

CLAIMS

What is claimed is:

- 1 1. A method for wireless communication at a user equipment (UE),
2 comprising:
3 determining, based at least in part on communication resources allocated by a
4 base station, a default transmit beam for communicating with the base station;
5 identifying a triggering condition for using the default transmit beam; and
6 transmitting an uplink communication to the base station using the default
7 transmit beam based at least in part on the triggering condition.
- 1 2. The method of claim 1, wherein identifying the triggering condition
2 comprises:
3 receiving, from the base station, an uplink grant that does not contain a
4 physical uplink shared channel (PUSCH) beam indicator.
- 1 3. The method of claim 2, wherein the PUSCH beam indicator comprises
2 a sounding reference signal (SRS) resource indicator (SRI) or a transmission configuration
3 indicator (TCI).
- 4 4. The method of claim 1, wherein determining the default transmit beam
5 comprises:
6 receiving a semi-static configuration or a dynamic configuration for the
7 allocated communication resources, wherein the allocated communication resources are
8 designated for carrying a first uplink transmission to the base station using a first uplink
9 transmit beam; and
10 determining the default transmit beam based at least in part on the first uplink
11 transmit beam.
- 1 5. The method of claim 4, wherein the first uplink transmission comprises
2 a physical uplink control channel (PUCCH) transmission and the allocated communication
3 resources comprise a PUCCH resource.
- 1 6. The method of claim 5, further comprising:

2 identifying the PUCCH resource from a plurality of candidate PUCCH
3 resources based at least in part on an index associated with the PUCCH resource, an intended
4 use of the PUCCH resource, or a combination thereof.

1 7. The method of claim 6, wherein the identifying the PUCCH resource
2 from the plurality of candidate PUCCH resources comprises identifying the PUCCH resource
3 based at least in part on the identified PUCCH resource with a lowest index.

4 8. The method of claim 6, wherein the intended use of the PUCCH
5 resource comprises one of a scheduling request (SR), a channel quality indicator (CQI)
6 report, or a beam failure recovery.

1 9. The method of claim 4, wherein the first uplink transmission comprises
2 a sounding reference signal (SRS) transmission, a physical uplink shared channel (PUSCH)
3 transmission scheduled by an uplink grant that includes a PUSCH beam indicator, a semi-
4 persistent scheduled (SPS) transmission, or a grant-free uplink transmission.

1 10. The method of claim 4, further comprising:
2 identifying the first uplink transmission to be used for determining the default
3 transmit beam from a plurality of candidate uplink transmissions based at least in part on a
4 scheduling parameter of the first uplink transmission, a number of beams associated with the
5 first uplink transmission, a selection indication received from the base station, or a
6 combination thereof.

1 11. The method of claim 1, wherein identifying the triggering condition
2 comprises:
3 identifying uplink data to be transmitted to the base station in the uplink
4 communication; and
5 determining that the base station has not transmitted a sounding reference
6 signal (SRS) resource indicator (SRI) indicating a configured uplink transmit beam for the
7 uplink communication.

1 12. The method of claim 1, wherein identifying the trigger condition
2 comprises:
3 identifying a threshold time period preceding the uplink communication; and

4 determining that the base station has not transmitted a physical uplink shared
5 channel (PUSCH) beam indicator indicating a configured uplink transmit beam for the uplink
6 communication prior to the threshold time period.

1 13. The method of claim 12, wherein the threshold time period is based at
2 least in part on a beam-switching capability of the UE.

1 14. The method of claim 1, wherein determining the default transmit beam
2 comprises:

3 identifying a receive beam used to receive a remaining minimum system
4 information (RMSI) control resource set, wherein the RMSI control resource set comprises
5 the allocated communication resources; and

6 selecting, prior to a completion of a radio resource control (RRC)
7 configuration, the default transmit beam based at least in part on the receive beam.

1 15. The method of claim 1, wherein determining the default transmit beam
2 comprises:

3 receiving a downlink transmission from the base station over the allocated
4 communication resources using a downlink receive beam; and

5 determining the default transmit beam based at least in part on the downlink
6 receive beam.

1 16. The method of claim 15, wherein the downlink transmission comprises
2 a physical downlink control channel (PDCCH) transmission and the allocated communication
3 resources comprise a PDCCH control resource set.

1 17. The method of claim 16, further comprising:

2 identifying the PDCCH control resource set from a plurality of candidate
3 PDCCH control resource sets based at least in part on an index associated with the PDCCH
4 control resource set.

1 18. The method of claim 16, further comprising:

2 identifying the PDCCH control resource set from a plurality of candidate
3 PDCCH control resource sets based at least in part on a reception time at the UE associated
4 with the PDCCH control resource set.

1 19. The method of claim 18, further comprising:
2 selecting, based at least in part on an index associated with the PDCCH
3 control resource set, the PDCCH control resource set from the plurality of candidate PDCCH
4 control resource sets, wherein the plurality of candidate PDCCH control resource sets are
5 associated with a same reception time at the UE.

1 20. The method of claim 15, wherein receiving the downlink transmission
2 comprises:
3 receiving one or more channel state information reference signals (CSI-RS)
4 over the allocated communication resources, wherein each CSI-RS is received using a
5 respective downlink receive beam;
6 identifying a given downlink receive beam of the one or more downlink
7 receive beams; and
8 determining the default transmit beam based at least in part on the given
9 downlink receive beam.

1 21. The method of claim 15, wherein the downlink transmission comprises
2 a physical downlink shared channel (PDSCH) transmission.

1 22. The method of claim 15, further comprising:
2 identifying the downlink transmission to be used for determining the default
3 transmit beam from a plurality of candidate downlink transmissions based at least in part on a
4 scheduling parameter of the downlink transmission, a number of beams associated with the
5 downlink transmission, a selection indication received from the base station, or a combination
6 thereof.

1 23. The method of claim 1, wherein determining the default transmit beam
2 comprises:
3 identifying a communication beam corresponding to a recent transmission, the
4 recent transmission comprising a recent uplink transmission or a recent downlink
5 transmission; and
6 determining the default transmit beam based at least in part on the
7 communication beam.

1 24. The method of claim 1, wherein transmitting the uplink
2 communication using the default transmit beam comprises:
3 receiving, from the base station, an update to the allocated communication
4 resources; and
5 determining a second default transmit beam based at least in part on the
6 update, wherein the uplink transmission is transmitted using the second default transmit
7 beam.

1 25. A method for wireless communication at a base station, comprising:
2 allocating communication resources for a user equipment (UE);
3 identifying a triggering condition that indicates to the UE to use a default
4 transmit beam for communicating with the base station, wherein the default transmit beam is
5 based at least in part on the allocated communication resources; and
6 receiving, based at least in part on the triggering condition, an uplink
7 communication from the UE, wherein the uplink communication is transmitted by the UE
8 using the default transmit beam.

1 26. The method of claim 25, wherein identifying the triggering condition
2 comprises:
3 transmitting, to the UE, an uplink grant that does not contain a physical uplink
4 shared channel (PUSCH) beam indicator.

1 27. The method of claim 26, wherein the PUSCH beam indicator
2 comprises a sounding reference signal (SRS) resource indicator (SRI) or a transmission
3 configuration indicator (TCI).

1 28. The method of claim 25, wherein allocating the communication
2 resources for the UE comprises:
3 transmitting a semi-static configuration or a dynamic configuration allocating
4 the communication resources, which are designated for carrying a first uplink transmission
5 from the UE to the base station using a first uplink transmit beam, wherein the uplink
6 communication is transmitted by the UE using the default transmit beam based at least in part
7 on the first uplink transmit beam.

1 29. The method of claim 28, wherein the first uplink transmission
2 comprises a physical uplink control channel (PUCCH) transmission and the allocated
3 communication resources comprise a PUCCH resource.

1 30. The method of claim 29, further comprising:
2 identifying the PUCCH resource from a plurality of candidate PUCCH
3 resources based at least in part on an index associated with the PUCCH resource, an intended
4 use of the PUCCH resource, or a combination thereof.

1 31. The method of claim 30, wherein the identifying the PUCCH resource
2 from the plurality of candidate PUCCH resources comprises identifying the PUCCH resource
3 based at least in part on the identified PUCCH resource with a lowest index.

1 32. The method of claim 30, wherein the intended use of the PUCCH
2 resource comprises one of a scheduling request (SR), a channel quality indicator (CQI)
3 report, or a beam failure recovery.

1 33. The method of claim 28, wherein the first uplink transmission
2 comprises a sounding reference signal (SRS) transmission, a physical uplink shared channel
3 (PUSCH) transmission scheduled by an uplink grant that includes a physical uplink shared
4 channel (PUSCH) beam indicator, a semi-persistent scheduled (SPS) transmission, or a grant-
5 free uplink transmission.

1 34. The method of claim 28, further comprising:
2 identifying the first uplink transmission to be used by the UE for determining
3 the default transmit beam from a plurality of candidate uplink transmissions based at least in
4 part on a scheduling parameter of the first uplink transmission, a number of beams associated
5 with the first uplink transmission, a selection indication transmitted by the base station, or a
6 combination thereof.

1 35. The method of claim 25, wherein allocating the communication
2 resources for the UE comprises:
3 configuring, for the UE, a remaining minimum system information (RMSI)
4 control resource set; and

5 identifying, prior to a completion of a radio resource control (RRC)
6 configuration, the default transmit beam based at least in part on the RMSI control resource
7 set.

1 36. The method of claim 25, further comprising:
2 transmitting a downlink transmission to the UE over the allocated
3 communication resources, wherein the uplink communication is transmitted by the UE using
4 the default transmit beam based at least in part on the downlink transmission.

1 37. The method of claim 36, wherein the downlink transmission comprises
2 a physical downlink control channel (PDCCH) transmission and the allocated communication
3 resources comprise a PDCCH control resource set.

1 38. The method of claim 37, further comprising:
2 identifying the PDCCH control resource set from a plurality of candidate
3 PDCCH control resource sets based at least in part on an index associated with the PDCCH
4 control resource set.

1 39. The method of claim 36, wherein transmitting the downlink
2 transmission comprises:
3 transmitting one or more channel state information reference signals (CSI-RS)
4 over the allocated communication resources, wherein the uplink communication is
5 transmitted by the UE using the default transmit beam based at least in part on the one or
6 more CSI-RS.

1 40. The method of claim 36, wherein the downlink transmission comprises
2 a physical downlink shared channel (PDSCH) transmission.

1 41. The method of claim 36, further comprising:
2 identifying the downlink transmission to be used by the UE for determining
3 the default transmit beam from a plurality of candidate downlink transmissions based at least
4 in part on a scheduling parameter of the downlink transmission, a number of beams
5 associated with the downlink transmission, a selection indication received from the base
6 station, or a combination thereof.

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1 42. The method of claim 25, further comprising:
2 identifying a communication beam corresponding to a recent transmission, the
3 recent transmission comprising a recent uplink transmission from the UE or a recent
4 downlink transmission to the UE, wherein the uplink communication is transmitted by the UE
5 using the default transmit beam based at least in part on the communication beam.

1 43. The method of claim 25, further comprising:
2 transmitting, to the UE, an update to the allocated communication resources,
3 wherein the uplink communication is transmitted by the UE on the default transmit beam
4 based at least in part on the update.

1 44. An apparatus for wireless communications, comprising:
2 means for determining, based at least in part on communication resources
3 allocated by a base station, a default transmit beam for communicating with the base station;
4 means for identifying a triggering condition for using the default transmit
5 beam; and
6 means for transmitting an uplink communication to the base station using the
7 default transmit beam based at least in part on the triggering condition.

1 45. The apparatus of claim 44, wherein the means for identifying the
2 triggering condition further comprises:
3 means for receiving, from the base station, an uplink grant that does not
4 contain a physical uplink shared channel (PUSCH) beam indicator.

1 46. The apparatus of claim 45, wherein the PUSCH beam indicator
2 comprises a sounding reference signal (SRS) resource indicator (SRI) or a transmission
3 configuration indicator (TCI).

1 47. The apparatus of claim 44, wherein the means for determining the
2 default transmit beam further comprises:
3 means for receiving a semi-static configuration or a dynamic configuration for
4 the allocated communication resources, wherein the allocated communication resources are
5 designated for carrying a first uplink transmission to the base station using a first uplink
6 transmit beam; and

7 means for determining the default transmit beam based at least in part on the
8 first uplink transmit beam.

1 48. The apparatus of claim 47, wherein the first uplink transmission
2 comprises a physical uplink control channel (PUCCH) transmission and the allocated
3 communication resources comprise a PUCCH resource.

1 49. The apparatus of claim 48, further comprising:
2 means for identifying the PUCCH resource from a plurality of candidate
3 PUCCH resources based at least in part on an index associated with the PUCCH resource, an
4 intended use of the PUCCH resource, or a combination thereof.

1 50. The apparatus of claim 49, wherein the identifying the PUCCH
2 resource from the plurality of candidate PUCCH resources comprises identifying the PUCCH
3 resource based at least in part on the identified PUCCH resource with a lowest index.

1 51. The apparatus of claim 49, wherein the intended use of the PUCCH
2 resource comprises one of a scheduling request (SR), a channel quality indicator (CQI)
3 report, or a beam failure recovery.

1 52. The apparatus of claim 47, wherein the first uplink transmission
2 comprises a sounding reference signal (SRS) transmission, a physical uplink shared channel
3 (PUSCH) transmission scheduled by an uplink grant that includes a PUSCH beam indicator,
4 a semi-persistent scheduled (SPS) transmission, or a grant-free uplink transmission.

1 53. The apparatus of claim 47, further comprising:
2 means for identifying the first uplink transmission to be used for determining
3 the default transmit beam from a plurality of candidate uplink transmissions based at least in
4 part on a scheduling parameter of the first uplink transmission, a number of beams associated
5 with the first uplink transmission, a selection indication received from the base station, or a
6 combination thereof.

1 54. The apparatus of claim 44, wherein the means for identifying the
2 triggering condition further comprises:
3 means for identifying uplink data to be transmitted to the base station in the
4 uplink communication; and

5 means for determining that the base station has not transmitted a sounding
6 reference signal (SRS) resource indicator (SRI) indicating a configured uplink transmit beam
7 for the uplink communication.

1 55. The apparatus of claim 44, wherein the means for identifying the
2 trigger condition further comprises:

3 means for identifying a threshold time period preceding the uplink
4 communication; and

5 means for determining that the base station has not transmitted a physical
6 uplink shared channel (PUSCH) beam indicator indicating a configured uplink transmit beam
7 for the uplink communication prior to the threshold time period.

1 56. The apparatus of claim 55, wherein the threshold time period is based
2 at least in part on a beam-switching capability of the UE.

1 57. The apparatus of claim 44, wherein the means for determining the
2 default transmit beam further comprises:

3 means for identifying a receive beam used to receive a remaining minimum
4 system information (RMSI) control resource set, wherein the RMSI control resource set
5 comprises the allocated communication resources; and

6 means for selecting, prior to a completion of a radio resource control (RRC)
7 configuration, the default transmit beam based at least in part on the receive beam.

1 58. The apparatus of claim 44, wherein the means for determining the
2 default transmit beam further comprises:

3 means for receiving a downlink transmission from the base station over the
4 allocated communication resources using a downlink receive beam; and

5 means for determining the default transmit beam based at least in part on the
6 downlink receive beam.

1 59. The apparatus of claim 58, wherein the downlink transmission
2 comprises a physical downlink control channel (PDCCH) transmission and the allocated
3 communication resources comprise a PDCCH control resource set.

1 60. The apparatus of claim 59, further comprising:

2 means for identifying the PDCCH control resource set from a plurality of
3 candidate PDCCH control resource sets based at least in part on an index associated with the
4 PDCCH control resource set.

1 61. The apparatus of claim 59, further comprising:
2 means for identifying the PDCCH control resource set from a plurality of
3 candidate PDCCH control resource sets based at least in part on a reception time at the UE
4 associated with the PDCCH control resource set.

1 62. The apparatus of claim 61, further comprising:
2 means for selecting, based at least in part on an index associated with the
3 PDCCH control resource set, the PDCCH control resource set from the plurality of candidate
4 PDCCH control resource sets, wherein the plurality of candidate PDCCH control resource
5 sets are associated with a same reception time at the UE.

1 63. The apparatus of claim 58, wherein the means for receiving the
2 downlink transmission further comprises:
3 means for receiving one or more channel state information reference signals
4 (CSI-RS) over the allocated communication resources, wherein each CSI-RS is received
5 using a respective downlink receive beam;
6 means for identifying a given downlink receive beam of the one or more
7 downlink receive beams; and
8 means for determining the default transmit beam based at least in part on the
9 given downlink receive beam.

1 64. The apparatus of claim 58, wherein the downlink transmission
2 comprises a physical downlink shared channel (PDSCH) transmission.

1 65. The apparatus of claim 58, further comprising:
2 means for identifying the downlink transmission to be used for determining
3 the default transmit beam from a plurality of candidate downlink transmissions based at least
4 in part on a scheduling parameter of the downlink transmission, a number of beams
5 associated with the downlink transmission, a selection indication received from the base
6 station, or a combination thereof.

- 1 66. The apparatus of claim 44, wherein the means for determining the
2 default transmit beam further comprises:
3 means for identifying a communication beam corresponding to a recent
4 transmission, the recent transmission comprising a recent uplink transmission or a recent
5 downlink transmission; and
6 means for determining the default transmit beam based at least in part on the
7 communication beam.
- 1 67. The apparatus of claim 44, wherein the means for transmitting the
2 uplink communication using the default transmit beam further comprises:
3 means for receiving, from the base station, an update to the allocated
4 communication resources; and
5 means for determining a second default transmit beam based at least in part on
6 the update, wherein the uplink transmission is transmitted using the second default transmit
7 beam.
- 1 68. An apparatus for wireless communications, comprising:
2 means for allocating communication resources for a user equipment (UE);
3 means for identifying a triggering condition that indicates to the UE to use a
4 default transmit beam for communicating with the base station, wherein the default transmit
5 beam is based at least in part on the allocated communication resources; and
6 means for receiving, based at least in part on the triggering condition, an
7 uplink communication from the UE, wherein the uplink communication is transmitted by the
8 UE using the default transmit beam.
- 1 69. The apparatus of claim 68, wherein the means for identifying the
2 triggering condition further comprises:
3 means for transmitting, to the UE, an uplink grant that does not contain a
4 physical uplink shared channel (PUSCH) beam indicator.
- 1 70. The apparatus of claim 69, wherein the PUSCH beam indicator
2 comprises a sounding reference signal (SRS) resource indicator (SRI) or a transmission
3 configuration indicator (TCI).

1 71. The apparatus of claim 68, wherein the means for allocating the
2 communication resources for the UE further comprises:
3 means for transmitting a semi-static configuration or a dynamic configuration
4 allocating the communication resources, which are designated for carrying a first uplink
5 transmission from the UE to the base station using a first uplink transmit beam, wherein the
6 uplink communication is transmitted by the UE using the default transmit beam based at least
7 in part on the first uplink transmit beam.

1 72. The apparatus of claim 71, wherein the first uplink transmission
2 comprises a physical uplink control channel (PUCCH) transmission and the allocated
3 communication resources comprise a PUCCH resource.

1 73. The apparatus of claim 72, further comprising:
2 means for identifying the PUCCH resource from a plurality of candidate
3 PUCCH resources based at least in part on an index associated with the PUCCH resource, an
4 intended use of the PUCCH resource, or a combination thereof.

1 74. The apparatus of claim 73, wherein the identifying the PUCCH
2 resource from the plurality of candidate PUCCH resources comprises identifying the PUCCH
3 resource based at least in part on the identified PUCCH resource with a lowest index.

1 75. The apparatus of claim 73, wherein the intended use of the PUCCH
2 resource comprises one of a scheduling request (SR), a channel quality indicator (CQI)
3 report, or a beam failure recovery.

1 76. The apparatus of claim 71, wherein the first uplink transmission
2 comprises a sounding reference signal (SRS) transmission, a physical uplink shared channel
3 (PUSCH) transmission scheduled by an uplink grant that includes a physical uplink shared
4 channel (PUSCH) beam indicator, a semi-persistent scheduled (SPS) transmission, or a grant-
5 free uplink transmission.

1 77. The apparatus of claim 71, further comprising:
2 means for identifying the first uplink transmission to be used by the UE for
3 determining the default transmit beam from a plurality of candidate uplink transmissions
4 based at least in part on a scheduling parameter of the first uplink transmission, a number of

5 beams associated with the first uplink transmission, a selection indication transmitted by the
6 base station, or a combination thereof.

1 78. The apparatus of claim 68, wherein the means for allocating the
2 communication resources for the UE further comprises:
3 means for configuring, for the UE, a remaining minimum system information
4 (RMSI) control resource set; and
5 means for identifying, prior to a completion of a radio resource control (RRC)
6 configuration, the default transmit beam based at least in part on the RMSI control resource
7 set.

1 79. The apparatus of claim 68, further comprising:
2 means for transmitting a downlink transmission to the UE over the allocated
3 communication resources, wherein the uplink communication is transmitted by the UE using
4 the default transmit beam based at least in part on the downlink transmission.

1 80. The apparatus of claim 79, wherein the downlink transmission
2 comprises a physical downlink control channel (PDCCH) transmission and the allocated
3 communication resources comprise a PDCCH control resource set.

1 81. The apparatus of claim 80, further comprising:
2 means for identifying the PDCCH control resource set from a plurality of
3 candidate PDCCH control resource sets based at least in part on an index associated with the
4 PDCCH control resource set.

1 82. The apparatus of claim 79, wherein the means for transmitting the
2 downlink transmission further comprises:
3 means for transmitting one or more channel state information reference signals
4 (CSI-RS) over the allocated communication resources, wherein the uplink communication is
5 transmitted by the UE using the default transmit beam based at least in part on the one or
6 more CSI-RS.

1 83. The apparatus of claim 79, wherein the downlink transmission
2 comprises a physical downlink shared channel (PDSCH) transmission.

1 84. The apparatus of claim 79, further comprising:

2 means for identifying the downlink transmission to be used by the UE for
3 determining the default transmit beam from a plurality of candidate downlink transmissions
4 based at least in part on a scheduling parameter of the downlink transmission, a number of
5 beams associated with the downlink transmission, a selection indication received from the
6 base station, or a combination thereof.

1 85. The apparatus of claim 68, further comprising:
2 means for identifying a communication beam corresponding to a recent
3 transmission, the recent transmission comprising a recent uplink transmission from the UE or
4 a recent downlink transmission to the UE, wherein the uplink communication is transmitted
5 by the UE using the default transmit beam based at least in part on the communication beam.

1 86. The apparatus of claim 68, further comprising:
2 means for transmitting, to the UE, an update to the allocated communication
3 resources, wherein the uplink communication is transmitted by the UE on the default transmit
4 beam based at least in part on the update.

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