UE), the indication information indicating a primary SSB in a SSB group to be sent;

sending at most one SSB in each SSB group to be sent to the UE; and

sending the number of SSBs corresponding to preambles in each Random Access Channel (RACH) Occasion (RO) and the number of ROs under Frequency Division Multiplexing (FDM) to the UE.

2. The method of claim 1, further comprising:

defaulting a grouping rule and a primary SSB selecting rule before grouping the multiple SSBs and selecting the primary SSB from each SSB group; or

determining a grouping rule and a primary SSB selecting rule before grouping the multiple SSBs and selecting the primary SSB from each SSB group, and sending the grouping rule and the primary SSB selecting rule to the UE.

3. The method of claim 1, further comprising:

selecting at least one SSB from the multiple SSBs as a target SSB and obtaining multiple sendable positions for each target SSB, before grouping the multiple SSBs.

4. The method of claim 3, wherein obtaining the multiple sendable positions for each target SSB comprises:

performing, based on a position where a set signal configured to determine an index of each target SSB is located, cyclic shift that is of a symbol level on other

signals than the set signal in each target SSB to obtain the multiple sendable positions for each target SSB, wherein the set signal has a same position in the multiple sendable positions with a position in the target SSB; and

grouping the multiple SSBs comprises:

classifying each target SSB and multiple SSBs corresponding to the multiple sendable positions obtained after the cyclic shift into one group.

5. The method of claim 3, wherein

obtaining the multiple sendable positions for each target SSB comprises:

overall shifting signals in each target SSB based on a position of each target SSB to obtain the multiple sendable positions for each target SSB; and

grouping the multiple SSBs comprises:

classifying each target SSB and multiple SSBs corresponding to the multiple sendable positions obtained after the overall shifting into one group.

6. The method of claim 1, wherein sending at most one SSB in each SSB group to be sent to the UE comprises:

taking a first SSB in each SSB group to be sent as a present SSB;

performing channel detection prior to a sending position for the present SSB;

sending the present SSB in response to a channel being idle; or

taking an SSB next to the present SSB as the present SSB in response to the channel being busy, and continuously performing the channel detection prior to the sending position for the present SSB till an SSB is successfully sent or channels prior to sending positions for all SSBs in a corresponding SSB group to be sent are all busy.

7. The method of claim 2, wherein the grouping rule comprises at least one of:

the number of beams, the number of the multiple SSBs, time-domain position distribution information of the multiple SSBs, a window size and a channel

condition.

8. A method for Random Access (RA), applicable to User Equipment (UE), comprising:

receiving and detecting a Synchronization Signal Block (SSB) from a base station, the SSB corresponding to one SSB group, the SSB group comprising a primary SSB, the SSB in a same group sharing a Random Access Channel (RACH) Occasion (RO) corresponding to the primary SSB, wherein, for each SSB group, the base station sends at most one SSB in the SSB group;

determining ~~a~~ the primary SSB in an SSB group corresponding to the detected SSB;

receiving indication information from the base station, and determining, based on the indication information, an SSB to be sent by the base station;

receiving the number of SSBs corresponding to preambles in each ~~Random Access Channel (RACH) Occasion (RO)~~ and the number of ROs under Frequency Division Multiplexing (FDM) from the base station, and determining corresponding RO and preamble of the primary SSB based on the SSB to be sent by the base station, a position of the primary SSB in the SSB to be sent by the base station, the number of SSBs corresponding to the preambles in each RO and the number of ROs under the FDM; and

sending the corresponding preamble to the base station on the determined RO to realize RA to the base station.

9. The method of claim 8, wherein receiving and detecting the SSB from the base station comprises:

receiving the SSB from the base station;

detecting a set signal configured to determine an SSB index in the SSB to obtain a position where the set signal is located;

acquiring a signal group in a preset time window based on the position where

the set signal is located;

determining position information of the SSB based on the signal group; and

determining an index of the SSB based on the position information.

10. The method of claim 8, wherein receiving and detecting the SSB from the base station comprises:

receiving the SSB from the base station;

detecting a target signal in the SSB to acquire all signals in the SSB; and

demodulating all the signals in the SSB to obtain an index of the SSB.

11. The method of claim 8, wherein determining the primary SSB in the SSB group corresponding to the detected SSB comprises:

determining the SSB group corresponding to the detected SSB based on a grouping rule; and

determining the primary SSB in the SSB group based on a primary SSB selecting rule.

12. The method of claim 11, further comprising:

defaulting the grouping rule and the primary SSB selecting rule; or

receiving the grouping rule and the primary SSB selecting rule from the base station.

13. The method of claim 9, wherein acquiring the signal group in the preset time window based on the position where the set signal is located comprises:

determining a symbol prior to or after a symbol where the set signal is located as a present symbol;

determining whether the set signal and a signal on the present symbol are matched with a content of the SSB, wherein the content of the SSB comprises a content of the SSB before the SSB is subjected to cyclic shift and a content of the

SSB after the SSB is subjected to the cyclic shift;

when matched, adding the signal on the present symbol to the signal group, counting a total number of present symbols, and taking the present symbol and a symbol prior to the present symbol or taking the present signal and a symbol after the present symbol as the present symbols when the total number does not reach a first preset number, and repeatedly determining whether signals on the present symbols and the set signal are matched with the content of the SSB till the total number reaches the first preset number; or

when not matched, terminating detection of a symbol prior to a symbol presently added to the signal group or a symbol after a symbol presently added to the signal group.

14. The method of claim 13, wherein determining the position information of the SSB based on the signal group comprises:

respectively matching all signals at a second preset number of continuous symbols comprising the symbol where the set signal is located in the signal group with the content of the SSB, wherein the content of the SSB comprises the content of the SSB before the SSB is subjected to the cyclic shift and the content of the SSB after the SSB is subjected to the cyclic shift;

when there is one signal successfully matched at the second preset number of continuous symbols, taking the second preset number of continuous symbols that are successfully matched as the position information; or

when there are multiple signals successfully matched at the second preset number of continuous symbols, classifying every second preset number of continuous symbols starting from a last symbol of the signal group into one group, and taking symbols corresponding to a group comprising the symbol where the set signal is located as the position information.

15. The method of claim 10, wherein detecting the target signal in the SSB to acquire

all the signals in the SSB comprises:

detecting the target signal in the SSB to obtain a position where the target signal is located; and

acquiring all the signals in the SSB based on the position where the target signal is located.

~~16. An apparatus for configuring Random Access (RA), applicable to a base station, comprising:~~

~~a grouping and selecting module, configured to group multiple Synchronization Signal Blocks (SSBs) and select a primary SSB from each SSB group;~~

~~a first sending module, configured to send indication information to User Equipment (UE), the indication information indicating a primary SSB selected by the grouping and selecting module in a SSB group to be sent;~~

~~a second sending module, configured to send at most one SSB in each SSB group to be sent to the UE; and~~

~~a third sending module, configured to send the number of SSBs corresponding to preambles in each Random Access Channel (RACH) Occasion (RO) and the number of ROs under Frequency Division Multiplexing (FDM) to the UE.~~

~~17. The apparatus of claim 16, further comprising:~~

~~a default module, configured to default a grouping rule and a primary SSB selecting rule before the grouping and selecting module groups the multiple SSBs and selects the primary SSB from each SSB group; or~~

~~a determining and sending module, configured to, before the grouping and selecting module groups the multiple SSBs and selects the primary SSB from each SSB group, determine a grouping rule and a primary SSB selecting rule and send the grouping rule and the primary SSB selecting rule to the UE.~~

18. The apparatus of claim 16, further comprising:

~~a selecting and obtaining module, configured to, before the grouping and selecting module groups the multiple SSBs, select at least one SSB from the multiple SSBs as a target SSB and obtain multiple sendable positions for each target SSB.~~

19. The apparatus of claim 18, wherein—

~~the selecting and obtaining module is configured to perform, based on a position where a set signal configured to determine an index of each target SSB is located, cyclic shift that is of a symbol level on other signals than the set signal in each target SSB to obtain the multiple sendable positions for each target SSB, wherein the set signal has a same position in the multiple sendable positions with a position in the target SSB; and~~

~~the grouping and selecting module is configured to classify each target SSB and multiple SSBs corresponding to the multiple sendable positions obtained after the cyclic shift into one group.~~

20. The apparatus of claim 18, wherein—

~~the selecting and obtaining module is configured to overall shift signals in each target SSB based on a position of each target SSB to obtain the multiple sendable positions for each target SSB; and~~

~~the grouping and selecting module is configured to classify each target SSB and multiple SSBs corresponding to the multiple sendable positions obtained after the overall shifting into one group.~~

21. The apparatus of claim 16, wherein the second sending module comprises:

~~a determining submodule, configured to take a first SSB in each SSB group to be sent as a present SSB;~~

~~a detecting submodule, configured to perform channel detection prior to a sending position for the present SSB determined by the determining submodule;~~

~~a sending submodule, configured to send the present SSB in response to the detecting submodule detecting that a channel is idle; or~~

~~a processing submodule, configured to take an SSB next to the present SSB as the present SSB in response to the detecting submodule detecting that a channel is busy, and continuously call the detecting submodule to perform the channel detection prior to the sending position for the present SSB till an SSB is successfully sent or channels prior to sending positions for all SSBs in a corresponding SSB group to be sent are all busy.~~

22. The apparatus of claim 17, wherein the grouping rule comprises at least one of:

~~the number of beams, the number of the multiple SSBs, time-domain position distribution information of the multiple SSBs, a window size and a channel condition.~~

23. An apparatus for Random Access (RA), applicable to User Equipment (UE), comprising:

~~a receiving and detecting module, configured to receive and detect a Synchronization Signal Block (SSB) from a base station;~~

~~a determining module, configured to determine a primary SSB in an SSB group corresponding to the SSB detected by the receiving and detecting module;~~

~~a first receiving and determining module, configured to receive indication information from the base station, and determine, based on the indication information, an SSB to be sent by the base station;~~

~~a second receiving and determining module, configured to receive the number of SSBs corresponding to preambles in each Random Access Channel (RACH) Occasion (RO) and the number of ROs under Frequency Division Multiplexing (FDM) from the base station, and determine corresponding RO and~~

~~preamble of the primary SSB based on the SSB determined by the first receiving and determining module and to be sent by the base station, a position of the primary SSB determined by the determining module in the SSB to be sent by the base station, the number of SSBs corresponding to the preambles in each RO and the number of ROs under the FDM; and~~

~~an access module, configured to send the corresponding preamble to the base station on the RO determined by the second receiving and determining module to realize RA to the base station.~~

24. The apparatus of claim 23, wherein the receiving and detecting module comprises:

~~a first receiving submodule, configured to receive the SSB from the base station;~~

~~a detection obtaining submodule, configured to detect a set signal configured to determine an SSB index in the SSB received by the first receiving submodule to obtain a position where the set signal is located;~~

~~an acquiring submodule, configured to acquire a signal group in a preset time window based on the position where the set signal is located and which is obtained by the detection obtaining submodule;~~

~~a first determining submodule, configured to determine position information of the SSB based on the signal group acquired by the acquiring submodule; and~~

~~a second determining submodule, configured to determine an index of the SSB based on the position information determined by the first determining submodule.~~

25. The apparatus of claim 23, wherein the receiving and detecting module comprises:

~~a second receiving submodule, configured to receive the SSB from the base station;~~

~~a detecting submodule, configured to detect a target signal in the SSB received by the second receiving submodule to acquire all signals in the SSB; and~~

~~a demodulating module, configured to demodulate all the signals acquired by the detecting submodule in the SSB to obtain an index of the SSB.~~

26. ~~The apparatus of claim 23, wherein the determining module comprises:~~

~~a third determining submodule, configured to determine the SSB group corresponding to the detected SSB based on a grouping rule; and~~

~~a fourth determining submodule, configured to determine, based on a primary SSB selecting rule, the primary SSB in the SSB group determined by the third determining submodule.~~

27. ~~The apparatus of claim 26, further comprising:~~

~~a default module, configured to default the grouping rule and the primary SSB selecting rule; or~~

~~a receiving module, configured to receive the grouping rule and the primary SSB selecting rule from the base station.~~

28. ~~The apparatus of claim 24, wherein the acquiring submodule comprises:~~

~~a determining unit, configured to determine a symbol prior to or after a symbol where the set signal is located as a present symbol;~~

~~a matching unit, configured to determine whether the set signal and a signal on the present symbol determined by the determining unit are matched with a content of the SSB, wherein the content of the SSB includes a content of the SSB before the SSB is subjected to cyclic shift and a content of the SSB after the SSB is subjected to the cyclic shift;~~

~~an adding and counting unit, configured to, when a result from the matching unit is matching, add the signal on the present symbol to the signal group, count a total number of present symbols, and correspondingly take the present symbol and a symbol prior to the present symbol or take the present signal and a symbol after the present symbol as the present symbols when the total number does not reach a~~

~~first preset number, and repeatedly call the matching unit to determine whether signals on the present symbols and the set signal are matched with the content of the SSB till the total number reaches the first preset number; or~~

~~a detection terminating unit, configured to, when a result from the matching unit is mismatching, terminate detection of a symbol prior to a symbol presently added to the signal group or a symbol after a symbol presently added to the signal group.~~

29. The apparatus of claim 28, wherein the first determining submodule comprises:

~~a matching unit, configured to respectively match all signals at a second preset number of continuous symbols comprising the symbol where the set signal is located in the signal group with the content of the SSB, wherein the content of the SSB comprises the content of the SSB before the SSB is subjected to the cyclic shift and the content of the SSB after the SSB is subjected to the cyclic shift;~~

~~a first determining unit, configured to, when there is one signal successfully matched by the matching unit at the second preset number of continuous symbols, take the second preset number of continuous symbols that are successfully matched as the position information; or~~

~~a second determining module, configured to, when there are multiple signals successfully matched by the matching unit at the second preset number of continuous symbols, classify every second preset number of continuous⁴ symbols starting from a last symbol of the signal group into one group, and take symbols corresponding to a group comprising the symbol where the set signal is located as the position information.~~

30. The apparatus of claim 25, wherein the detecting submodule comprises:

~~a detecting unit, configured to detect the target signal in the SSB to obtain a position where the target signal is located; and~~

~~an acquiring unit, configured to acquire all the signals in the SSB based on~~

~~the position where the target signal is located and that is obtained by the detecting unit.~~

3416. A base station, comprising:

a processor; and

a memory, configured to store instructions executable by the processor,

wherein the processor is configured to:

group multiple Synchronization Signal Blocks (SSBs) and select a primary SSB from each SSB group;

send indication information to User Equipment (UE), the indication information indicating a primary SSB in a SSB group to be sent;

send at most one SSB in each SSB group to be sent to the UE; and

send the number of SSBs corresponding to preambles in each Random Access Channel (RACH) Occasion (RO) and the number of ROs under Frequency Division Multiplexing (FDM) to the UE.

3217. User Equipment (UE), comprising:

a processor; and

a memory, configured to store instructions executable by the processor,

wherein the processor is configured to:

~~group multiple Synchronization Signal Blocks (SSBs) and select a primary SSB from each SSB group;~~

~~send indication information to the UE, the indication information indicating a primary SSB in a SSB group to be sent;~~

~~send at most one SSB in each SSB group to be sent to the UE; and~~

~~send the number of SSBs corresponding to preambles in each Random Access Channel (RACH) Occasion (RO) and the number of ROs under Frequency Division Multiplexing (FDM) to the UE~~
receive and detect a Synchronization Signal Block (SSB) from a base station, the SSB corresponding to one SSB group,

the SSB group comprising a primary SSB, the SSB in a same group sharing a Random Access Channel (RACH) Occasion (RO) corresponding to the primary SSB, wherein, for each SSB group, the base station sends at most one SSB in the SSB group;

determine the primary SSB in an SSB group corresponding to the detected SSB;

receive indication information from the base station, and determine, based on the indication information, an SSB to be sent by the base station;

receive the number of SSBs corresponding to preambles in each RO and the number of ROs under Frequency Division Multiplexing (FDM) from the base station, and determining corresponding RO and preamble of the primary SSB based on the SSB to be sent by the base station, a position of the primary SSB in the SSB to be sent by the base station, the number of SSBs corresponding to the preambles in each RO and the number of ROs under the FDM; and

send the corresponding preamble to the base station on the determined RO to realize RA to the base station.

3318. A computer-readable storage medium, storing computer instructions that, when executed by a processor, implement the operations of the method for Random Access (RA) configuration according to any one of claims 1 to 7.

3419. A computer-readable storage medium, storing computer instructions that, when executed by a processor, implement the operations of the method for Random Access (RA) according to any one of claims 8 to 15.