

CLAIMS

What is claimed is:

1 1. A method for wireless communications, comprising:
2 transmitting a first Orthogonal Frequency-Division Multiple Access
3 (OFDMA) communications signal to a wireless node in a licensed spectrum; and
4 transmitting, concurrently with the transmission of the first OFDMA
5 communications signal, a second OFDMA communications signal to the wireless node in an
6 unlicensed spectrum.

1 2. The method of claim 1, wherein the transmission of the second
2 OFDMA communications signal in the unlicensed spectrum is time-synchronized with the
3 first OFDMA communications signal in the licensed spectrum, with a fixed offset between a
4 frame structure of the first OFDMA communications signal and a frame structure of the
5 second OFDMA communications signal.

1 3. The method of claim 2, wherein the fixed offset is equal to zero.

1 4. The method of claim 1, further comprising:
2 receiving, concurrently with the transmission of the first and second OFDMA
3 communications signals, a first Single-Carrier Frequency-Division Multiple Access (SC-
4 FDMA) communications signal from the wireless node in the licensed spectrum.

1 5. The method of claim 4, further comprising:
2 receiving, concurrently with the transmission of the first and second OFDMA
3 communications signals, a second SC-FDMA communications signal from the wireless node
4 in the unlicensed spectrum.

1 6. The method of claim 4, wherein the first SC-FDMA communications
2 signal received from the wireless node in the licensed spectrum carries signaling or other
3 control information related to the second OFDMA communications signal transmitted in the
4 unlicensed spectrum.

1 7. The method of claim 6, further comprising:

receiving, concurrently with the transmission of the first and second OFDMA communications signals, a second SC-FDMA communications signal from the wireless node in the unlicensed spectrum.

8. The method of claim 1, further comprising:
receiving, concurrently with the transmission of the first and second OFDMA communications signals, a first SC-FDMA communications signal from the wireless node in the licensed spectrum and a second SC-FDMA communications signal from the wireless node in the unlicensed spectrum.

9. The method of claim 1, wherein the wireless node comprises a user equipment (UE).

10. The method of claim 1, wherein the first and second OFDMA communications signals are transmitted from an evolved Node B (eNB).

11. The method of claim 1, wherein each of the first and second OFDMA communications signals comprises a Long Term Evolution (LTE) signal.

12. An apparatus for wireless communications, comprising:
means for transmitting a first Orthogonal Frequency-Division Multiple Access (OFDMA) communications signal to a wireless node in a licensed spectrum; and
means for transmitting, concurrently with the transmission of the first OFDMA communications signal, a second OFDMA communications signal to the wireless node in an unlicensed spectrum.

13. The apparatus of claim 12, wherein the transmission of the second OFDMA communications signal in the unlicensed spectrum is time-synchronized with the first OFDMA communications signal in the licensed spectrum, with a fixed offset between a frame structure of the first OFDMA communications signal and a frame structure of the second OFDMA communications signal.

14. The apparatus of claim 13, wherein the fixed offset is equal to zero.

15. The apparatus of claim 12, further comprising:

means for receiving, concurrently with the transmission of the first and second OFDMA communications signals, a first Single-Carrier Frequency-Division Multiple Access (SC-FDMA) communications signal from the wireless node in the licensed spectrum.

16. The apparatus of claim 15, further comprising:
means for receiving, concurrently with the transmission of the first and second OFDMA communications signals, a second SC-FDMA communications signal from the wireless node in the unlicensed spectrum.

17. The apparatus of claim 15, wherein the first SC-FDMA communications signal received from the wireless node in the licensed spectrum carries signaling or other control information related to the second OFDMA communications signal transmitted in the unlicensed spectrum.

18. The apparatus of claim 17, further comprising:
means for receiving, concurrently with the transmission of the first and second OFDMA communications signals, a second SC-FDMA communications signal from the wireless node in the unlicensed spectrum.

19. The apparatus of claim 12, further comprising:
means for receiving, concurrently with the transmission of the first and second OFDMA communications signals, a first SC-FDMA communications signal from the wireless node in the licensed spectrum and a second SC-FDMA communications signal from the wireless node in the unlicensed spectrum.

20. The apparatus of claim 12, wherein the wireless node comprises a user equipment (UE).

21. The apparatus of claim 12, wherein the first and second OFDMA communications signals are transmitted from an evolved Node B (eNB).

22. The apparatus of claim 12, wherein each of the first and second OFDMA communications signals comprises a Long Term Evolution (LTE) signal.

23. An apparatus for wireless communications, comprising:
a processor;

memory in electronic communication with the processor; and
instructions stored in the memory, the instructions being executable by the
processor to:

transmit a first Orthogonal Frequency-Division Multiple Access
(OFDMA) communications signal to a wireless node in a licensed spectrum;
and

transmit, concurrently with the transmission of the first OFDMA
communications signal, a second OFDMA communications signal to the
wireless node in an unlicensed spectrum.

24. The apparatus of claim 23, wherein the transmission of the second
OFDMA communications signal in the unlicensed spectrum is time-synchronized with the
first OFDMA communications signal in the licensed spectrum, with a fixed offset between a
frame structure of the first OFDMA communications signal and a frame structure of the
second OFDMA communications signal.

25. The apparatus of claim 24, wherein the fixed offset is equal to zero.

26. The apparatus of claim 23, wherein the instructions are executable by
the processor to:

receive, concurrently with the transmission of the first and second OFDMA
communications signals, a first Single-Carrier Frequency-Division Multiple Access (SC-
FDMA) communications signal from the wireless node in the licensed spectrum.

27. The apparatus of claim 26, wherein the instructions are executable by
the processor to:

receive, concurrently with the transmission of the first and second OFDMA
communications signals, a second SC-FDMA communications signal from the wireless node
in the unlicensed spectrum.

28. The apparatus of claim 26, wherein the first SC-FDMA
communications signal received from the wireless node in the licensed spectrum carries
signaling or other control information related to the second OFDMA communications signal
transmitted in the unlicensed spectrum.

1 29. The apparatus of claim 28, wherein the instructions are executable by
2 the processor to:
3 receive, concurrently with the transmission of the first and second OFDMA
4 communications signals, a second SC-FDMA communications signal from the wireless node
5 in the unlicensed spectrum.

1 30. The apparatus of claim 23, wherein the instructions are executable by
2 the processor to:
3 receive, concurrently with the transmission of the first and second OFDMA
4 communications signals, a first SC-FDMA communications signal from the wireless node in
5 the licensed spectrum and a second SC-FDMA communications signal from the wireless
6 node in the unlicensed spectrum.

1 31. The apparatus of claim 23, wherein the wireless node comprises a user
2 equipment (UE).

1 32. The apparatus of claim 23, wherein the first and second OFDMA
2 communications signals are transmitted from an evolved Node B (eNB).

1 33. The apparatus of claim 23, wherein each of the first and second
2 OFDMA communications signals comprises a Long Term Evolution (LTE) signal.

1 34. A computer program product for communications by a wireless
2 communications apparatus in a wireless communications system, the computer program
3 product comprising a non-transitory computer-readable medium storing instructions
4 executable by a processor to cause the wireless communications apparatus to:
5 transmit a first Orthogonal Frequency-Division Multiple Access (OFDMA)
6 communications signal to a wireless node in a licensed spectrum; and
7 transmit, concurrently with the transmission of the first OFDMA
8 communications signal, a second OFDMA communications signal to the wireless node in an
9 unlicensed spectrum.

1 35. The computer program product of claim 34, wherein the transmission
2 of the second OFDMA communications signal in the unlicensed spectrum is time-

synchronized with the first OFDMA communications signal in the licensed spectrum, with a fixed offset between a frame structure of the first OFDMA communications signal and a frame structure of the second OFDMA communications signal.

36. The computer program product of claim 35, wherein the fixed offset is equal to zero.

37. The computer program product of claim 34, wherein the instructions are executable by the processor to cause the wireless communications apparatus to:
receive, concurrently with the transmission of the first and second OFDMA communications signals, a first SC-FDMA communications signal from the wireless node in the licensed spectrum and a second SC-FDMA communications signal from the wireless node in the unlicensed spectrum.

38. The computer program product of claim 34, wherein the wireless node comprises a user equipment (UE).

39. A method for wireless communications, comprising:
receiving a first SC-FDMA communications signal from a wireless node in a licensed spectrum; and
receiving, concurrently with the reception of the first SC-FDMA communications signal, a second SC-FDMA signal from the wireless node in an unlicensed spectrum.

40. The method of claim 39, wherein the wireless node comprises a user equipment (UE).

41. The method of claim 39, wherein the first and second SC-FDMA communications signals are received at an evolved Node B (eNB).

42. The method of claim 39, wherein each of the first and second SC-FDMA communications signals comprises a Long Term Evolution (LTE) signal.

43. An apparatus for wireless communications, comprising:
means for receiving a first SC-FDMA communications signal from a wireless node in a licensed spectrum; and

means for receiving, concurrently with the reception of the first SC-FDMA communications signal, a second SC-FDMA signal from the wireless node in an unlicensed spectrum.

44. The apparatus of claim 43, wherein the wireless node comprises a user equipment (UE).

45. The method of claim 43, wherein the first and second SC-FDMA communications signals are received at an evolved Node B (eNB).

46. The apparatus of claim 43, wherein each of the first and second SC-FDMA communications signals comprises a Long Term Evolution (LTE) signal.

47. An apparatus for wireless communications, comprising:
a processor;
memory in electronic communication with the processor; and
instructions stored in the memory, the instructions being executable by the processor to:
receive a first SC-FDMA communications signal from a wireless node in a licensed spectrum; and
receive, concurrently with the reception of the first SC-FDMA communications signal, a second SC-FDMA signal from the wireless node in an unlicensed spectrum.

48. The apparatus of claim 47, wherein the wireless node comprises a user equipment (UE).

49. The apparatus of claim 47, wherein the first and second SC-FDMA communications signals are received at an evolved Node B (eNB).

50. The apparatus of claim 47, wherein each of the first and second SC-FDMA communications signals comprises a Long Term Evolution (LTE) signal.

51. A computer program product for communications by a wireless communications apparatus in a wireless communications system, the computer program

3 product comprising a non-transitory computer-readable medium storing instructions
4 executable by a processor to cause the wireless communications apparatus to:
5 receive a first SC-FDMA communications signal from a wireless node in a
6 licensed spectrum; and
7 receive, concurrently with the reception of the first SC-FDMA
8 communications signal, a second SC-FDMA signal from the wireless node in an unlicensed
9 spectrum.

1 52. The computer program product of claim 51, wherein the wireless node
2 comprises a user equipment (UE).

1 53. A method for wireless communications, comprising:
2 receiving a first Orthogonal Frequency-Division Multiple Access (OFDMA)
3 communications signal from a wireless node in a licensed spectrum; and
4 receiving, concurrently with the reception of the first OFDMA
5 communications signal, a second OFDMA communication signal from the wireless node in
6 an unlicensed spectrum.

1 54. The method of claim 53, further comprising:
2 transmitting, concurrently with the reception of the first and second OFDMA
3 communications signals, a first SC-FDMA communications signal to the wireless node in the
4 licensed spectrum.

1 55. The method of claim 54, further comprising:
2 transmitting, concurrently with the reception of the first and second OFDMA
3 communications signals, a second SC-FDMA communications signal to the wireless node in
4 the unlicensed spectrum.

1 56. The method of claim 54, wherein the first SC-FDMA communications
2 signal transmitted to the wireless node in the licensed spectrum carries signaling or other
3 control information related to the second OFDMA signal received in the unlicensed
4 spectrum.

1 57. The method of claim 56, further comprising:

transmitting, concurrently with the reception of the first and second OFDMA communications signals, a second SC-FDMA communications signal to the wireless node in the unlicensed spectrum.

58. The method of claim 53, further comprising:
transmitting, concurrently with the reception of the first and second OFDMA communications signals, a first SC-FDMA communications signal to the wireless node in the licensed spectrum and a second SC-FDMA communications signal to the wireless node in the unlicensed spectrum.

59. The method of claim 53, wherein the wireless node comprises an evolved Node B (eNB).

60. The method of claim 53, wherein the first and second OFDMA communications signals are received at a user equipment (UE).

61. The method of claim 53, wherein each of the first and second OFDMA communications signals comprises a Long Term Evolution (LTE) signal.

62. An apparatus for wireless communications, comprising:
means for receiving a first Orthogonal Frequency-Division Multiple Access (OFDMA) communications signal from a wireless node in a licensed spectrum; and
means for receiving, concurrently with the reception of the first OFDMA communications signal, a second OFDMA communication signal from the wireless node in an unlicensed spectrum.

63. The apparatus of claim 62, further comprising:
means for transmitting, concurrently with the reception of the first and second OFDMA communications signals, a first SC-FDMA communications signal to the wireless node in a licensed spectrum.

64. The apparatus of claim 63, further comprising:
means for transmitting, concurrently with the reception of the first and second OFDMA communications signals, a second SC-FDMA communications signal to the wireless node in the unlicensed spectrum.

1 65. The apparatus of claim 63, wherein the first SC-FDMA
2 communications signal transmitted to the wireless node in the licensed spectrum carries
3 signaling or other control information related to the second OFDMA signal received in the
4 unlicensed spectrum.

1 66. The apparatus of claim 65, further comprising:
2 means for transmitting, concurrently with the reception of the first and second
3 OFDMA communications signals, a second SC-FDMA communications signal to the
4 wireless node in the unlicensed spectrum.

1 67. The apparatus of claim 62, further comprising:
2 means for transmitting, concurrently with the reception of the first and second
3 OFDMA communications signals, a first SC-FDMA communications signal to the wireless
4 node in the licensed spectrum and a second SC-FDMA communications signal to the wireless
5 node in the unlicensed spectrum.

1 68. The apparatus of claim 62, wherein the wireless node comprises an
2 evolved Node B (eNB).

1 69. The apparatus of claim 62, wherein the first and second OFDMA
2 communications signals are received at a user equipment (UE).

1 70. The apparatus of claim 62, wherein each of the first and second
2 OFDMA communications signals comprises LTE signals.

1 71. An apparatus for wireless communications, comprising:
2 a processor;
3 memory in electronic communication with the processor; and
4 instructions stored in the memory, the instructions being executable by the
5 processor to:
6 receive a first Orthogonal Frequency-Division Multiple Access (OFDMA)
7 communications signal from a wireless node in a licensed spectrum;
8 and

9 receive, concurrently with the reception of the first OFDMA communications
10 signal, a second OFDMA communication signal from the wireless
11 node in an unlicensed spectrum.

1 72. The apparatus of claim 71, wherein the instructions are executable by
2 the processor to:
3 transmit, concurrently with the reception of the first and second OFDMA
4 communications signals, a first SC-FDMA communications signal to the wireless node in a
5 licensed spectrum.

1 73. The apparatus of claim 72, wherein the instructions are executable by
2 the processor to:
3 transmit, concurrently with the reception of the first and second OFDMA
4 communications signals, a second SC-FDMA communications signal to the wireless node in
5 the unlicensed spectrum.

1 74. The apparatus of claim 72, wherein the first SC-FDMA
2 communications signal transmitted to the wireless node in the licensed spectrum carries
3 signaling or other control information related to the second OFDMA signal received in the
4 unlicensed spectrum.

1 75. The apparatus of claim 74, wherein the instructions are executable by
2 the processor to:
3 transmit, concurrently with the reception of the first and second OFDMA
4 communications signals, a second SC-FDMA communications signal to the wireless node in
5 the unlicensed spectrum.

1 76. The apparatus of claim 71, wherein the instructions are executable by
2 the processor to:
3 transmit, concurrently with the reception of the first and second OFDMA
4 communications signals, a first SC-FDMA communications signal to the wireless node in the
5 licensed spectrum and a second SC-FDMA communications signal to the wireless node in the
6 unlicensed spectrum.

1 77. The apparatus of claim 71, wherein the wireless node comprises an
2 evolved Node B (eNB).

1 78. The apparatus of claim 71, wherein the first and second OFDMA
2 communications signals are received at a user equipment (UE).

1 79. The apparatus of claim 71, wherein each of the first and second
2 OFDMA communications signals comprises LTE signals.

1 80. A computer program product for communications by a wireless
2 communications apparatus in a wireless communications system, the computer program
3 product comprising a non-transitory computer-readable medium storing instructions
4 executable by a processor to cause the wireless communications apparatus to:
5 receive a first Orthogonal Frequency-Division Multiple Access (OFDMA)
6 communications signal from a wireless node in a licensed spectrum; and
7 receive, concurrently with the reception of the first OFDMA communications
8 signal, a second OFDMA communication signal from the wireless node in an unlicensed
9 spectrum.

1 81. The computer program product of claim 80, wherein the instructions
2 are executable by the processor to cause the wireless communications apparatus to:
3 transmit, concurrently with the reception of the first and second OFDMA
4 communications signals, a first SC-FDMA communications signal to the wireless node in a
5 licensed spectrum.

1 82. The computer program product of claim 81, wherein the instructions
2 are executable by the processor to cause the wireless communications apparatus to:
3 transmit, concurrently with the reception of the first and second OFDMA
4 communications signals, a second SC-FDMA communications signal to the wireless node in
5 the unlicensed spectrum.

1 83. The computer program product of claim 80, wherein the wireless node
2 comprises an evolved Node B (eNB).

1 84. A method for wireless communications, comprising:

transmitting a first SC-FDMA communications signal to a wireless node in a licensed spectrum; and
transmitting, concurrently with the transmission of the first SC-FDMA communications signal, a second SC-FDMA communications signal to the wireless node in an unlicensed spectrum.

85. The method of claim 84, wherein the wireless node comprises an evolved Node B (eNB).

86. The method of claim 84, wherein the first and second OFDMA communications signals are received at a user equipment (UE).

87. The method of claim 84, wherein each of the first and second SC-FDMA communications signals comprises a Long Term Evolution (LTE) signal.

88. An apparatus for wireless communications, comprising:
means for transmitting a first SC-FDMA communications signal to a wireless node in a licensed spectrum; and
means for transmitting, concurrently with the transmission of the first SC-FDMA communications signal, a second SC-FDMA communications signal to the wireless node in an unlicensed spectrum.

89. The apparatus of claim 88, wherein the wireless node comprises an evolved Node B (eNB).

90. The apparatus of claim 88, wherein the first and second SC-FDMA communications signals are transmitted from a user equipment (UE).

91. The apparatus of claim 88, wherein each of the first and second SC-FDMA communications signals comprises a Long Term Evolution (LTE) signal.

92. An apparatus for wireless communications, comprising:
a processor;
memory in electronic communication with the processor; and
instructions stored in the memory, the instructions being executable by the processor to:

6 transmit a first SC-FDMA communications signal to a wireless node in a
7 licensed spectrum; and
8 transmit, concurrently with the transmission of the first SC-FDMA
9 communications signal, a second SC-FDMA communications signal to
10 the wireless node in an unlicensed spectrum.

1 93. The apparatus of claim 92, wherein the wireless node comprises an
2 evolved Node B (eNB).

1 94. The apparatus of claim 92, wherein the first and second SC-FDMA
2 communications signals are transmitted from a user equipment (UE).

1 95. The apparatus of claim 92, wherein each of the first and second SC-
2 FDMA communications signals comprises a Long Term Evolution (LTE) signal.

1 96. A computer program product for communications by a wireless
2 communications apparatus in a wireless communications system, the computer program
3 product comprising a non-transitory computer-readable medium storing instructions
4 executable by a processor to cause the wireless communications apparatus to:
5 transmit a first SC-FDMA communications signal to a wireless node in a
6 licensed spectrum; and
7 transmit, concurrently with the transmission of the first SC-FDMA
8 communications signal, a second SC-FDMA communications signal to the wireless node in
9 an unlicensed spectrum.

1 97. The computer program product of claim 96, wherein the wireless node
2 comprises an evolved Node B (eNB).

1 98. A method for wireless communications, comprising:
2 generating a periodic gating interval for a downlink in an unlicensed spectrum;
3 and
4 synchronizing at least one boundary of the periodic gating interval with at
5 least one boundary of a periodic frame structure associated with a primary component carrier
6 (PCC) of the downlink.

1 99. The method of claim 98, wherein the PCC comprises a carrier in a
2 licensed spectrum.

1 100. The method of claim 98, wherein the periodic gating interval
2 comprises a listen-before-talk (LBT) frame and the periodic frame structure comprises a
3 Long Term Evolution (LTE) radio frame.

1 101. The method of claim 98, wherein a duration of the periodic gating
2 interval is an integral multiple of a duration of the periodic frame structure.

1 102. The method of claim 98, wherein a duration of the periodic gating
2 interval is a sub-multiple of a duration of the periodic frame structure.

1 103. The method of claim 98, wherein the downlink carries Long Term
2 Evolution (LTE) signals.

1 104. An apparatus for wireless communications, comprising:
2 means for generating a periodic gating interval for a downlink in an unlicensed
3 spectrum; and
4 means for synchronizing at least one boundary of the periodic gating interval
5 with at least one boundary of a periodic frame structure associated with a primary component
6 carrier (PCC) of the downlink.

1 105. The apparatus of claim 104, wherein the PCC comprises a carrier in a
2 licensed spectrum.

1 106. The apparatus of claim 104, wherein the periodic gating interval
2 comprises a listen-before-talk (LBT) frame and the periodic frame structure comprises a
3 Long Term Evolution (LTE) radio frame.

1 107. The apparatus of claim 104, wherein a duration of the periodic gating
2 interval is an integral multiple of a duration of the periodic frame structure

1 108. The apparatus of claim 104, wherein a duration of the periodic gating
2 interval is a sub-multiple of a duration of the periodic frame structure.

1 109. The apparatus of claim 104, wherein the downlink carries Long Term
2 Evolution (LTE) signals.

1 110. An apparatus for wireless communications, comprising:
2 a processor;
3 memory in electronic communication with the processor; and
4 instructions stored in the memory, the instructions being executable by the
5 processor to:
6 generate a periodic gating interval for a downlink in an unlicensed spectrum;
7 and
8 synchronize at least one boundary of the periodic gating interval with at least
9 one boundary of a periodic frame structure associated with a primary
10 component carrier (PCC) of the cellular downlink.

1 111. The apparatus of claim 110, wherein the PCC comprises a carrier in a
2 licensed spectrum.

1 112. The apparatus of claim 110, wherein the periodic gating interval
2 comprises a listen-before-talk (LBT) frame and the periodic frame structure comprises a
3 Long Term Evolution (LTE) radio frame.

1 113. The apparatus of claim 110, wherein a duration of the periodic gating
2 interval is an integral multiple of a duration of the periodic frame structure.

1 114. The apparatus of claim 110, wherein a duration of the periodic gating
2 interval is a sub-multiple of a duration of the periodic frame structure.

1 115. The apparatus of claim 110, wherein the downlink carries Long Term
2 Evolution (LTE) signals.

1 116. A computer program product for communications by a wireless
2 communications apparatus in a wireless communications system, the computer program
3 product comprising a non-transitory computer-readable medium storing instructions
4 executable by a processor to cause the wireless communications apparatus to:

5 generate a periodic gating interval for a downlink in an unlicensed spectrum;
6 and
7 synchronize at least one boundary of the periodic gating interval with at least
8 one boundary of a periodic frame structure associated with a primary component carrier
9 (PCC) of the cellular downlink.

1 117. The computer program product of claim 116, wherein the PCC
2 comprises a carrier in a licensed spectrum.

1 118. The computer program product of claim 116, wherein the periodic
2 gating interval comprises a listen-before-talk (LBT) frame and the periodic frame structure
3 comprises a Long Term Evolution (LTE) radio frame.

CLAIMS

1. A method for wireless communications, comprising:
transmitting a first Orthogonal Frequency-Division Multiple Access (OFDMA) communications signal to a wireless node in a licensed spectrum; and
transmitting, concurrently with the transmission of the first OFDMA communications signal, a second OFDMA communications signal to the wireless node in an unlicensed spectrum;
wherein the transmission of the second OFDMA communications signal in the unlicensed spectrum is time-synchronized with the first OFDMA communications signal in the licensed spectrum, with a fixed offset between a frame structure of the first OFDMA communications signal and a frame structure of the second OFDMA communications signal.
2. The method of claim 1, wherein the transmission of the second OFDMA communications signal in the unlicensed spectrum is time-synchronized with the first OFDMA communications signal in the licensed spectrum, with a fixed offset between a frame structure of the first OFDMA communications signal and a frame structure of the second OFDMA communications signal.
3. The method of claim 1, wherein the fixed offset is equal to zero.
4. The method of claim 1, further comprising:
receiving, concurrently with the transmission of the first and second OFDMA communications signals, a first Single-Carrier Frequency-Division Multiple Access (SC-FDMA) communications signal from the wireless node in the licensed spectrum.
5. The method of claim 4, further comprising:
receiving, concurrently with the transmission of the first and second OFDMA communications signals, a second SC-FDMA communications signal from the wireless node in the unlicensed spectrum.

6. The method of claim 4, wherein the first SC-FDMA communications signal received from the wireless node in the licensed spectrum carries signaling or other control information related to the second OFDMA communications signal transmitted in the unlicensed spectrum.

7. The method of claim 6, further comprising:
receiving, concurrently with the transmission of the first and second OFDMA communications signals, a second SC-FDMA communications signal from the wireless node in the unlicensed spectrum.

8. The method of claim 1, further comprising:
receiving, concurrently with the transmission of the first and second OFDMA communications signals, a first SC-FDMA communications signal from the wireless node in the licensed spectrum and a second SC-FDMA communications signal from the wireless node in the unlicensed spectrum.

9. The method of claim 1, wherein the wireless node comprises a user equipment (UE).

10. The method of claim 1, wherein the first and second OFDMA communications signals are transmitted from an evolved Node B (eNB).

11. The method of claim 1, wherein each of the first and second OFDMA communications signals comprises a Long Term Evolution (LTE) signal.

12. An apparatus for wireless communications, comprising:
means for transmitting a first Orthogonal Frequency-Division Multiple Access (OFDMA) communications signal to a wireless node in a licensed spectrum; and
means for transmitting, concurrently with the transmission of the first OFDMA communications signal, a second OFDMA communications signal to the wireless node in an unlicensed spectrum;

wherein the transmission of the second OFDMA communications signal in the unlicensed spectrum is time-synchronized with the first OFDMA communications signal in the licensed spectrum, with a fixed offset between a frame structure of the first OFDMA communications signal and a frame structure of the second OFDMA communications signal.

13. The apparatus of claim 12, wherein the transmission of the second OFDMA communications signal in the unlicensed spectrum is time-synchronized with the first OFDMA communications signal in the licensed spectrum, with a fixed offset between a frame structure of the first OFDMA communications signal and a frame structure of the second OFDMA communications signal.

14. The apparatus of claim 12, wherein the fixed offset is equal to zero.

15. The apparatus of claim 12, further comprising:
means for receiving, concurrently with the transmission of the first and second OFDMA communications signals, a first Single-Carrier Frequency-Division Multiple Access (SC-FDMA) communications signal from the wireless node in the licensed spectrum.

16. The apparatus of claim 15, further comprising:
means for receiving, concurrently with the transmission of the first and second OFDMA communications signals, a second SC-FDMA communications signal from the wireless node in the unlicensed spectrum.

17. The apparatus of claim 15, wherein the first SC-FDMA communications signal received from the wireless node in the licensed spectrum carries signaling or other control information related to the second OFDMA communications signal transmitted in the unlicensed spectrum.

18. The apparatus of claim 17, further comprising:

means for receiving, concurrently with the transmission of the first and second OFDMA communications signals, a second SC-FDMA communications signal from the wireless node in the unlicensed spectrum.

19. The apparatus of claim 12, further comprising:

means for receiving, concurrently with the transmission of the first and second OFDMA communications signals, a first SC-FDMA communications signal from the wireless node in the licensed spectrum and a second SC-FDMA communications signal from the wireless node in the unlicensed spectrum.

20. The apparatus of claim 12, wherein the wireless node comprises a user equipment (UE).

21. The apparatus of claim 12, wherein the first and second OFDMA communications signals are transmitted from an evolved Node B (eNB).

22. The apparatus of claim 12, wherein each of the first and second OFDMA communications signals comprises a Long Term Evolution (LTE) signal.

23. An apparatus for wireless communications, comprising:

a processor;

memory in electronic communication with the processor; and

instructions stored in the memory, the instructions being executable by the processor to:

transmit a first Orthogonal Frequency-Division Multiple Access (OFDMA)

communications signal to a wireless node in a licensed spectrum; and

transmit, concurrently with the transmission of the first OFDMA communications signal, a second OFDMA communications signal to the wireless node in an unlicensed spectrum;

wherein the transmission of the second OFDMA communications signal in the unlicensed spectrum is time-synchronized with the first OFDMA communications signal in the licensed spectrum, with a fixed offset between a frame structure of the first OFDMA communications signal and a frame structure of the second OFDMA communications signal.

24. The apparatus of claim 23, wherein the transmission of the second OFDMA communications signal in the unlicensed spectrum is time-synchronized with the first OFDMA communications signal in the licensed spectrum, with a fixed offset between a frame structure of the first OFDMA communications signal and a frame structure of the second OFDMA communications signal.

25. The apparatus of claim 23, wherein the fixed offset is equal to zero.

26. The apparatus of claim 23, wherein the instructions are executable by the processor to:

receive, concurrently with the transmission of the first and second OFDMA communications signals, a first Single-Carrier Frequency-Division Multiple Access (SC-FDMA) communications signal from the wireless node in the licensed spectrum.

27. The apparatus of claim 26, wherein the instructions are executable by the processor to:

receive, concurrently with the transmission of the first and second OFDMA communications signals, a second SC-FDMA communications signal from the wireless node in the unlicensed spectrum.

28. The apparatus of claim 26, wherein the first SC-FDMA communications signal received from the wireless node in the licensed spectrum carries signaling or other control information related to the second OFDMA communications signal transmitted in the unlicensed spectrum.

29. The apparatus of claim 28, wherein the instructions are executable by the processor to:

receive, concurrently with the transmission of the first and second OFDMA communications signals, a second SC-FDMA communications signal from the wireless node in the unlicensed spectrum.

30. The apparatus of claim 23, wherein the instructions are executable by the processor to:

receive, concurrently with the transmission of the first and second OFDMA communications signals, a first SC-FDMA communications signal from the wireless node in the licensed spectrum and a second SC-FDMA communications signal from the wireless node in the unlicensed spectrum.

31. The apparatus of claim 23, wherein the wireless node comprises a user equipment (UE).

32. The apparatus of claim 23, wherein the first and second OFDMA communications signals are transmitted from an evolved Node B (eNB).

33. The apparatus of claim 23, wherein each of the first and second OFDMA communications signals comprises a Long Term Evolution (LTE) signal.

34. A computer program product for communications by a wireless communications apparatus in a wireless communications system, the computer program product comprising a non-transitory computer-readable medium storing instructions executable by a processor to cause the wireless communications apparatus to:

transmit a first Orthogonal Frequency-Division Multiple Access (OFDMA) communications signal to a wireless node in a licensed spectrum; and

transmit, concurrently with the transmission of the first OFDMA communications signal, a second OFDMA communications signal to the wireless node in an unlicensed spectrum;

wherein the transmission of the second OFDMA communications signal in the unlicensed spectrum is time-synchronized with the first OFDMA communications signal in the licensed spectrum, with a fixed offset between a frame structure of the first OFDMA communications signal and a frame structure of the second OFDMA communications signal.

35. The computer program product of claim 34, wherein the transmission of the second OFDMA communications signal in the unlicensed spectrum is time-synchronized with the first OFDMA communications signal in the licensed spectrum, with a fixed offset between a frame structure of the first OFDMA communications signal and a frame structure of the second OFDMA communications signal.

36. The computer program product of claim 34, wherein the fixed offset is equal to zero.

37. The computer program product of claim 34, wherein the instructions are executable by the processor to cause the wireless communications apparatus to:
receive, concurrently with the transmission of the first and second OFDMA communications signals, a first SC-FDMA communications signal from the wireless node in the licensed spectrum and a second SC-FDMA communications signal from the wireless node in the unlicensed spectrum.

38. The computer program product of claim 34, wherein the wireless node comprises a user equipment (UE).

39. A method for wireless communications, comprising:
receiving a first Orthogonal Frequency-Division Multiple Access (OFDMA) communications signal from a wireless node in a licensed spectrum; and
receiving, concurrently with the reception of the first OFDMA communications signal, a second OFDMA communication signal from the wireless node in an unlicensed spectrum;
wherein the second OFDMA communications signal in the unlicensed spectrum is time-synchronized with the first OFDMA communications signal in the licensed spectrum, with a fixed offset between a frame structure of the first OFDMA communications signal and a frame structure of the second OFDMA communications signal.

40. The method of claim 39, further comprising:
transmitting, concurrently with the reception of the first and second OFDMA communications signals, a first SC-FDMA communications signal to the wireless node in the licensed spectrum.

41. The method of claim 40, further comprising:
transmitting, concurrently with the reception of the first and second OFDMA communications signals, a second SC-FDMA communications signal to the wireless node in the unlicensed spectrum.

42. The method of claim 40, wherein the first SC-FDMA communications signal transmitted to the wireless node in the licensed spectrum carries signaling or other control information related to the second OFDMA signal received in the unlicensed spectrum.

43. The method of claim 42, further comprising:
transmitting, concurrently with the reception of the first and second OFDMA communications signals, a second SC-FDMA communications signal to the wireless node in the unlicensed spectrum.

44. The method of claim 39, further comprising:
transmitting, concurrently with the reception of the first and second OFDMA communications signals, a first SC-FDMA communications signal to the wireless node in the licensed spectrum and a second SC-FDMA communications signal to the wireless node in the unlicensed spectrum.

45. The method of claim 39, wherein the wireless node comprises an evolved Node B (eNB).

46. The method of claim 39, wherein the first and second OFDMA communications signals are received at a user equipment (UE).

47. The method of claim 39, wherein each of the first and second OFDMA communications signals comprises a Long Term Evolution (LTE) signal.

48. An apparatus for wireless communications, comprising:
means for receiving a first Orthogonal Frequency-Division Multiple Access (OFDMA) communications signal from a wireless node in a licensed spectrum; and
means for receiving, concurrently with the reception of the first OFDMA communications signal, a second OFDMA communication signal from the wireless node in an unlicensed spectrum;

wherein the second OFDMA communications signal in the unlicensed spectrum is time-synchronized with the first OFDMA communications signal in the licensed spectrum, with a fixed offset between a frame structure of the first OFDMA communications signal and a frame structure of the second OFDMA communications signal.

49. The apparatus of claim 48, further comprising:
means for transmitting, concurrently with the reception of the first and second OFDMA communications signals, a first SC-FDMA communications signal to the wireless node in a licensed spectrum.

50. The apparatus of claim 49, further comprising:
means for transmitting, concurrently with the reception of the first and second OFDMA communications signals, a second SC-FDMA communications signal to the wireless node in the unlicensed spectrum.

51. The apparatus of claim 49, wherein the first SC-FDMA communications signal transmitted to the wireless node in the licensed spectrum carries signaling or other control information related to the second OFDMA signal received in the unlicensed spectrum.

52. The apparatus of claim 51, further comprising:

means for transmitting, concurrently with the reception of the first and second OFDMA communications signals, a second SC-FDMA communications signal to the wireless node in the unlicensed spectrum.

53. The apparatus of claim 48, further comprising:

means for transmitting, concurrently with the reception of the first and second OFDMA communications signals, a first SC-FDMA communications signal to the wireless node in the licensed spectrum and a second SC-FDMA communications signal to the wireless node in the unlicensed spectrum.

54. The apparatus of claim 48, wherein the wireless node comprises an evolved Node B (eNB).

55. The apparatus of claim 48, wherein the first and second OFDMA communications signals are received at a user equipment (UE).

56. The apparatus of claim 48, wherein each of the first and second OFDMA communications signals comprises LTE signals.

57. An apparatus for wireless communications, comprising:

a processor;

memory in electronic communication with the processor; and

instructions stored in the memory, the instructions being executable by the processor to:

receive a first Orthogonal Frequency-Division Multiple Access (OFDMA)

communications signal from a wireless node in a licensed spectrum; and

receive, concurrently with the reception of the first OFDMA communications signal, a second OFDMA communication signal from the wireless node in an unlicensed spectrum;

wherein the second OFDMA communications signal in the unlicensed spectrum is time-synchronized with the first OFDMA communications signal in the licensed spectrum, with a fixed offset between a frame structure of the first OFDMA communications signal and a frame structure of the second OFDMA communications signal.

58. The apparatus of claim 57, wherein the instructions are executable by the processor to:

transmit, concurrently with the reception of the first and second OFDMA communications signals, a first SC-FDMA communications signal to the wireless node in a licensed spectrum.

59. The apparatus of claim 58, wherein the instructions are executable by the processor to:

transmit, concurrently with the reception of the first and second OFDMA communications signals, a second SC-FDMA communications signal to the wireless node in the unlicensed spectrum.

60. The apparatus of claim 58, wherein the first SC-FDMA communications signal transmitted to the wireless node in the licensed spectrum carries signaling or other control information related to the second OFDMA signal received in the unlicensed spectrum.

61. The apparatus of claim 60, wherein the instructions are executable by the processor to:

transmit, concurrently with the reception of the first and second OFDMA communications signals, a second SC-FDMA communications signal to the wireless node in the unlicensed spectrum.

62. The apparatus of claim 57, wherein the instructions are executable by the processor to:

transmit, concurrently with the reception of the first and second OFDMA communications signals, a first SC-FDMA communications signal to the wireless node in the licensed spectrum and a second SC-FDMA communications signal to the wireless node in the unlicensed spectrum.

63. The apparatus of claim 57, wherein the wireless node comprises an evolved Node B (eNB).

64. The apparatus of claim 57, wherein the first and second OFDMA communications signals are received at a user equipment (UE).

65. The apparatus of claim 57, wherein each of the first and second OFDMA communications signals comprises LTE signals.

66. A computer program product for communications by a wireless communications apparatus in a wireless communications system, the computer program product comprising a non-transitory computer-readable medium storing instructions executable by a processor to cause the wireless communications apparatus to:

receive a first Orthogonal Frequency-Division Multiple Access (OFDMA) communications signal from a wireless node in a licensed spectrum; and

receive, concurrently with the reception of the first OFDMA communications signal, a second OFDMA communication signal from the wireless node in an unlicensed spectrum;

wherein the second OFDMA communications signal in the unlicensed spectrum is time-synchronized with the first OFDMA communications signal in the licensed spectrum, with a fixed offset between a frame structure of the first OFDMA communications signal and a frame structure of the second OFDMA communications signal.

67. The computer program product of claim 66, wherein the instructions are executable by the processor to cause the wireless communications apparatus to:

transmit, concurrently with the reception of the first and second OFDMA communications signals, a first SC-FDMA communications signal to the wireless node in a licensed spectrum.

68. The computer program product of claim 67, wherein the instructions are executable by the processor to cause the wireless communications apparatus to:

transmit, concurrently with the reception of the first and second OFDMA communications signals, a second SC-FDMA communications signal to the wireless node in the unlicensed spectrum.

69. The computer program product of claim 66, wherein the wireless node comprises an evolved Node B (eNB).