

Claims

1. A method for use in a network node, the method comprising:
determining (1202, 1402) a first parameter N1, wherein the first parameter N1 indicates a maximum number of beams to be used by a wireless device for performing a first type of signal measurements on a first carrier frequency in a cell;
determining (1202, 1402) a second parameter N2, wherein the second parameter N2 indicates a maximum number of beams to be used by the wireless device for performing a second type of signal measurements on the first carrier frequency in the cell; and
communicating (1204, 1404A, 1404B, 1404C) the first parameter N1 and the second parameter N2 to the wireless device.
2. The method of Claim 1, further comprising:
determining a third parameter N3, wherein the third parameter N3 indicates a maximum number of beams to be used by the wireless device for performing the first type of signal measurements on a second carrier frequency in the cell; and
communicating the third parameter N3 to the wireless device.
3. The method of any of Claims 1-2, wherein the second type of signal measurements is different than the first type of signal measurements.
4. The method of any one of Claims 1-3, wherein the first type of signal measurements comprise at least one of the following types of signal measurements: measurements of cell specific reference signals, measurements of synchronization signals, or radio resource management (RRM) measurements.
5. The method of Claim 4, wherein the second type of signal measurements comprise another one of the following types of signal measurements: measurements of cell specific reference signals, measurements of synchronization signals, or radio resource management (RRM) measurements.

6. The method of any one of Claims 1-5, wherein at least the first parameter N1 is communicated in system information common for all wireless devices.
7. The method of any one of Claims 1-6, wherein at least the first parameter N1 is communicated in dedicated signaling to the wireless device.
8. The method of any one of Claims 1-7, further comprising:
 - sending (2202) the wireless device one or more cell-specific offsets, each cell-specific offset associated with a specific cell such that the wireless device adjusts the value of the first parameter N1 according to the cell-specific offset when performing the first type of signal measurements of the specific cell.
9. The method of Claim 8, wherein the one or more cell-specific offsets are configured per carrier frequency.
10. The method of any one of Claims 1-9, further comprising:
 - determining (2102) a UE-specific offset based on the beamforming capabilities of the wireless device;
 - sending (2104) the wireless device the UE-specific offset such that the wireless device adjusts the value of the first parameter N1 according to the UE-specific offset.
11. The method of any one of Claims 1-10, wherein the first parameter N1 and the second parameter N2 are signaled from the network node to the wireless device in a measurement object (MeasObject) information element.
12. A network node (20), comprising:
 - processing circuitry (24) operable to:
 - determine a first parameter N1, wherein the first parameter N1 indicates a maximum number of beams to be used by a wireless device for performing a first type of signal measurements on a first carrier frequency in a cell;
 - determine a second parameter N2, wherein the second parameter N2 indicates

a maximum number of beams to be used by the wireless device for performing a second type of signal measurements on the first carrier frequency in the cell; and

a wireless interface (22) operable to communicate the first parameter N1 and the second parameter N2 to the wireless device.

13. The network node of Claim 12, wherein:

the processing circuitry is further operable to determine a third parameter N3, wherein the third parameter N3 indicates a maximum number of beams to be used by the wireless device for performing the first type of signal measurements on a second carrier frequency in the cell; and

the wireless interface is further operable to communicate the third parameter N3 to the wireless device.

14. The network node of any one of Claims 12-13, wherein the second type of signal measurements is different than the first type of signal measurements.

15. The network node of any one of Claims 12-14, wherein the first type of signal measurements comprise at least one of the following types of signal measurements: measurements of cell specific reference signals, measurements of synchronization signals, or radio resource management (RRM) measurements.

16. The network node of Claim 15, wherein the second type of signal measurements comprise another one of the following types of signal measurements: measurements of cell specific reference signals, measurements of synchronization signals, or radio resource management (RRM) measurements.

17. The network node of any one of Claims 12-16, wherein the wireless interface is operable to communicate at least the first parameter N1 in system information common for all wireless devices.

18. The network node of any one of Claims 12-17, wherein the wireless interface is

operable to communicate at least the first parameter N1 in dedicated signaling to the wireless device.

19. The network node of any one of Claims 12-18, wherein:

the processing circuitry is further operable to determine one or more cell-specific offsets, each cell-specific offset associated with a specific cell such that the wireless device adjusts the value of the first parameter N1 according to the cell-specific offset when performing the first type of signal measurements of the specific cell; and

the wireless interface is further operable to send the one or more cell-specific offsets to the wireless device.

20. The network node of Claim 19, wherein the one or more cell-specific offsets are configured per carrier frequency.

21. The network node of any one of Claims 12-20, wherein:

the processing circuitry is further operable to determine a UE-specific offset based on the beamforming capabilities of the wireless device; and

the wireless interface is further operable to send the wireless device the UE-specific offset such that the wireless device adjusts the value of the first parameter N1 according to the UE-specific offset.

22. The network node of any one of Claims 12-21, wherein the first parameter N1 and the second parameter N2 are signaled from the network node to the wireless device in a measurement object (MeasObject) information element.

23. A method for use in a wireless device, the method comprising:

receiving (1302, 1404A, 1404B, 1404C), from a network node, a first parameter N1 and a second parameter N2, wherein:

the first parameter N1 indicates a maximum number of beams to be used by a wireless device for performing a first type of signal measurements on a first carrier frequency in a cell; and

the second parameter N2 indicates a maximum number of beams to be used by the wireless device for performing a second type of signal measurements on the first carrier frequency in the cell;

using (1304, 1406) the first parameter N1 when performing the first type of signal measurements on the first carrier frequency in the cell; and

using (1304, 1406) the second parameter N2 when performing the second type of signal measurements on the first carrier frequency in the cell.

24. The method of Claim 23, further comprising:

receiving (1404C) a third parameter N3, wherein the third parameter N3 indicates a maximum number of beams to be used by the wireless device for performing the first type of signal measurements on a second carrier frequency in the cell; and

using the third parameter N3 when performing the first type of signal measurements on the second carrier frequency in the cell.

25. The method of any one of Claims 23-24, wherein the second type of signal measurements is different than the first type of signal measurements.

26. The method of any one of Claims 23-25, wherein the first type of signal measurements comprise at least one of the following types of signal measurements: measurements of cell specific reference signals, measurements of synchronization signals, or radio resource management (RRM) measurements.

27. The method of Claim 26, wherein the second type of signal measurements comprise another one of the following types of signal measurements: measurements of cell specific reference signals, measurements of synchronization signals, or radio resource management (RRM) measurements.

28. The method of any one of Claims 23-27, wherein at least the first parameter N1 is received in system information common for all wireless devices.

29. The method of any one of Claims 23-28, wherein at least the first parameter N1 is received in dedicated signaling to the wireless device.
30. The method of any one of Claims 23-29, further comprising:
configuring (2106) the wireless device with one or more cell-specific offsets, each cell-specific offset associated with a specific cell such that the wireless device adjusts the value of the first parameter N1 according to the cell-specific offset when performing the first type of signal measurements of the specific cell.
31. The method of any one of Claims 23-30, wherein the one or more cell-specific offsets are configured per carrier frequency.
32. The method of any one of Claims 23-31, further comprising:
detecting (2402) the cell-specific offset of a new cell; and
reporting (2404) the cell-specific offset of the new cell to the serving cell.
33. The method of any one of Claims 23-32, further comprising:
configuring (2106) the wireless device with a UE-specific offset associated with the particular wireless device such that the wireless device adjusts the value of the first parameter N1 according to the UE-specific offset.
34. The method of any one of Claims 23-33, wherein the first parameter N1 and the second parameter N2 are received from the network node by the wireless device in a measurement object (MeasObject) information element.
35. A wireless device (10), comprising:
an interface (12) operable to receive, from a network node, a first parameter N1 and a second parameter N2, wherein:
the first parameter N1 indicates a maximum number of beams to be used by a wireless device for performing a first type of signal measurements on a first carrier frequency in a cell; and

the second parameter N2 indicates a maximum number of beams to be used by the wireless device for performing a second type of signal measurements on the first carrier frequency in the cell; and

processing circuitry (14) operable to use the first parameter N1 to perform the first type of signal measurements on the first carrier frequency in the cell and to use the second parameter N2 to perform the second type of signal measurements on the first carrier frequency in the cell.

36. The wireless device of Claim 35, wherein:

the interface is operable to receive a third parameter N3, wherein the third parameter N3 indicates a maximum number of beams to be used by the wireless device for performing the first type of signal measurements on a second carrier frequency in the cell; and

the processing circuitry is operable to use the third parameter N3 when performing the first type of signal measurements on the second carrier frequency in the cell.

37. The wireless device of any one of Claims 35-36, wherein the second type of signal measurements is different than the first type of signal measurements.

38. The wireless device of any one of Claims 35-37, wherein the first type of signal measurements comprise at least one of the following types of signal measurements: measurements of cell specific reference signals, measurements of synchronization signals, or radio resource management (RRM) measurements.

39. The wireless device of Claim 38, wherein the second type of signal measurements comprise another one of the following types of signal measurements: measurements of cell specific reference signals, measurements of synchronization signals, or radio resource management (RRM) measurements.

40. The wireless device of any one of Claims 35-39, wherein at least the first parameter N1 is received in system information common for all wireless devices.

41. The wireless device of any one of Claims 35-40, wherein at least the first parameter N1 is received in dedicated signaling to the wireless device.

42. The wireless device of any one of Claims 35-41, wherein the processing circuitry is further operable to:

configure the wireless device with one or more cell-specific offsets, each cell-specific offset associated with a specific cell such that the wireless device adjusts the value of the first parameter N1 according to the cell-specific offset when performing the first type of signal measurements of the specific cell.

43. The wireless device of any one of Claims 35-42, wherein the one or more cell-specific offsets are configured per carrier frequency.

44. The wireless device of any one of Claims 35-43, wherein the processing circuitry is further operable to:

detect the cell-specific offset of a new cell; and
report the cell-specific offset of the new cell to the serving cell.

45. The wireless device of any one of Claims 35-44, wherein the processing circuitry is further operable to:

configure the wireless device with a UE-specific offset associated with the particular wireless device such that the wireless device adjusts the value of the first parameter N1 according to the UE-specific offset.

46. The wireless device of any one of Claims 35-45, wherein the first parameter N1 and the second parameter N2 are received from the network node by the wireless device in a measurement object (MeasObject) information element.