CLAIMS

We Claim:

1. A method comprising:

generating information that is indicative of: (a) a signaling time at which an uplink-downlink configuration signaling for a new uplink-downlink configuration is to take place, and (b) an application time at which the new uplink-downlink configuration is to be applied; and

providing the generated information to a user equipment, wherein the generated information specifies the new uplink-downlink configuration to be applied to the user equipment.

2. The method of claim 1 further comprising specifying the signaling time using a first parameter that is indicative of a starting point of an uplink-downlink configuration persistency window, and specifying the application time using a second parameter that is indicative of a duration of the uplink-downlink configuration persistency window.

3. The method of any one of claims 1 or 2 wherein the generated information comprises a first parameter that is indicative of a radio frame periodicity or a radio subframe periodicity, and a second parameter that is indicative of a subframe offset, and wherein the subframe offset is specified in terms of frames or subframes at which common physical signaling is used to indicate a new uplink-downlink configuration.

4. The method of any one of claims 1-3 wherein the generated information includes one or more fixed subframes specifying an uplink, one or more fixed subframes specifying a downlink, and one or more flexible subframes each of which may be used to specify either an uplink or a downlink.

5. The method of any one of claims 1-4 wherein the generated information comprises allocating at least one time period for an uplink-downlink configuration

persistency window, such that an uplink-downlink configuration change may only occur at a commencement of the uplink-downlink configuration persistency window.

6. The method of claim 1 further comprising using common physical signalling for performing the uplink-downlink configuration signaling, wherein the common physical signalling is based on a specific downlink control information (DCI) format scrambled with a Radio Network Temporary Identifier (RNTI).

7. The method of claim 6 further comprising providing an indication of the new uplink-downlink configuration in a payload of the downlink control information (DCI).

8. An apparatus comprising one or more processors and one or more memories including computer program code, the one or more memories and the computer program code configured, with the one or more processors, to cause the apparatus to perform:

generating information that is indicative of: (a) a signaling time at which an uplink-downlink configuration signaling for a new uplink-downlink configuration is to take place, and (b) an application time at which the new uplink-downlink configuration is to be applied; and

providing the generated information to a user equipment, wherein the generated information specifies the new uplink-downlink configuration to be applied to the user equipment.

9. The apparatus of claim 8, wherein the computer program code is further configured, with the one or more processors, to cause the apparatus to perform specifying the signaling time using a first parameter that is indicative of a starting point of an uplink-downlink configuration persistency window, and specifying the application time using a second parameter that is indicative of a duration of the uplink-downlink configuration persistency window.

10. The apparatus of any one of claims 8 or 9, wherein the computer program code is further configured, with the one or more processors, to cause the apparatus to perform the generating using a first parameter that is indicative of a radio frame periodicity

and a second parameter that is indicative of a subframe offset; and wherein the computer program code is further configured, with the one or more processors, to cause the apparatus to specify the subframe offset in terms of frames or subframes at which common physical signaling is used to indicate a new uplink-downlink configuration.

11. The apparatus of any one of claims 8-10, wherein the computer program code is further configured, with the one or more processors, to cause the apparatus to perform the generating by using one or more fixed subframes specifying an uplink, one or more fixed subframes specifying a downlink, and one or more flexible subframes each of which may be used to specify either an uplink or a downlink.

12. The apparatus of any one of claims 8-11, wherein the computer program code is further configured, with the one or more processors, to cause the apparatus to perform the generating by allocating at least one time period for an uplink-downlink configuration persistency window, such that an uplink-downlink configuration change may only occur at a commencement of the uplink-downlink configuration persistency window.

13. The apparatus of claim 8 wherein common physical signalling is used for performing the uplink-downlink configuration signaling, and wherein the common physical signalling is based on a specific downlink control information (DCI) format scrambled with a Radio Network Temporary Identifier (RNTI).

14. The apparatus of claim 8 wherein an indication of the new uplink-downlink configuration is provided in a payload of the downlink control information (DCI).

15. A computer program product comprising a computer-readable storage medium bearing computer program code embodied therein for use with a computer, the computer program code comprising code for:

generating information that is indicative of: (a) a signaling time at which an uplink-downlink configuration signaling for a new uplink-downlink configuration is to take place, and (b) an application time at which the new uplink-downlink configuration is to be applied; and

providing the generated information to a user equipment, wherein the generated information specifies the new uplink-downlink configuration to be applied to the user equipment.

16. The computer program product of claim 15, further comprising code for specifying the signaling time using a first parameter that is indicative of a starting point of an uplink-downlink configuration persistency window, and specifying the application time using a second parameter that is indicative of a duration of the uplink-downlink configuration persistency window.

17. The computer program product of any one of claims 15 or 16, further comprising code for performing the generating using a first parameter that is indicative of a radio frame periodicity and a second parameter that is indicative of a subframe offset, and further comprising code for specifying the subframe offset in terms of frames or subframes at which common physical signaling is used to indicate a new uplink-downlink configuration.

18. The computer program product of any one of claims 15-17, further comprising code for performing the generating by using one or more fixed subframes specifying an uplink, one or more fixed subframes specifying a downlink, and one or more flexible subframes each of which may be used to specify either an uplink or a downlink.

19. The computer program product of any one of claims 15-18, further comprising code for performing the generating by allocating at least one time period for an uplink-downlink configuration persistency window, such that an uplink-downlink configuration change may only occur at a commencement of the uplink-downlink configuration persistency window.

20. The computer program product of claim 15, further comprising code for using common physical signalling for performing the uplink-downlink configuration signaling, wherein the common physical signalling is based on a specific downlink control information (DCI) format scrambled with a Radio Network Temporary Identifier (RNTI).

21. The computer program product of claim 20, further comprising code for providing an indication of the new uplink-downlink configuration in a payload of the downlink control information (DCI).

22. A method comprising:

receiving first information at a user equipment that is indicative of a signaling time at which an uplink-downlink configuration signaling for a new uplink-downlink configuration is to take place, and

receiving second information at the user equipment that is indicative of an application time at which the new uplink-downlink configuration is to be applied;

wherein the generated information specifies the new uplink-downlink configuration to be applied to the user equipment.

23. The method of claim 22 further comprising specifying the signaling time using a first parameter that is indicative of a starting point of an uplink-downlink configuration persistency window, and specifying the application time using a second parameter that is indicative of a duration of the uplink-downlink configuration persistency window.

24. The method of any one of claims 22 or 23 wherein the received first or second information further comprises a first parameter that is indicative of a radio frame periodicity or a radio subframe periodicity, and a second parameter that is indicative of a subframe offset, and wherein the subframe offset is specified in terms of frames or subframes at which common physical signaling is used to indicate a new uplink-downlink configuration.

25. The method of any one of claims 22-24 wherein the received first or second information further includes one or more fixed subframes specifying an uplink, one or more fixed subframes specifying a downlink, and one or more flexible subframes each of which may be used to specify either an uplink or a downlink.

26. The method of any one of claims 22-25 wherein the received first or second information further comprises at least one allocated time period for an uplink-downlink configuration persistency window, such that an uplink-downlink configuration change may only occur at a commencement of the uplink-downlink configuration persistency window.

27. The method of claim 22 further comprising using common physical signalling for performing the uplink-downlink configuration signaling, wherein the common physical signalling is based on a specific downlink control information (DCI) format scrambled with a Radio Network Temporary Identifier (RNTI).

28. The method of claim 27 further comprising receiving an indication of the new uplink-downlink configuration in a payload of the downlink control information (DCI).

29. An apparatus comprising one or more processors and one or more memories including computer program code, the one or more memories and the computer program code configured, with the one or more processors, to cause the apparatus to perform:

receiving first information at a user equipment that is indicative of a signaling time at which an uplink-downlink configuration signaling for a new uplink-downlink configuration is to take place, and

receiving second information at the user equipment that is indicative of an application time at which the new uplink-downlink configuration is to be applied;

wherein the generated information specifies the new uplink-downlink configuration to be applied to the user equipment.

30. The apparatus of claim 29 wherein the computer program code is further configured, with the one or more processors, to cause the apparatus to perform specifying of the signaling time using a first parameter that is indicative of a starting point of an uplink-downlink configuration persistency window, and specifying of the application time using a second parameter that is indicative of a duration of the uplink-downlink configuration persistency window.

31. The apparatus of any one of claims 29 or 30 wherein the received first or second information further comprises a first parameter that is indicative of a radio frame periodicity or a radio subframe periodicity, and a second parameter that is indicative of a subframe offset, and wherein the subframe offset is specified in terms of frames or subframes at which common physical signaling is used to indicate a new uplink-downlink configuration.

32. The apparatus of any one of claims 29-31 wherein the received first or second information further includes one or more fixed subframes specifying an uplink, one or more fixed subframes specifying a downlink, and one or more flexible subframes each of which may be used to specify either an uplink or a downlink.

33. The apparatus of any one of claims 29-32 wherein the received first or second information further comprises at least one allocated time period for an uplink-downlink configuration persistency window, such that an uplink-downlink configuration change may only occur at a commencement of the uplink-downlink configuration persistency window.

34. The apparatus of claim 29 further comprising using common physical signalling for performing the uplink-downlink configuration signaling, wherein the common physical signalling is based on a specific downlink control information (DCI) format scrambled with a Radio Network Temporary Identifier (RNTI).

35. The apparatus of claim 34 further comprising receiving an indication of the new uplink-downlink configuration in a payload of the downlink control information (DCI).

36. A computer program product comprising a computer-readable storage medium bearing computer program code embodied therein for use with a computer, the computer program code comprising code for:

receiving first information at a user equipment that is indicative of a signaling time at which an uplink-downlink configuration signaling for a new uplink-downlink configuration is to take place, and

receiving second information at the user equipment that is indicative of an application time at which the new uplink-downlink configuration is to be applied;

wherein the generated information specifies the new uplink-downlink configuration to be applied to the user equipment.

37. The computer program product of claim 36 further comprising code for specifying the signaling time using a first parameter that is indicative of a starting point of an uplink-downlink configuration persistency window, and specifying the application time using a second parameter that is indicative of a duration of the uplink-downlink configuration persistency window.

38. The computer program product of any one of claims 36-37 wherein the received first or second information further comprises a first parameter that is indicative of a radio frame periodicity or a radio subframe periodicity, and a second parameter that is indicative of a subframe offset, and wherein the subframe offset is specified in terms of frames or subframes at which common physical signaling is used to indicate a new uplink-downlink configuration.

39. The computer program product of any one of claims 36-38 wherein the received first or second information further includes one or more fixed subframes specifying an uplink, one or more fixed subframes specifying a downlink, and one or more flexible subframes each of which may be used to specify either an uplink or a downlink.

40. The computer program product of any one of claims 36-39 wherein the received first or second information further comprises at least one allocated time period for an uplink-downlink configuration persistency window, such that an uplink-downlink configuration change may only occur at a commencement of the uplink-downlink configuration persistency window.

41. The computer program product of claim 36 further comprising code for using common physical signalling for performing the uplink-downlink configuration signaling,

wherein the common physical signalling is based on a specific downlink control information (DCI) format scrambled with a Radio Network Temporary Identifier (RNTI).

42. The computer program product of claim 41 further comprising receiving an indication of the new uplink-downlink configuration in a payload of the downlink control information (DCI).

CLAIMS

We Claim:

1. A method comprising:

generating information that is indicative of: (a) a signaling time at which an uplink-downlink configuration signaling for a new uplink-downlink configuration is to take place, and (b) an application time at which the new uplink-downlink configuration is to be applied; and

providing the generated information to a user equipment, wherein the generated information specifies the new uplink-downlink configuration to be applied to the user equipment.

2. The method of claim 1 further comprising specifying the signaling time using a first parameter that is indicative of a starting point of an uplink-downlink configuration persistency window, and specifying the application time using a second parameter that is indicative of a duration of the uplink-downlink configuration persistency window.

3. The method of any one of claims 1 or 2 wherein the generated information comprises a first parameter that is indicative of a radio frame periodicity or a radio subframe periodicity, and a second parameter that is indicative of a subframe offset, and wherein the subframe offset is specified in terms of frames or subframes at which common physical signaling is used to indicate a new uplink-downlink configuration.

4. The method of any one of claims 1-3 wherein the generated information comprises allocating at least one time period for an uplink-downlink configuration persistency window, such that an uplink-downlink configuration change may only occur at a commencement of the uplink-downlink configuration persistency window.

5. An apparatus comprising one or more processors and one or more memories including computer program code, the one or more memories and the computer program code configured, with the one or more processors, to cause the apparatus to perform:

generating information that is indicative of: (a) a signaling time at which an uplink-downlink configuration signaling for a new uplink-downlink configuration is to take place, and (b) an application time at which the new uplink-downlink configuration is to be applied; and

providing the generated information to a user equipment, wherein the generated information specifies the new uplink-downlink configuration to be applied to the user equipment.

6. The apparatus of claim 5, wherein the computer program code is further configured, with the one or more processors, to cause the apparatus to perform specifying the signaling time using a first parameter that is indicative of a starting point of an uplink-downlink configuration persistency window, and specifying the application time using a second parameter that is indicative of a duration of the uplink-downlink configuration persistency window.

7. The apparatus of any one of claims 4 or 5, wherein the computer program code is further configured, with the one or more processors, to cause the apparatus to perform the generating using a first parameter that is indicative of a radio frame periodicity and a second parameter that is indicative of a subframe offset; and wherein the computer program code is further configured, with the one or more processors, to cause the apparatus to specify the subframe offset in terms of frames or subframes at which common physical signaling is used to indicate a new uplink-downlink configuration.

8. The apparatus of any one of claims 4-7, wherein the computer program code is further configured, with the one or more processors, to cause the apparatus to perform the generating by allocating at least one time period for an uplink-downlink configuration persistency window, such that an uplink-downlink configuration change may only occur at a commencement of the uplink-downlink configuration persistency window.

9. A computer program product comprising a computer-readable storage medium bearing computer program code embodied therein for use with a computer, the computer program code comprising code for:

generating information that is indicative of: (a) a signaling time at which an uplink-downlink configuration signaling for a new uplink-downlink configuration is to take place, and (b) an application time at which the new uplink-downlink configuration is to be applied; and

providing the generated information to a user equipment, wherein the generated information specifies the new uplink-downlink configuration to be applied to the user equipment.

10. The computer program product of claim 9, further comprising code for specifying the signaling time using a first parameter that is indicative of a starting point of an uplink-downlink configuration persistency window, and specifying the application time using a second parameter that is indicative of a duration of the uplink-downlink configuration persistency window.

11. The computer program product of any one of claims 9 or 10, further comprising code for performing the generating using a first parameter that is indicative of a radio frame periodicity and a second parameter that is indicative of a subframe offset, and further comprising code for specifying the subframe offset in terms of frames or subframes at which common physical signaling is used to indicate a new uplink-downlink configuration.

12. The computer program product of any one of claims 9-11, further comprising code for performing the generating by allocating at least one time period for an uplink-downlink configuration persistency window, such that an uplink-downlink configuration change may only occur at a commencement of the uplink-downlink configuration persistency window.

13. A method comprising:

receiving first information at a user equipment that is indicative of a signaling time at which an uplink-downlink configuration signaling for a new uplink-downlink configuration is to take place, and

receiving second information at the user equipment that is indicative of an application time at which the new uplink-downlink configuration is to be applied;

wherein the generated information specifies the new uplink-downlink configuration to be applied to the user equipment.

14. The method of claim 13 further comprising specifying the signaling time using a first parameter that is indicative of a starting point of an uplink-downlink configuration persistency window, and specifying the application time using a second parameter that is indicative of a duration of the uplink-downlink configuration persistency window.

15. The method of any one of claims 13 or 14 wherein the received first or second information further comprises a first parameter that is indicative of a radio frame periodicity or a radio subframe periodicity, and a second parameter that is indicative of a subframe offset, and wherein the subframe offset is specified in terms of frames or subframes at which common physical signaling is used to indicate a new uplink-downlink configuration.

16. The method of any one of claims 13-15 wherein the received first or second information further comprises at least one allocated time period for an uplink-downlink configuration persistency window, such that an uplink-downlink configuration change may only occur at a commencement of the uplink-downlink configuration persistency window.

17. An apparatus comprising one or more processors and one or more memories including computer program code, the one or more memories and the computer program code configured, with the one or more processors, to cause the apparatus to perform:

receiving first information at a user equipment that is indicative of a signaling time at which an uplink-downlink configuration signaling for a new uplink-downlink configuration is to take place, and

receiving second information at the user equipment that is indicative of an application time at which the new uplink-downlink configuration is to be applied;

wherein the generated information specifies the new uplink-downlink configuration to be applied to the user equipment.

18. The apparatus of claim 17 wherein the computer program code is further configured, with the one or more processors, to cause the apparatus to perform specifying of the signaling time using a first parameter that is indicative of a starting point of an uplink-downlink configuration persistency window, and specifying of the application time using a second parameter that is indicative of a duration of the uplink-downlink configuration persistency window.

19. The apparatus of any one of claims 17 or 18 wherein the received first or second information further comprises a first parameter that is indicative of a radio frame periodicity or a radio subframe periodicity, and a second parameter that is indicative of a subframe offset, and wherein the subframe offset is specified in terms of frames or subframes at which common physical signaling is used to indicate a new uplink-downlink configuration.

20. The apparatus of any one of claims 17-19 wherein the received first or second information further comprises at least one allocated time period for an uplink-downlink configuration persistency window, such that an uplink-downlink configuration change may only occur at a commencement of the uplink-downlink configuration persistency window.

21. A computer program product comprising a computer-readable storage medium bearing computer program code embodied therein for use with a computer, the computer program code comprising code for:

receiving first information at a user equipment that is indicative of a signaling time at which an uplink-downlink configuration signaling for a new uplink-downlink configuration is to take place, and

receiving second information at the user equipment that is indicative of an application time at which the new uplink-downlink configuration is to be applied;

wherein the generated information specifies the new uplink-downlink configuration to be applied to the user equipment.

22. The computer program product of claim 21 further comprising code for specifying the signaling time using a first parameter that is indicative of a starting point of

an uplink-downlink configuration persistency window, and specifying the application time using a second parameter that is indicative of a duration of the uplink-downlink configuration persistency window.

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