CLAIMS

~~**WHAT IS CLAIMED IS:**~~

1. A method of wireless communication~~,~~ for a user equipment (UE), the method comprising:

~~transmitting~~sending, to a ~~user equipment (UE~~primary cell (PCell) on a ~~control channel, one or more indications~~first set of ~~one or more beam indexes corresponding to one or more beams; and~~

~~transmitting, to the UE, one or more reference signals through the one or more beams corresponding to the one or more beam indexes.~~

~~2. The method of claim 1, wherein the control channel comprises a physical downlink control channel (PDCCH), and the one or more indications are included in one or more bits of a downlink control information (DCI) message.~~

~~3. The method of claim 1, wherein the transmitting the one or more indications of the one or more beam indexes corresponding to the one or more beams comprises:~~

~~transmitting one or more beam indexes~~component carriers, a request associated with ~~one or more beam reference signals (BRSs), the one or more BRSs transmitted during~~ performance of beam tracking in a ~~synchronization subframe.~~

~~4. The method of claim 1, wherein the transmitting the one or more indications of the one or more beam indexes corresponding to the one or beams comprises:~~

~~receiving, from the UE, one or more beam indexes corresponding to the one or more beams; and~~

~~transmitting the one or more beam indexes corresponding to the one or more beams based on the one or more beam indexes~~secondary cell (SCell) that ~~are received most recently.~~is configurable by the PCell;

~~5. The method of claim 4, wherein the one or more~~ performing beam ~~indexes corresponding to the one or more beams are received on~~ tracking with a ~~physical uplink shared channel (PUSCH) or a physical uplink control channel (PUCCH).~~

~~6. The method of claim 5, wherein the one or more beam indexes corresponding to the one or more beams are transmitted~~base station for the SCell based on the ~~one or more beam indexes received through~~request sent to the ~~PUSCH when more than two symbols are used for the reference signal transmission.~~

~~7. The method of claim 5~~PCell, wherein the ~~one or more beam indexes associated with one or more beams are transmitted based on the one or more beam indexes received through the PUCCH when two or fewer symbols are used for the reference signal transmission.~~

~~8. The method~~performing the beam tracking comprises communicating each of a set of ~~claim 1, wherein the one or more~~ reference signals ~~include at least one of a channel state information reference signal (CSI-RS) or~~ via a respective beam of a ~~beam refinement reference signal (BRRS).~~
set of beams;

determining a first beam of the set of beams based on the performing the beam tracking; and

communicating with the base station for the SCell on a second set of component carriers via the first beam, wherein the second set of component carriers has a carrier frequency different from the first set of component carriers.

~~9.~~ 2. The method of claim ~~8~~1, wherein the ~~transmitting~~PCell and the SCell are served by a same base station.

3. The method of claim 1, wherein the request requests a change for at least one of a serving beam or ~~more indications of the one or more beam indexes~~ an active beam configured for communication between the UE and the base station for the SCell.

4. The method of claim 1, wherein the request indicates at least one beam index corresponding to at least one beam of the set of beams.

5. The method of claim 4, wherein the request is associated with ~~the one or more beams comprises:~~a random access channel (RACH) procedure, and wherein the request indicates the at least one beam index based on at least one resource associated with the RACH procedure.

~~transmitting the one or more beam indexes associated with the one or more beams through which at least one of the CSI-RSs was previously transmitted.~~

~~10. A base station~~6. The method of claim 1, further comprising:

~~means for transmitting, to a user equipment (UE) on a control channel, one or more indications of one or more beam indexes corresponding to one or more beams; and~~

~~means for transmitting, to the UE, one or more~~ receiving a message from a base station for the PCell, wherein the message comprises an instruction for the performing the beam tracking.

7. The method of claim 1, wherein the performing the beam tracking with the base station for the SCell comprises:

receiving each of the set of reference signals ~~through~~via the ~~one or more~~respective beam of the set of beams; and

determining a respective measurement of a set of measurements based on each of the set of reference signals.

8. The method of claim 7, wherein the performing the beam tracking with the base station for the SCell further comprises:

sending the set of measurements to a base station for the PCell; and

receiving a first beam index corresponding to the ~~one or more beam indexes.~~first beam from the base station for the PCell based on the set of measurements,

~~11. The base station of claim 10,~~ wherein the ~~control channel comprises a physical~~ first beam is determined for downlink ~~control channel (PDCCH), and the one or more indications are included in one or more bits of a downlink control information (DCI) message.~~

~~12. The base station of claim 10, wherein the means for transmitting the one or more indications of the one or more beam indexes corresponding~~communication to the ~~one or more~~

~~beams is configured to transmit one or more beam indexes associated with one or more beam reference signals (BRSs), the one or more BRSs transmitted during a synchronization subframe.~~

~~13. The base station of claim 10, wherein the means for transmitting the one or more indications of the one or more beam indexes corresponding to the one or beams is configured to:~~

~~receive,~~UE from the ~~UE, one or more beam indexes corresponding to the one or more beams; and~~

~~transmit the one or more beam indexes corresponding to the one or more beams based on the one or more beam indexes that are received most recently.~~

~~14. The base station of claim 13, wherein the one or more beam indexes corresponding to the one or more beams are received on a physical uplink shared channel (PUSCH) or a physical uplink control channel (PUCCH).~~

~~15. The base station of claim 14, wherein the one or more beam indexes corresponding to the one or more beams are transmitted based on the one or more beam indexes received through the PUSCH when more than two symbols are used for the reference signal transmission.~~

~~16. The base station of claim 14, wherein the one or more beam indexes associated with one or more beams are transmitted based on the one or more beam indexes received through the PUCCH when two or fewer symbols are used for the reference signal transmission.~~

~~17. The base station of claim 10, wherein the one or more reference signals include at least one of a channel state information reference signal (CSI-RS) or a beam refinement reference signal (BRRS).~~

~~18. The base station of claim 17, wherein the means for transmitting the one or more indications of the one or more beam indexes associated with the one or more beams is configured to transmit the one or more beam indexes associated with the one or more beams through which at least one of the CSI-RSs was previously transmitted.~~

~~19. A~~ base station for the SCell based on the first beam index.

9. The method of claim 1, wherein the performing the beam tracking with the base station for the SCell comprises:

sending each of the set of reference signals via the respective beam of the set of beams; and

receiving a first beam index corresponding to the first beam from a base station for the PCell after the sending each of the set of reference signals,

wherein the first beam is determined for uplink communication from the UE to the base station for the SCell based on the first beam index.

10. The method of claim 1, wherein the request is communicated with a base station for the PCell based on a radio link failure between the UE and the base station for the SCell.

11. The method of claim 10, further comprising:

detecting the radio link failure between the UE and the base station for the SCell based on at least one of a signal-to-noise ratio (SNR), a signal-to-interference-plus-noise ratio (SINR), a received signal strength indicator (RSSI), a reference signal received quality, or a reference signal received power (RSRP) associated with at least one of a serving beam or an active beam via which the UE communicates with the base station for the SCell.

12. A method of wireless communication for a primary cell (PCell), the method comprising:

receiving, at a primary cell (PCell) on a first set of component carriers, a request associated with performance of beam tracking in a secondary cell (SCell) that is configurable by the PCell;

determining beam tracking is to be performed between a user equipment (UE) and the SCell based on the request from the UE, wherein performing the beam tracking comprises communicating each of a set of reference signals between the UE and the SCell via a respective beam of a set of beams;

determining a set of measurements associated with the beam tracking performed between the UE and a base station for the SCell;

determining a first beam of the set of beams based on the set of measurements; and

configuring communication between the UE and the base station for the SCell on a second set of component carriers to use the first beam, wherein the second set of component carriers has a carrier frequency different from the first set of component carriers.

13. The method of claim 12, wherein the request requests a change at least one of a serving beam or an active beam configured for communication between the UE and the base station for the SCell.

14. The method of claim 12, wherein the request indicates at least one beam index corresponding to at least one beam of the set of beams.

15. The method of claim 14, wherein the request is associated with a random access channel (RACH) procedure, and wherein the request indicates the at least one beam index based on at least one resource associated with the RACH procedure.

16. The method of claim 12, further comprising:

sending a message to the UE, wherein the message comprises an instruction for the performing the beam tracking.

17. The method of claim 12, wherein the PCell and the SCell are served by a same base station.

18. The method of claim 17, wherein the performing the beam tracking with the UE comprises:

receiving each of the set of reference signals via the respective beam of the set of beams; and

determining a respective measurement of the set of measurements based on each of the set of reference signals.

19. The method of claim 17, wherein the performing the beam tracking with the UE comprises:

sending each of the set of reference signals via the respective beam of the set of beams; and

receiving the set of measurements from the UE based on the set of reference signals.

20. An apparatus for wireless communication by a user equipment (UE), the apparatus comprising:

a memory; and

at least one processor coupled to the memory and configured to:

~~transmit~~ send, to a ~~user equipment (UE)~~ primary cell (PCell) on a ~~control channel, one or more indications~~first set of ~~one or more~~ component carriers, a request associated with performance of beam ~~indexes~~tracking in a secondary cell (SCell) that is configurable by the PCell;

perform beam tracking with a base station for the SCell based on the request sent to the PCell, wherein the performance of the beam tracking comprises communication of each of a set of reference signals via a respective beam of a set of beams;

determine a first beam of the set of beams based on the performance of the beam tracking; and

communicate with the base station for the SCell on a second set of component carriers via the first beam, wherein the second set of component carriers has a carrier frequency different from the first set of component carriers.

21. The apparatus of claim 20, wherein the PCell and the SCell are served by a same base station.

22. The apparatus of claim 20, wherein request requests a change for at least one of a serving beam or an active beam configured for communication between the UE and the base station for the SCell.

23. The apparatus of claim 20, wherein the request indicates at least one beam index corresponding to at least one ~~or more~~beam of the set of beams~~; and.~~

~~transmit, to the UE,~~

24. The apparatus of claim 23, wherein the request is associated with a random access channel (RACH) procedure, and wherein the request indicates the at least one ~~or more~~ beam index based on at least one resource associated with the RACH procedure.

25. The apparatus of claim 20, wherein the at least one processor is further configured to:

receive a message from a base station for the PCell, wherein the message comprises an instruction for the performance of the beam tracking.

26. The apparatus of claim 20, wherein to perform the beam tracking with the base station for the SCell, the at least one processor is further configured to:

receive each of the set of reference signals ~~through~~via the ~~one or more~~respective beam of the set of beams; and

determine a respective measurement of a set of measurements based on each of the set of reference signals.

27. The apparatus of claim 26, wherein to perform the beam tracking with the base station for the SCell, the at least one processor is further configured to:

send the set of measurements to a base station for the PCell; and

receive a first beam index corresponding to the ~~one or more beam indexes.~~first beam from the base station for the PCell based on the set of measurements,

~~20. The base station of claim 19, wherein the control channel comprises a physical downlink control channel (PDCCH), and the one or more indications are included in one or more bits of a downlink control information (DCI) message.~~

~~21. The~~ wherein the first beam is determined for downlink communication to the UE from the base station for the SCell based on the first beam index.

28. The apparatus of claim 20, wherein to perform the beam tracking with the base station ~~of claim 19, wherein the transmission~~for the SCell, the at least one processor is further configured to:

send each of the set of reference signals via the respective beam of the ~~one or more indications~~set of ~~the one or more~~beams; and

receive a first beam ~~indexes~~index corresponding to the ~~one or more beams includes transmission of one or more beam indexes~~first beam from a base station for the PCell after each of the set of reference signals is sent,

wherein the first beam is determined for uplink communication from the UE to the base station for the SCell based on the first beam index.

29. The apparatus of claim 20, wherein the request is communicated with a base station for the PCell based on a radio link failure between the UE and the base station for the SCell.

30. The apparatus of claim 29, wherein the at least one processor is further configured to:

detect the radio link failure between the UE and the base station for the SCell based on at least one of a signal-to-noise ratio (SNR), a signal-to-interference-plus-noise ratio (SINR), a received signal strength indicator (RSSI), a reference signal received quality, or a reference signal received power (RSRP) associated with ~~one or more beam reference signals (BRSs), the one or more BRSs transmitted during a synchronization subframe.~~at least one of a serving beam or an active beam via which the UE communicates with the base station for the SCell.

~~22. The~~ 31. An apparatus for wireless communication by a base station ~~of claim 19~~for a primary cell (PCell), the apparatus comprising:

a memory; and

at least one processor coupled to the memory and configured to:

receive, at the PCell on a first set of component carriers, a request associated with performance of beam tracking in a secondary cell (SCell) that is configurable by the PCell;

determine beam tracking is to be performed between a user equipment (UE) and the SCell based on the request from the UE, wherein ~~the transmission of the~~ performing the beam tracking comprises communicating each of a set of reference signals between the UE and the SCell via a respective beam of a set of beams;

determine a set of measurements associated with the beam tracking performed between the UE and a base station for the SCell;

determine a first beam of the set of beams based on the set of measurements; and

configure communication between the UE and the base station for the SCell on a second set of component carriers to use the first beam, wherein the second set of component carriers has a carrier frequency different from the first set of component carriers.

32. The apparatus of claim 31, wherein the requests a change at least one of a serving beam or an active beam configured for communication between the UE and the base station for the SCell.

33. The apparatus of claim 31, wherein the request indicates at least one ~~or more indications of the one or more beam indexes~~beam index corresponding to ~~the~~at least one beam of the set of beams.

34. The apparatus of claim 33, wherein the request is associated with a random access channel (RACH) procedure, and wherein the request indicates the at least one ~~or beams includes:~~beam index based on at least one resource associated with the RACH procedure. ~~reception,~~

35. The apparatus of claim 31, wherein the at least one processor is further configured to:

send a message to the UE, wherein the message comprises an instruction for the performance of the beam tracking.

36. The apparatus of claim 31, wherein the PCell and the SCell are served by a same base station.

37. The apparatus of claim 36, wherein to perform the beam tracking with the UE, the at least one processor is further configured to:

receive each of the set of reference signals via the respective beam of the set of beams; and

determine a respective measurement of the set of measurements based on each of the set of reference signals.

38. The apparatus of claim 37, wherein to perform the beam tracking with the UE, the at least one processor is further configured to:

send each of the set of reference signals via the respective beam of the set of beams; and

receive the set of measurements from the UE~~,~~ based on the set of reference signals.

39. An apparatus for wireless communication by a user equipment (UE), the apparatus comprising:

means sending, to a primary cell (PCell) on a first set of component carriers, a request associated with performance of beam tracking in a secondary cell (SCell) that is configurable by the PCell;

means for performing beam tracking with a base station for the SCell based on the request sent to the PCell, wherein the performing the beam tracking comprises communicating each of a set of reference signals via a respective beam of a set of beams;

means for determining a first beam of the set of beams based on the beam tracking; and

means for communicating with the base station for the SCell on a second set of component carriers via the first beam, wherein the second set of component carriers has a carrier frequency different from the first set of component carriers.

40. The apparatus of claim 39, wherein the PCell and the SCell are served by a same base station.

41. The apparatus of claim 39, wherein the request requests a change for at least one of a serving beam or ~~more beam indexes~~an active beam configured for communication between the UE and the base station for the SCell.

42. The apparatus of claim 39, wherein the request indicates at least one beam index corresponding to at least one beam of the ~~one or more~~set of beams~~; and~~.

~~transmission of the one or more beam indexes corresponding to the one or more beams based on the one or more beam indexes that are received most recently.~~

~~23~~43. The ~~base station~~apparatus of claim ~~22~~42, wherein the ~~one or more~~request is associated with a random access channel (RACH) procedure, and wherein the request indicates the at least one beam index based on at least one resource associated with the RACH procedure.

44. The apparatus of claim 39, further comprising:

means for receiving a message from a base station for the PCell, wherein the message comprises an instruction for the performing the beam tracking.

45. The apparatus of claim 39, wherein the means for performing the beam ~~indexes~~tracking with the base station for the SCell is configured to:

receive each of the set of reference signals via the respective beam of the set of beams; and

determine a respective measurement of a set of measurements based on each of the set of reference signals.

46. The apparatus of claim 45, wherein the means for performing the beam tracking with the base station for the SCell is further configured to:

send the set of measurements to a base station for the PCell; and

receive a first beam index corresponding to the first beam from the base station for the PCell based on the set of measurements,

wherein the first beam is determined for downlink communication to the UE from the base station for the SCell based on the first beam index.

47. The apparatus of claim 39, wherein the means for performing the beam tracking with the base station for the SCell is configured to:

send each of the set of reference signals via the respective beam of the set of beams; and

receive a first beam index corresponding to the ~~one or more beams are received on a physical uplink shared~~first beam from a base station for the PCell after the sending each of the set of reference signals,

wherein the first beam is determined for uplink communication from the UE to the base station for the SCell based on the first beam index.

48. The apparatus of claim 39, wherein the request is communicated with a base station for the PCell based on a radio link failure between the UE and the base station for the SCell.

49. The apparatus of claim 48, further comprising:

means for detecting the radio link failure between the UE and the base station for the SCell based on at least one of a signal-to-noise ratio (SNR), a signal-to-interference-plus-noise ratio (SINR), a received signal strength indicator (RSSI), a reference signal received quality, or a reference signal received power (RSRP) associated with at least one of a serving beam or an active beam via which the UE communicates with the base station for the SCell.

50. An apparatus for wireless communication by a station for a primary cell (PCell), the apparatus comprising:

means for receiving, at the PCell on a first set of component carriers, a request associated with performance of beam tracking in a secondary cell (SCell) that is configurable by the PCell;

means for determining beam tracking is to be performed between a user equipment (UE) and the SCell based on the request from the UE, wherein performing the beam tracking comprises communicating each of a set of reference signals between the UE and the SCell via a respective beam of a set of beams;

means for determining a set of measurements associated with the beam tracking performed between the UE and a base station for the SCell;

means for determining a first beam of the set of beams based on the set of measurements; and

means for configuring communication between the UE and the base station for the SCell on a second set of component carriers to use the first beam, wherein the second set of component carriers has a carrier frequency different from the first set of component carriers.

51. The apparatus of claim 50, wherein the request requests a change at least one of a serving beam or an active beam configured for communication between the UE and the base station for the SCell.

52. The apparatus of claim 50, wherein the request indicates at least one beam index corresponding to at least one beam of the set of beams.

53. The apparatus of claim 52, wherein the request is associated with a random access channel (~~PUSCH) or a physical uplink control channel (PUCCH).~~RACH) procedure, and wherein the request indicates the at least one beam index based on at least one resource associated with the RACH procedure.

~~24. The base station of claim 23, wherein the one or more beam indexes corresponding to the one or more beams are transmitted based on the one or more beam indexes received through the PUSCH when more than two symbols are used for the reference signal transmission.~~

~~25. The base station of claim 23, wherein the one or more beam indexes associated with one or more beams are transmitted based on the one or more beam indexes received through the PUCCH when two or fewer symbols are used for the reference signal transmission.~~

~~26. The base station of claim 19, wherein the one or more reference signals include at least one of a channel state information reference signal (CSI-RS) or a beam refinement reference signal (BRRS).~~

~~27. The base station of claim 26, wherein the transmission of the one or more indications of the one or more beam indexes associated with the one or more beams includes transmission of the one or more beam indexes associated with the one or more beams through which at least one of the CSI-RSs was previously transmitted.~~

54. The apparatus of claim 50, further comprising:

means for sending a message to the UE, wherein the message comprises an instruction for performing the beam tracking.

55. The apparatus of claim 50, wherein the PCell and the SCell are served by a same base station.

56. The apparatus of claim 55, further comprising:

means for performing the beam tracking with the UE when the beam tracking is determined to be performed.

57. The apparatus of claim 56, wherein the means for performing the beam tracking is configured to:

receive each of the set of reference signals via the respective beam of the set of beams; and

determine a respective measurement of the set of measurements based on each of the set of reference signals.

58. The apparatus of claim 56, wherein the means for performing the beam tracking is configured to:

send each of the set of reference signals via the respective beam of the set of beams; and

receive the set of measurements from the UE based on the set of reference signals.

~~28~~59. A non-transitory computer-readable medium storing computer-executable code for wireless communication by a first base station, ~~comprising~~the code ~~to:~~when executed by at least one processor cause the at least one processor to:

~~transmit, to a user equipment (UE) on a control channel, one or more indications of one or more beam indexes corresponding to one or more beams; and~~

~~transmit, to the UE, one or more reference signals through the one or more beams corresponding to the one or more beam indexes.~~ send, to a primary cell (PCell) on a first set of component carriers, a request associated with performance of beam tracking in a secondary cell that is configurable by the primary cell;

perform beam tracking with a base station for the SCell based on the request sent to the PCell, wherein the performance of the beam tracking comprises communication of each of a set of reference signals via a respective beam of a set of beams;

determine a first beam of the set of beams based on the performance of the beam tracking; and

communicate with the base station for the SCell on a second set of component carriers via the first beam, wherein the second set of component carriers has a carrier frequency different from the first set of component carriers.

60. A non-transitory computer-readable medium storing computer-executable code for wireless communication by a base station of a primary cell (PCell), the code when executed by at least one processor cause the at least one processor to:

receive, at the PCell on a first set of component carriers, a request associated with performance of beam tracking in a secondary cell (SCell) that is configurable by the PCell;

determine beam tracking is to be performed between a user equipment (UE) and the SCell based on the request from the UE, wherein performing the beam tracking comprises communicating each of a set of reference signals between the UE and the SCell via a respective beam of a set of beams;

determine a set of measurements associated with the beam tracking performed between the UE and a base station for the SCell;

determine a first beam of the set of beams based on the set of measurements; and

configure communication between the UE and the base station for the SCell on a second set of component carriers to use the first beam, wherein the second set of component carriers has a carrier frequency different from the first set of component carriers.