

CLAIMS

What is claimed is:

~~1. An information transmission method, comprising:~~

~~determining, by a terminal device, a target offset parameter, an uplink control channel resource index, a physical resource block offset parameter, and a number of initial cyclic shift indexes comprised in an initial cyclic shift index set;~~

~~determining, by the terminal device, a resource block index based on the target offset parameter, the uplink control channel resource index, the physical resource block offset parameter, and the number of initial cyclic shift indexes comprised in the initial cyclic shift index set; and~~

~~sending, by the terminal device on a resource associated with the resource block index, uplink control information to a network device.~~

~~2. The method according to claim 1, wherein the uplink control information is transmitted with frequency hopping; and~~

~~the determining, by the terminal device, a resource block index comprises:~~

~~determining, by the terminal device based on the target offset parameter, the uplink control channel resource index, the physical resource block offset parameter, and the number of initial cyclic shift indexes comprised in the initial cyclic shift index set, a first resource block index corresponding to a p^{th} hop of transmission with frequency hopping of the uplink control information, wherein p is a positive integer; and/or~~

~~determining, by the terminal device based on the target offset parameter, the uplink control channel resource index, the physical resource block offset parameter, the number of initial cyclic shift indexes comprised in the initial cyclic shift index set, and a first frequency range, a second resource block index corresponding to a q^{th} hop of transmission with frequency hopping of the uplink control channel data, wherein q is a positive integer, and the resource associated with the resource block index falls within the first frequency range.~~

~~3. The method according to claim 2, wherein the target offset parameter comprises a first sub-offset parameter and a second sub-offset parameter, wherein the first sub-offset parameter is used to determine the first resource block index, and the second sub-offset parameter is used to determine the second resource block index.~~

~~4. The method according to claim 2 or 3, wherein~~

p = 1, and q = 2; or

p = 2, and q = 1.

5. The method according to any one of claims 2 to 4, wherein

the first resource block index, the target offset parameter, the uplink control channel resource index, the physical resource block offset parameter, and the number of initial cyclic shift indexes comprised in the initial cyclic shift index set satisfy the following correspondence:

$$X_1 = RB_{BWP}^{offset} + \lfloor r_{PUCCH} / N_{CS} \rfloor + D, \text{ or}$$

$$X_1 = RB_{BWP}^{offset} + \lfloor r_{PUCCH} / N_{CS} \rfloor + D_1, \text{ wherein}$$

X_1 is the first resource block index, RB_{BWP}^{offset} is the physical resource block offset parameter, r_{PUCCH} is the uplink control channel resource index, N_{CS} is the number of initial cyclic shift indexes comprised in the initial cyclic shift index set, D is the target offset parameter, D_1 is the first sub-offset parameter used to determine the first resource block index, and $\lfloor r_{PUCCH} / N_{CS} \rfloor$ indicates rounding down a result of r_{PUCCH} / N_{CS} .

6. The method according to any one of claims 2 to 4, wherein

the second resource block index, the target offset parameter, the uplink control channel resource index, the physical resource block offset parameter, and the number of initial cyclic shift indexes comprised in the initial cyclic shift index set satisfy the following correspondence:

$$X_2 = N_{size} - 1 - RB_{BWP}^{offset} - \lfloor r_{PUCCH} / N_{CS} \rfloor + D, \text{ or}$$

$$X_2 = N_{BWP}^{size} - 1 - RB_{BWP}^{offset} - \lfloor r_{PUCCH} / N_{CS} \rfloor + D, \text{ or}$$

$$X_2 = N_{BWP}^{size} - 1 - RB_{BWP}^{offset} - \lfloor r_{PUCCH} / N_{CS} \rfloor + D_2, \text{ wherein}$$

X_2 is the second resource block index, N_{size} is a number of resource blocks comprised in the first frequency range, N_{BWP}^{size} is a number of resource blocks comprised in a second frequency range, the second frequency range is less than or equal to a maximum channel bandwidth supported by the terminal device, RB_{BWP}^{offset} is the physical resource block offset parameter, r_{PUCCH} is the uplink control channel resource index, N_{CS} is the number of initial cyclic shift indexes comprised

in the initial cyclic shift index set, D is the target offset parameter, D_2 is the second sub-offset parameter used to determine the second resource block index, and $\lfloor r_{PUCCH} / N_{CS} \rfloor$ indicates rounding down a result of r_{PUCCH} / N_{CS} .

7. The method according to any one of claims 1 to 6, wherein the determining, by a terminal device, a target offset parameter comprises:

determining, by the terminal device, the target offset parameter based on a first location and a second location, wherein the first location is a location of a y^{th} resource block index in the first frequency range, the second location is a location of a resource block whose resource block index is z and that falls within the second frequency range, y and z are non-negative integers, the first frequency range is greater than the maximum channel bandwidth supported by the terminal device, and the second frequency range is less than or equal to the maximum channel bandwidth supported by the terminal device; or

determining, by the terminal device, the target offset parameter based on first information, wherein the first information is received by the terminal device from the network device, or

the target offset parameter is a predefined parameter; or

determining, by the terminal device, the target offset parameter according to a predefined rule.

8. The method according to any one of claims 1 to 7, wherein

a value of the target offset parameter is an integer less than 0; or

a value of the target offset parameter is an integer multiple of K , wherein $K = 2, 3$, or 4 .

9. The method according to claim 1, wherein

sending, by the terminal device without frequency hopping, the uplink control information on the resource associated with the resource block index.

10. The method according to any one of claims 1 to 9, wherein before the determining, by a terminal device, a target offset parameter, the method further comprises:

determining, by the terminal device, that a subcarrier spacing S corresponding to the terminal device and a number L of symbols of an uplink control channel resource meet a first preset condition.

11. An information transmission method, comprising:

determining, by a terminal device, a number L of symbols and/or a subcarrier spacing S that

are/is used to send uplink control information; and

if L and/or S meet/meets at least one of the following conditions:

a minimum value of L is greater than or equal to 4;

a minimum value of L is determined based on S;

5 a value of L falls within a first value range, an uplink control channel is transmitted without frequency hopping, or the uplink control channel is transmitted with frequency hopping, and frequency tuning is not needed between two adjacent hops of transmission with frequency hopping;

10 a value of L falls within a second value range, an uplink control channel is transmitted with frequency hopping, and frequency tuning is needed between two adjacent hops of transmission with frequency hopping;

a value of S falls within a third value range, an uplink control channel is transmitted without frequency hopping, or the uplink control channel is transmitted with frequency hopping, and frequency tuning is not needed between two adjacent hops of transmission with frequency hopping;

or

15 a value of S falls within a fourth value range, an uplink control channel can be transmitted with frequency hopping, and frequency tuning is needed between two adjacent hops of transmission with frequency hopping;

transmitting, by the terminal device, the uplink control information.

12. An information transmission method, comprising:

20 sending, by a network device, first information to a terminal device, wherein the first information is used by the terminal device to determine a resource block index, and the first information further indicates a target offset parameter, an uplink control channel resource index, a physical resource block offset parameter, and a number of initial cyclic shift indexes comprised in an initial cyclic shift index set; and

25 receiving, by the network device on a resource associated with the resource block index, uplink control information sent by the terminal device.

13. The method according to claim 12, wherein the uplink control information is transmitted with frequency hopping; and

30 that the first information is used by the terminal device to determine the resource block index comprises:

the first information is used by the terminal device to determine a first resource block index corresponding to a p^{th} hop of transmission with frequency hopping of the uplink control information, wherein p is a positive integer; and/or

the first information is used by the terminal device to determine a second resource block index corresponding to a q^{th} hop of transmission with frequency hopping of the uplink control information, wherein q is a positive integer.

14. The method according to claim 13, wherein the target offset parameter comprises a first sub-offset parameter and a second sub-offset parameter, wherein the first sub-offset parameter is used to determine the first resource block index, and the second sub-offset parameter is used to determine the second resource block index.

15. The method according to claim 13 or 14, wherein

$p = 1$, and $q = 2$; or

$p = 2$, and $q = 1$.

16. The method according to any one of claims 13 to 15, wherein

the first resource block index, the target offset parameter, the uplink control channel resource index, the physical resource block offset parameter, and the number of initial cyclic shift indexes comprised in the initial cyclic shift index set satisfy the following correspondence:

$$X_1 = RB_{BWP}^{\text{offset}} + \lfloor r_{PUCCH} / N_{CS} \rfloor + D, \text{ or}$$

$$X_1 = RB_{BWP}^{\text{offset}} + \lfloor r_{PUCCH} / N_{CS} \rfloor + D_1, \text{ wherein}$$

X_1 is the first resource block index, RB_{BWP}^{offset} is the physical resource block offset parameter, r_{PUCCH} is the uplink control channel resource index, N_{CS} is the number of initial cyclic shift indexes comprised in the initial cyclic shift index set, D is the target offset parameter, D_1 is the first sub-offset parameter used to determine the first resource block index, and $\lfloor r_{PUCCH} / N_{CS} \rfloor$ indicates rounding down a result of r_{PUCCH} / N_{CS} .

17. The method according to any one of claims 13 to 15, wherein

the second resource block index, the target offset parameter, the uplink control channel resource index, the physical resource block offset parameter, and the number of initial cyclic shift indexes comprised in the initial cyclic shift index set satisfy the following correspondence:

$$X_2 = N_{size} - 1 - \frac{RB_{BWP}^{offset}}{N_{CS}} \lfloor \frac{r_{PUCCH}}{N_{CS}} \rfloor + D, \text{ or}$$

$$X_2 = N_{BWP}^{size} - 1 - \frac{RB_{BWP}^{offset}}{N_{CS}} \lfloor \frac{r_{PUCCH}}{N_{CS}} \rfloor + D, \text{ or}$$

$$X_2 = N_{BWP}^{size} - 1 - \frac{RB_{BWP}^{offset}}{N_{CS}} \lfloor \frac{r_{PUCCH}}{N_{CS}} \rfloor + D_2, \text{ wherein}$$

X_2 is the second resource block index, N_{size} is a number of resource blocks comprised in a first frequency range, the resource associated with the resource block index falls within the first frequency range, N_{BWP}^{size} is a number of resource blocks comprised in a second frequency range, the second frequency range is less than or equal to a maximum channel bandwidth supported by the terminal device, RB_{BWP}^{offset} is the physical resource block offset parameter, r_{PUCCH} is the uplink control channel resource index, N_{CS} is the number of initial cyclic shift indexes comprised in the initial cyclic shift index set, D is the target offset parameter, D_2 is the second sub-offset parameter used to determine the second resource block index, and $\lfloor \frac{r_{PUCCH}}{N_{CS}} \rfloor$ indicates rounding down a result of r_{PUCCH} / N_{CS} .

18. The method according to any one of claims 12 to 17, wherein that the first information indicates the target offset parameter comprises:

the first information indicates a first location and a second location, the first location and the second location are used to determine the target offset parameter, the first location is a location of a y^{th} resource block index in the first frequency range, the second location is a location of a resource block whose resource block index is z and that falls within the second frequency range, y and z are non-negative integers, the first frequency range is greater than the maximum channel bandwidth supported by the terminal device, and the second frequency range is less than or equal to the maximum channel bandwidth supported by the terminal device; or

the first information comprises the target offset parameter; or

the first information comprises a predefined parameter, and the predefined parameter is used to determine the target offset parameter; or

the first information comprises a predefined rule, and the predefined rule is used to determine the target offset parameter.

19. The method according to any one of claims 12 to 18, wherein

a value of the target offset parameter is an integer less than 0; or

a value of the target offset parameter is an integer multiple of K, wherein $K = 2, 3, \text{ or } 4$.

20. The method according to claim 12, wherein

receiving, by the network device without frequency hopping on the resource associated with the resource block index, the uplink control information sent by the terminal device.

21. The method according to any one of claims 12 to 20, wherein before the sending, by a network device, first information to a terminal device, the method further comprises:

determining, by the network device, that a subcarrier spacing S corresponding to the terminal device and a number L of symbols of an uplink control channel resource meet a first preset condition.

22. An information transmission method, comprising:

determining, by a network device, a number L of symbols and/or a subcarrier spacing S that are/is used by a terminal device to send uplink control information; and

if L and/or S meet/meets at least one of the following conditions:

a minimum value of L is greater than or equal to 4;

a minimum value of L is determined based on S;

a value of L falls within a first value range, an uplink control channel is transmitted without frequency hopping, or the uplink control channel is transmitted with frequency hopping, and frequency tuning is not needed between two adjacent hops of transmission with frequency hopping;

a value of L falls within a second value range, an uplink control channel is transmitted with frequency hopping, and frequency tuning is needed between two adjacent hops of transmission with frequency hopping;

a value of S falls within a third value range, an uplink control channel is transmitted without frequency hopping, or the uplink control channel is transmitted with frequency hopping, and frequency tuning is not needed between two adjacent hops of transmission with frequency hopping;

or

a value of S falls within a fourth value range, an uplink control channel can be transmitted with frequency hopping, and frequency tuning is needed between two adjacent hops of transmission with frequency hopping;

receiving, by the network device, the uplink control information sent by the terminal device.

23. ~~An information transmission apparatus, comprising:~~

~~a processing unit, configured to determine, by using a terminal device, a target offset parameter, an uplink control channel resource index, a physical resource block offset parameter, and a number of initial cyclic shift indexes comprised in an initial cyclic shift index set, wherein~~

5 ~~the processing unit is further configured to determine, by using the terminal device, a resource block index based on the target offset parameter, the uplink control channel resource index, the physical resource block offset parameter, and the number of initial cyclic shift indexes comprised in the initial cyclic shift index set; and~~

10 ~~a transceiver unit, configured to send, by using the terminal device on a resource associated with the resource block index, uplink control information to a network device.~~

24. ~~The apparatus according to claim 23, wherein the uplink control information is transmitted with frequency hopping, and~~

15 ~~the processing unit is further configured to determine, by using the terminal device based on the target offset parameter, the uplink control channel resource index, the physical resource block offset parameter, and the number of initial cyclic shift indexes comprised in the initial cyclic shift index set, a first resource block index corresponding to a p^{th} hop of transmission with frequency hopping of the uplink control information, wherein p is a positive integer; and/or~~

20 ~~the processing unit is further configured to determine, by using the terminal device based on the target offset parameter, the uplink control channel resource index, the physical resource block offset parameter, the number of initial cyclic shift indexes comprised in the initial cyclic shift index set, and a first frequency range, a second resource block index corresponding to a q^{th} hop of transmission with frequency hopping of the uplink control channel data, wherein q is a positive integer, and the resource associated with the resource block index falls within the first frequency range.~~

25 ~~25. The apparatus according to claim 24, wherein the target offset parameter comprises a first sub-offset parameter and a second sub-offset parameter; and~~

~~the processing unit is further configured to determine, by using the terminal device, the first resource block index based on the first sub-offset parameter; and/or~~

30 ~~the processing unit is further configured to determine, by using the terminal device, the second resource block index based on the second sub-offset parameter.~~

26. The apparatus according to claim 24 or 25, wherein

the processing unit is further configured to determine the first resource block index based on the following correspondence among the target offset parameter, the uplink control channel resource index, the physical resource block offset parameter, and the number of initial cyclic shift indexes comprised in the initial cyclic shift index set:

$$X_1 = RB_{BWP}^{offset} + \lfloor r_{PUCCH} / N_{CS} \rfloor + D, \text{ or}$$

$$X_1 = RB_{BWP}^{offset} + \lfloor r_{PUCCH} / N_{CS} \rfloor + D_1, \text{ wherein}$$

X_1 is the first resource block index, RB_{BWP}^{offset} is the physical resource block offset parameter, r_{PUCCH} is the uplink control channel resource index, N_{CS} is the number of initial cyclic shift indexes comprised in the initial cyclic shift index set, D is the target offset parameter, D_1 is the first sub-offset parameter used to determine the first resource block index, and $\lfloor r_{PUCCH} / N_{CS} \rfloor$ indicates rounding down a result of r_{PUCCH} / N_{CS} .

27. The apparatus according to claim 24 or 25, wherein

the processing unit is further configured to determine the second resource block index based on the following correspondence among the target offset parameter, the uplink control channel resource index, the physical resource block offset parameter, and the number of initial cyclic shift indexes comprised in the initial cyclic shift index set:

$$X_2 = N_{size} - 1 - RB_{BWP}^{offset} - \lfloor r_{PUCCH} / N_{CS} \rfloor + D, \text{ or}$$

$$X_2 = N_{BWP}^{size} - 1 - RB_{BWP}^{offset} - \lfloor r_{PUCCH} / N_{CS} \rfloor + D, \text{ or}$$

$$X_2 = N_{BWP}^{size} - 1 - RB_{BWP}^{offset} - \lfloor r_{PUCCH} / N_{CS} \rfloor + D_2, \text{ wherein}$$

X_2 is the second resource block index, N_{size} is a number of resource blocks comprised in the first frequency range, N_{BWP}^{size} is a number of resource blocks comprised in a second frequency range, the second frequency range is less than or equal to a maximum channel bandwidth supported by the terminal device, RB_{BWP}^{offset} is the physical resource block offset parameter, r_{PUCCH} is the uplink control channel resource index, N_{CS} is the number of initial cyclic shift indexes comprised

in the initial cyclic shift index set, D is the target offset parameter, D_2 is the second sub-offset parameter used to determine the second resource block index, and $\lfloor r_{PUCCH} / N_{CS} \rfloor$ indicates rounding down a result of r_{PUCCH} / N_{CS} .

28. The apparatus according to any one of claims 23 to 27, wherein that the processing unit is configured to determine, by using the terminal device, the target offset parameter comprises:

the processing unit is configured to determine, by using the terminal device, the target offset parameter based on a first location and a second location, wherein the first location is a location of a y^{th} resource block index in the first frequency range, the second location is a location of a resource block whose resource block index is z and that falls within the second frequency range, y and z are non-negative integers, the first frequency range is greater than the maximum channel bandwidth supported by the terminal device, and the second frequency range is less than or equal to the maximum channel bandwidth supported by the terminal device; or

the transceiver unit is further configured to receive, by using the terminal device, first information from the network device; and

the processing unit is configured to determine, by using the terminal device, the target offset parameter based on the first information; or

the processing unit is configured to determine, by using the terminal device, the target offset parameter based on a predefined parameter; or

the processing unit is configured to determine, by using the terminal device, the target offset parameter according to a predefined rule.

29. The apparatus according to claim 23, wherein

the processing unit is further configured to send, by using the terminal device without frequency hopping, the uplink control information on the resource associated with the resource block index.

30. The apparatus according to any one of claims 23 to 29, wherein before the processing unit is configured to determine, by using the terminal device, the target offset parameter,

the processing unit is further configured to determine, by using the terminal device, that a subcarrier spacing S corresponding to the terminal device and a number L of symbols of an uplink control channel resource meet a first preset condition.

31. An information transmission apparatus, comprising:

a processing unit, configured to determine, by using a terminal device, a number L of symbols and/or a subcarrier spacing S that are/is used to send uplink control information, wherein

the processing unit is further configured to determine that L and/or S meet/meets at least one of the following conditions:

a minimum value of L is greater than or equal to 4;

a minimum value of L is determined based on S ;

a value of L falls within a first value range, an uplink control channel is transmitted without frequency hopping, or the uplink control channel is transmitted with frequency hopping, and frequency tuning is not needed between two adjacent hops of transmission with frequency hopping;

a value of L falls within a second value range, an uplink control channel is transmitted with frequency hopping, and frequency tuning is needed between two adjacent hops of transmission with frequency hopping;

a value of S falls within a third value range, an uplink control channel is transmitted without frequency hopping, or the uplink control channel is transmitted with frequency hopping, and frequency tuning is not needed between two adjacent hops of transmission with frequency hopping;

or

a value of S falls within a fourth value range, an uplink control channel can be transmitted with frequency hopping, and frequency tuning is needed between two adjacent hops of transmission with frequency hopping; and

a transceiver unit, configured to transmit, by using the terminal device, the uplink control information.

32. An information transmission apparatus, comprising:

a transceiver unit, configured to send, by using a network device, first information to a terminal device, wherein the first information is used by the terminal device to determine a resource block index, and the first information further indicates a target offset parameter, an uplink control channel resource index, a physical resource block offset parameter, and a number of initial cyclic shift indexes comprised in an initial cyclic shift index set; and

the transceiver unit is further configured to receive, by using the network device on a resource associated with the resource block index, uplink control information sent by the terminal device.

33. The apparatus according to claim 32, wherein the uplink control information is transmitted with frequency hopping; and

that the first information is used by the terminal device to determine the resource block index comprises:

the first information is used by the terminal device to determine a first resource block index corresponding to a p^{th} hop of transmission with frequency hopping of the uplink control information, wherein p is a positive integer; and/or

the first information is used by the terminal device to determine a second resource block index corresponding to a q^{th} hop of transmission with frequency hopping of the uplink control information, wherein q is a positive integer.

34. The apparatus according to claim 33, wherein the target offset parameter comprises a first sub-offset parameter and a second sub-offset parameter, wherein the first sub-offset parameter is used to determine the first resource block index, and the second sub-offset parameter is used to determine the second resource block index.

35. The apparatus according to claim 33 or 34, wherein

$p = 1$, and $q = 2$; or

$p = 2$, and $q = 1$.

36. The apparatus according to any one of claims 33 to 35, wherein

the first resource block index, the target offset parameter, the uplink control channel resource index, the physical resource block offset parameter, and the number of initial cyclic shift indexes comprised in the initial cyclic shift index set satisfy the following correspondence:

$$X_1 = RB_{BWP}^{\text{offset}} + \lfloor r_{PUCCH} / N_{CS} \rfloor + D, \text{ or}$$

$$X_1 = RB_{BWP}^{\text{offset}} + \lfloor r_{PUCCH} / N_{CS} \rfloor + D_1, \text{ wherein}$$

X_1 is the first resource block index, RB_{BWP}^{offset} is the physical resource block offset parameter, r_{PUCCH} is the uplink control channel resource index, N_{CS} is the number of initial cyclic shift indexes comprised in the initial cyclic shift index set, D is the target offset parameter, D_1 is the first sub-offset parameter used to determine the first resource block index, and $\lfloor r_{PUCCH} / N_{CS} \rfloor$ indicates rounding down a result of r_{PUCCH} / N_{CS} .

37. The apparatus according to any one of claims 33 to 35, wherein

the second resource block index, the target offset parameter, the uplink control channel resource index, the physical resource block offset parameter, and the number of initial cyclic shift indexes comprised in the initial cyclic shift index set satisfy the following correspondence:

$$X_2 = N_{\text{size}} - 1 - RB_{\text{BWP}}^{\text{offset}} - \lfloor r_{\text{PUCCH}} / N_{\text{CS}} \rfloor + D, \text{ or}$$

$$X_2 = N_{\text{BWP}}^{\text{size}} - 1 - RB_{\text{BWP}}^{\text{offset}} - \lfloor r_{\text{PUCCH}} / N_{\text{CS}} \rfloor + D, \text{ or}$$

$$X_2 = N_{\text{BWP}}^{\text{size}} - 1 - RB_{\text{BWP}}^{\text{offset}} - \lfloor r_{\text{PUCCH}} / N_{\text{CS}} \rfloor + D_2, \text{ wherein}$$

X_2 is the second resource block index, N_{size} is a number of resource blocks comprised in a first frequency range, the resource associated with the resource block index falls within the first frequency range, $N_{\text{BWP}}^{\text{size}}$ is a number of resource blocks comprised in a second frequency range, the second frequency range is less than or equal to a maximum channel bandwidth supported by the terminal device, $RB_{\text{BWP}}^{\text{offset}}$ is the physical resource block offset parameter, r_{PUCCH} is the uplink control channel resource index, N_{CS} is the number of initial cyclic shift indexes comprised in the initial cyclic shift index set, D is the target offset parameter, D_2 is the second sub-offset parameter used to determine the second resource block index, and $\lfloor r_{\text{PUCCH}} / N_{\text{CS}} \rfloor$ indicates rounding down a result of $r_{\text{PUCCH}} / N_{\text{CS}}$.

38. The apparatus according to any one of claims 32 to 37, wherein that the first information indicates the target offset parameter comprises:

the first information indicates a first location and a second location, the first location and the second location are used to determine the target offset parameter, the first location is a location of a y^{th} resource block index in the first frequency range, the second location is a location of a resource block whose resource block index is z and that falls within the second frequency range, y and z are non-negative integers, the first frequency range is greater than the maximum channel bandwidth supported by the terminal device, and the second frequency range is less than or equal to the maximum channel bandwidth supported by the terminal device; or

the first information comprises the target offset parameter; or

the first information comprises a predefined parameter, and the predefined parameter is used

to determine the target offset parameter; or

the first information comprises a predefined rule, and the predefined rule is used to determine the target offset parameter.

39. The apparatus according to any one of claims 32 to 38, wherein

a value of the target offset parameter is an integer less than 0; or

a value of the target offset parameter is an integer multiple of K , wherein $K = 2, 3$, or 4 .

40. The apparatus according to claim 32, wherein

the transceiver unit is further configured to receive, by using the network device without frequency hopping on the resource associated with the resource block index, the uplink control information sent by the terminal device.

41. The apparatus according to any one of claims 32 to 40, wherein the apparatus further comprises a processing unit, wherein

before the transceiver unit is configured to send, by using the network device, the first information to the terminal device,

the processing unit is configured to determine, by using the network device, that a subcarrier spacing S corresponding to the terminal device and a number L of symbols of an uplink control channel resource meet a first preset condition.

42. An information transmission apparatus, comprising:

a processing unit, configured to determine, by using a network device, a number L of symbols and/or a subcarrier spacing S that are/is used by a terminal device to send uplink control information, wherein

the processing unit is further configured to determine, by using the network device, that L and/or S meet/meets at least one of the following conditions:

a minimum value of L is greater than or equal to 4;

a minimum value of L is determined based on S ;

a value of L falls within a first value range, an uplink control channel is transmitted without frequency hopping, or the uplink control channel is transmitted with frequency hopping, and frequency tuning is not needed between two adjacent hops of transmission with frequency hopping;

a value of L falls within a second value range, an uplink control channel is transmitted with frequency hopping, and frequency tuning is needed between two adjacent hops of transmission

with frequency hopping;

a value of S falls within a third value range, an uplink control channel is transmitted without frequency hopping, or the uplink control channel is transmitted with frequency hopping, and frequency tuning is not needed between two adjacent hops of transmission with frequency hopping;

or

a value of S falls within a fourth value range, an uplink control channel can be transmitted with frequency hopping, and frequency tuning is needed between two adjacent hops of transmission with frequency hopping; and

a transceiver unit, configured to receive, by using the network device, the uplink control information sent by the terminal device.

43. A computer readable storage medium, wherein the computer readable storage medium stores a computer program, and when the computer program is run, an apparatus is enabled to perform the method according to any one of claims 1 to 10, or

an apparatus is enabled to perform the method according to claim 11, or

an apparatus is enabled to perform the method according to any one of claims 12 to 21, or

an apparatus is enabled to perform the method according to claim 22.

44. A computer program product, comprising a computer program, wherein when the computer program is run on a computer, the method according to any one of claims 1 to 10 is performed, or the method according to claim 11 is performed, or the method according to any one of claims 12 to 21 is performed, or the method according to claim 22 is performed.

45. A communication apparatus, comprising:

a memory, configured to store a computer program; and

a processor, configured to execute the computer program stored in the memory, so that the communication apparatus performs the method according to any one of claims 1 to 10, or

the communication apparatus performs the method according to claim 11, or

the communication apparatus performs the method according to any one of claims 12 to 21,

or

the communication apparatus performs the communication method according to claim 22.

1. A communication method, comprising:

determining, by a terminal device, a first offset parameter, an uplink control channel resource

index, a physical resource block offset parameter, and a number of initial cyclic shift indexes comprised in an initial cyclic shift index set;

determining, by the terminal device, a resource block index based on the first offset parameter, the uplink control channel resource index, the physical resource block offset parameter, and the number of initial cyclic shift indexes comprised in the initial cyclic shift index set; and

sending, by the terminal device on a resource associated with the resource block index, uplink control information to a network device.

2. The method according to claim 1, wherein

the resource block index, the first offset parameter, the uplink control channel resource index, the physical resource block offset parameter, and the number of initial cyclic shift indexes comprised in the initial cyclic shift index set satisfy the following correspondence:

$$X_1 = RB_{BWP}^{offset} + \lfloor r_{PUCCH} / N_{CS} \rfloor + D$$
, wherein X_1 is the resource block index, RB_{BWP}^{offset} is the physical resource block offset parameter, r_{PUCCH} is the uplink control channel resource index, N_{CS} is the number of initial cyclic shift indexes comprised in the initial cyclic shift index set, D is the first offset parameter, and $\lfloor r_{PUCCH} / N_{CS} \rfloor$ indicates rounding down a result of r_{PUCCH} / N_{CS} .

3. The method according to claim 1, wherein

the resource block index, the first offset parameter, the uplink control channel resource index, the physical resource block offset parameter, and the number of initial cyclic shift indexes comprised in the initial cyclic shift index set satisfy the following correspondence:

$$X_2 = N_{BWP}^{size} - 1 - RB_{BWP}^{offset} - \lfloor r_{PUCCH} / N_{CS} \rfloor + D$$
, wherein X_2 is the resource block index, N_{BWP}^{size} is a number of resource blocks comprised in a second frequency range, the second frequency range is less than or equal to a maximum channel bandwidth supported by the terminal device, RB_{BWP}^{offset} is the physical resource block offset parameter, r_{PUCCH} is the uplink control channel resource index, N_{CS} is the number of initial cyclic shift indexes comprised in the initial cyclic shift index set, D is the first offset parameter, and a value of D is an integer less than 0, and $\lfloor r_{PUCCH} / N_{CS} \rfloor$ indicates rounding down a result of r_{PUCCH} / N_{CS} .

4. The method according to any one of claims 1 to 3, wherein the determining, by a terminal device, a first offset parameter comprises:

determining, by the terminal device, the first offset parameter based on first information, wherein the first information is received by the terminal device from the network device, or

the first offset parameter is a predefined parameter; or

determining, by the terminal device, the first offset parameter according to a predefined rule.

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

a value of the first offset parameter is an integer multiple of K, wherein $K = 2$ or 3 .

6. The method according to claim 1, wherein the sending, by the terminal device on a resource associated with the resource block index, uplink control information to a network device comprises:

sending, by the terminal device without frequency hopping, the uplink control information on the resource associated with the resource block index to the network device.

7. A communication method, comprising:

sending, by a network device, first information to a terminal device, wherein the first information is used to determine a resource block index, and the first information further indicates a first offset parameter, an uplink control channel resource index, a physical resource block offset parameter, and a number of initial cyclic shift indexes comprised in an initial cyclic shift index set; and

receiving, by the network device on a resource associated with the resource block index, uplink control information from the terminal device.

8. The method according to claim 7, wherein

the resource block index, the first offset parameter, the uplink control channel resource index, the physical resource block offset parameter, and the number of initial cyclic shift indexes comprised in the initial cyclic shift index set satisfy the following correspondence:

$X_1 = RB_{BWP}^{offset} + \lfloor r_{PUCCH} / N_{CS} \rfloor + D$, wherein X_1 is the resource block index, RB_{BWP}^{offset} is the physical resource block offset parameter, r_{PUCCH} is the uplink control channel resource index, N_{CS} is the number of initial cyclic shift indexes comprised in the initial cyclic shift index set, D is the first offset parameter, and $\lfloor r_{PUCCH} / N_{CS} \rfloor$ indicates rounding down a result of r_{PUCCH} / N_{CS} .

9. The method according to claim 7, wherein

the resource block index, the first offset parameter, the uplink control channel resource index, the physical resource block offset parameter, and the number of initial cyclic shift indexes comprised in the initial cyclic shift index set satisfy the following correspondence:

$$X_2 = N_{BWP}^{size} - 1 - RB_{BWP}^{offset} - \lfloor r_{PUCCH} / N_{CS} \rfloor + D, \text{ wherein}$$

X_2 is the resource block index, the resource associated with the resource block index falls within a first frequency range, N_{BWP}^{size} is a number of resource blocks comprised in a second frequency range, the second frequency range is less than or equal to a maximum channel bandwidth supported by the terminal device, RB_{BWP}^{offset} is the physical resource block offset parameter, r_{PUCCH} is the uplink control channel resource index, N_{CS} is the number of initial cyclic shift indexes comprised in the initial cyclic shift index set, D is the first offset parameter, and a value of D is an integer less than 0, and $\lfloor r_{PUCCH} / N_{CS} \rfloor$ indicates rounding down a result of r_{PUCCH} / N_{CS} .

10. The method according to any one of claims 7 to 9, wherein

the first information comprises the first offset parameter; or

the first information comprises a predefined parameter, and the predefined parameter is used to determine the first offset parameter; or

the first information comprises a predefined rule, and the predefined rule is used to determine the first offset parameter.

11. The method according to any one of claims 7 to 10, wherein

a value of the first offset parameter is an integer multiple of K, wherein $K = 2$ or 3 .

12. The method according to claim 7, wherein the receiving, by the network device on a resource associated with the resource block index, uplink control information from the terminal device comprises:

receiving, by the network device without frequency hopping on the resource associated with the resource block index, the uplink control information from the terminal device.

13. A communication apparatus, comprising:

a processing unit, configured to determine, a first offset parameter, an uplink control channel resource index, a physical resource block offset parameter, and a number of initial cyclic shift

indexes comprised in an initial cyclic shift index set, wherein

the processing unit is further configured to determine, a resource block index based on the first offset parameter, the uplink control channel resource index, the physical resource block offset parameter, and the number of initial cyclic shift indexes comprised in the initial cyclic shift index set; and

a transceiver unit, configured to send, on a resource associated with the resource block index, uplink control information to a network device.

14. The apparatus according to claim 13, wherein

the processing unit is further configured to determine the resource block index based on the following correspondence among the first offset parameter, the uplink control channel resource index, the physical resource block offset parameter, and the number of initial cyclic shift indexes comprised in the initial cyclic shift index set:

$$X_1 = RB_{BWP}^{offset} + \lfloor r_{PUCCH} / N_{CS} \rfloor + D, \text{ wherein}$$

X_1 is the resource block index, RB_{BWP}^{offset} is the physical resource block offset parameter, r_{PUCCH} is the uplink control channel resource index, N_{CS} is the number of initial cyclic shift indexes comprised in the initial cyclic shift index set, D is the first offset parameter, and $\lfloor r_{PUCCH} / N_{CS} \rfloor$ indicates rounding down a result of r_{PUCCH} / N_{CS} .

15. The apparatus according to claim 13, wherein

the processing unit is further configured to determine the resource block index based on the following correspondence among the first offset parameter, the uplink control channel resource index, the physical resource block offset parameter, and the number of initial cyclic shift indexes comprised in the initial cyclic shift index set:

$$X_2 = N_{BWP}^{size} - 1 - RB_{BWP}^{offset} - \lfloor r_{PUCCH} / N_{CS} \rfloor + D, \text{ wherein}$$

X_2 is the resource block index, N_{BWP}^{size} is a number of resource blocks comprised in a second frequency range, the second frequency range is less than or equal to a maximum channel bandwidth supported by the terminal device, RB_{BWP}^{offset} is the physical resource block offset parameter, r_{PUCCH} is the uplink control channel resource index, N_{CS} is the number of initial

cyclic shift indexes comprised in the initial cyclic shift index set, D is the first offset parameter, and a value of D is an integer less than 0, and $\lfloor r_{PUCCH} / N_{CS} \rfloor$ indicates rounding down a result of r_{PUCCH} / N_{CS} .

16. The apparatus according to any one of claims 13 to 15, wherein that the processing unit is configured to determine, the first offset parameter comprises:

the transceiver unit is further configured to receive, first information from the network device; and

the processing unit is configured to determine, the first offset parameter based on the first information; or

the processing unit is configured to determine, the first offset parameter based on a predefined parameter; or

the processing unit is configured to determine, the first offset parameter according to a predefined rule.

17. The apparatus according to any one of claims 13 to 16, wherein

a value of the first offset parameter is an integer multiple of K , wherein $K = 2$ or 3 .

18. The apparatus according to any one of claims 13 to 17, wherein

the processing unit is further configured to send, without frequency hopping, the uplink control information on the resource associated with the resource block index.

19. A communication apparatus, comprising:

a transceiver unit, configured to send, first information to a terminal device, wherein the first information is used to determine a resource block index, and the first information further indicates a first offset parameter, an uplink control channel resource index, a physical resource block offset parameter, and a number of initial cyclic shift indexes comprised in an initial cyclic shift index set; and

the transceiver unit is further configured to receive, on a resource associated with the resource block index, uplink control information from the terminal device.

20. The apparatus according to claim 19, wherein

the resource block index, the first offset parameter, the uplink control channel resource index, the physical resource block offset parameter, and the number of initial cyclic shift indexes comprised in the initial cyclic shift index set satisfy the following correspondence:

$X_1 = RB_{BWP}^{offset} + \lfloor r_{PUCCH} / N_{CS} \rfloor + D$, wherein X_1 is the resource block index, RB_{BWP}^{offset} is the physical resource block offset parameter, r_{PUCCH} is the uplink control channel resource index, N_{CS} is the number of initial cyclic shift indexes comprised in the initial cyclic shift index set, D is the first offset parameter, and $\lfloor r_{PUCCH} / N_{CS} \rfloor$ indicates rounding down a result of r_{PUCCH} / N_{CS} .

21. The apparatus according to claim 19, wherein

the resource block index, the first offset parameter, the uplink control channel resource index, the physical resource block offset parameter, and the number of initial cyclic shift indexes comprised in the initial cyclic shift index set satisfy the following correspondence:

$X_2 = N_{BWP}^{size} - 1 - RB_{BWP}^{offset} - \lfloor r_{PUCCH} / N_{CS} \rfloor + D$, wherein X_2 is the resource block index, the resource associated with the resource block index falls within a first frequency range, N_{BWP}^{size} is a number of resource blocks comprised in a second frequency range, the second frequency range is less than or equal to a maximum channel bandwidth supported by the terminal device, RB_{BWP}^{offset} is the physical resource block offset parameter, r_{PUCCH} is the uplink control channel resource index, N_{CS} is the number of initial cyclic shift indexes comprised in the initial cyclic shift index set, D is the first offset parameter, and a value of D is an integer less than 0, and $\lfloor r_{PUCCH} / N_{CS} \rfloor$ indicates rounding down a result of r_{PUCCH} / N_{CS} .

22. The apparatus according to any one of claims 19 to 21, wherein

the first information comprises the first offset parameter; or

the first information comprises a predefined parameter, and the predefined parameter is used to determine the first offset parameter; or

the first information comprises a predefined rule, and the predefined rule is used to determine the first offset parameter.

23. The apparatus according to any one of claims 19 to 22, wherein

a value of the first offset parameter is an integer multiple of K, wherein $K = 2$ or 3 .

24. The apparatus according to any one of claims 19 to 23, wherein

the transceiver unit is further configured to receive, without frequency hopping on the resource associated with the resource block index, the uplink control information from the terminal

device.

25. A computer-readable storage medium, wherein the computer-readable storage medium stores a computer program, and when the computer program is run, an apparatus is enabled to perform the method according to any one of claims 1 to 6, or

5 an apparatus is enabled to perform the method according to any one of claims 7 to 12.

26. A computer program product, comprising a computer program, wherein when the computer program is run on a computer, the method according to any one of claims 1 to 6 is performed, or the method according to any one of claims 7 to 12 is performed.

27. A communication apparatus, comprising:

10 a memory, configured to store a computer program; and

a processor, configured to execute the computer program stored in the memory, so that the communication apparatus performs the method according to any one of claims 1 to 6, or

the communication apparatus performs the method according to any one of claims 7 to 12.