

CLAIMS

1. A search space configuration method, comprising:

monitoring, by a user equipment, at least one synchronization signal block;

obtaining, by the user equipment, configuration information of a search space corresponding to a detected synchronization signal block, wherein the configuration information comprises QCL modulus information and/or information about a discovery reference signal transmission window, the information about the discovery reference signal transmission window comprises a position index of a smallest transmittable synchronization signal block and/or a position index of a largest transmittable synchronization signal block, wherein the QCL modulus information includes a maximum quantity of different QCL assumptions allowed to be included in a discovery reference signal, DRS, transmission, or a maximum quantity of beams with which the network-side device sends a DRS; and

determining, by the user equipment, a position of a search space for a physical downlink control channel PDCCH based on time synchronization information of the detected synchronization signal block and the configuration information;

wherein the time synchronization information comprises a position index, slot index, and/or frame index of the synchronization signal block; and the determining, by the user equipment, a position of a search space for a PDCCH based on time synchronization information of the detected synchronization signal block and the configuration information comprises:

calculating, by the user equipment, a slot index and a frame index that are of the search space for the PDCCH corresponding to the detected synchronization signal block by using the slot index of the synchronization signal block, the position index of the synchronization signal block, the frame index of the synchronization signal block, a time offset comprised in the configuration information, the QCL modulus information, the position index of the smallest transmittable synchronization signal block, the position index of the largest transmittable synchronization signal block, and a quantity of frames of a period for initial access.

2. The search space configuration method according to claim 1, wherein the information about the discovery reference signal transmission window is specified by a protocol or

configured by a network-side device.

3. The search space configuration method according to claim 1, wherein the configuration information further comprises at least one of the following:

a quantity of search spaces per slot; and

an overlapping factor.

4. The search space configuration method according to claim 1, wherein the time offset is 0, and the overlapping factor is 1/2.

5. The search space configuration method according to claim 1, wherein

both the position index of the smallest transmittable synchronization signal block and the position index of the largest transmittable synchronization signal block are configurable; or

the position index of the smallest transmittable synchronization signal block is 0, and the position index of the largest transmittable synchronization signal block is configurable; or

the position index of the smallest transmittable synchronization signal block is 0, and the position index of the largest transmittable synchronization signal block is a largest synchronization signal block position index.

6. The search space configuration method according to claim 1, wherein the slot index n_0 of the search space for the PDCCH corresponding to the detected synchronization signal block is calculated by using any one of the following formulas:

$$n_0 = [(n_{SSB,i} + O) + \Delta i * Q/2 + [i * M]] \bmod N_{slot}^{frame,\mu}, \text{ or}$$

$$n_0 = [(n_{SSB,i}) + \Delta i * Q/2 + [i/2]] \bmod N_{slot}^{frame,\mu}; \text{ and}$$

the frame index SFN_C of the search space for the PDCCH corresponding to the detected synchronization signal block is calculated by using the following formula: $SFN_C \bmod J = j$, wherein

$$j = \lfloor SFN_{SSB,i} + [(n_{SSB,i} + O) + \Delta i * Q/2 + [i * M]] / N_{slot}^{frame,\mu} \rfloor \bmod J \text{ or } j = \lfloor SFN_{SSB,i} + [(n_{SSB,i}) + \Delta i * Q/2 + [i/2]] / N_{slot}^{frame,\mu} \rfloor \bmod J, \Delta i \text{ is an integer between } \left\lfloor \frac{y_{start}-i}{Q} \right\rfloor \text{ and } \left\lfloor \frac{y_{end}-i}{Q} \right\rfloor \text{ or an integer between } \left\lfloor (y_{start}-i) * \frac{k}{Q*2} \right\rfloor \text{ and } \left\lfloor (y_{end}-i) * \frac{k}{Q*2} \right\rfloor, n_{SSB,i} \text{ is the slot index of the synchronization signal block, } O \text{ is the time offset, } Q \text{ is the QCL modulus information, } i \text{ is the position index of the synchronization signal block, } M \text{ is the overlapping factor, } N_{slot}^{frame,\mu} \text{ is a quantity of slots comprised in each frame, } y_{start} \text{ is the position index of the}$$

smallest transmittable synchronization signal block, y_{end} is the position index of the largest transmittable synchronization signal block, $\text{SFN}_{\text{SSB},i}$ is the frame index of the synchronization signal block, J is the quantity of frames of the period for initial access, and k is the quantity of search spaces per slot.

7. The search space configuration method according to claim 6, wherein values of Δi are some integers between $\left\lfloor \frac{y_{\text{start}}-i}{Q} \right\rfloor$ and $\left\lfloor \frac{y_{\text{end}}-i}{Q} \right\rfloor$ or some integers between $\left\lfloor (y_{\text{start}} - i) * \frac{k}{Q*2} \right\rfloor$ and $\left\lfloor (y_{\text{end}} - i) * \frac{k}{Q*2} \right\rfloor$.

8. The search space configuration method according to claim 1, wherein the search space is a Type-0 PDCCH common search space or a Type-0A PDCCH common search space.

9. The search space configuration method according to claim 8, wherein when the search space is a Type-0A PDCCH common search space, and a plurality of types of other system information OSI is allowed to be transmitted in one system information window, search spaces that are used for scheduling two different types of OSI occupy different slots within a same search space period.

10. A search space configuration method, comprising:

sending, by a network side device, a synchronization signal block and configuration information of a search space corresponding to the synchronization signal block to user equipment, wherein the configuration information is used to indicate a position of a search space for a PDCCH, and the configuration information comprises QCL modulus information and/or information about a discovery reference signal transmission window, the information about the discovery reference signal transmission window comprises a position index of a smallest transmittable synchronization signal block and/or a position index of a largest transmittable synchronization signal block, wherein the QCL modulus information includes a maximum quantity of different QCL assumptions allowed to be included in a discovery reference signal, DRS, transmission, or a maximum quantity of beams with which the network-side device sends a DRS; and

wherein time synchronization information of the synchronization signal block comprises a position index, slot index, and/or frame index of the synchronization signal block, such that the user equipment is enabled to calculate a slot index and a frame index that are of the search space for the PDCCH corresponding to the synchronization signal block by using the slot index

of the synchronization signal block, the position index of the synchronization signal block, the frame index of the synchronization signal block, a time offset comprised in the configuration information, the QCL modulus information, the position index of the smallest transmittable synchronization signal block, the position index of the largest transmittable synchronization signal block, and a quantity of frames of a period for initial access.

11. The search space configuration method according to claim 10, wherein the configuration information further comprises at least one of the following:

- a quantity of search spaces per slot; and
- an overlapping factor.

12. The search space configuration method according to claim 10, wherein the time offset is 0, and the overlapping factor is 1/2.

13. A search space configuration apparatus, applied to user equipment and comprising:

- a monitoring module, configured to monitor at least one synchronization signal block;

- an obtaining module, configured to obtain configuration information of a search space corresponding to a detected synchronization signal block, wherein the configuration information comprises QCL modulus information and/or information about a discovery reference signal transmission window, the information about the discovery reference signal transmission window comprises a position index of a smallest transmittable synchronization signal block and/or a position index of a largest transmittable synchronization signal block, wherein the QCL modulus information includes a maximum quantity of different QCL assumptions allowed to be included in a discovery reference signal, DRS, transmission, or a maximum quantity of beams with which the network-side device sends a DRS; and

- a processing module, configured to determine a position of a search space for a physical downlink control channel PDCCH based on time synchronization information of the detected synchronization signal block and the configuration information;

wherein the time synchronization information comprises a position index, slot index, and/or frame index of the synchronization signal block; and the processing module is specifically configured to:

- calculate a slot index and a frame index that are of the search space for the PDCCH corresponding to the detected synchronization signal block by using the slot index of the synchronization signal block, the position index of the synchronization signal block, the frame

index of the synchronization signal block, a time offset comprised in the configuration information, the QCL modulus information, the position index of the smallest transmittable synchronization signal block, the position index of the largest transmittable synchronization signal block, and a quantity of frames of a period for initial access.

14. The search space configuration apparatus according to claim 13, wherein the information about the discovery reference signal transmission window is specified by a protocol or configured by a network-side device.

15. The search space configuration apparatus according to claim 13, wherein the configuration information further comprises at least one of the following:

a quantity of search spaces per slot; and

an overlapping factor.

16. The search space configuration apparatus according to claim 13, wherein the time offset is 0, and the overlapping factor is 1/2.

17. The search space configuration apparatus according to claim 13, wherein the processing module is specifically configured to: calculate the slot index n_0 of the search space for the PDCCH corresponding to the detected synchronization signal block by using any one of the following formulas:

$$n_0 = [(n_{SSB,i} + O) + \Delta i * Q/2 + [i * M]] \bmod N_{slot}^{frame, \mu}, \text{ or}$$

$$n_0 = [(n_{SSB,i}) + \Delta i * Q/2 + [i/2]] \bmod N_{slot}^{frame, \mu}; \text{ and}$$

calculate the frame index SFN_C of the search space for the PDCCH corresponding to the detected synchronization signal block by using the following formula: $SFN_C \bmod J = j$, wherein

$j = \lfloor SFN_{SSB,i} + [(n_{SSB,i} + O) + \Delta i * Q/2 + [i * M]] / N_{slot}^{frame, \mu} \rfloor \bmod J$ or $j = \lfloor SFN_{SSB,i} + [(n_{SSB,i}) + \Delta i * Q/2 + [i/2]] / N_{slot}^{frame, \mu} \rfloor \bmod J$, Δi is an integer between $\lfloor \frac{y_{start}-i}{Q} \rfloor$ and $\lfloor \frac{y_{end}-i}{Q} \rfloor$ or an integer between $\lfloor (y_{start} - i) * \frac{k}{Q*2} \rfloor$ and $\lfloor (y_{end} - i) * \frac{k}{Q*2} \rfloor$, $n_{SSB,i}$ is the slot index of the synchronization signal block, O is the time offset, Q is the QCL modulus information, i is the position index of the synchronization signal block, M is the overlapping factor, $N_{slot}^{frame, \mu}$ is a quantity of slots comprised in each frame, y_{start} is the position index of the smallest transmittable synchronization signal block, y_{end} is the position index of the largest

transmittable synchronization signal block, $SFN_{SSB,i}$ is the frame index of the synchronization signal block, J is the quantity of frames of the period for initial access, and k is the quantity of search spaces per slot.

18. A search space configuration apparatus, applied to a network-side device and comprising:

a sending module, configured to send a synchronization signal block and configuration information of a search space corresponding to the synchronization signal block to user equipment, wherein the configuration information is used to indicate a position of a search space for a PDCCH, and the configuration information comprises QCL modulus information and/or information about a discovery reference signal transmission window, the information about the discovery reference signal transmission window comprises a position index of a smallest transmittable synchronization signal block and/or a position index of a largest transmittable synchronization signal block, wherein the QCL modulus information includes a maximum quantity of different QCL assumptions allowed to be included in a discovery reference signal, DRS, transmission, or a maximum quantity of beams with which the network-side device sends a DRS; and

wherein time synchronization information of the synchronization signal block comprises a position index, slot index, and/or frame index of the synchronization signal block, such that the user equipment is enabled to calculate a slot index and a frame index that are of the search space for the PDCCH corresponding to the synchronization signal block by using the slot index of the synchronization signal block, the position index of the synchronization signal block, the frame index of the synchronization signal block, a time offset comprised in the configuration information, the QCL modulus information, the position index of the smallest transmittable synchronization signal block, the position index of the largest transmittable synchronization signal block, and a quantity of frames of a period for initial access.