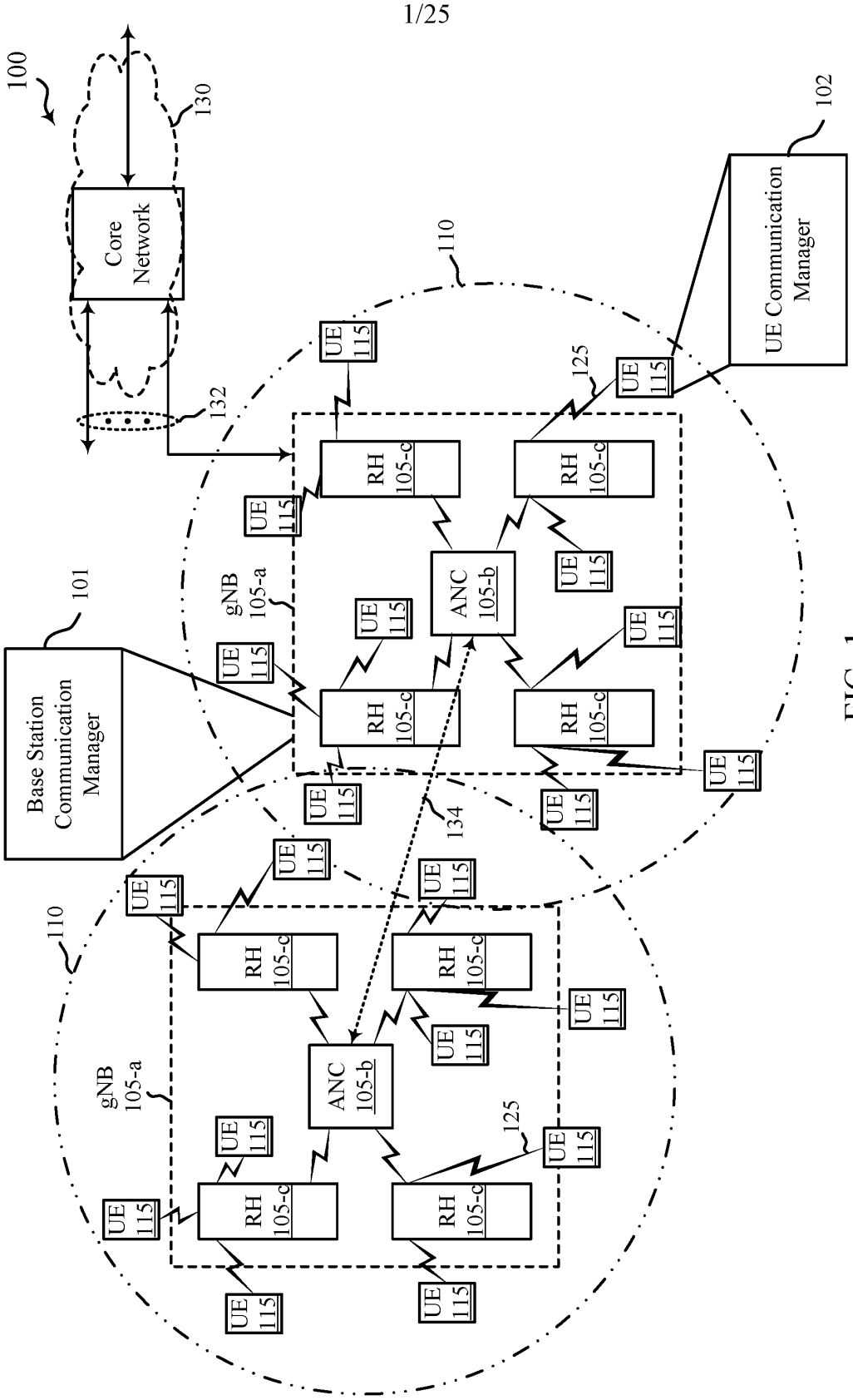

100
130
Core Network
102
UE Communication Manager
110
132
UE 115
125
RH 105-c
ANC 105-b
gNB 105-a
101
Base Station Communication Manager
134

FIG. 1

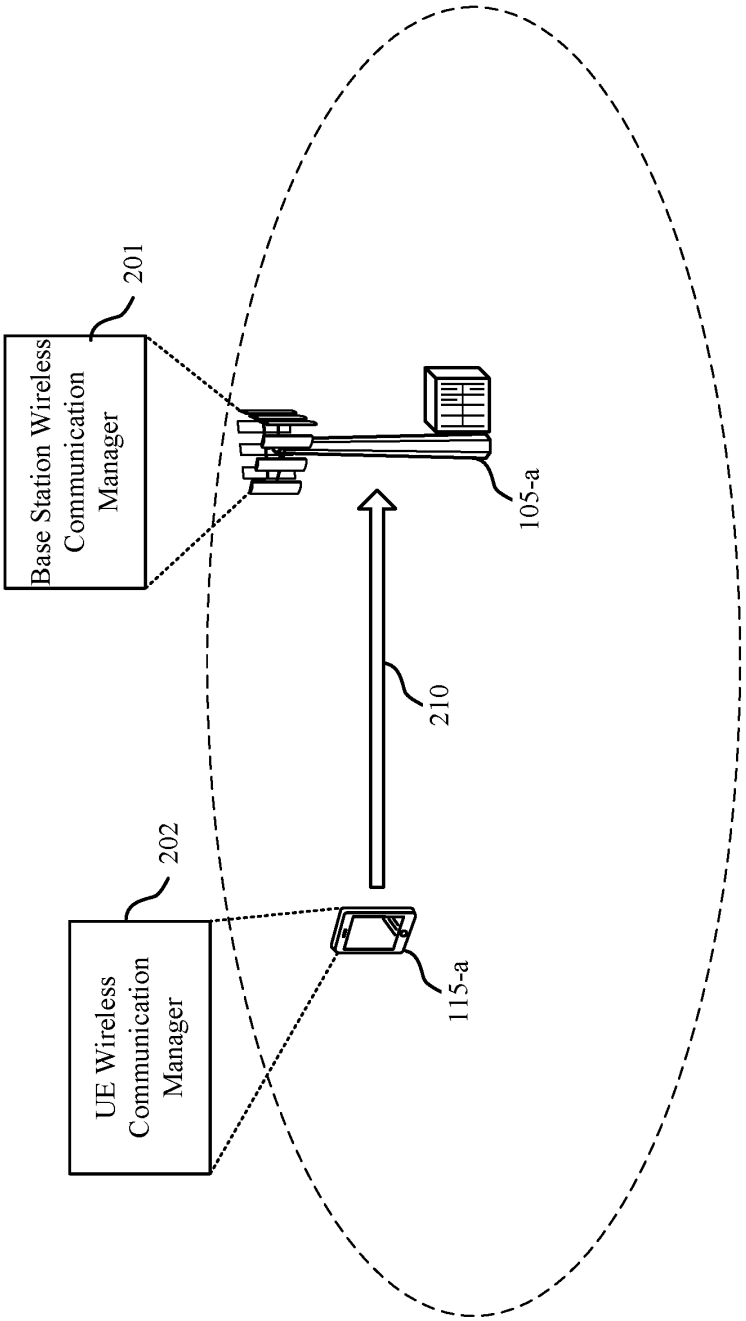

200
201
Base Station Wireless Communication Manager
105-a
210
202
UE Wireless Communication Manager
115-a

FIG. 2

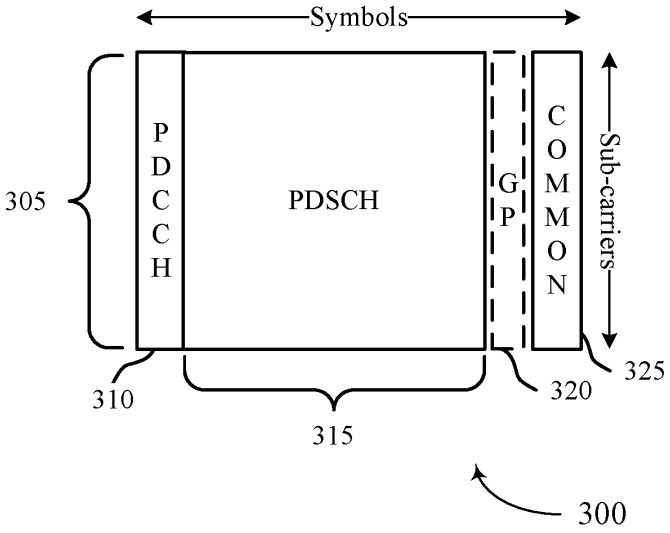

Symbols
PDCCH
PDSCH
GP
COMMON
Sub-carriers
305
310
315
320
325
300

FIG. 3A

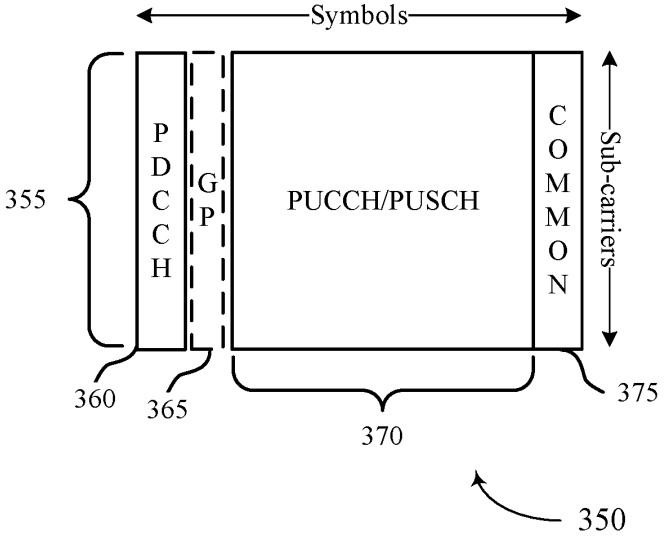
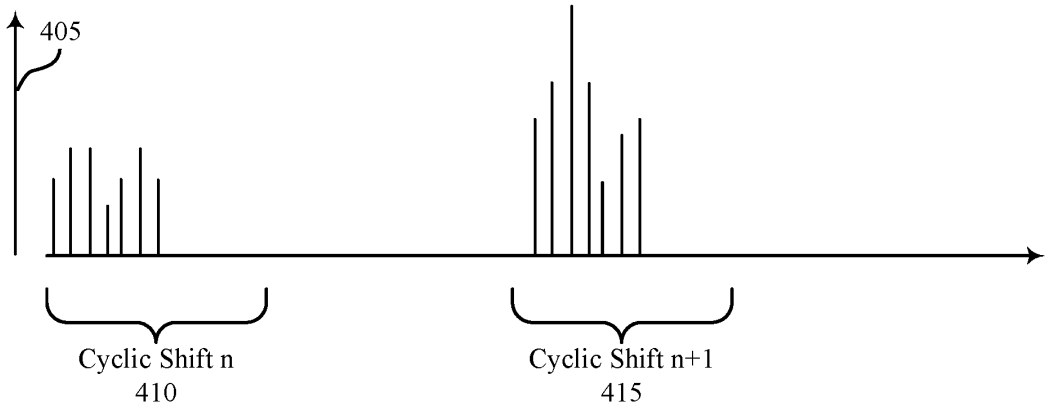
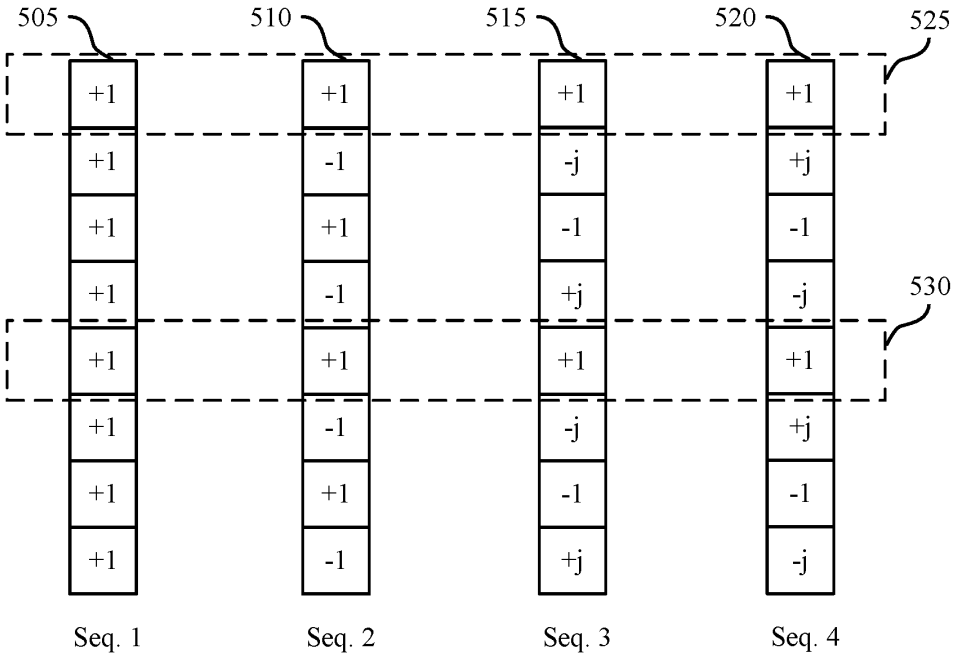

Symbols
PDCCH
GP
PUCCH/PUSCH
COMMON
Sub-carriers
355
360
365
370
375
350

FIG. 3B



400

FIG. 4


505
510
515
520
525
530
+1
+1
+1
+1
+1
+1
+1
+1
+1
-1
+1
-1
+1
-1
-1
+1
-j
-1
+j
+1
-j
-1
+j
-j
+1
-1
-j
+j
-1
-j
Seq. 1
Seq. 2
Seq. 3
Seq. 4

500

FIG. 5

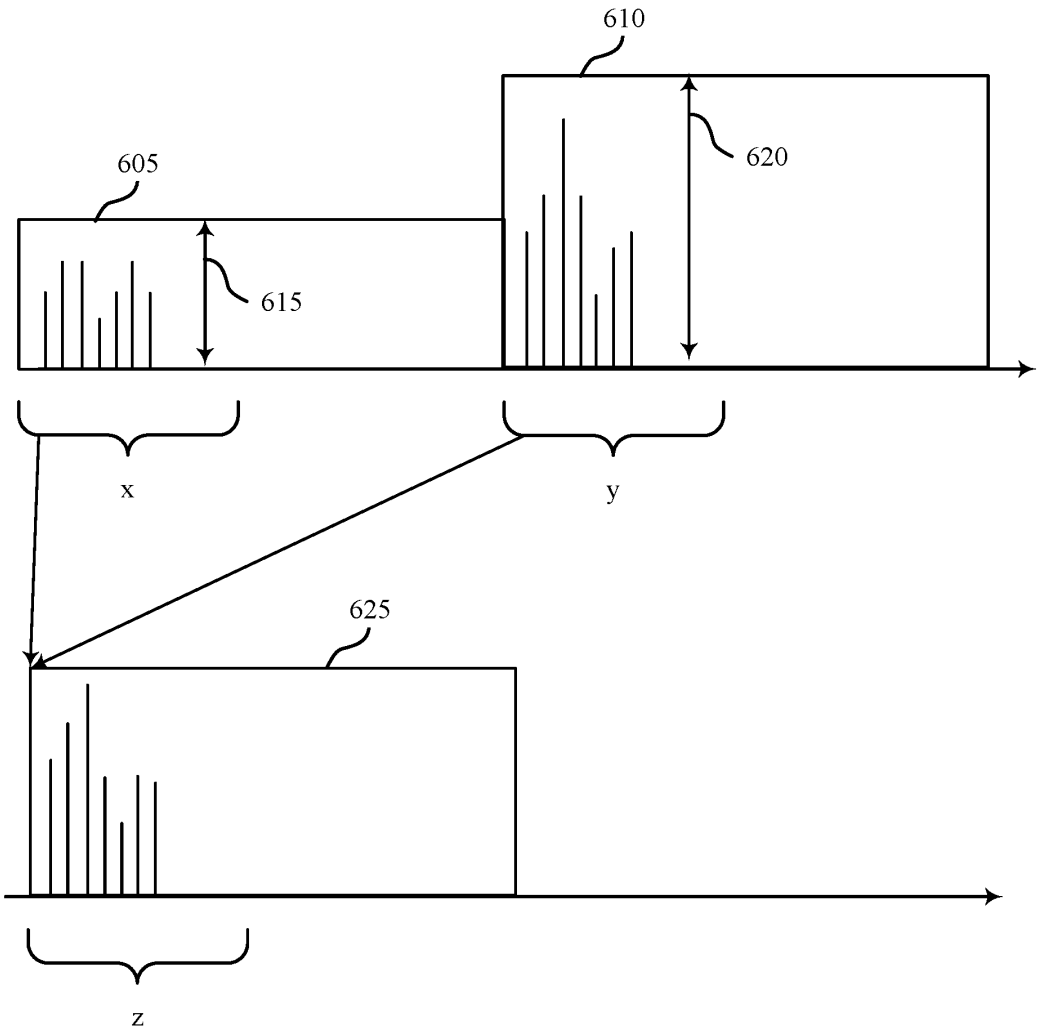


FIG. 6

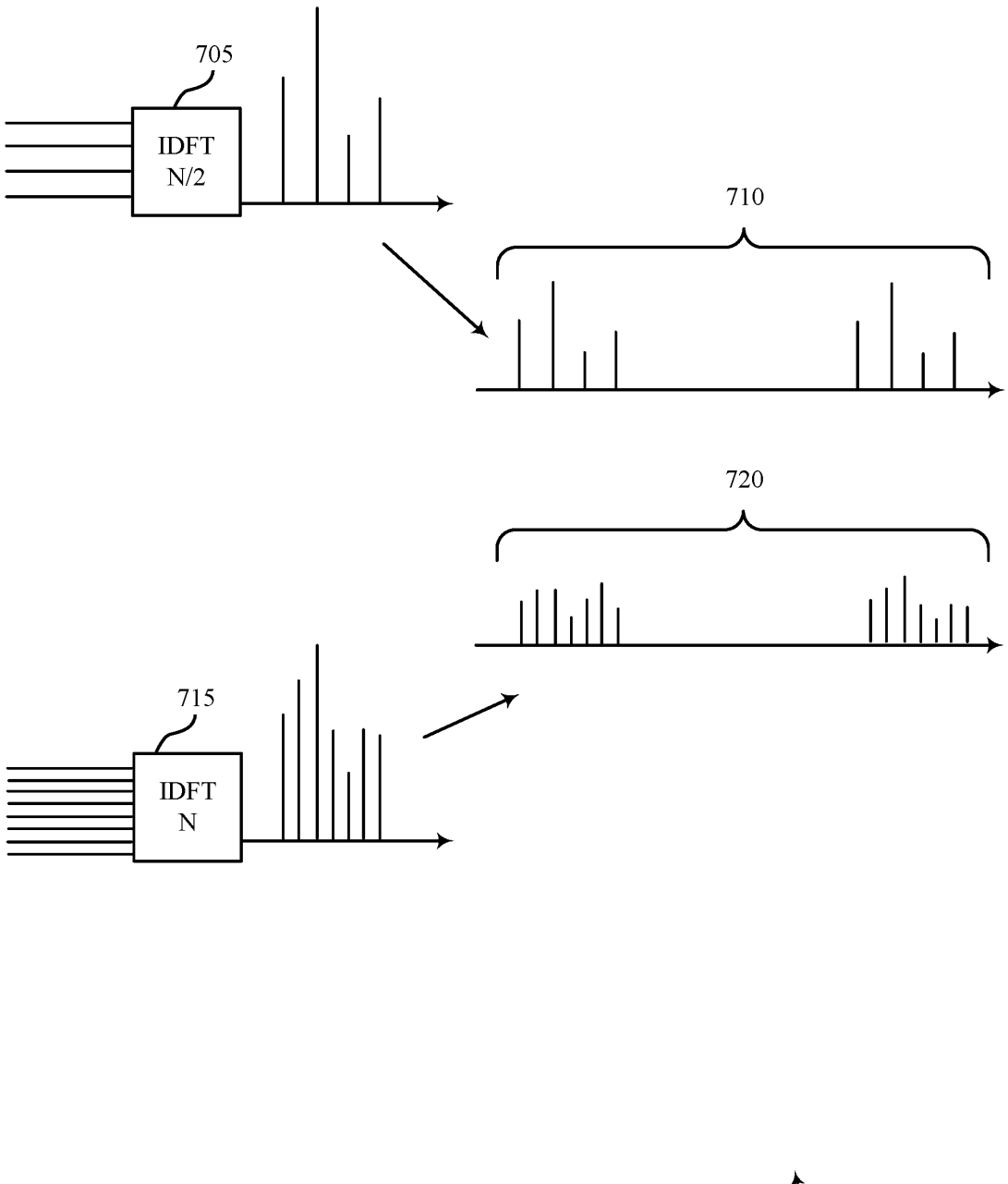
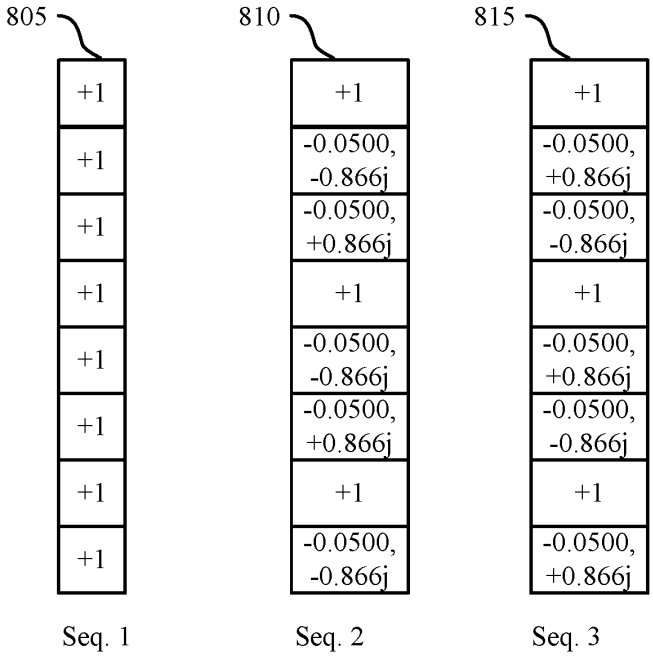


FIG. 7


805
810
815
+1
+1
+1
+1
+1
+1
+1
+1
+1
-0.0500, -0.866j
-0.0500, +0.866j
+1
-0.0500, -0.866j
-0.0500, +0.866j
+1
-0.0500, -0.866j
+1
-0.0500, +0.866j
-0.0500, -0.866j
+1
-0.0500, +0.866j
Seq. 1
Seq. 2
Seq. 3

800

FIG. 8

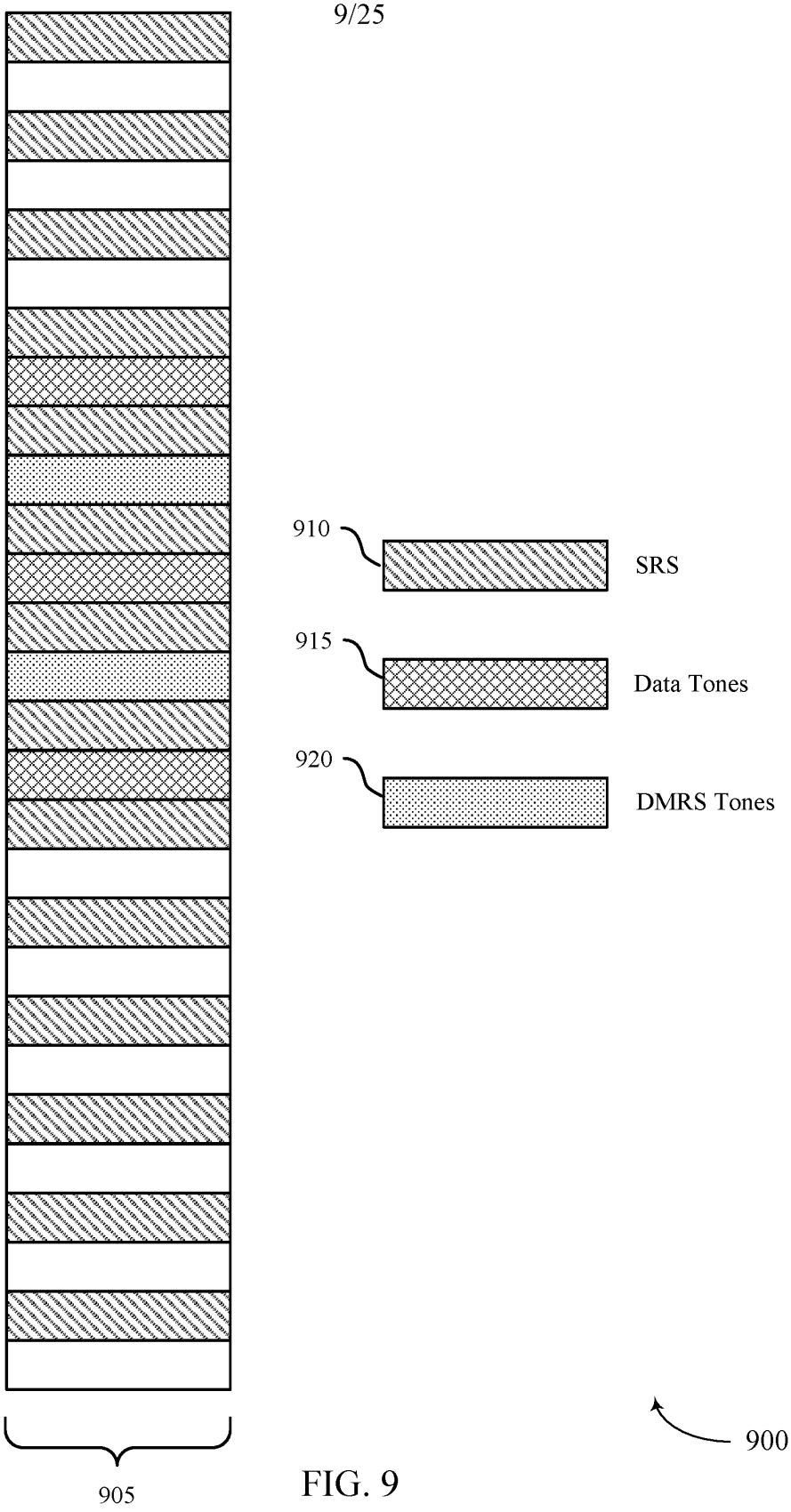


FIG. 9

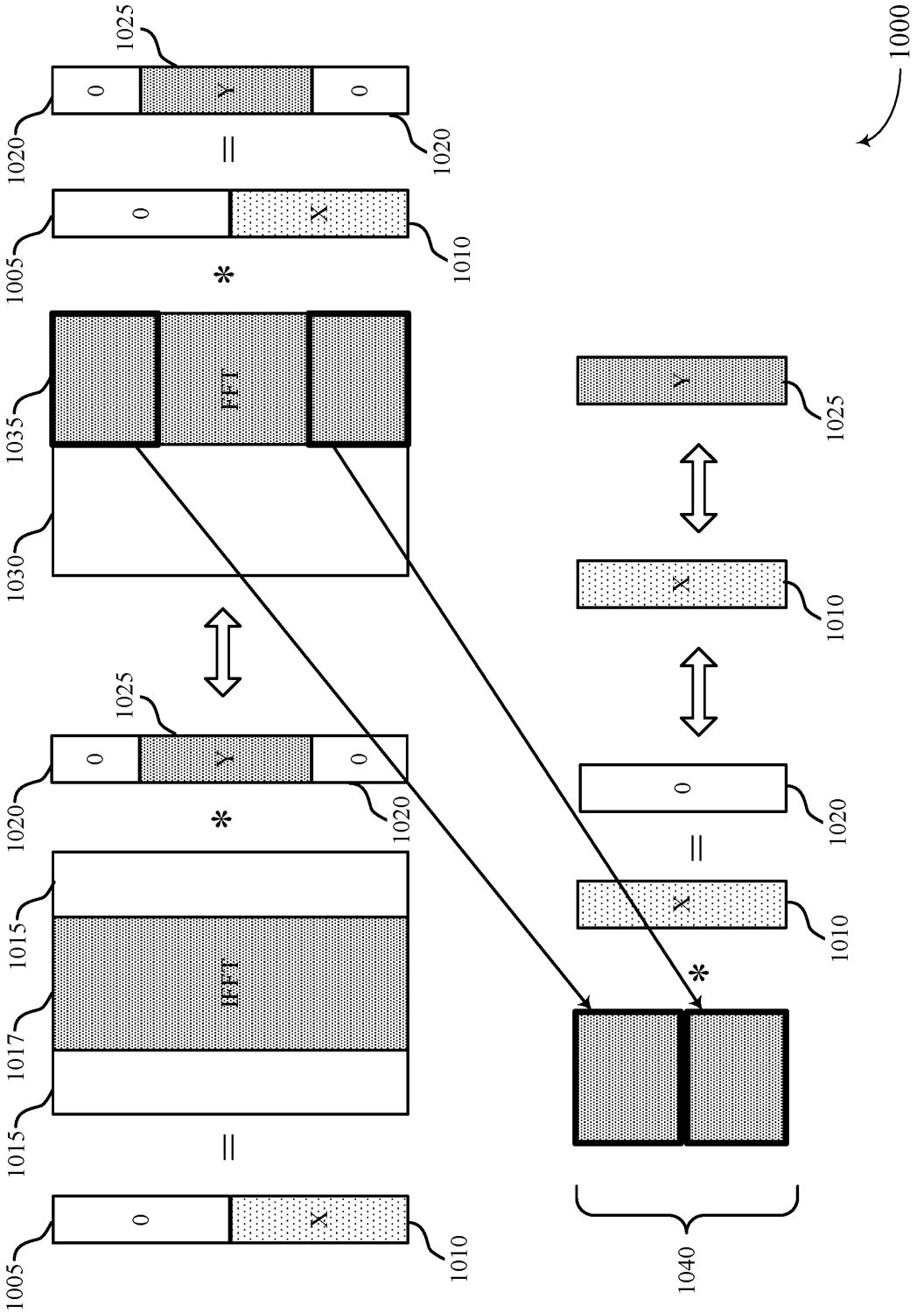
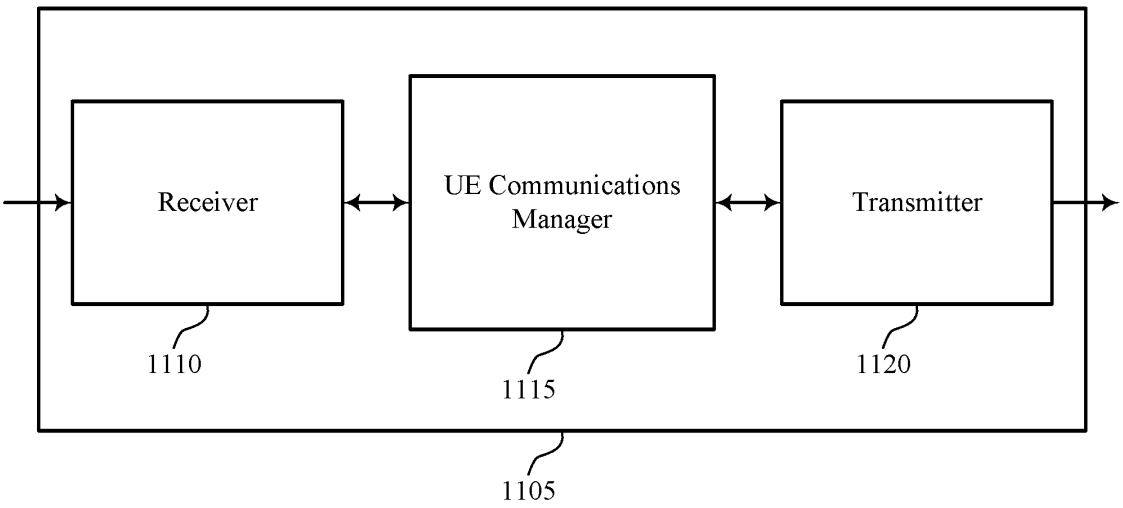

1000
1025
0
Y
0
1020
1020
=
1005
0
X
1010
1010
*
1035
FFT
1030
1025
Y
1010
X
1020
0
=
1010
X
*
1025
0
Y
0
1020
1020
*
1015
FFT
1017
1015
=
1005
0
X
1010
1040

FIG. 10


Receiver
UE Communications Manager
Transmitter
1110
1115
1120
1105

1100

FIG. 11

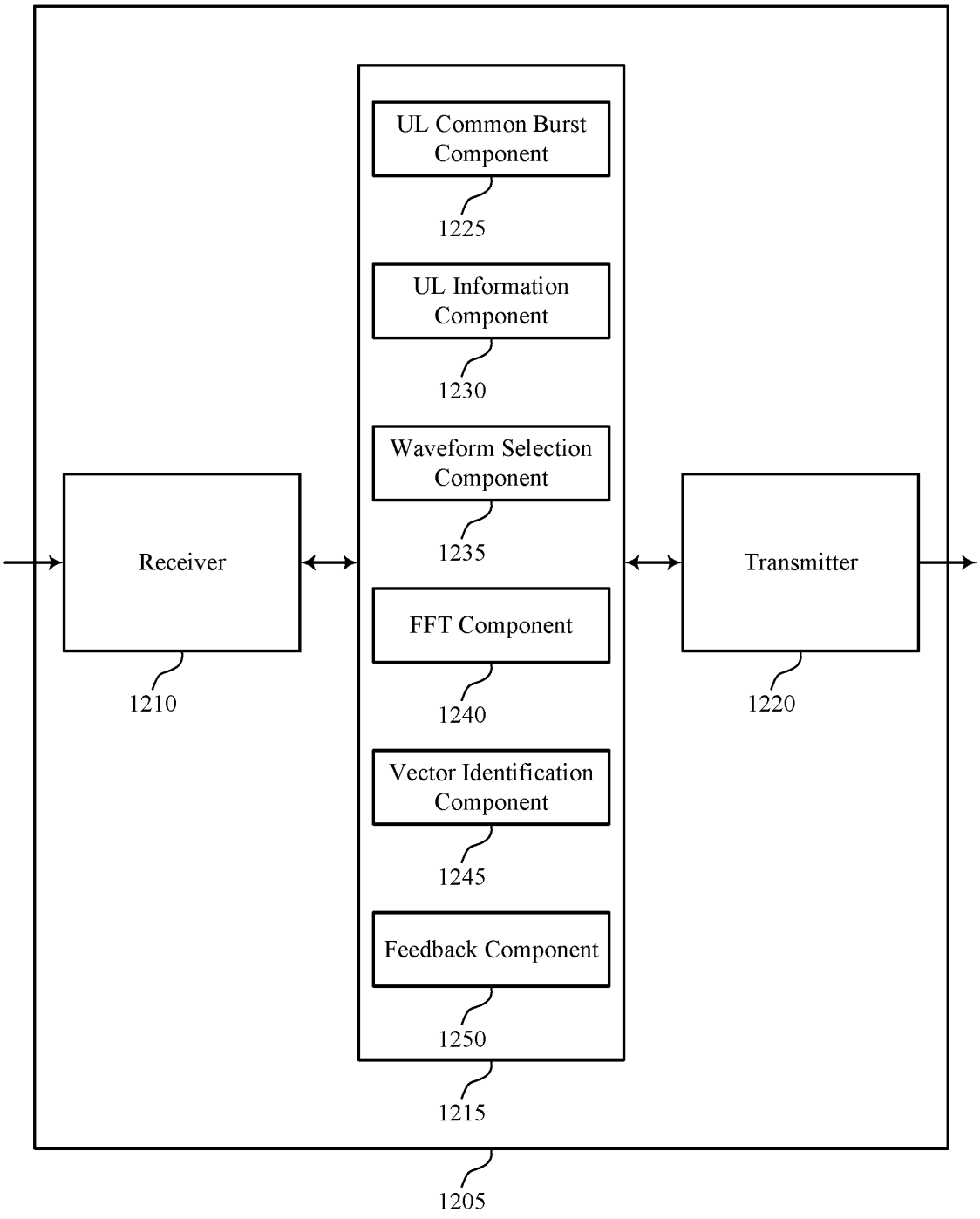

UL Common Burst Component
1225
UL Information Component
1230
Waveform Selection Component
1235
FFT Component
1240
Vector Identification Component
1245
Feedback Component
1250
1215
1205
Receiver
1210
Transmitter
1220
1200

FIG. 12

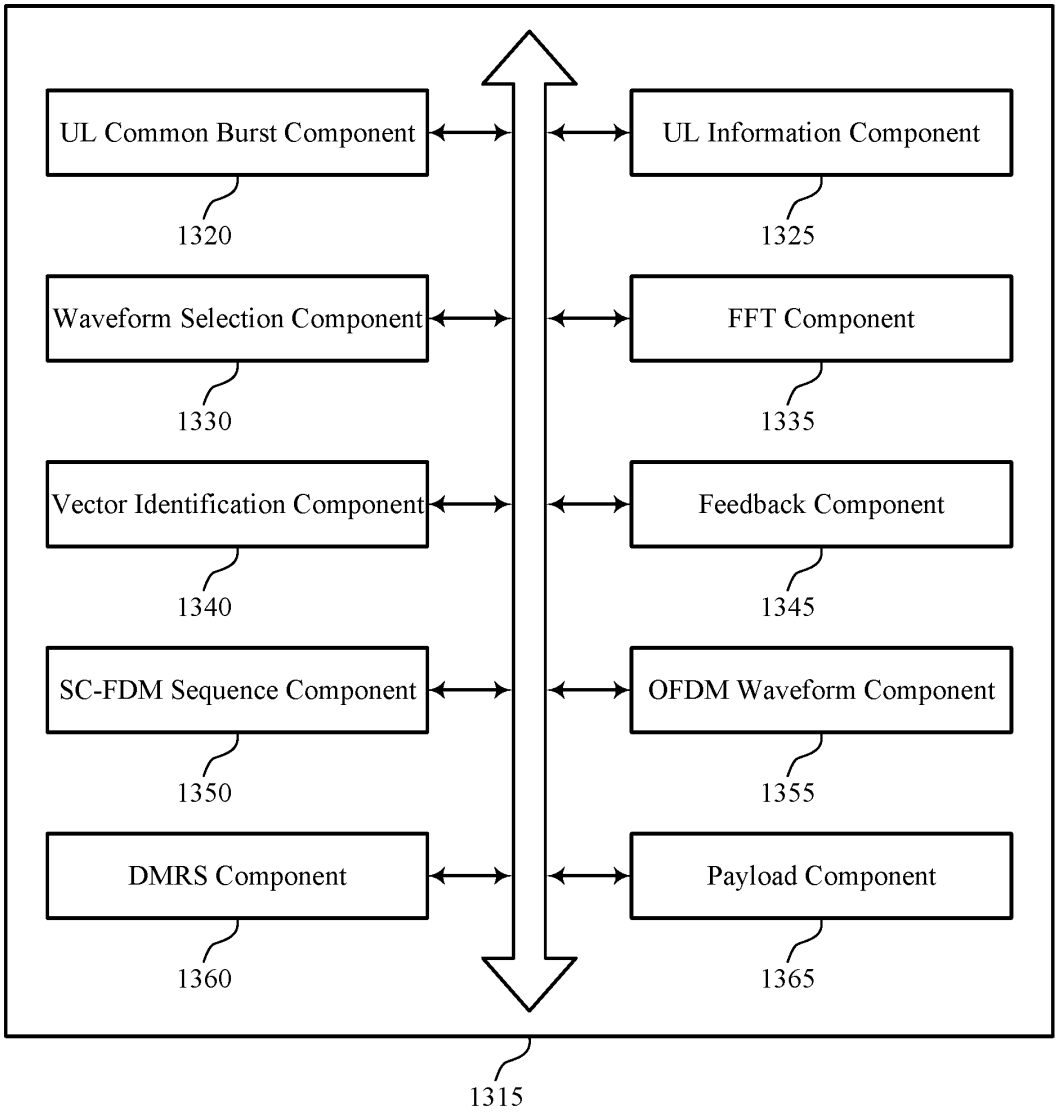

UL Common Burst Component
1320
UL Information Component
1325
Waveform Selection Component
1330
FFT Component
1335
Vector Identification Component
1340
Feedback Component
1345
SC-FDM Sequence Component
1350
OFDM Waveform Component
1355
DMRS Component
1360
Payload Component
1365
1315
1300

FIG. 13

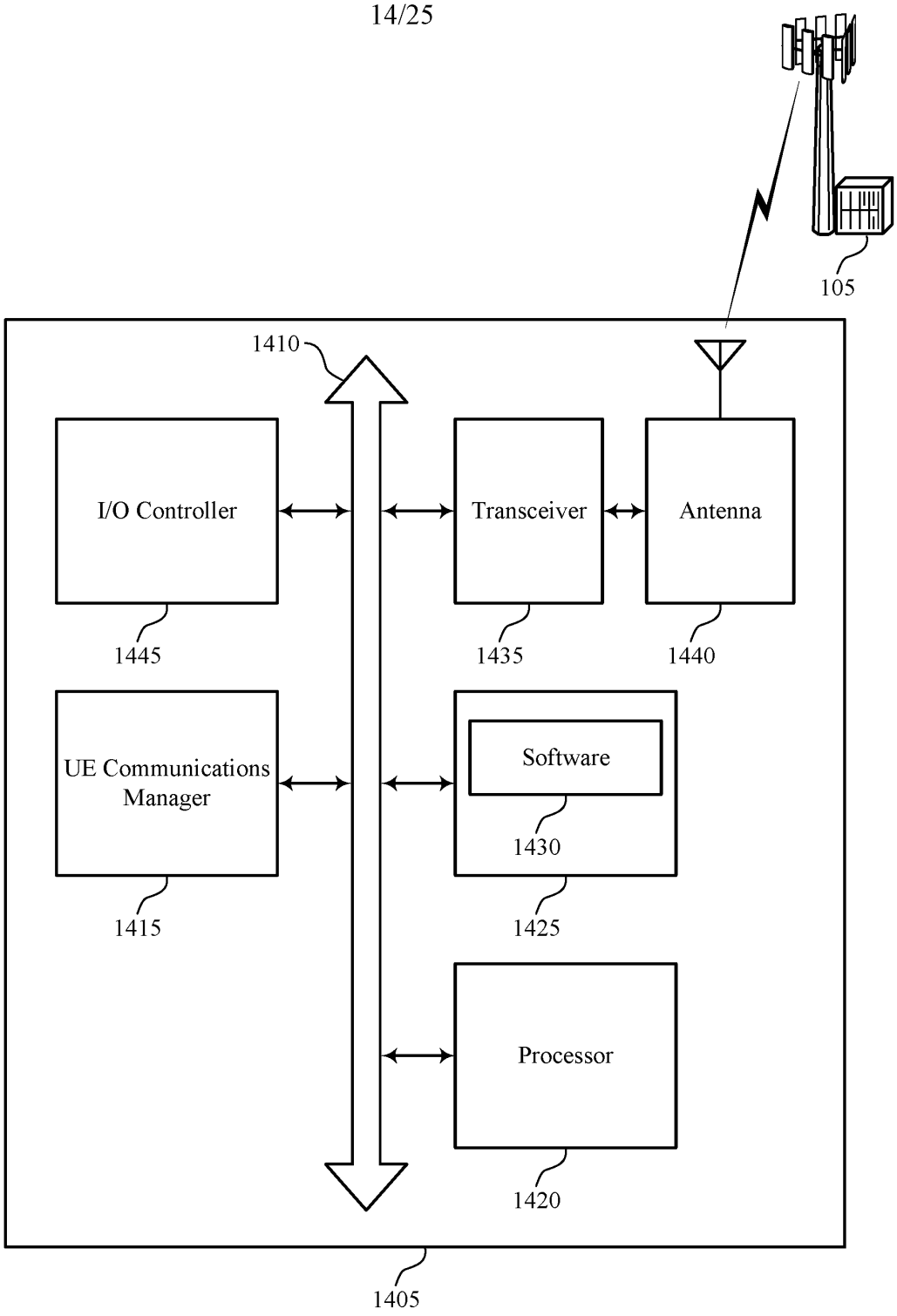

105
1410
I/O Controller
Transceiver
Antenna
1445
1435
1440
UE Communications Manager
Software
1430
1415
1425
Processor
1420
1405
1400

FIG. 14

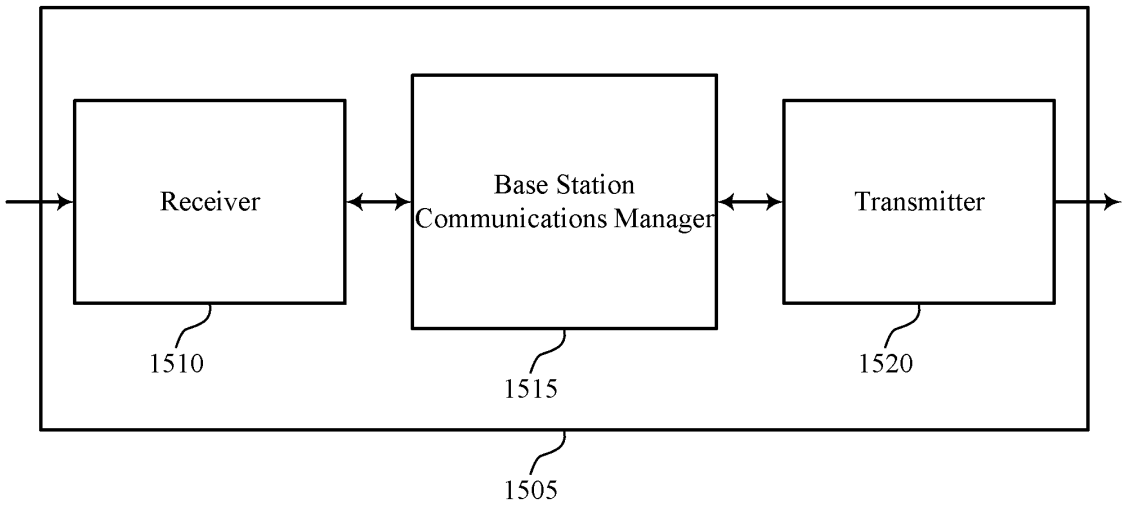

Receiver
Base Station Communications Manager
Transmitter
1510
1515
1520
1505
1500

FIG. 15

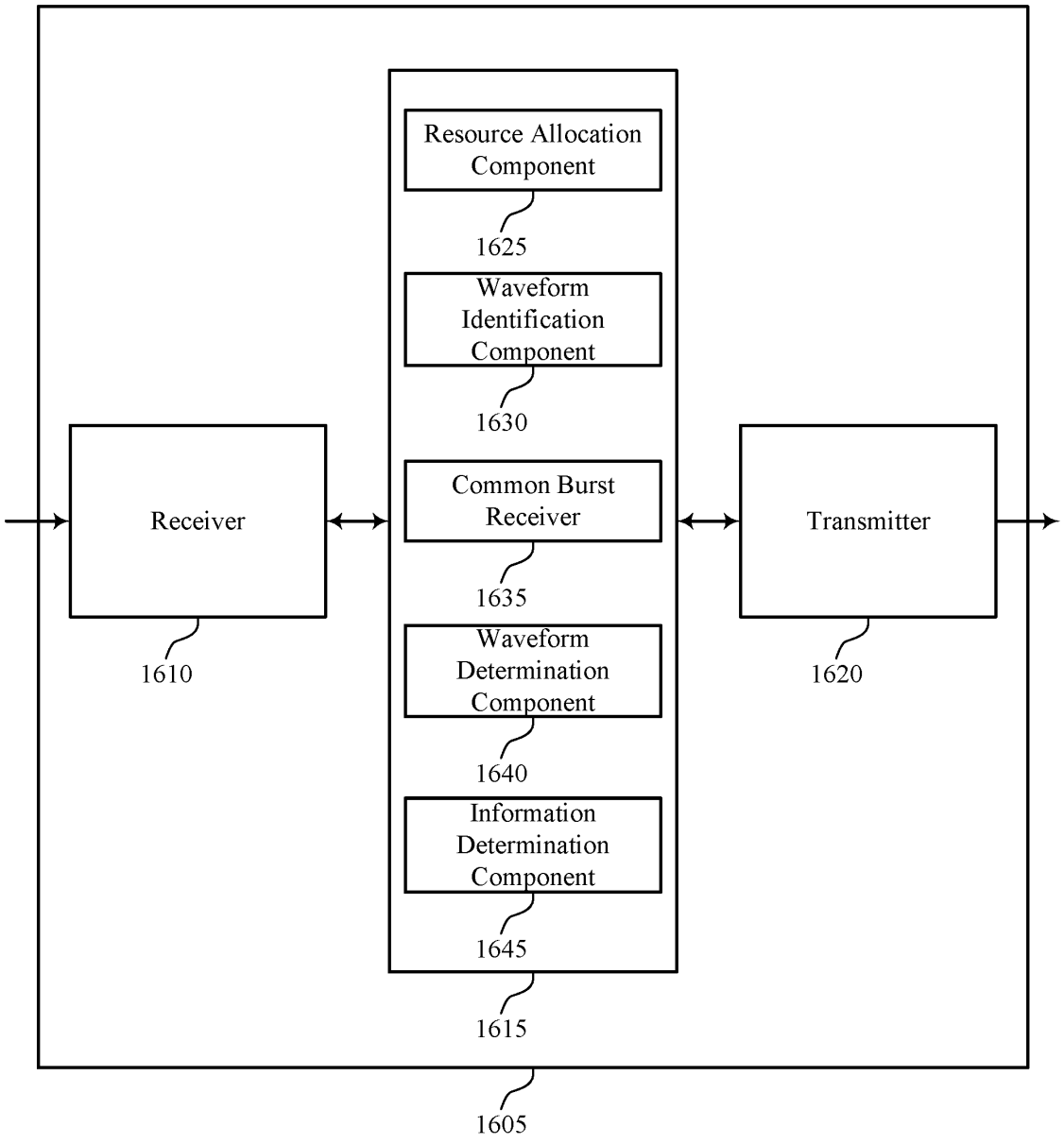

Resource Allocation Component
1625
Waveform Identification Component
1630
Common Burst Receiver
1635
Waveform Determination Component
1640
Information Determination Component
1645
1615
1605
Receiver
1610
Transmitter
1620
1600

FIG. 16

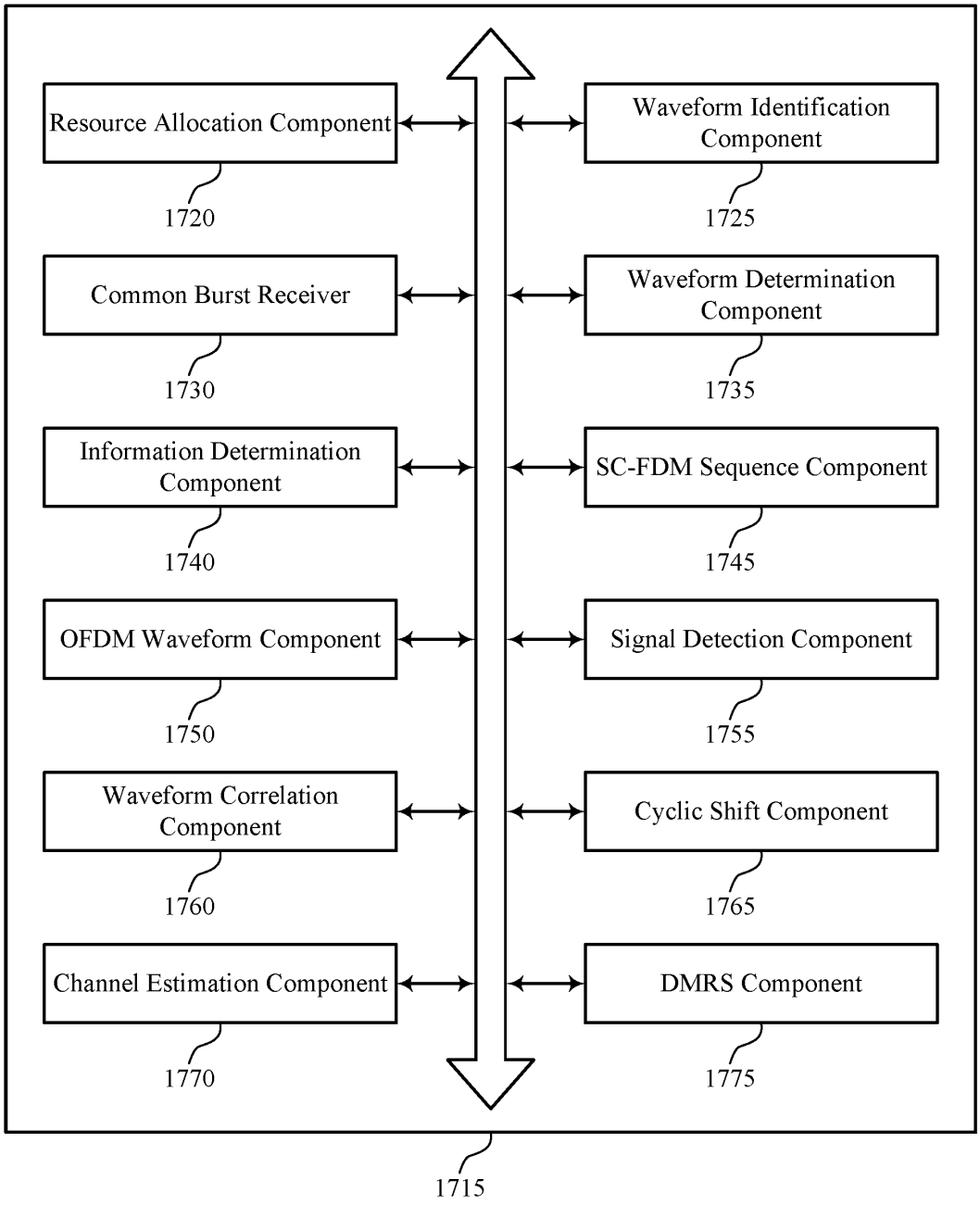

Resource Allocation Component
1720
Waveform Identification Component
1725
Common Burst Receiver
1730
Waveform Determination Component
1735
Information Determination Component
1740
SC-FDM Sequence Component
1745
OFDM Waveform Component
1750
Signal Detection Component
1755
Waveform Correlation Component
1760
Cyclic Shift Component
1765
Channel Estimation Component
1770
DMRS Component
1775
1715
1700

FIG. 17

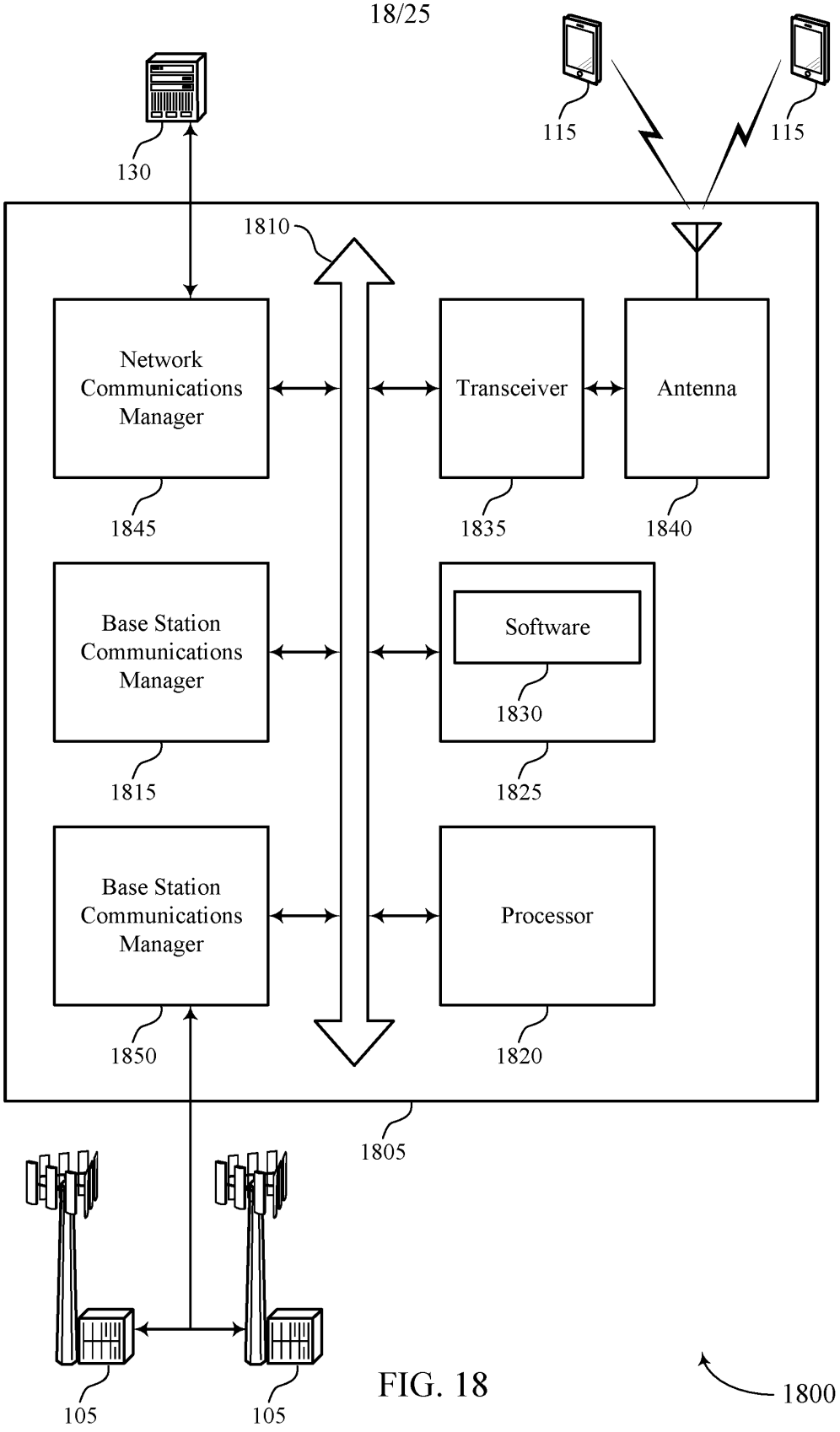

130
115
115
1810
Network Communications Manager
Transceiver
Antenna
1845
1835
1840
Base Station Communications Manager
Software
1830
1815
1825
Base Station Communications Manager
Processor
1850
1820
1805
105
105
1800

FIG. 18

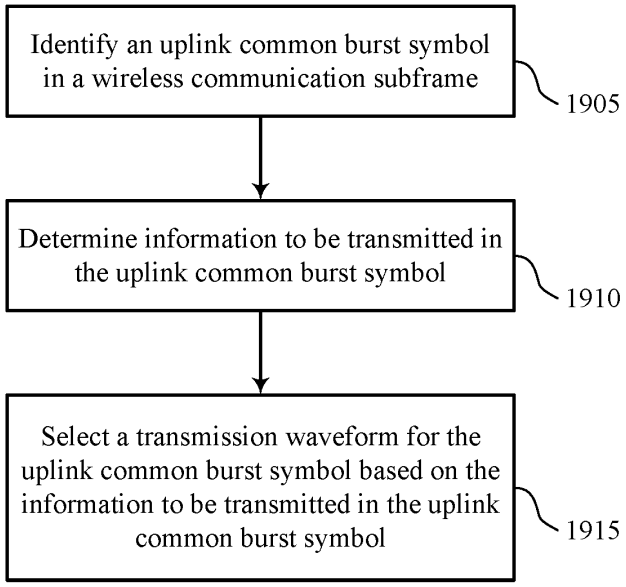

Identify an uplink common burst symbol in a wireless communication subframe
1905
Determine information to be transmitted in the uplink common burst symbol
1910
Select a transmission waveform for the uplink common burst symbol based on the information to be transmitted in the uplink common burst symbol
1915

FIG. 19

1900

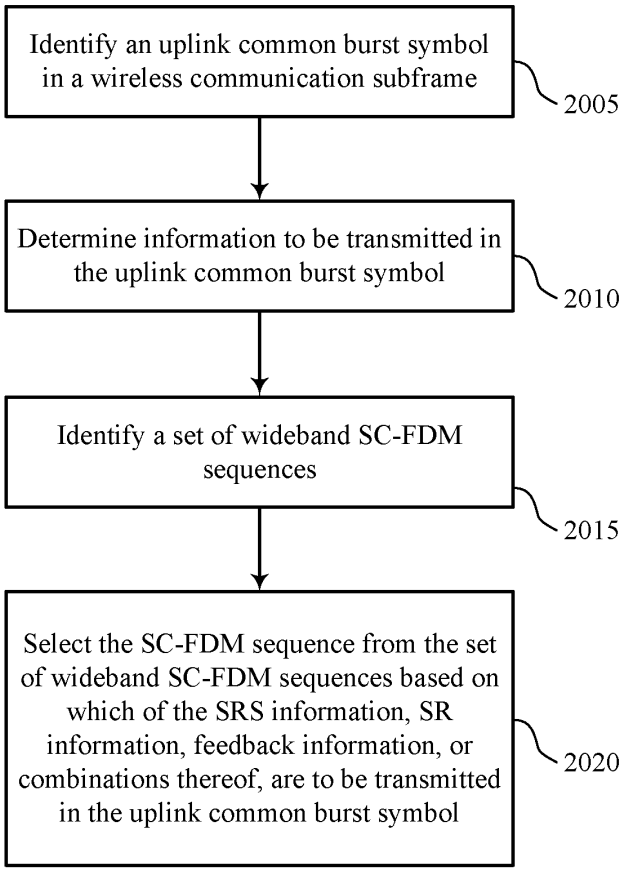

Identify an uplink common burst symbol in a wireless communication subframe
2005
Determine information to be transmitted in the uplink common burst symbol
2010
Identify a set of wideband SC-FDM sequences
2015
Select the SC-FDM sequence from the set of wideband SC-FDM sequences based on which of the SRS information, SR information, feedback information, or combinations thereof, are to be transmitted in the uplink common burst symbol
2020

FIG. 20

2000

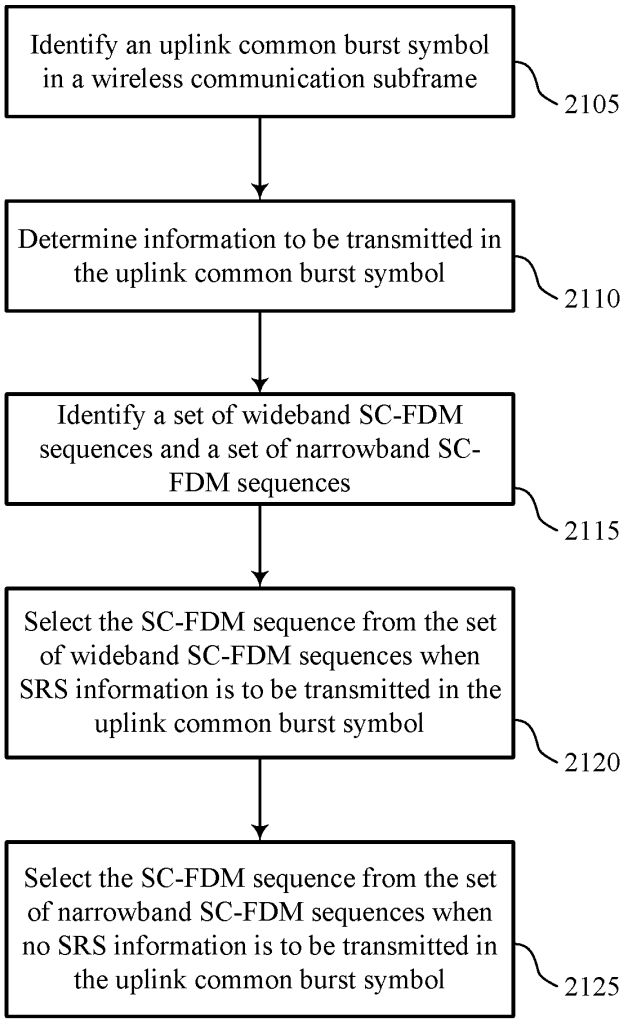

Identify an uplink common burst symbol in a wireless communication subframe
2105
Determine information to be transmitted in the uplink common burst symbol
2110
Identify a set of wideband SC-FDM sequences and a set of narrowband SC-FDM sequences
2115
Select the SC-FDM sequence from the set of wideband SC-FDM sequences when SRS information is to be transmitted in the uplink common burst symbol
2120
Select the SC-FDM sequence from the set of narrowband SC-FDM sequences when no SRS information is to be transmitted in the uplink common burst symbol
2125

FIG. 21

2100

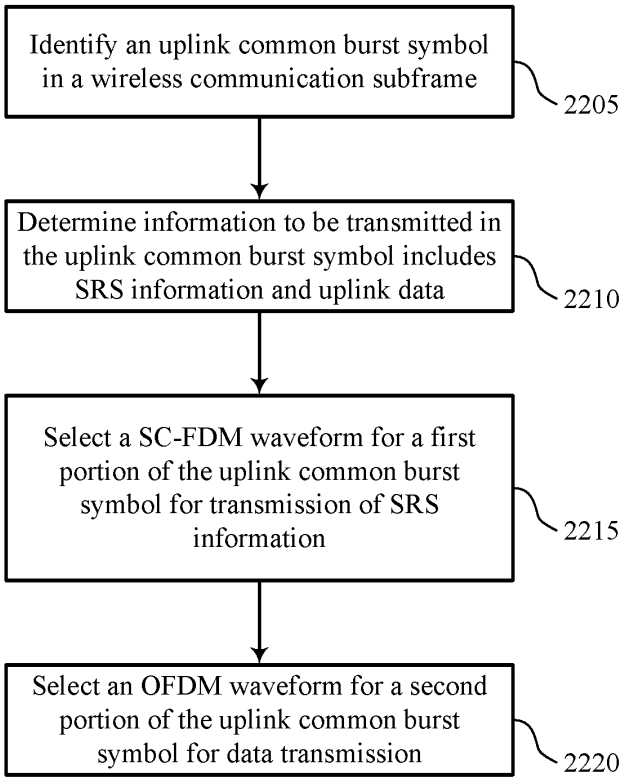

Identify an uplink common burst symbol in a wireless communication subframe
2205
Determine information to be transmitted in the uplink common burst symbol includes SRS information and uplink data
2210
Select a SC-FDM waveform for a first portion of the uplink common burst symbol for transmission of SRS information
2215
Select an OFDM waveform for a second portion of the uplink common burst symbol for data transmission
2220

FIG. 22

2200

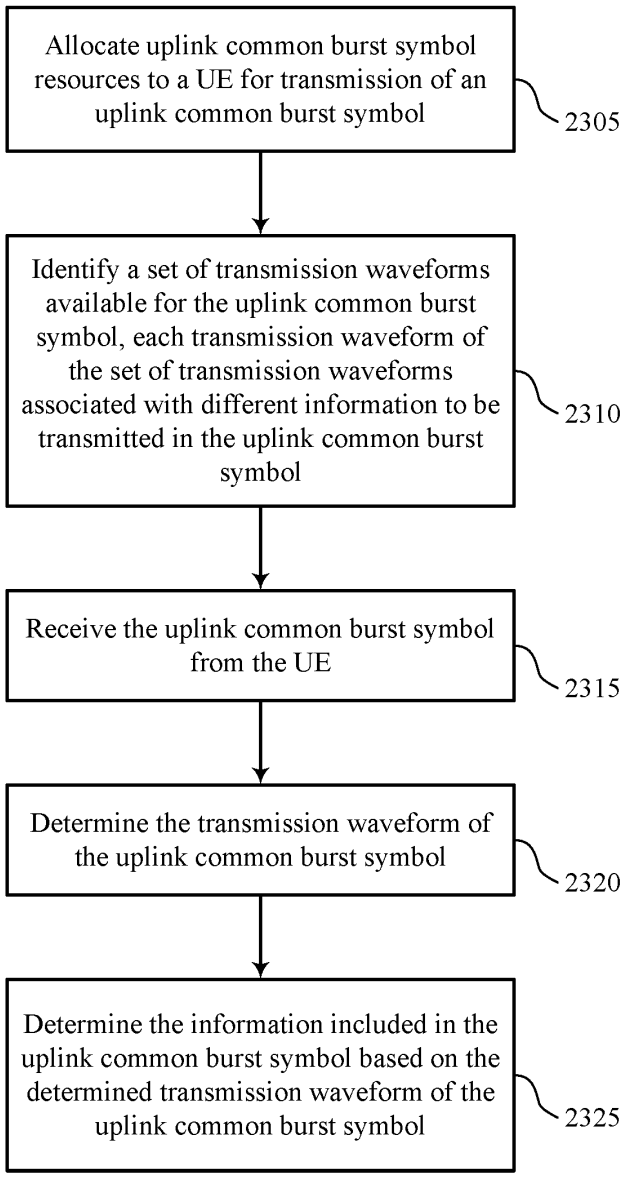

Allocate uplink common burst symbol resources to a UE for transmission of an uplink common burst symbol
2305
Identify a set of transmission waveforms available for the uplink common burst symbol, each transmission waveform of the set of transmission waveforms associated with different information to be transmitted in the uplink common burst symbol
2310
Receive the uplink common burst symbol from the UE
2315
Determine the transmission waveform of the uplink common burst symbol
2320
Determine the information included in the uplink common burst symbol based on the determined transmission waveform of the uplink common burst symbol
2325

FIG. 23

2300

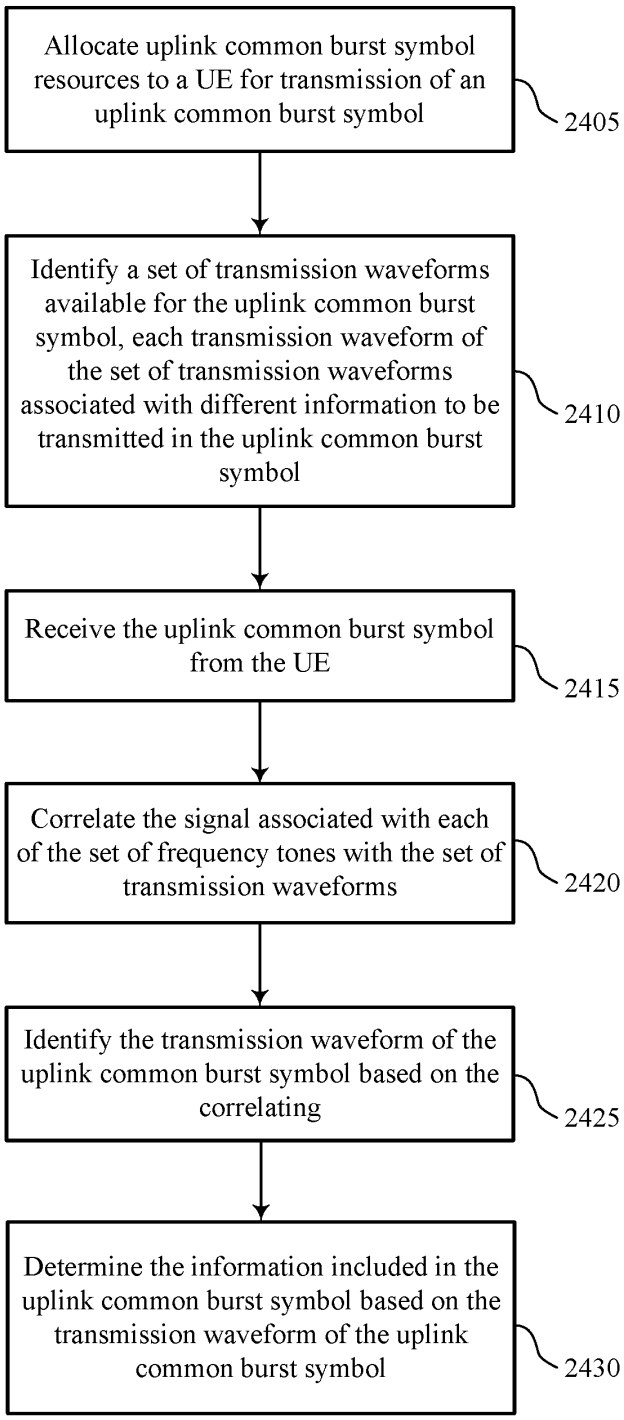

Allocate uplink common burst symbol resources to a UE for transmission of an uplink common burst symbol
2405
Identify a set of transmission waveforms available for the uplink common burst symbol, each transmission waveform of the set of transmission waveforms associated with different information to be transmitted in the uplink common burst symbol
2410
Receive the uplink common burst symbol from the UE
2415
Correlate the signal associated with each of the set of frequency tones with the set of transmission waveforms
2420
Identify the transmission waveform of the uplink common burst symbol based on the correlating
2425
Determine the information included in the uplink common burst symbol based on the transmission waveform of the uplink common burst symbol
2430

FIG. 24

2400

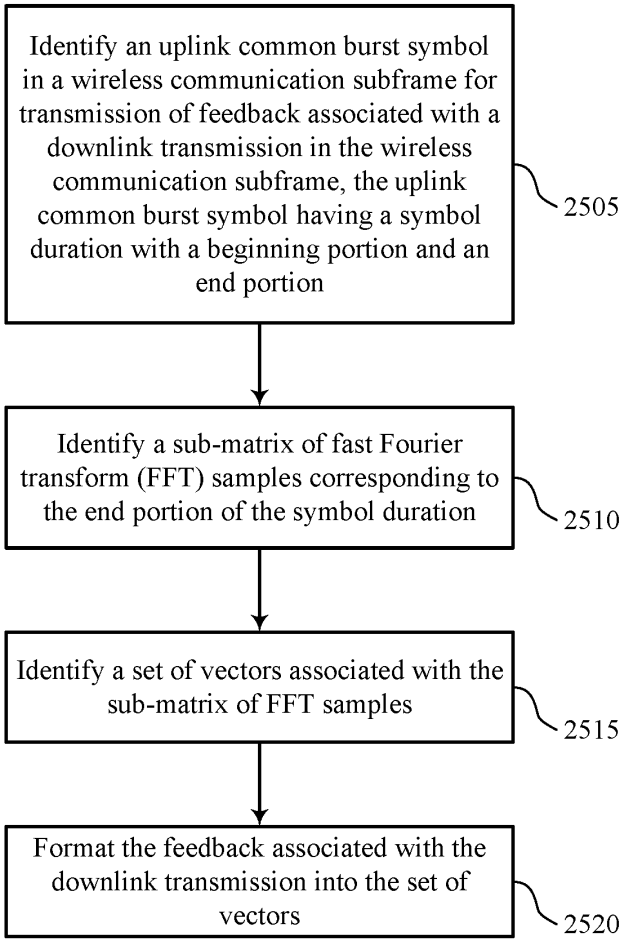

Identify an uplink common burst symbol in a wireless communication subframe for transmission of feedback associated with a downlink transmission in the wireless communication subframe, the uplink common burst symbol having a symbol duration with a beginning portion and an end portion
2505
Identify a sub-matrix of fast Fourier transform (FFT) samples corresponding to the end portion of the symbol duration
2510
Identify a set of vectors associated with the sub-matrix of FFT samples
2515
Format the feedback associated with the downlink transmission into the set of vectors
2520

FIG. 25

2500