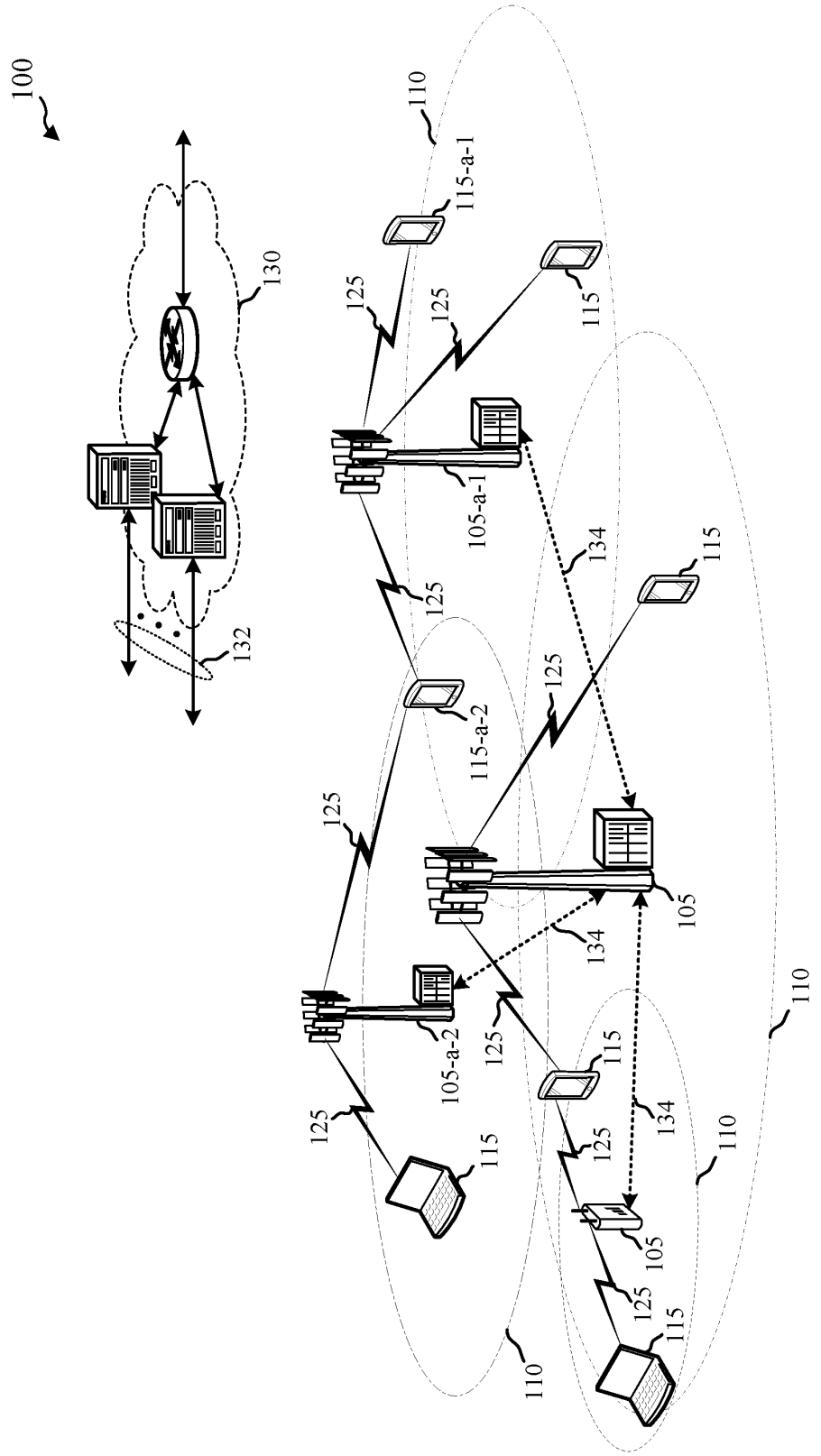

FIG. 1

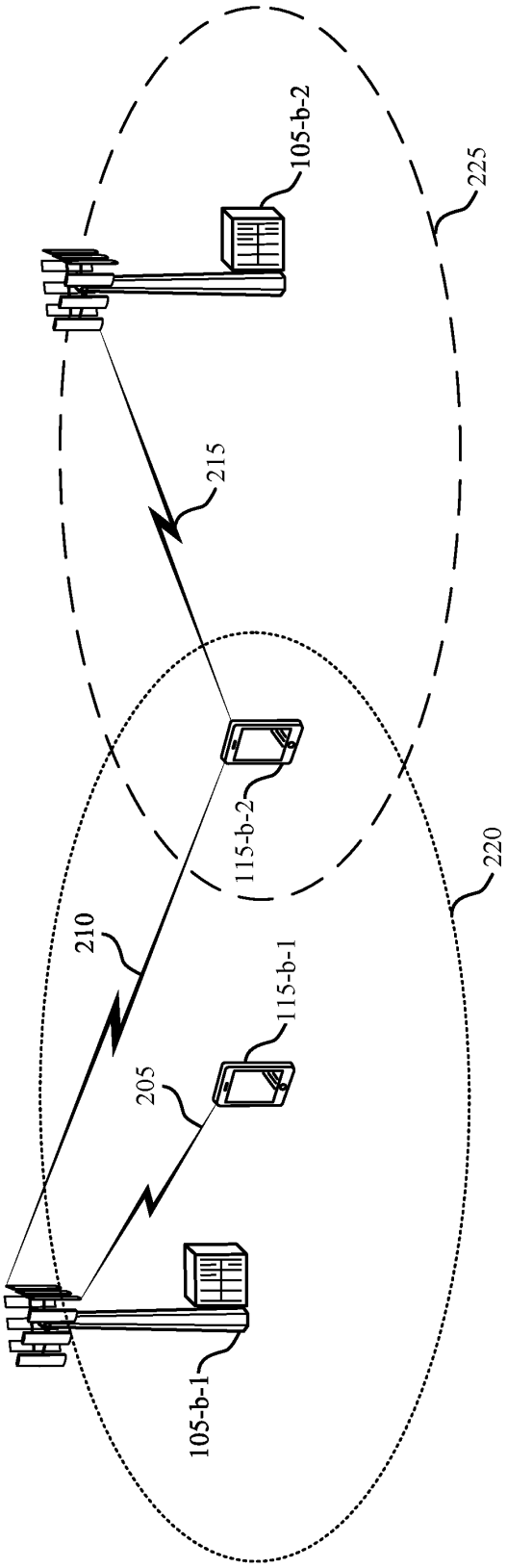

FIG. 2

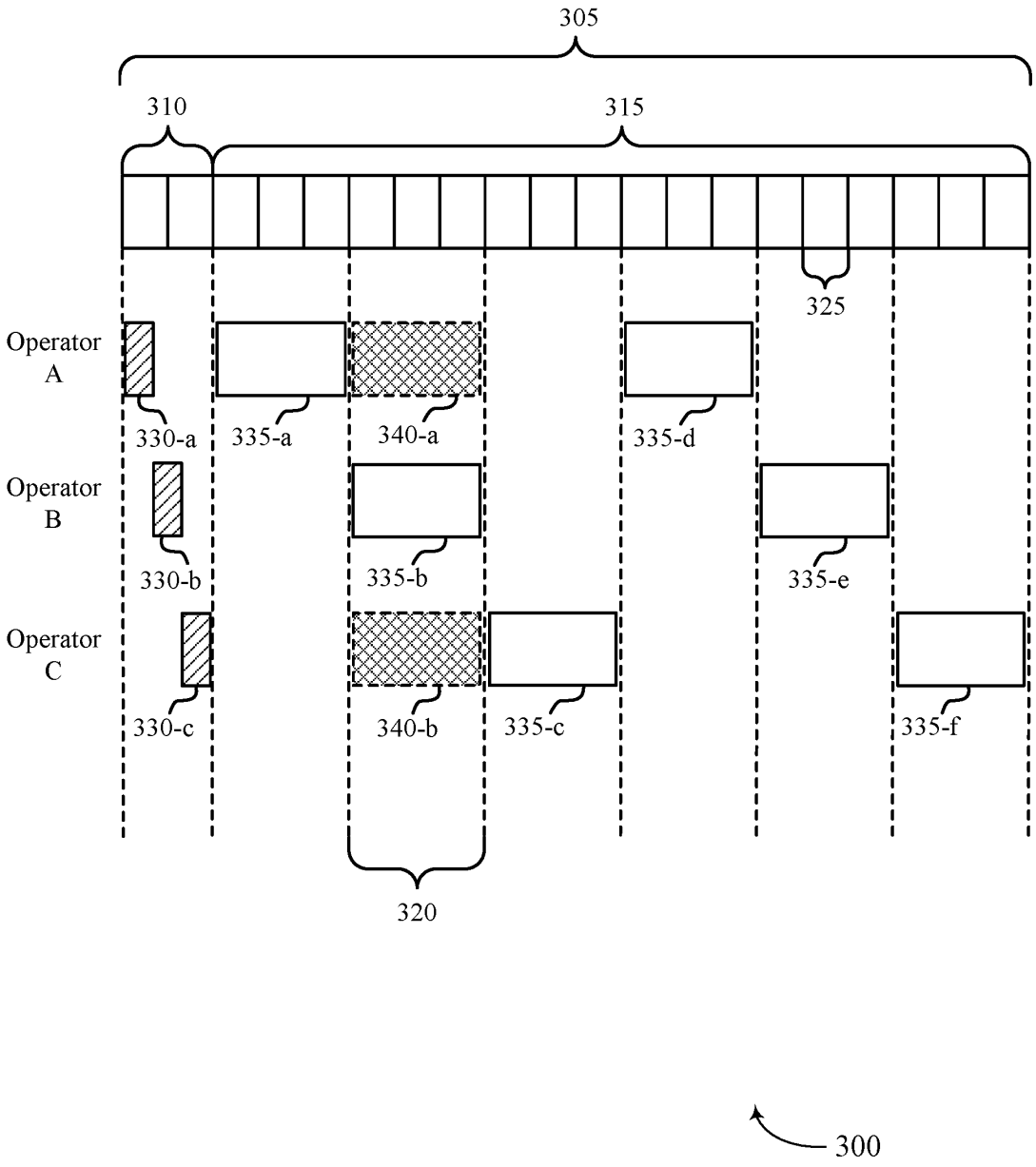
305
310
315
325
Operator A
Operator B
Operator C
330-a
335-a
340-a
335-d
330-b
335-b
335-e
330-c
340-b
335-c
335-f
320
300

FIG. 3

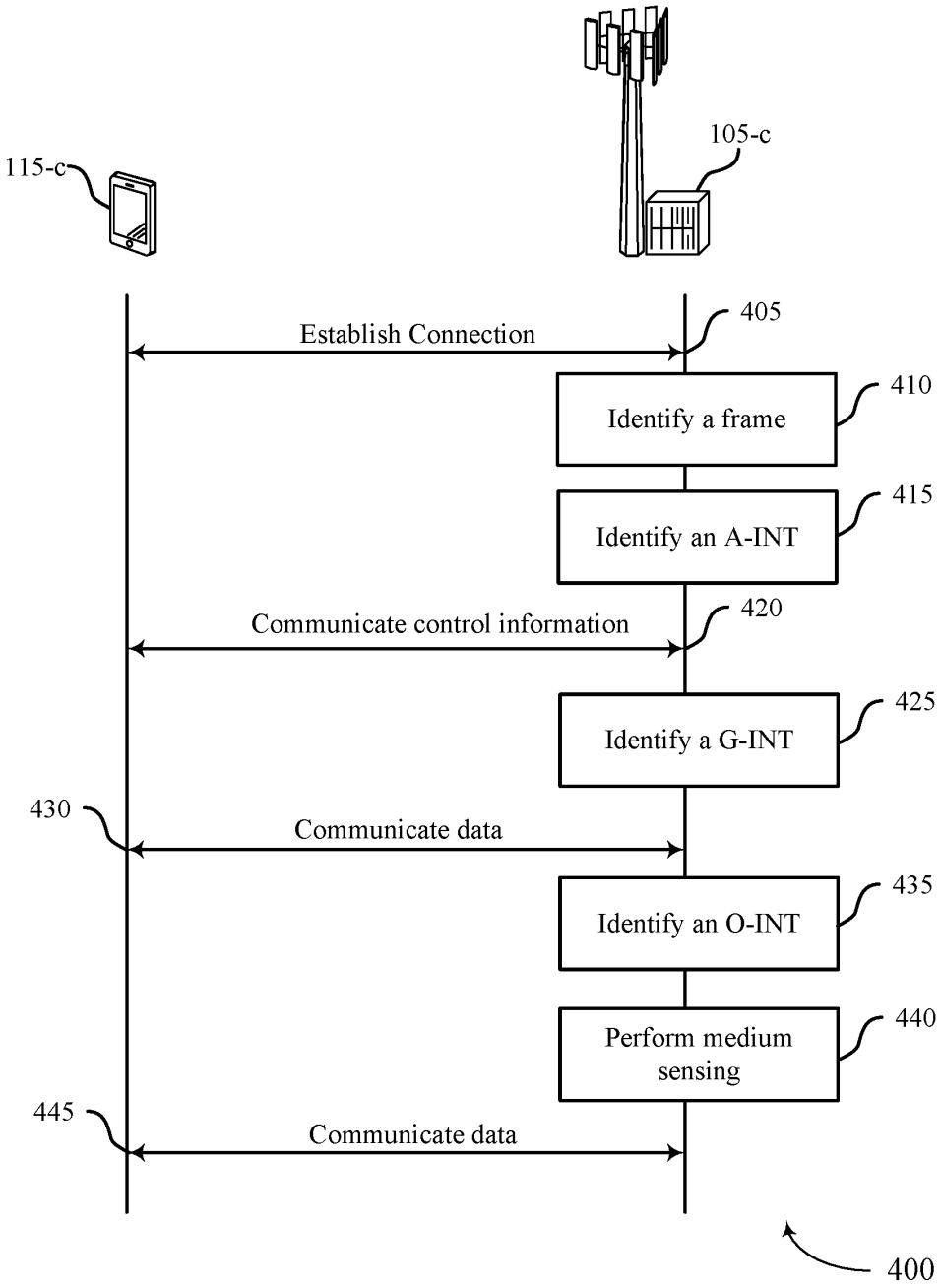
115-c
105-c
Establish Connection
405
Identify a frame
410
Identify an A-INT
415
Communicate control information
420
Identify a G-INT
425
430
Communicate data
Identify an O-INT
435
Perform medium sensing
440
445
Communicate data
400

FIG. 4

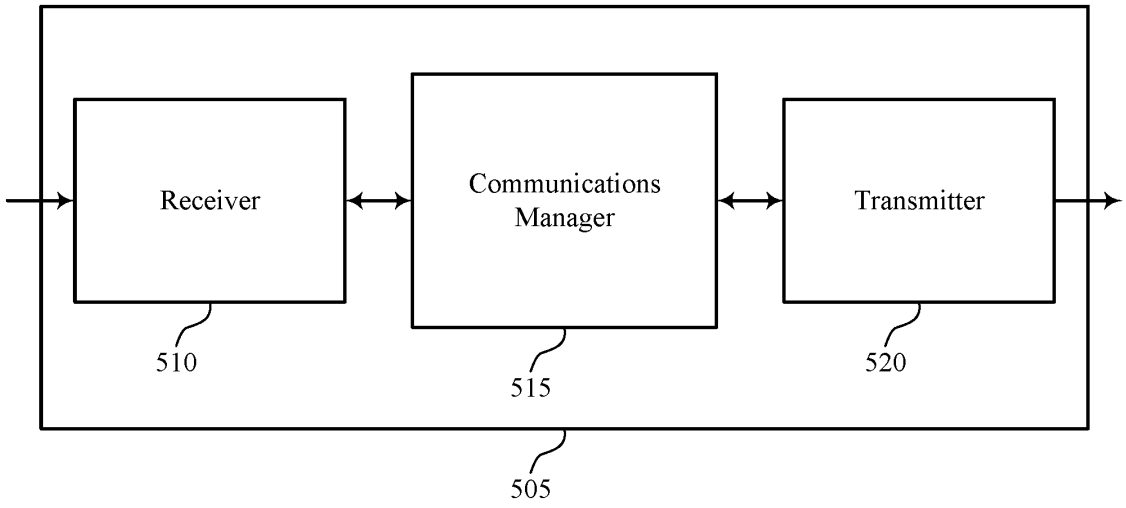
Receiver
Communications Manager
Transmitter
510
515
520
505
500

FIG. 5

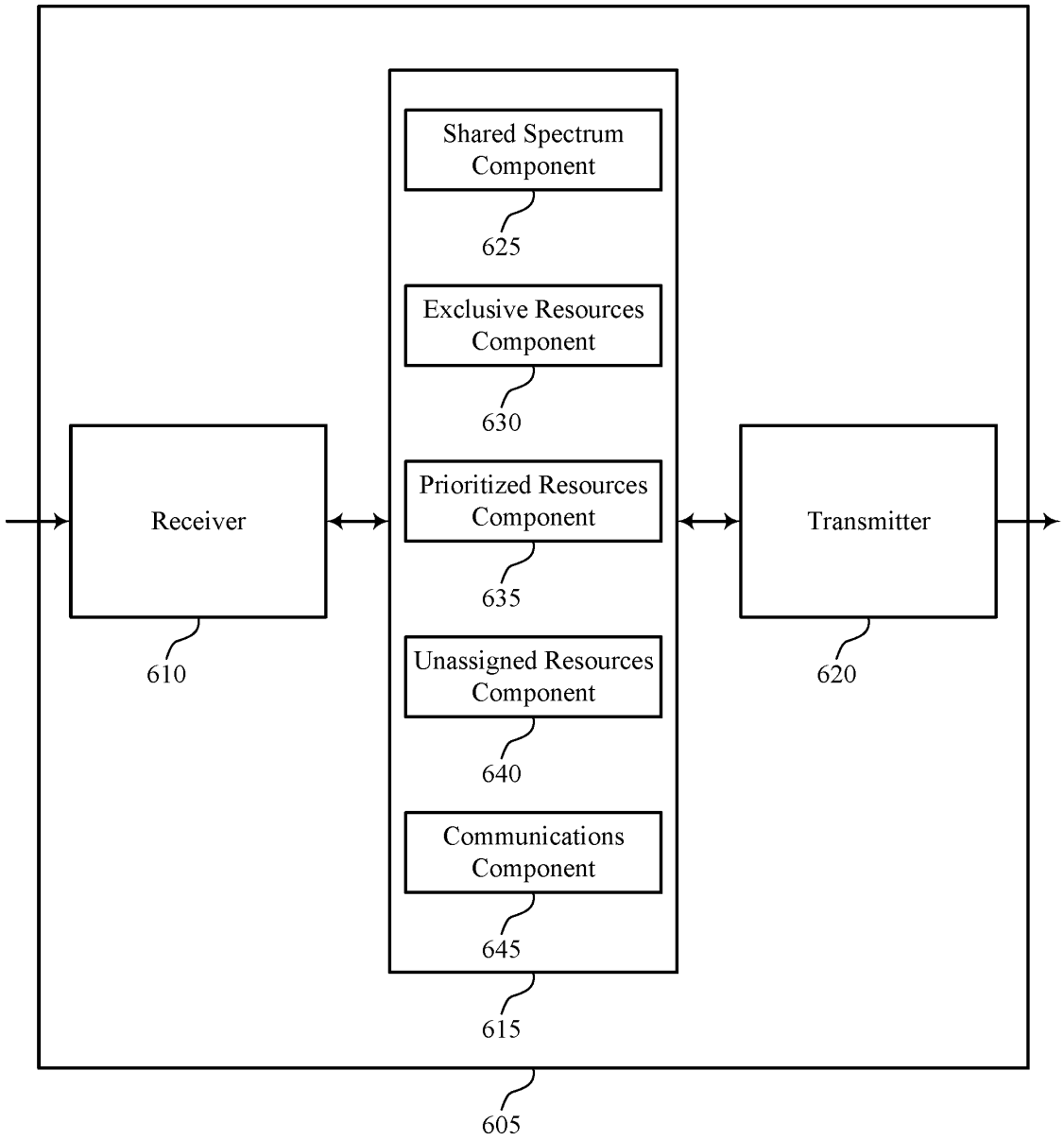
Shared Spectrum Component
625
Exclusive Resources Component
630
Prioritized Resources Component
635
Unassigned Resources Component
640
Communications Component
645
615
Receiver
610
Transmitter
620
605
600

FIG. 6

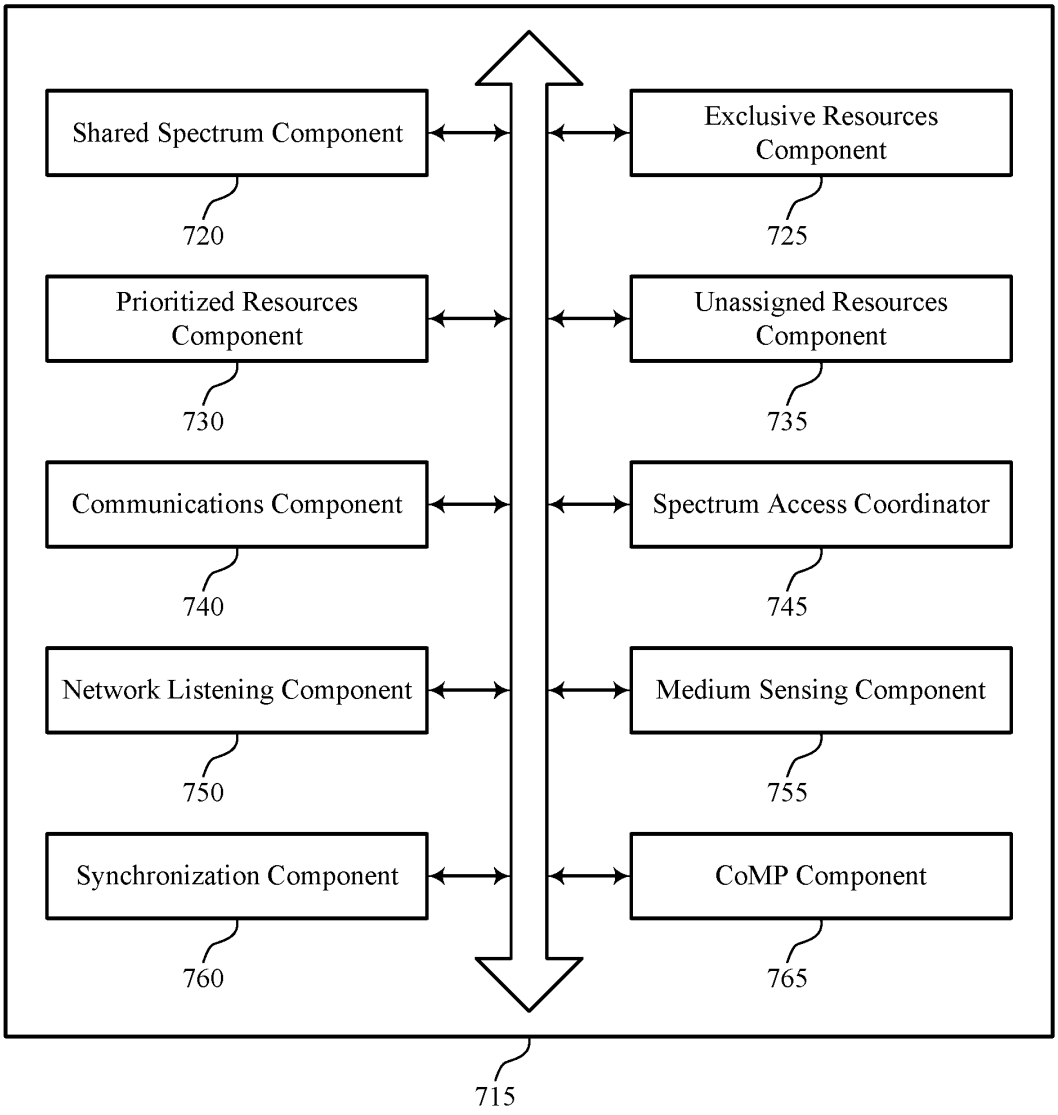
Shared Spectrum Component
720
Exclusive Resources Component
725
Prioritized Resources Component
730
Unassigned Resources Component
735
Communications Component
740
Spectrum Access Coordinator
745
Network Listening Component
750
Medium Sensing Component
755
Synchronization Component
760
CoMP Component
765
715
700

FIG. 7

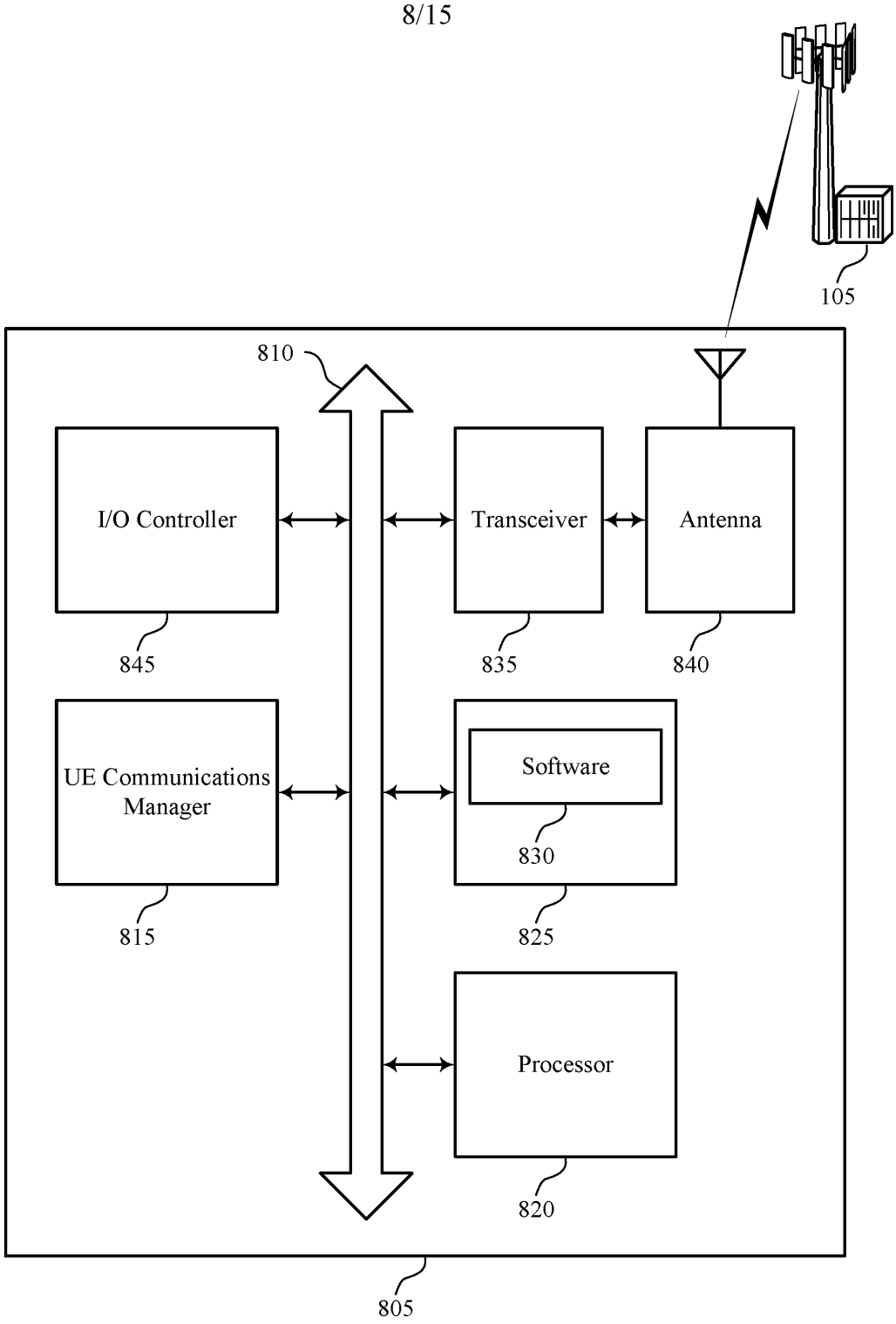
105
810
I/O Controller
Transceiver
Antenna
845
835
840
UE Communications Manager
Software
830
815
825
Processor
820
805
800

FIG. 8

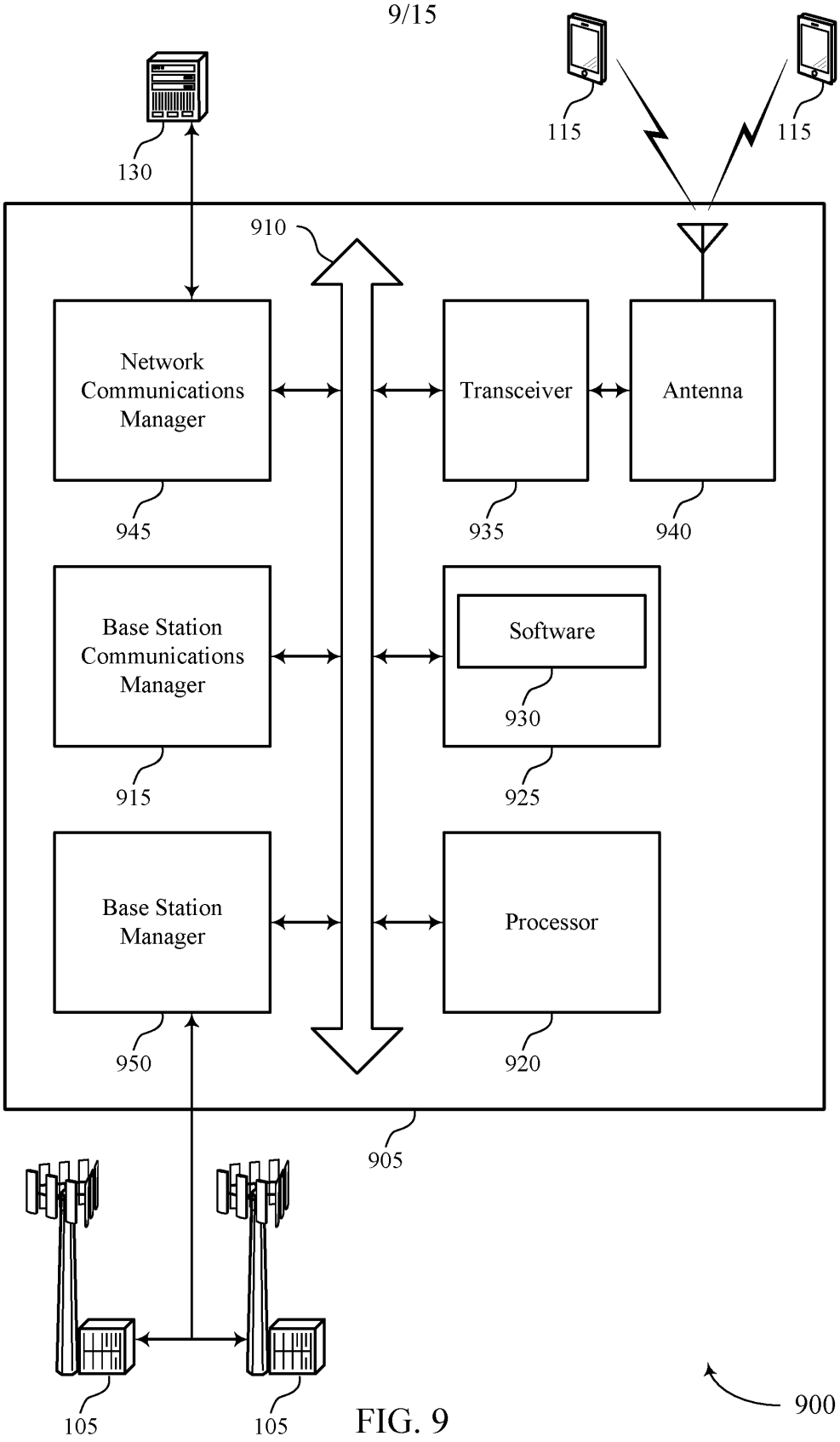
130
115
115
910
Network Communications Manager
Transceiver
Antenna
945
935
940
Base Station Communications Manager
Software
930
915
925
Base Station Manager
Processor
950
920
905
105
105
900

FIG. 9

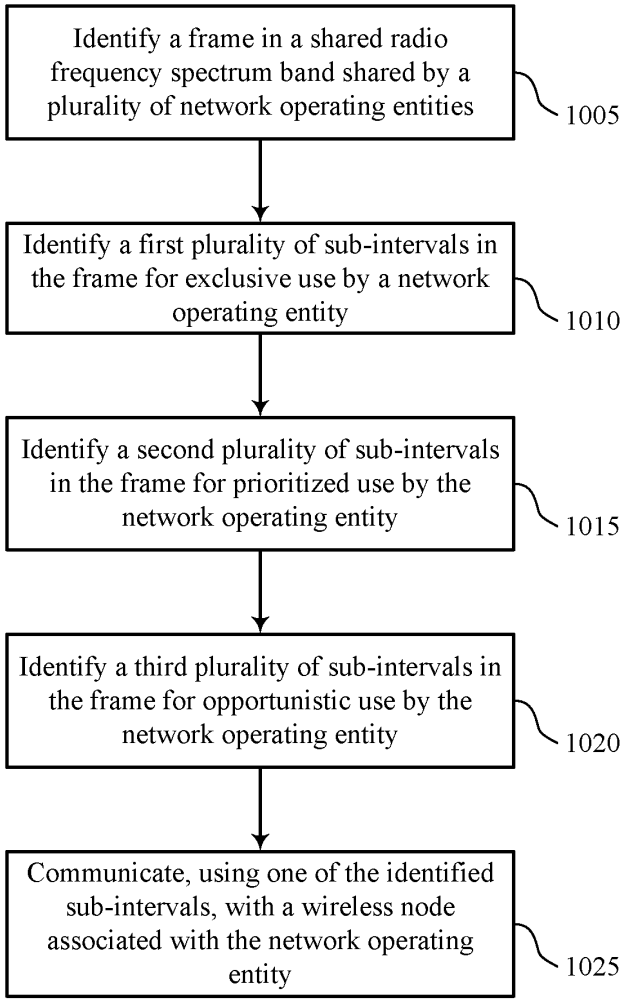
Identify a frame in a shared radio frequency spectrum band shared by a plurality of network operating entities
1005
Identify a first plurality of sub-intervals in the frame for exclusive use by a network operating entity
1010
Identify a second plurality of sub-intervals in the frame for prioritized use by the network operating entity
1015
Identify a third plurality of sub-intervals in the frame for opportunistic use by the network operating entity
1020
Communicate, using one of the identified sub-intervals, with a wireless node associated with the network operating entity
1025
1000

FIG. 10

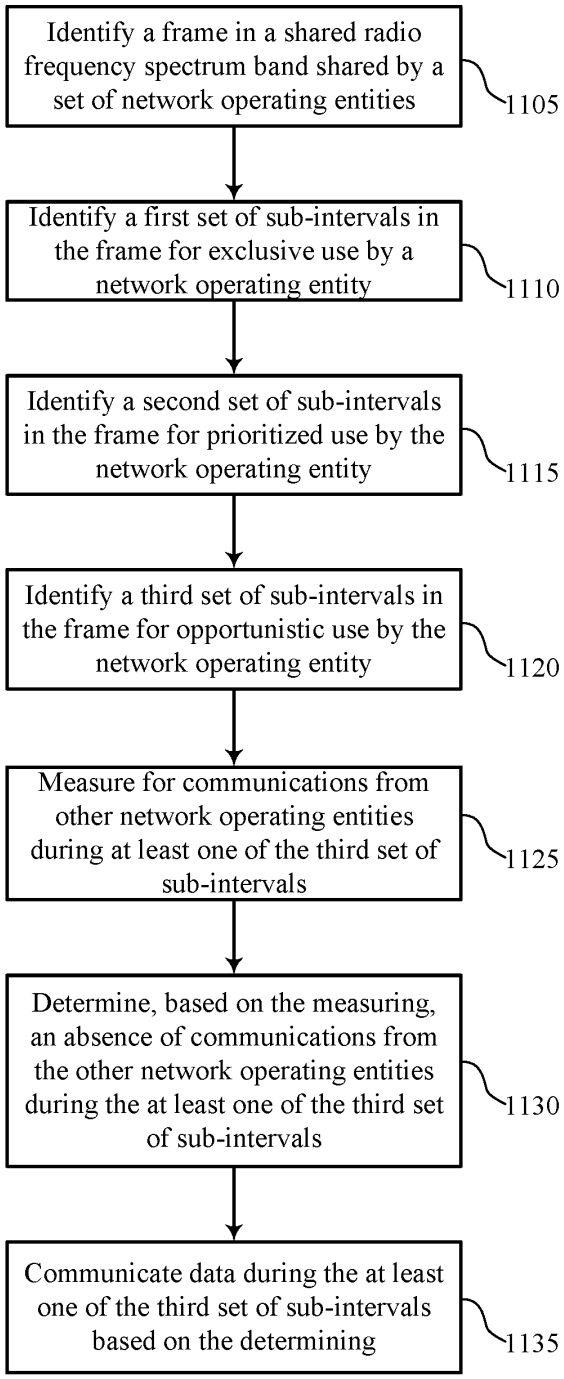
Identify a frame in a shared radio frequency spectrum band shared by a set of network operating entities
1105
Identify a first set of sub-intervals in the frame for exclusive use by a network operating entity
1110
Identify a second set of sub-intervals in the frame for prioritized use by the network operating entity
1115
Identify a third set of sub-intervals in the frame for opportunistic use by the network operating entity
1120
Measure for communications from other network operating entities during at least one of the third set of sub-intervals
1125
Determine, based on the measuring, an absence of communications from the other network operating entities during the at least one of the third set of sub-intervals
1130
Communicate data during the at least one of the third set of sub-intervals based on the determining
1135
1100

FIG. 11

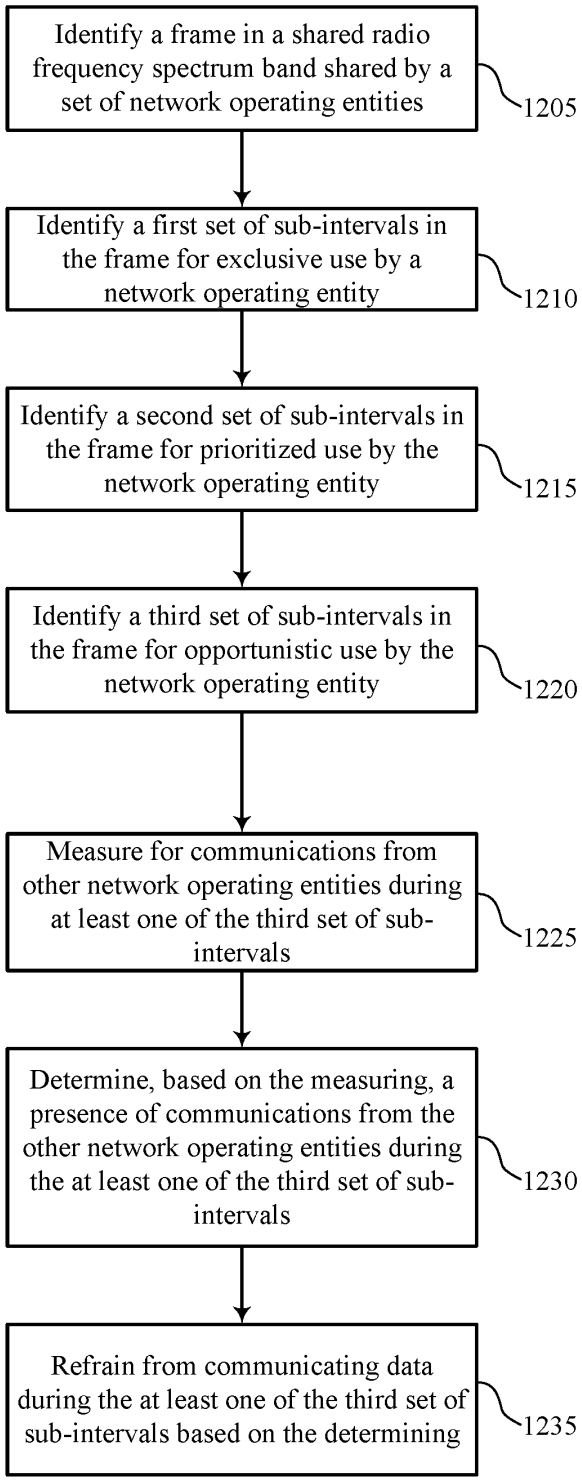
Identify a frame in a shared radio frequency spectrum band shared by a set of network operating entities
1205
Identify a first set of sub-intervals in the frame for exclusive use by a network operating entity
1210
Identify a second set of sub-intervals in the frame for prioritized use by the network operating entity
1215
Identify a third set of sub-intervals in the frame for opportunistic use by the network operating entity
1220
Measure for communications from other network operating entities during at least one of the third set of sub-intervals
1225
Determine, based on the measuring, a presence of communications from the other network operating entities during the at least one of the third set of sub-intervals
1230
Refrain from communicating data during the at least one of the third set of sub-intervals based on the determining
1235
1200

FIG. 12

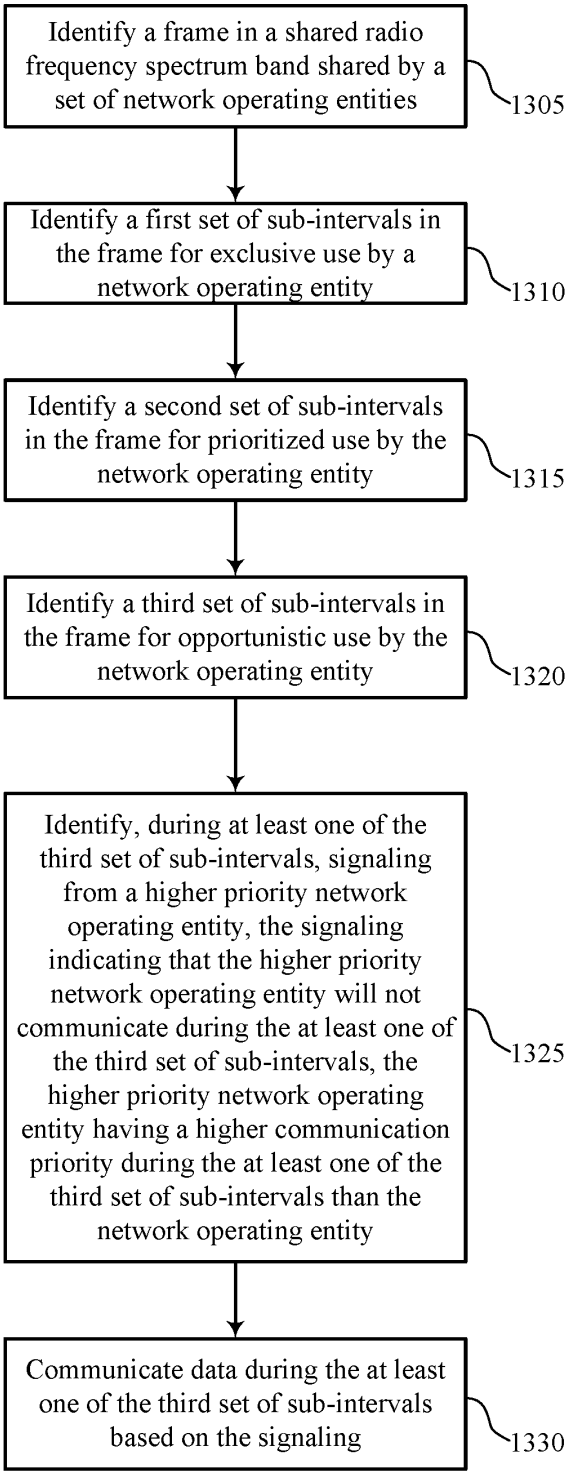
Identify a frame in a shared radio frequency spectrum band shared by a set of network operating entities
1305
Identify a first set of sub-intervals in the frame for exclusive use by a network operating entity
1310
Identify a second set of sub-intervals in the frame for prioritized use by the network operating entity
1315
Identify a third set of sub-intervals in the frame for opportunistic use by the network operating entity
1320
Identify, during at least one of the third set of sub-intervals, signaling from a higher priority network operating entity, the signaling indicating that the higher priority network operating entity will not communicate during the at least one of the third set of sub-intervals, the higher priority network operating entity having a higher communication priority during the at least one of the third set of sub-intervals than the network operating entity
1325
Communicate data during the at least one of the third set of sub-intervals based on the signaling
1330
1300

FIG. 13

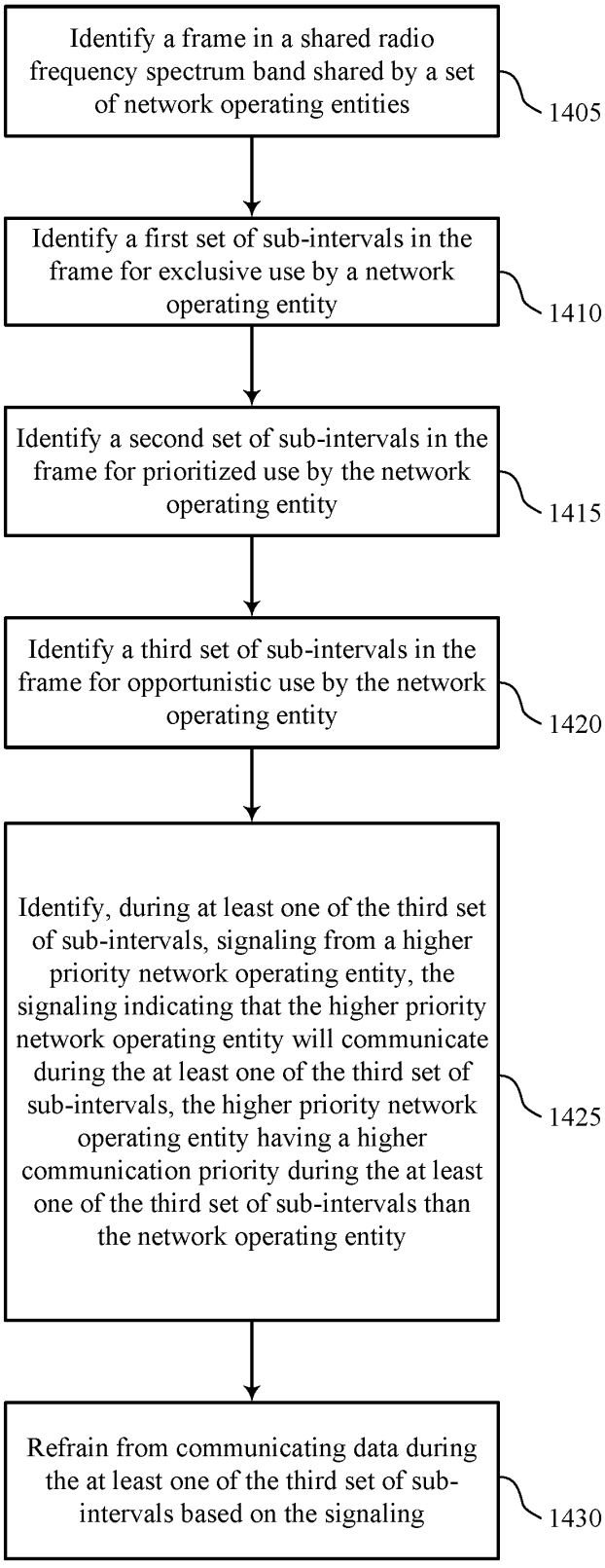
Identify a frame in a shared radio frequency spectrum band shared by a set of network operating entities
1405
Identify a first set of sub-intervals in the frame for exclusive use by a network operating entity
1410
Identify a second set of sub-intervals in the frame for prioritized use by the network operating entity
1415
Identify a third set of sub-intervals in the frame for opportunistic use by the network operating entity
1420
Identify, during at least one of the third set of sub-intervals, signaling from a higher priority network operating entity, the signaling indicating that the higher priority network operating entity will communicate during the at least one of the third set of sub-intervals, the higher priority network operating entity having a higher communication priority during the at least one of the third set of sub-intervals than the network operating entity
1425
Refrain from communicating data during the at least one of the third set of sub-intervals based on the signaling
1430
1400

FIG. 14

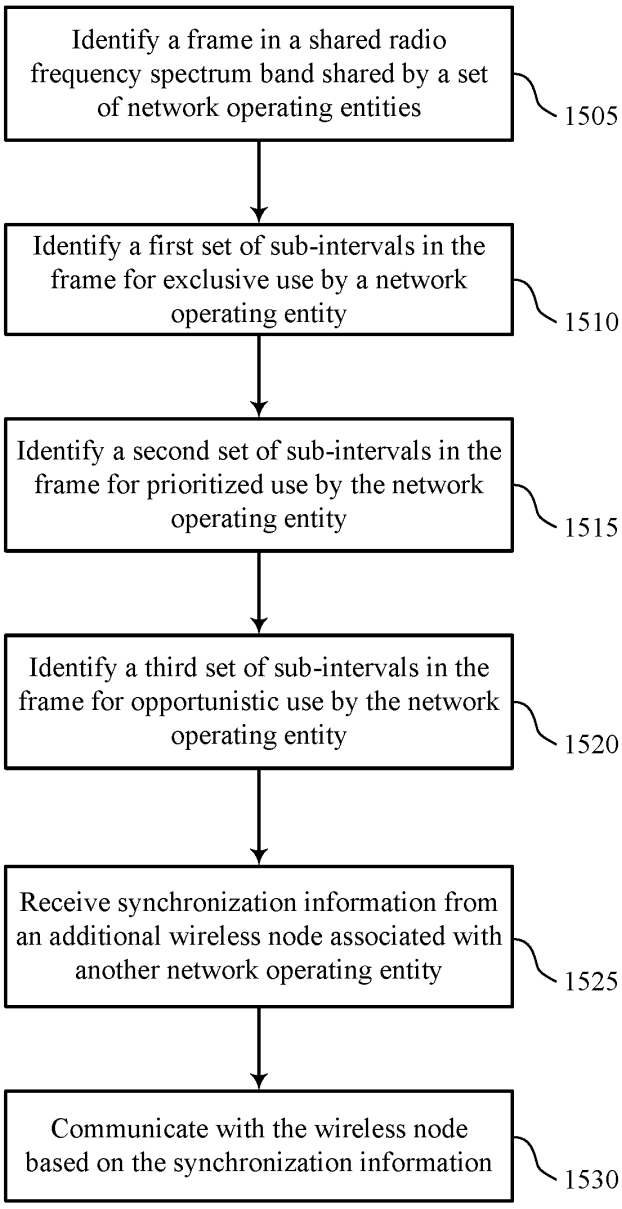
Identify a frame in a shared radio frequency spectrum band shared by a set of network operating entities
1505
Identify a first set of sub-intervals in the frame for exclusive use by a network operating entity
1510
Identify a second set of sub-intervals in the frame for prioritized use by the network operating entity
1515
Identify a third set of sub-intervals in the frame for opportunistic use by the network operating entity
1520
Receive synchronization information from an additional wireless node associated with another network operating entity
1525
Communicate with the wireless node based on the synchronization information
1530
1500

FIG. 15