

CLAIMS

1. A method for signal transmission, comprising:

determining a time-frequency resource location of a downlink signal, wherein
5 the downlink signal comprises at least one of a Synchronization Signal, SS, a
broadcast signal, a common control channel signal, a common reference signal and a
Measurement Reference Signal, MRS, the time-frequency resource location of the
downlink signal is on multiple frequency points of a carrier within a predetermined
time and the multiple frequency points are part of frequency points within a
10 bandwidth of the carrier, wherein time-frequency resource location of the common
control channel signal or the common reference signal is within a downlink control
region; and

transmitting the downlink signal according to the time-frequency resource
location of the downlink signal;

15 wherein when the downlink signal comprises the MRS, transmitting the
downlink signal according to the time-frequency resource location of the downlink
signal comprises:

transmitting the MRS in a location, not used for the downlink control region,
of the multiple frequency points, according to periodicity.

20 2. The method according to claim 1, wherein when the downlink signal comprises the
SS, transmitting the downlink signal according to the time-frequency resource
location of the downlink signal comprises:

transmitting the SS on the multiple frequency points according to periodicity.

25 3. The method according to claim 2, wherein periodicities for transmitting the SS on
different frequency points in the multiple frequency points are the same as each other
or different from each other.

30 4. The method according to claim 2 or 3, wherein sequences used by transmitting the
SS on different frequency points in the multiple frequency points are the same as each
other or different from each other.

5. The method according to any one of claims 1-4, wherein when the downlink signal comprises the broadcast signal, transmitting the downlink signal according to the time-frequency resource location of the downlink signal comprises:

5 transmitting the broadcast signal on the multiple frequency points according to periodicity.

6. The method according to any one of claims 1-5, wherein the downlink control region is located on a group of consecutive frequency points of the multiple frequency points in a radio frame, and a time-domain length of the downlink control region in the radio frame is smaller than a length of the radio frame.

7. The method according to claim 6, further comprising:

explicitly or implicitly indicating information of the downlink control region to terminal equipment;

15 wherein explicitly or implicitly indicating the information of the downlink control region to the terminal equipment comprises:

explicitly or implicitly indicating the information of the downlink control region to the terminal equipment through at least one of:

20 starting and ending location information of each of the frequency points of the group;

information of the radio frame and a subframe in the radio frame where the downlink control region is located;

25 information of a sequence for the SS, the information of the sequence for the SS being configured to indicate whether the downlink control region is located on the frequency points where the SS is transmitted or not;

relative time-frequency location information between the SS and the broadcast signal, the relative time-frequency location information being configured to indicate whether the downlink control region is located on the frequency points where the SS and the broadcast signal are transmitted or not;

30 a content of the broadcast signal; or

a content of basic system information indicated by the broadcast signal.

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

comprises:

if a time-frequency resource location of the MRS conflicts with a time-frequency resource location of downlink data, transmitting the MRS or the downlink data in a punched manner.

5

9. A method for signal reception, comprising:

determining a time-frequency resource location of a downlink signal, wherein the downlink signal comprises at least one of a Synchronization Signal, SS, a broadcast signal, a common control channel signal, a common reference signal and a Measurement Reference Signal, MRS, the time-frequency resource location of the downlink signal is on multiple frequency points of a carrier within a predetermined time and the multiple frequency points are part of frequency points within a bandwidth of the carrier, wherein time-frequency resource location of the common control channel signal or the common reference signal is within a downlink control region; and

10
15

receiving the downlink signal transmitted by network equipment according to the time-frequency resource location of the downlink signal;

wherein when the downlink signal comprises the MRS, receiving the downlink signal transmitted by the network equipment according to the time-frequency resource location of the downlink signal comprises:

20

receiving the MRS transmitted by the network equipment according to periodicity in a location, not used for the downlink control region, of the multiple frequency points.

25

10. The method according to claim 9, wherein when the downlink signal comprises the SS, receiving the downlink signal transmitted by the network equipment according to the time-frequency resource location of the downlink signal comprises:

receiving the SS transmitted by the network equipment according to periodicity on the multiple frequency points.

30

11. The method according to claim 10, wherein periodicities for transmitting the SS on different frequency points in the multiple frequency points are the same as each other or different from each other.

12. The method according to claim 10 or 11, wherein sequences used by transmitting the SS on different frequency points in the multiple frequency points are the same as each other or different from each other.

5

13. The method according to any one of claims 9-12, wherein when the downlink signal comprises the broadcast signal, receiving the downlink signal transmitted by the network equipment according to the time-frequency resource location of the downlink signal comprises:

10 receiving the broadcast signal transmitted by the network equipment according to periodicity on the multiple frequency points.

14. The method according to any one of claims 9-13, wherein the downlink control region is located on a group of consecutive frequency points of the multiple frequency
15 points in a radio frame, and a time-domain length of the downlink control region in the radio frame is smaller than a length of the radio frame.

15. The method according to claim 14, further comprising:

20 acquiring information, explicitly or implicitly indicated by the network equipment, of the downlink control region, wherein

 determining the time-frequency resource location of the downlink signal comprises:

 determining the downlink control region according to the information of the downlink control region.

25

16. The method according to claim 15, wherein determining the downlink control region according to the information of the downlink control region comprises:

 determining the downlink control region according to at least one of:

30 starting and ending location information of each of the frequency points of the group;

 information of the radio frame and a subframe in the radio frame where the downlink control region is located;

 information of a sequence for the SS, the information of the sequence for the

SS being configured to indicate whether the downlink control region is located on the frequency points where the SS is transmitted or not;

relative time-frequency location information between the SS and the broadcast signal, the relative time-frequency location information being configured to indicate

5 whether the downlink control region is located on the frequency points where the SS and the broadcast signal are transmitted or not;

a content of the broadcast signal; or

a content of basic system information indicated by the broadcast signal.

10 17. Network equipment, comprising:

a determination module, configured to determine a time-frequency resource location of a downlink signal, wherein the downlink signal comprises at least one of a Synchronization Signal, SS, a broadcast signal, a common control channel signal, a common reference signal and a Measurement Reference Signal, MRS, the time-
15 frequency resource location of the downlink signal is on multiple frequency points of a carrier within a predetermined time and the multiple frequency points are part of frequency points within a bandwidth of the carrier, wherein time-frequency resource location of the common control channel signal or the common reference signal is within a downlink control region; and

20 a transmission module, configured to transmit the downlink signal according to the time-frequency resource location of the downlink signal;

wherein when the downlink signal comprises the MRS, the transmission module is specifically configured to transmit the MRS in a location, not used for the downlink control region, of the multiple frequency points, according to periodicity.

25

18. The network equipment according to claim 17, wherein when the downlink signal comprises the SS, the transmission module is specifically configured to transmit the SS on the multiple frequency points according to periodicity.

30 19. The network equipment according to claim 18, wherein periodicities for transmitting the SS on different frequency points in the multiple frequency points are the same as each other or different from each other.

20. The network equipment according to claim 18 or 19, wherein sequences used by transmitting the SS on different frequency points in the multiple frequency points are the same as each other or different from each other.
- 5 21. The network equipment according to any one of claims 17-20, wherein when the downlink signal comprises the broadcast signal, the transmission module is specifically configured to transmit the broadcast signal on the multiple frequency points according to periodicity.
- 10 22. The network equipment according to any one of claims 17-21, wherein the downlink control region is located on a group of consecutive frequency points of the multiple frequency points in a radio frame, and a time-domain length of the downlink control region in the radio frame is smaller than a length of the radio frame.
- 15 23. The network equipment according to claim 22, wherein the transmission module is further configured to explicitly or implicitly indicate information of the downlink control region to terminal equipment;
- wherein the transmission module is specifically configured to explicitly or implicitly indicate the information of the downlink control region to the terminal equipment through at least one of:
- 20 starting and ending location information of each of the frequency points of the group;
- information of the radio frame and a subframe in the radio frame where the downlink control region is located;
- 25 information of a sequence for the SS, the information of the sequence for the SS being configured to indicate whether the downlink control region is located on the frequency points where the SS is transmitted or not;
- relative time-frequency location information between the SS and the broadcast signal, the relative time-frequency location information being configured to indicate whether the downlink control region is located on the frequency points where the SS and the broadcast signal are transmitted or not;
- 30 a content of the broadcast signal; or
- a content of basic system information indicated by the broadcast signal.

24. The network equipment according to any one of claims 17-23, wherein the transmission module is further configured to, if a time-frequency resource location of the MRS conflicts with a time-frequency resource location of downlink data, transmit
5 the MRS or the downlink data in a punched manner.

25. Terminal equipment, comprising:

a determination module, configured to determine a time-frequency resource location of a downlink signal, wherein the downlink signal comprises at least one of a
10 Synchronization Signal, SS, a broadcast signal, a common control channel signal, a common reference signal and a Measurement Reference Signal, MRS, the time-frequency resource location of the downlink signal is on multiple frequency points of a carrier within a predetermined time and the multiple frequency points are part of frequency points within a bandwidth of the carrier, wherein time-frequency resource
15 location of the common control channel signal or the common reference signal is within a downlink control region; and

a receiving module, configured to receive the downlink signal transmitted by network equipment according to the time-frequency resource location of the downlink signal;

20 wherein when the downlink signal comprises the MRS, the receiving module is specifically configured to receive the MRS transmitted by the network equipment according to periodicity in a location, not used for the downlink control region, of the multiple frequency points.

25 26. The terminal equipment according to claim 25, wherein when the downlink signal comprises the SS, the receiving module is specifically configured to receive the SS transmitted by the network equipment according to periodicity on the multiple frequency points.

30 27. The terminal equipment according to claim 26, wherein periodicities for transmitting the SS on different frequency points in the multiple frequency points are the same as each other or different from each other.

28. The terminal equipment according to claim 26 or 27, wherein sequences used by transmitting the SS on different frequency points in the multiple frequency points are the same as each other or different from each other.

5 29. The terminal equipment according to any one of claims 25-28, wherein when the downlink signal comprises the broadcast signal, the receiving module is specifically configured to receive the broadcast signal transmitted by the network equipment according to periodicity on the multiple frequency points.

10 30. The terminal equipment according to any one of claims 25-29, wherein the downlink control region is located on a group of consecutive frequency points of the multiple frequency points in a radio frame, and a time-domain length of the downlink control region in the radio frame is smaller than a length of the radio frame.

15 31. The terminal equipment according to claim 30, wherein the receiving module is further configured to acquire information, explicitly or implicitly indicated by the network equipment, of the downlink control region; and
the determination module is specifically configured to determine the downlink control region according to the information of the downlink control region.

20 32. The terminal equipment according to claim 31, wherein the determination module is specifically configured to determine the downlink control region according to at least one of:

starting and ending location information of each of the frequency points of the group;

25 information of the radio frame and a subframe in the radio frame where the downlink control region is located;

information of a sequence for the SS, the information of the sequence for the SS being configured to indicate whether the downlink control region is located on the frequency points where the SS is transmitted or not;

30 relative time-frequency location information between the SS and the broadcast signal, the relative time-frequency location information being configured to indicate whether the downlink control region is located on the frequency points where the SS

and the broadcast signal are transmitted or not;

a content of the broadcast signal; or

a content of basic system information indicated by the broadcast signal.