

Claims

1. A method of controlling radio transmission in a wireless communication network, the method comprising:

5 a node (100; 1100; 1300; 1600) of the wireless communication network managing sending of downlink control information to a radio device (10; 1500; 1700), the downlink control information controlling reception of a data channel which is based on modulation using subcarriers from a first frequency subband and a second frequency subband and indicating, for the first frequency subband, a first start position for transmission of the data channel, and,
10 for a second frequency subband, a second start position for transmission of the data channel, and

based on the first start position and the second start position, the node (100; 1100; 1300; 1600) controlling transmission of data on the data channel.

15 2. The method according to claim 1,
wherein the first start position and the second start position are selected depending on a time-frequency position of a downlink control channel for transmission of downlink control information to at least one further radio device (11).

20 3. The method according to claim 2,
wherein the first start position and the second start position are selected to avoid overlap of the data channel with the downlink control channel.

4. The method according to claim 2,
25 wherein the first start position and the second start position are selected to allow overlap of the data channel with the downlink control channel.

5. The method according to any one of claims 2 to 4, comprising:
the node controlling the transmission of the data depending on potential interference
30 between the data channel and the downlink control channel.

6. The method according to any one of the preceding claims,
wherein at least one of the first start position and the second start position corresponds to a first modulation symbol of a transmission time interval.

35 7. The method according to any one of the preceding claims,

wherein the downlink control information indicates the first start position and the second start position in terms of a selection from a set of multiple start positions.

8. The method according to any one of the preceding claims,

5 wherein the downlink control information consists of one indicator bit per frequency subband.

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

wherein the downlink control information consists of two indicator bits per frequency subband.

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10. The method according to any one of the preceding claims,

wherein the downlink control information is specific to the radio device.

11. The method according to any one of the preceding claims,

15 wherein the modulation is Orthogonal Frequency Division Multiplexing, OFDM, modulation, Filterbank Multicarrier, FBMC, modulation, Discrete Fourier Transform Single Carrier OFDM, DFTS-OFDM, modulation, Single Carrier Frequency Division Multiple Access, SC-FDMA, modulation, or precoded FBMC modulation.

20 12. A method of controlling radio transmission in a wireless communication network, the method comprising:

a node (100; 1100; 1300; 1600) of the wireless communication network determining potential interference of a data channel for a radio device (10; 1500; 1700) and a downlink control channel for a further radio device (11), the data channel being based on modulation using

25 subcarriers from multiple frequency subbands;

depending on the potential interference, the node (100; 1100; 1300; 1600) determining a start position of the data channel which is specific to one of the multiple frequency subbands; and

30 the node (100; 1100; 1300; 1600) managing sending of downlink control information to the radio device (10; 1500; 1700), the downlink control information indicating the start position of the data channel; and

based on the start position, the node (100; 1100; 1300; 1600) controlling transmission of data on the data channel.

35 13. The method according to claim 12,

wherein the start position is selected depending on a time-frequency position of the downlink control channel.

14. The method according to claim 12 or 13,
wherein the start position is selected to avoid overlap of the data channel with the downlink
control channel.

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15. The method according to any one of claims 12 to 14,
wherein the start position is selected to allow overlap of the data channel with the downlink
control channel.

10 16. The method according to any one of claims 12 to 15,
wherein the node (100; 1100; 1300; 1600) controls the transmission of the data depending
on the determined interference.

15 17. The method according to any one of claims 12 to 16,
wherein the start position corresponds to a first modulation symbol of a transmission time
interval.

18. The method according to any one of claims 12 to 17,
wherein the downlink control information indicates the start position in terms of a selection
20 from a set of multiple start positions.

19. The method according to any one of claims 12 to 18,
wherein the downlink control information consists of one indicator bit.

25 20. The method according to any one of claims 12 to 18,
wherein the downlink control information consists of two indicator bits.

21. The method according to any one of claims 12 to 20,
wherein the downlink control information is specific to the radio device (10; 1500; 1700).

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22. The method according to any one of claims 12 to 21,
wherein the modulation is OFDM modulation, FBMC modulation, DFTS-OFDM modulation,
SC-FDMA modulation, or precoded FBMC modulation.

35 23. A method of controlling radio transmission in a wireless communication network, the
method comprising:

a radio device (10; 1500; 1700) receiving downlink control information from the wireless communication network, the downlink control information controlling reception of a data channel which is based on modulation using subcarriers from a first frequency subband and a second frequency subband and indicating, for the first frequency subband, a first start position for transmission of the data channel and, for the second frequency subband, a second start position for transmission of the data channel, and based on the first start position and the second start position, the radio device (10; 1500; 1700) controlling receiving of data on the data channel.

24. The method according to claim 23, wherein at least one of the first start position and the second start position corresponds to a first modulation symbol of a transmission time interval.

25. The method according to an one of claims 23 to 24, wherein the downlink control information indicates the first start position and the second start position in terms of a selection from a set of multiple start positions.

26. The method according to any one of claims 23 to 25, wherein the downlink control information consists of one indicator bit per frequency subband.

27. The method according to any one of claims 23 to 25, wherein the downlink control information consists of two indicator bits per frequency subband.

28. The method according to any one of claims 23 to 269, wherein the downlink control information is specific to the radio device.

29. The method according to any one of claims 23 to 28, wherein the modulation is OFDM modulation, FBMC modulation, DFTS-OFDM modulation, SC-FDMA modulation, or precoded FBMC modulation.

30. A node (100; 1100; 1300; 1600) for a wireless communication network, the node (100; 1100; 1300; 1600) being configured to:

- manage sending of downlink control information to a radio device (10; 1500; 1700), the downlink control information controlling reception of a data channel based on modulation using subcarriers from a first frequency subband and a second frequency subband and

indicating, for the first frequency subband, a first start position for transmission of the data channel and, for the second frequency subband, a second start position for transmission of the data channel, and

- based on the first start position and the second start position, control transmission of data on the data channel.

31. The node (100; 1100; 1300; 1600) according to claim 30, wherein the first start position and the second start position are selected depending on a time-frequency position of a downlink control channel for transmission of downlink control information to at least one further radio device (11).

32. The node (100; 1100; 1300; 1600) according to claim 31, wherein the first start position and the second start position are selected to avoid overlap of the data channel with the downlink control channel.

33. The node (100; 1100; 1300; 1600) according to claim 31, wherein the first start position and the second start position are selected to allow overlap of the data channel with the downlink control channel.

34. The node (100; 1100; 1300; 1600) according to any one of claims 30 to 33, wherein the node (100; 1100; 1300; 1600) is configured to control the transmission of the data depending on potential interference between the data channel and the downlink control channel.

35. The node (100; 1100; 1300; 1600) according to any one of claims 30 to 34, wherein at least one of the first start position and the second start position corresponds to a first modulation symbol of a transmission time interval.

36. The node (100; 1100; 1300; 1600) according to any one of claims 30 to 35, wherein the downlink control information indicates the first start position and the second start position in terms of a selection from a set of multiple start positions.

37. The node (100; 1100; 1300; 1600) according to any one of claims 30 to 36, wherein the downlink control information consists of one indicator bit per frequency band.

38. The node (100; 1100; 1300; 1600) according to any one of claims 30 to 36,

wherein the downlink control information consists of two indicator bits per frequency band.

39. The node (100; 1100; 1300; 1600) according to any one of claims 30 to 38,
wherein the downlink control information is specific to the radio device (10; 1500; 1700).

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40. The node (100; 1100; 1300; 1600) according to any one of claims 30 to 39,
wherein the modulation is OFDM modulation, FBMC modulation, DFTS-OFDM modulation,
SC-FDMA modulation, or precoded FBMC modulation.

10 41. The node (100; 1100; 1300; 1600) according to claim 30,
wherein the node (100; 1100; 1300; 1600) is configured to perform the steps of a method
according to any one of claims 2 to 11.

15 42. A node (100; 1100; 1300; 1600) for a wireless communication network, the node (100;
1100; 1300; 1600) being configured to:

- determine potential interference of a data channel for a radio device (10; 1500; 1700) and a
downlink control channel for a further radio device (11). the data channel being based on
modulation using subcarriers from multiple frequency subbands;
- depending on the potential interference, determine a start position of the data channel
20 which is specific to one of the frequency subbands; and
- manage sending of downlink control information to the radio device (10; 1500; 1700), the
control information indicating the start position of the data channel; and
- based on the start position, control transmission of data on the data channel.

25 43. The node (100; 1100; 1300; 1600) according to claim 42,
wherein the start position is selected depending on a time-frequency position of the downlink
control channel.

30 44. The node (100; 1100; 1300; 1600) according to claim 42 or 43,
wherein the start position is selected to avoid overlap of the data channel with the downlink
control channel.

35 45. The node (100; 1100; 1300; 1600) according to any one of claims 42 to 44,
wherein the start position is selected to allow overlap of the data channel with the downlink
control channel.

46. The node (100; 1100; 1300; 1600) according to any one of claims 42 to 45,

wherein the node (100; 1100; 1300; 1600) controls the transmission of the data depending on the determined interference.

47. The node (100; 1100; 1300; 1600) according to any one of claims 42 to 46,
5 wherein the start position corresponds to a first modulation symbol of a transmission time interval.

48. The node (100; 1100; 1300; 1600) according to any one of claims 42 to 47,
10 wherein the downlink control information indicates the start position in terms of a selection from a set of multiple start positions.

49. The node (100; 1100; 1300; 1600) according to any one of claims 42 to 48,
wherein the downlink control information consists of one indicator bit.

15 50. The node (100; 1100; 1300; 1600) according to any one of claims 42 to 48,
wherein the downlink control information consists of two indicator bits.

51. The node (100; 1100; 1300; 1600) according to any one of claims 42 to 50,
20 wherein the control information is specific to the radio device (10; 1500; 1700).

52. The node (100; 1100; 1300; 1600) according to any one of claims 42 to 51,
wherein the modulation is OFDM modulation, FBMC modulation, DFTS-OFDM modulation,
SC-FDMA modulation, or precoded FBMC modulation.

25 53. The node (100; 1100; 1300; 1600) according to claim 42,
wherein the node (100; 1100; 1300; 1600) is configured to perform the steps of a method according to any one of claims 13 to 22.

30 54. A radio device (10; 1500; 1700), the radio device (10; 1500; 1700) being configured to:
- receive downlink control information from a wireless communication network, the control information controlling reception of a data channel which is based on modulation using subcarriers from a first frequency subband and a second frequency subband and indicating, for the first frequency subband, a first start position for transmission of a data channel and,
35 for the second frequency subband, a second start position for transmission of the data channel, and

- based on the first start position and the second start position, control receiving of data on the data channel.

55. The radio device (10; 1500; 1700) according to claim 54,

5 wherein at least one of the first start position and the second start position corresponds to a first modulation symbol of a transmission time interval.

56. The radio device (10; 1500; 1700) according to an one of claims 54 to 55,

10 wherein the downlink control information indicates the first start position and the second start position in terms of a selection from a set of multiple start positions.

57. The radio device (10; 1500; 1700) according to any one of claims 54 to 56,

wherein the downlink control information consists of one indicator bit per frequency subband.

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58. The radio device (10; 1500; 1700) according to any one of claims 54 to 56,

wherein the downlink control information consists of two indicator bits per frequency subband.

59. The radio device (10; 1500; 1700) according to any one of claims 54 to 58,

wherein the downlink control information is specific to the radio device.

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60. The radio device (10; 1500; 1700) according to any one of claims 54 to 58,

wherein the modulation is OFDM modulation, FBMC modulation, DFTS-OFDM modulation, SC-FDMA modulation, or precoded FBMC modulation.

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61. The radio device (10; 1500; 1700) according to claim 54,

wherein the radio device (10; 1500; 1700) is configured to perform the steps of a method according to any one of claims 24 to 29.

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62. A system for a wireless communication network, the system comprising:

a node (100; 1100; 1300; 1600) for the wireless communication network; and

a radio device (10; 1500; 1700);

the node (100; 1100; 1300; 1600) being configured to manage sending of downlink control information to a radio device (10; 1500; 1700), the downlink control information controlling reception of a data channel which is based on modulation using subcarriers from a first

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frequency subband and a second frequency subband and indicating, for the first frequency subband, a first start position for transmission of a data channel and, for the second frequency subband, a second start position for transmission of the data channel, and the radio device (10; 1500; 1700) being configured to receive the downlink control information and, based on the first start position and the second start position, control receiving of data on the data channel.

63. A system for a wireless communication network, the system comprising:

a node (100; 1100; 1300; 1600) for the wireless communication network; and

a radio device (10; 1500; 1700);

the node (100; 1100; 1300; 1600) being configured to:

- determine potential interference of a data channel for the radio device (10; 1500; 1700) and a downlink control channel for a further radio device (11), the data channel being based on modulation using subcarriers from multiple frequency subbands;

- depending on the potential interference, determine a start position of the data channel which is specific to one of the frequency subbands, and

- manage sending of downlink control information to the radio device (10; 1500; 1700), the downlink control information indicating the start position of the data channel; and

the radio device (10; 1500; 1700) being configured to, based on the start position, control receiving of data on the data channel.

64. A computer program or computer program product comprising program code to be executed by at least one processor (1650) of a node (100; 1100; 1300; 1600) of a wireless communication network, wherein execution of the program code causes the node (100; 1100; 1300; 1600) to perform steps of a method according to any one of claims 1 to 22.

65. A computer program or computer program product comprising program code to be executed by at least one processor (1650) of a radio device (10; 1500; 1700), wherein execution of the program code causes the radio device (10; 1500; 1700) to perform steps of a method according to any one of claims 23 to 29.