

CLAIMS

WHAT IS CLAIMED IS:

1. A method of wireless communication of a base station, comprising:
determining at least one of a number of one or more demodulation reference signal (DM-RS) symbols or one or more locations within a subframe for transmission of the one or more DM-RS symbols;
transmitting the at least one of the number of the one or more DM-RS symbols or the one or more locations within the subframe for the transmission of the one or more DM-RS symbols to a user equipment (UE);
determining a resource allocation scheme for a phase noise compensation reference signal (PC-RS); and
transmitting the resource allocation scheme for the PC-RS to the UE.
2. The method of claim 1, wherein the resource allocation scheme for the PC-RS is determined with regard to the one or more DM-RS symbols.
3. The method of claim 1, wherein the transmitting of the resource allocation scheme for the PC-RS to the UE comprises sending the resource allocation scheme for the PC-RS to the UE dynamically via physical downlink control channel (PDCCH).
4. The method of claim 3, wherein one or more bits are reserved in downlink control information (DCI) to identify the resource allocation scheme for the PC-RS.
5. The method of claim 1, wherein the transmitting of the resource allocation scheme for the PC-RS to the UE comprises sending the resource allocation scheme for the PC-RS to the UE via radio resource control (RRC) signaling.
6. The method of claim 1, wherein the resource allocation scheme informs the UE to rate match the PC-RS around subcarriers of the one or more DM-RS symbols.

7. The method of claim 1, wherein the resource allocation scheme informs the UE to puncture the one or more DM-RS symbols in subcarriers that are reserved for the PC-RS.
8. The method of claim 1, wherein the resource allocation scheme informs the UE to puncture the PC-RS in the one or more DM-RS symbols.
9. A method of wireless communication of a base station, comprising:
determining information to be conveyed by a physical downlink control channel (PDCCH); and
transmitting the information to a user equipment (UE) via the PDCCH, wherein the PDCCH is punctured to accommodate a phase noise compensation reference signal (PC-RS).
10. The method of claim 9, wherein the information comprises at least one of a number of one or more demodulation reference signal (DM-RS) symbols or one or more locations within a subframe for transmission of the one or more DM-RS symbols.
11. The method of claim 10, wherein one or more bits are reserved in downlink control information (DCI) to identify the at least one of the number of the one or more DM-RS symbols or the one or more locations within the subframe for the transmission of the one or more DM-RS symbols.
12. The method of claim 10, wherein the number of the one or more DM-RS symbols is one, wherein the one or more locations comprise a first symbol of physical downlink shared channel (PDSCH).
13. The method of claim 10, wherein the number of the one or more DM-RS symbols is two, wherein the one or more locations comprise a first location at a beginning of physical downlink shared channel (PDSCH) and a second location in a middle of the PDSCH, the first location and the second location being separated by at least one symbol.
14. A method of wireless communication of a user equipment (UE), comprising:

receiving at least one of a number of one or more demodulation reference signal (DM-RS) symbols or one or more locations within a subframe for transmission of the one or more DM-RS symbols from a base station;

decoding the one or more DM-RS symbols from the subframe based on the at least one of the number of the one or more DM-RS symbols or the one or more locations;

receiving a resource allocation scheme for a phase noise compensation reference signal (PC-RS); and

decoding the PC-RS from the subframe based on the resource allocation scheme for the PC-RS.

15. The method of claim 14, wherein the resource allocation scheme for the PC-RS is determined with regard to the one or more DM-RS symbols.

16. The method of claim 14, wherein the receiving of the resource allocation scheme for the PC-RS comprises receiving the resource allocation scheme for the PC-RS dynamically via physical downlink control channel (PDCCH).

17. The method of claim 16, wherein one or more bits are reserved in downlink control information (DCI) to identify the resource allocation scheme for the PC-RS.

18. The method of claim 14, wherein the receiving of the resource allocation scheme for the PC-RS comprises receiving the resource allocation scheme for the PC-RS via radio resource control (RRC) signaling.

19. The method of claim 14, wherein the resource allocation scheme informs the UE to rate match the PC-RS around subcarriers of the one or more DM-RS symbols.

20. The method of claim 14, wherein the resource allocation scheme informs the UE to puncture the one or more DM-RS symbols in subcarriers that are reserved for the PC-RS.

21. The method of claim 14, wherein the resource allocation scheme informs the UE to puncture the PC-RS in the one or more DM-RS symbols.

22. A method of wireless communication of a user equipment (UE), comprising:
receiving a first information via a physical downlink control channel (PDCCH) from a base station, wherein the PDCCH is punctured to accommodate a phase noise compensation reference signal (PC-RS); and
extracting a second information from a subframe based on the first information.
23. The method of claim 22, wherein the first information comprises at least one of a number of one or more demodulation reference signal (DM-RS) symbols or one or more locations within the subframe for transmission of the one or more DM-RS symbols from the base station, wherein the extracting comprises decoding the one or more DM-RS symbols from the subframe based on the at least one of the number of the one or more DM-RS symbols or the one or more locations.
24. The method of claim 23, wherein one or more bits are reserved in downlink control information (DCI) to identify the at least one of the number of the one or more DM-RS symbols or the one or more locations within the subframe for the transmission of the one or more DM-RS symbols.
25. The method of claim 23, wherein the number of the one or more DM-RS symbols is one, wherein the one or more locations comprise a first symbol of physical downlink shared channel (PDSCH).
26. The method of claim 23, wherein the number of the one or more DM-RS symbols is two, wherein the one or more locations comprise a first location at a beginning of physical downlink shared channel (PDSCH) and a second location in a middle of the PDSCH, the first location and the second location being separated by at least one symbol.
27. An apparatus for wireless communication, the apparatus being a base station, comprising:
means for determining at least one of a number of one or more demodulation reference signal (DM-RS) symbols or one or more locations within a subframe for transmission of the one or more DM-RS symbols;

means for transmitting the at least one of the number of the one or more DM-RS symbols or the one or more locations within the subframe for the transmission of the one or more DM-RS symbols to a user equipment (UE);

means for determining a resource allocation scheme for a phase noise compensation reference signal (PC-RS); and

means for transmitting the resource allocation scheme for the PC-RS to the UE.

28. The apparatus of claim 27, wherein the resource allocation scheme for the PC-RS is determined with regard to the one or more DM-RS symbols.

29. The apparatus of claim 27, wherein the means for transmitting the resource allocation scheme for the PC-RS to the UE is configured to send the resource allocation scheme for the PC-RS to the UE dynamically via physical downlink control channel (PDCCH).

30. The apparatus of claim 29, wherein one or more bits are reserved in downlink control information (DCI) to identify the resource allocation scheme for the PC-RS.

31. The apparatus of claim 27, wherein the means for transmitting the resource allocation scheme for the PC-RS to the UE is configured to send the resource allocation scheme for the PC-RS to the UE via radio resource control (RRC) signaling.

32. The apparatus of claim 27, wherein the resource allocation scheme informs the UE to rate match the PC-RS around subcarriers of the one or more DM-RS symbols.

33. The apparatus of claim 27, wherein the resource allocation scheme informs the UE to puncture the one or more DM-RS symbols in subcarriers that are reserved for the PC-RS.

34. The apparatus of claim 27, wherein the resource allocation scheme informs the UE to puncture the PC-RS in the one or more DM-RS symbols.

35. An apparatus for wireless communication, the apparatus being a base station, comprising:

means for determining information to be conveyed by a physical downlink control channel (PDCCH); and

means for transmitting the information to a user equipment (UE) via the PDCCH, wherein the PDCCH is punctured to accommodate a phase noise compensation reference signal (PC-RS).

36. The apparatus of claim 35, wherein the information comprises at least one of a number of one or more demodulation reference signal (DM-RS) symbols or one or more locations within a subframe for transmission of the one or more DM-RS symbols.

37. The apparatus of claim 36, wherein one or more bits are reserved in downlink control information (DCI) to identify the at least one of the number of the one or more DM-RS symbols or the one or more locations within the subframe for the transmission of the one or more DM-RS symbols.

38. The apparatus of claim 36, wherein the number of the one or more DM-RS symbols is one, wherein the one or more locations comprise a first symbol of physical downlink shared channel (PDSCH).

39. The apparatus of claim 36, wherein the number of the one or more DM-RS symbols is two, wherein the one or more locations comprise a first location at a beginning of physical downlink shared channel (PDSCH) and a second location in a middle of the PDSCH, the first location and the second location being separated by at least one symbol.

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

means for receiving at least one of a number of one or more demodulation reference signal (DM-RS) symbols or one or more locations within a subframe for transmission of the one or more DM-RS symbols from a base station;

means for decoding the one or more DM-RS symbols from the subframe based on the at least one of the number of the one or more DM-RS symbols or the one or more locations;

means for receiving a resource allocation scheme for a phase noise compensation reference signal (PC-RS); and

means for decoding the PC-RS from the subframe based on the resource allocation scheme for the PC-RS.

41. The apparatus of claim 40, wherein the resource allocation scheme for the PC-RS is determined with regard to the one or more DM-RS symbols.

42. The apparatus of claim 40, wherein the means for receiving the resource allocation scheme for the PC-RS is configured to receive the resource allocation scheme for the PC-RS dynamically via physical downlink control channel (PDCCH).

43. The apparatus of claim 42, wherein one or more bits are reserved in downlink control information (DCI) to identify the resource allocation scheme for the PC-RS.

44. The apparatus of claim 40, wherein the means for receiving the resource allocation scheme for the PC-RS is configured to receive the resource allocation scheme for the PC-RS via radio resource control (RRC) signaling.

45. The apparatus of claim 40, wherein the resource allocation scheme informs the UE to rate match the PC-RS around subcarriers of the one or more DM-RS symbols.

46. The apparatus of claim 40, wherein the resource allocation scheme informs the UE to puncture the one or more DM-RS symbols in subcarriers that are reserved for the PC-RS.

47. The apparatus of claim 40, wherein the resource allocation scheme informs the UE to puncture the PC-RS in the one or more DM-RS symbols.

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

means for receiving a first information via a physical downlink control channel (PDCCH) from a base station, wherein the PDCCH is punctured to accommodate a phase noise compensation reference signal (PC-RS); and

means for extracting a second information from a subframe based on the first information.

49. The apparatus of claim 48, wherein the first information comprises at least one of a number of one or more demodulation reference signal (DM-RS) symbols or one or more locations within the subframe for transmission of the one or more DM-RS symbols from the base station, wherein the second information comprise the one or more DM-RS symbols, wherein the means for extracting is configured to decode the one or more DM-RS symbols from the subframe based on the at least one of the number of the one or more DM-RS symbols or the one or more locations.

50. The apparatus of claim 49, wherein one or more bits are reserved in downlink control information (DCI) to identify the at least one of the number of the one or more DM-RS symbols or the one or more locations within the subframe for the transmission of the one or more DM-RS symbols.

51. The apparatus of claim 49, wherein the number of the one or more DM-RS symbols is one, wherein the one or more locations comprise a first symbol of physical downlink shared channel (PDSCH).

52. The apparatus of claim 49, wherein the number of the one or more DM-RS symbols is two, wherein the one or more locations comprise a first location at a beginning of physical downlink shared channel (PDSCH) and a second location in a middle of the PDSCH, the first location and the second location being separated by at least one symbol.

53. An apparatus for wireless communication, the apparatus being a base station, comprising:

a memory; and

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

determine at least one of a number of one or more demodulation reference signal (DM-RS) symbols or one or more locations within a subframe for transmission of the one or more DM-RS symbols;

transmit the at least one of the number of the one or more DM-RS symbols or the one or more locations within the subframe for the transmission of the one or more DM-RS symbols to a user equipment (UE);

determine a resource allocation scheme for a phase noise compensation reference signal (PC-RS); and

transmit the resource allocation scheme for the PC-RS to the UE.

54. The apparatus of claim 53, wherein the resource allocation scheme for the PC-RS is determined with regard to the one or more DM-RS symbols.

55. The apparatus of claim 53, wherein, to transmit the resource allocation scheme for the PC-RS to the UE, the at least one processor is configured to send the resource allocation scheme for the PC-RS to the UE dynamically via physical downlink control channel (PDCCH).

56. The apparatus of claim 55, wherein one or more bits are reserved in downlink control information (DCI) to identify the resource allocation scheme for the PC-RS.

57. The apparatus of claim 53, wherein, to transmit the resource allocation scheme for the PC-RS to the UE, the at least one processor is configured to send the resource allocation scheme for the PC-RS to the UE via radio resource control (RRC) signaling.

58. The apparatus of claim 53, wherein the resource allocation scheme informs the UE to rate match the PC-RS around subcarriers of the one or more DM-RS symbols.

59. The apparatus of claim 53, wherein the resource allocation scheme informs the UE to puncture the one or more DM-RS symbols in subcarriers that are reserved for the PC-RS.

60. The apparatus of claim 53, wherein the resource allocation scheme informs the UE to puncture the PC-RS in the one or more DM-RS symbols.

61. An apparatus for wireless communication, the apparatus being a base station, comprising:

a memory; and
at least one processor coupled to the memory and configured to:
determine information to be conveyed by a physical downlink control channel (PDCCH); and
transmit the information to a user equipment (UE) via the PDCCH, wherein the PDCCH is punctured to accommodate a phase noise compensation reference signal (PC-RS).

62. The apparatus of claim 61, wherein the information comprises at least one of a number of one or more demodulation reference signal (DM-RS) symbols or one or more locations within a subframe for transmission of the one or more DM-RS symbols.

63. The apparatus of claim 62, wherein one or more bits are reserved in downlink control information (DCI) to identify the at least one of the number of the one or more DM-RS symbols or the one or more locations within the subframe for the transmission of the one or more DM-RS symbols.

64. The apparatus of claim 62, wherein the number of the one or more DM-RS symbols is one, wherein the one or more locations comprise a first symbol of physical downlink shared channel (PDSCH).

65. The apparatus of claim 62, wherein the number of the one or more DM-RS symbols is two, wherein the one or more locations comprise a first location at a beginning of physical downlink shared channel (PDSCH) and a second location in a middle of the PDSCH, the first location and the second location being separated by at least one symbol.

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

a memory; and
at least one processor coupled to the memory and configured to:
receive at least one of a number of one or more demodulation reference signal (DM-RS) symbols or one or more locations within a subframe for transmission of the one or more DM-RS symbols from a base station;

decode the one or more DM-RS symbols from the subframe based on the at least one of the number of the one or more DM-RS symbols or the one or more locations;

receive a resource allocation scheme for a phase noise compensation reference signal (PC-RS); and

decode the PC-RS from the subframe based on the resource allocation scheme for the PC-RS.

67. The apparatus of claim 66, wherein the resource allocation scheme for the PC-RS is determined with regard to the one or more DM-RS symbols.

68. The apparatus of claim 66, wherein, to receive the resource allocation scheme for the PC-RS, the at least one processor is configured to receive the resource allocation scheme for the PC-RS dynamically via physical downlink control channel (PDCCH).

69. The apparatus of claim 68, wherein one or more bits are reserved in downlink control information (DCI) to identify the resource allocation scheme for the PC-RS.

70. The apparatus of claim 66, wherein, to receive the resource allocation scheme for the PC-RS, the at least one processor is configured to receive the resource allocation scheme for the PC-RS via radio resource control (RRC) signaling.

71. The apparatus of claim 66, wherein the resource allocation scheme informs the UE to rate match the PC-RS around subcarriers of the one or more DM-RS symbols.

72. The apparatus of claim 66, wherein the resource allocation scheme informs the UE to puncture the one or more DM-RS symbols in subcarriers that are reserved for the PC-RS.

73. The apparatus of claim 66, wherein the resource allocation scheme informs the UE to puncture the PC-RS in the one or more DM-RS symbols.

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

a memory; and

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

receive a first information via a physical downlink control channel (PDCCH) from a base station, wherein the PDCCH is punctured to accommodate a phase noise compensation reference signal (PC-RS); and

extract a second information from a subframe based on the first information.

75. The apparatus of claim 74, wherein the first information comprises at least one of a number of one or more demodulation reference signal (DM-RS) symbols or one or more locations within the subframe for transmission of the one or more DM-RS symbols from the base station, wherein the second information comprise the one or more DM-RS symbols, wherein, to extract the second information, the at least one processor is configured to decode the one or more DM-RS symbols from the subframe based on the at least one of the number of the one or more DM-RS symbols or the one or more locations.

76. The apparatus of claim 75, wherein one or more bits are reserved in downlink control information (DCI) to identify the at least one of the number of the one or more DM-RS symbols or the one or more locations within the subframe for the transmission of the one or more DM-RS symbols.

77. The apparatus of claim 75, wherein the number of the one or more DM-RS symbols is one, wherein the one or more locations comprise a first symbol of physical downlink shared channel (PDSCH).

78. The apparatus of claim 75, wherein the number of the one or more DM-RS symbols is two, wherein the one or more locations comprise a first location at a beginning of physical downlink shared channel (PDSCH) and a second location in a middle of the PDSCH, the first location and the second location being separated by at least one symbol.

79. A computer-readable medium storing computer executable code, comprising code to:

determine at least one of a number of one or more demodulation reference signal (DM-RS) symbols or one or more locations within a subframe for transmission of the one or more DM-RS symbols;

transmit the at least one of the number of the one or more DM-RS symbols or the one or more locations within the subframe for the transmission of the one or more DM-RS symbols to a user equipment (UE);

determine a resource allocation scheme for a phase noise compensation reference signal (PC-RS); and

transmit the resource allocation scheme for the PC-RS to the UE.

80. A computer-readable medium storing computer executable code, comprising code to:

determine information to be conveyed by a physical downlink control channel (PDCCH); and

transmit the information to a user equipment (UE) via the PDCCH, wherein the PDCCH is punctured to accommodate a phase noise compensation reference signal (PC-RS).

81. A computer-readable medium storing computer executable code, comprising code to:

receive at least one of a number of one or more demodulation reference signal (DM-RS) symbols or one or more locations within a subframe for transmission of the one or more DM-RS symbols from a base station;

decode the one or more DM-RS symbols from the subframe based on the at least one of the number of the one or more DM-RS symbols or the one or more locations;

receive a resource allocation scheme for a phase noise compensation reference signal (PC-RS); and

decode the PC-RS from the subframe based on the resource allocation scheme for the PC-RS.

82. A computer-readable medium storing computer executable code, comprising code to:

receive a first information via a physical downlink control channel (PDCCH) from a base station, wherein the PDCCH is punctured to accommodate a phase noise compensation reference signal (PC-RS); and
extract a second information from a subframe based on the first information.