

CLAIMS

1. A control channel transmission method, applied to a network device, comprising:
 sending at least two candidate control channels, wherein there is a first corresponding link between information related to a first candidate control channel of the at least two candidate control channels and information related to other candidate control channels of the at least two candidate control channels except for the first candidate control channel.
2. The method of claim 1, wherein contents of the at least two candidate control channels are the same; or
 the at least two candidate control channels constitute a same Downlink Control Information (DCI).
- ~~3. The method of claim 1, wherein the at least two candidate control channels are in one Search Space set or one Control Resource Set (CORESET), and the first corresponding link comprises a link between indexes of the other candidate control channels and an index of the first candidate control channel.~~
- ~~4. The method of claim 1, wherein the at least two candidate control channels are in one Search Space set or one Control Resource Set (CORESET), and the first corresponding link comprises a link between Control Channel Element (CCE) indexes of the other candidate control channels and a CCE index of the first candidate control channel.~~
- ~~53.~~ 3. The method of claim 1, wherein the at least two candidate control channels are in different Search Space sets, and the first corresponding link comprises a link between Search Space set indexes of the other candidate control channels and a Search Space set index of the first candidate control channel.
- ~~64.~~ 4. The method of claim ~~53~~ 3, wherein the first corresponding link further comprises a link between indexes of the other candidate control channels and an index of the first candidate control channel.

~~75.~~ The method of claim ~~53~~, wherein the first corresponding link further comprises a link between Control Channel Element (CCE) indexes of the other candidate control channels and a CCE index of the first candidate control channel.

~~8. The method of claim 1, wherein the at least two candidate control channels are in different Control Resource Sets (CORESETs), and the first corresponding link comprises a link between CORESET indexes of the other candidate control channels and a CORESET index of the first candidate control channel.~~

~~9. The method of claim 8, wherein the CORESET indexes of the other candidate control channels are determined by using the CORESET index of the first candidate control channel and a first parameter, and the first parameter represents an offset relative to the CORESET index of the first candidate control channel.~~

~~10. The method of claim 8, wherein the first corresponding link further comprises a link between Search Space set indexes of the other candidate control channels and a Search Space set index of the first candidate control channel.~~

~~116.~~ The method of claim ~~53 or 10~~, wherein the Search Space set indexes of the other candidate control channels are determined by using the Search Space set index of the first candidate control channel and a second parameter, and the second parameter represents an offset relative to the Search Space set index of the first candidate control channel.

~~12. The method of claim 8, wherein the first corresponding link further comprises a link between indexes of the other candidate control channels and an index of the first candidate control channel.~~

~~13. The method of claim 8, wherein the first corresponding link further comprises a link between Control Channel Element (CCE) indexes of the other candidate control channels and a CCE index of the first candidate control channel.~~

147. The method of claim 3, 64 or 12, wherein the indexes of the other candidate control channels are determined by using the index of the first candidate control channel and a third parameter, and the third parameter represents an offset relative to the index of the first candidate control channel.

158. The method of claim 4, 75 or 13, wherein the CCE indexes of the other candidate control channels are determined by using the CCE index of the first candidate control channel and a fourth parameter, and the fourth parameter represents an offset relative to the CCE index of the first candidate control channel.

16. The method of claim 15, wherein the CCE indexes of the at least two candidate control channels are determined by following equation:

$$L \cdot \left\{ \left(\left\lfloor \frac{Y_{p, n_{s,i}}}{L \cdot M_{s, \max}^{(L)}} \right\rfloor + n_{CI} \right) \bmod \left\lfloor \frac{N_{CCE, p}}{L} \right\rfloor \right\} + i + C,$$

wherein L represents an Aggregation Level (AL); $i = 0, \dots, L-1$; for a common Search Space set, $Y_{p, n_{s,i}}$ is 0; for a specific Search Space set for a User Equipment (UE), $Y_{p, n_{s,i}} = (A_p \cdot Y_{p, n_{s,i}-1}) \bmod D$, wherein if $p \bmod 3 = 0$, A_p is 39827; if $p \bmod 3 = 1$, A_p is 39829; if $p \bmod 3 = 2$, A_p is 39839, and D is 65537; $N_{CCE, p}$ represents a number of CCEs in a CORESET p; n_{CI} represents a value of a Carrier Indicator Field (CIF) or is fixed to 0; $M_{s, n_{CI}}^{(L)}$ represents a number of candidate control channels at the AL L of a Search Space set s on a serving cell n_{CI} ; $M_{s, \max}^{(L)}$ represents a maximum value of all $M_{s, n_{CI}}^{(L)}$; $m_{s, n_{CI}} = 0, \dots, M_{s, n_{CI}}^{(L)} - 1$; and C represents the fourth parameter.

179. The method of claim 1, further comprising:

sending first information to a User Equipment (UE), the first information being configured to indicate a respective Transmission Configuration Indicator (TCI) state of each of the at least two candidate control channels.

~~18. The method of claim 17, wherein the first information is sent to the UE through a Media Access Control Control Element (MAC CE).~~

~~19~~10. A control channel transmission method, applied to a User Equipment (UE), comprising:
receiving at least two candidate control channels,
wherein there is a first corresponding link between information related to a first candidate control channel of the at least two candidate control channels and information related to other candidate control channels of the at least two candidate control channels except for the first candidate control channel.

~~20~~11. The method of claim ~~19~~10, wherein contents of the at least two candidate control channels are the same; or
the at least two candidate control channels constitute a same Downlink Control Information (DCI).

~~21. The method of claim 19, wherein the at least two candidate control channels are in one Search Space set or one Control Resource Set (CORESET), and the first corresponding link comprises a link between indexes of the other candidate control channels and an index of the first candidate control channel.~~

~~22. The method of claim 19, wherein the at least two candidate control channels are in one Search Space set or one Control Resource Set (CORESET), and the first corresponding link comprises a link between Control Channel Element (CCE) indexes of the other candidate control channels and a CCE index of the first candidate control channel.~~

~~23~~12. The method of claim ~~19~~10, wherein the at least two candidate control channels are in different Search Space sets, and the first corresponding link comprises a link between Search Space set indexes of the other candidate control channels and a Search Space set index of the first candidate control channel.

~~24~~13. The method of claim ~~23~~12, wherein the first corresponding link further comprises a link

between indexes of the other candidate control channels and an index of the first candidate control channel.

~~25~~14. The method of claim ~~23~~12, wherein the first corresponding link further comprises a link between Control Channel Element (CCE) indexes of the other candidate control channels and a CCE index of the first candidate control channel.

~~26. The method of claim 19, wherein the at least two candidate control channels are in different Control Resource Sets (CORESETs), and the first corresponding link comprises a link between CORESET indexes of the other candidate control channels and a CORESET index of the first candidate control channel.~~

~~27. The method of claim 26, wherein the CORESET indexes of the other candidate control channels are determined by using the CORESET index of the first candidate control channel and a first parameter, and the first parameter represents an offset relative to the CORESET index of the first candidate control channel.~~

~~28. The method of claim 26, wherein the first corresponding link further comprises a link between Search Space set indexes of the other candidate control channels and a Search Space set index of the first candidate control channel.~~

~~29~~15. The method of claim ~~23~~12 ~~or 28~~, wherein the Search Space set indexes of the other candidate control channels are determined by using the Search Space set index of the first candidate control channel and a second parameter, and the second parameter represents an offset relative to the Search Space set index of the first candidate control channel.

~~30. The method of claim 26, wherein the first corresponding link further comprises a link between indexes of the other candidate control channels and an index of the first candidate control channel.~~

~~31. The method of claim 26, wherein the first corresponding link further comprises a link~~

between Control Channel Element (CCE) indexes of the other candidate control channels and a CCE index of the first candidate control channel.

3216. The method of claim 21, 2413 or 30, wherein the indexes of the other candidate control channels are determined by using the index of the first candidate control channel and a third parameter, and the third parameter represents an offset relative to the index of the first candidate control channel.

3317. The method of claim 22, 2514 or 31, wherein the CCE indexes of the other candidate control channels are determined by using the CCE index of the first candidate control channel and a fourth parameter, and the fourth parameter represents an offset relative to the CCE index of the first candidate control channel.

34. The method of claim 31, wherein the CCEs of the at least two candidate control channels are determined by following equation:

$$L \cdot \left\{ \left(\frac{Y_{p, n_{s,f}^{\mu}}}{L \cdot M_{s, \max}^{(L)}} + \left\lfloor \frac{m_{s, n_{CI}} \cdot N_{CCE, p}}{L \cdot M_{s, \max}^{(L)}} \right\rfloor + n_{CI} \right) \bmod \left\lfloor \frac{N_{CCE, p}}{L} \right\rfloor \right\} + i + C,$$

wherein L represents an Aggregation Level (AL); $i = 0, \dots, L - 1$; for a common Search Space set, $\frac{Y_{p, n_{s,f}^{\mu}}}{L \cdot M_{s, \max}^{(L)}}$ is 0; for a specific Search Space set for the UE, $\frac{Y_{p, n_{s,f}^{\mu}}}{L \cdot M_{s, \max}^{(L)}} = \left(A_p \cdot Y_{p, n_{s,f}^{\mu} - 1} \right) \bmod D$, wherein if $p \bmod 3 = 0$, A_p is 39827; if $p \bmod 3 = 1$, A_p is 39829; if $p \bmod 3 = 2$, A_p is 39839, and D is 65537; $N_{CCE, p}$ represents a number of CCEs in a CORESET p; n_{CI} represents a value of a Carrier Indicator Field (CIF) or is fixed to 0; $M_{s, n_{CI}}^{(L)}$ represents a number of candidate control channels at the AL L of a Search Space set s on a serving cell n_{CI} ; $M_{s, \max}^{(L)}$ represents a maximum value of all $M_{s, n_{CI}}^{(L)}$; $m_{s, n_{CI}} = 0, \dots, M_{s, n_{CI}}^{(L)} - 1$; and C represents the fourth parameter.

35. The method of claim 19, further comprising:

receiving first information sent by a network side, the first information being configured to indicate a respective Transmission Configuration Indicator (TCI) state of each

~~of the two candidate control channels.~~

~~36. The method of claim 35, wherein the first information sent by the network side is received through a Media Access Control Control Element (MAC CE).~~

~~37. A control channel transmission apparatus, comprising:~~

~~a sending unit, configured to send at least two candidate control channels, wherein there is a first corresponding link between information related to a first candidate control channel of the at least two candidate control channels and information related to other candidate control channels of the at least two candidate control channels except for the first candidate control channel.~~

~~38. A control channel transmission apparatus, comprising:~~

~~a receiving unit, configured to receive at least two candidate control channels, wherein there is a first corresponding link between information related to a first candidate control channel of the at least two candidate control channels and information related to other candidate control channels of the at least two candidate control channels except for the first candidate control channel.~~

~~39. A network device, comprising:~~

~~a first processor; and~~

~~a first communication interface,~~

~~wherein the first communication interface is configured to send at least two candidate control channels, and there is a first corresponding link between information related to a first candidate control channel of the at least two candidate control channels and information related to other candidate control channels of the at least two candidate control channels except for the first candidate control channel.~~

~~40. A User Equipment (UE), comprising:~~

~~a second processor; and~~

~~a second communication interface,~~

~~wherein the second communication interface is configured to receive at least two candidate control channels, and there is a first corresponding link between information related to a first candidate control channel of the at least two candidate control channels and information related to other candidate control channels of the at least two candidate control channels except for the first candidate control channel.~~

~~41~~18. A network device, comprising:

a first processor; and

a first memory configured to store a computer program executable on the processor,

wherein the first processor is configured to implement the method of any one of claims 1 to ~~18~~9 when running the computer program.

~~42~~19. A User Equipment (UE), comprising:

a second processor; and

a second memory configured to store a computer program executable on the processor,

wherein the second processor is configured to implement the method of any one of claims ~~19-10~~ to ~~36~~17 when running the computer program.

~~43~~20. A storage medium, having stored thereon a computer program that when executed by a processor, implements the method of any one of claims 1 to ~~18~~9, or implements the method of any one of claims ~~19-10~~ to ~~36~~17.