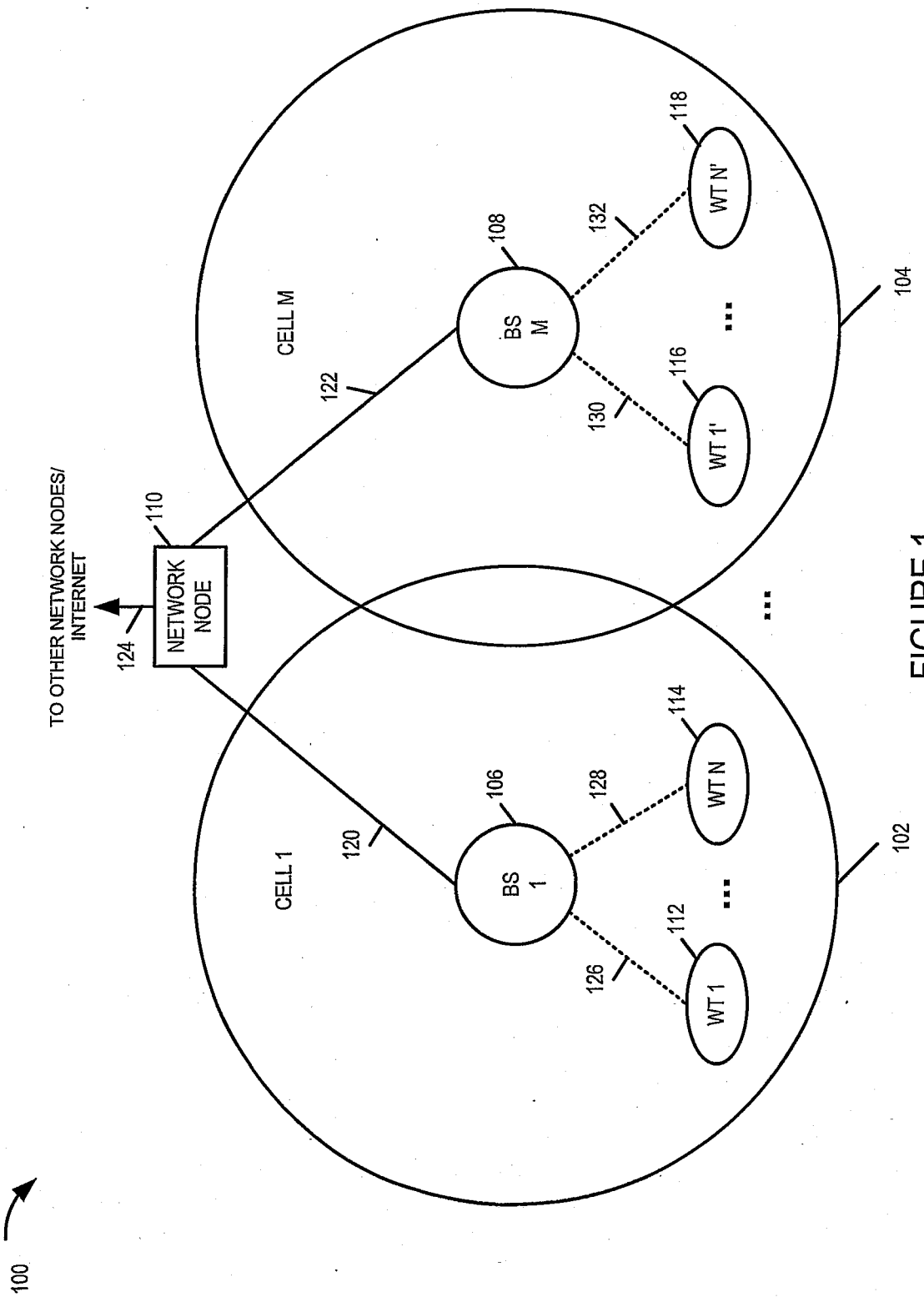

100
TO OTHER NETWORK NODES/ INTERNET
124
NETWORK NODE
110
CELL 1
CELL M
120
122
BS 1
BS M
106
108
WT 1
WT N
WT 1'
WT N'
112
114
116
118
126
128
130
132
102
104

FIGURE 1

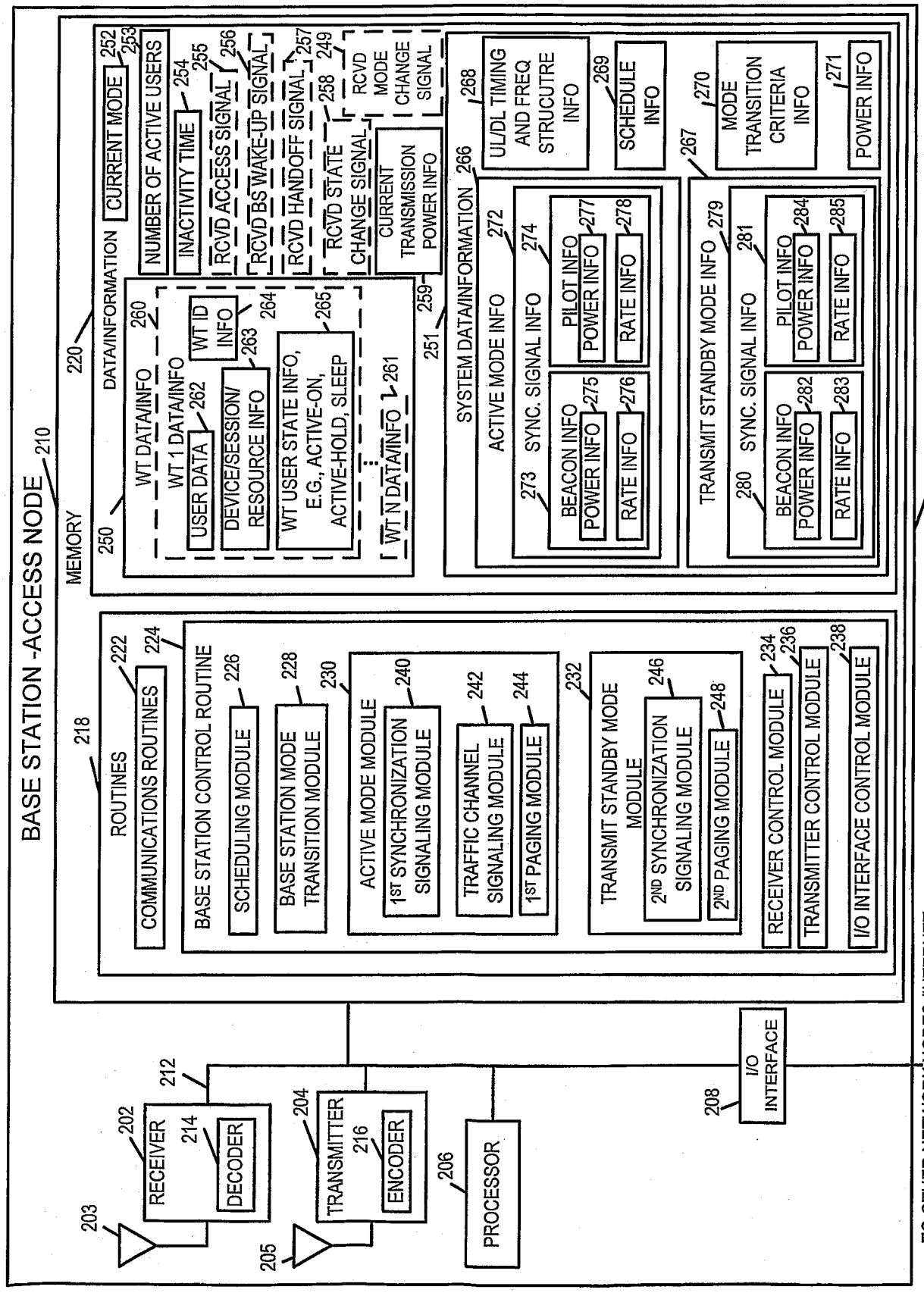

BASE STATION -ACCESS NODE
210
MEMORY
220
DATA/INFORMATION
WT DATA/INFO
260
WT 1 DATA/INFO
USER DATA
262
DEVICE/SESSION/ RESOURCE INFO
263
WT ID INFO
264
WT USER STATE INFO, E.G., ACTIVE-ON, ACTIVE-HOLD, SLEEP
265
WT N DATA/INFO
261
250
CURRENT MODE
252
253
NUMBER OF ACTIVE USERS
254
INACTIVITY TIME
255
RCVD ACCESS SIGNAL
256
RCVD BS WAKE-UP SIGNAL
257
RCVD HANDOFF SIGNAL
258
RCVD STATE CHANGE SIGNAL
249
RCVD MODE CHANGE SIGNAL
CURRENT TRANSMISSION POWER INFO
259
251
SYSTEM DATA/INFORMATION
266
ACTIVE MODE INFO
272
SYNC. SIGNAL INFO
274
PILOT INFO
277
POWER INFO
278
RATE INFO
BEACON INFO
275
POWER INFO
276
RATE INFO
273
UL/DL TIMING AND FREQ STRUCUTRE INFO
268
SCHEDULE INFO
269
TRANSMIT STANDBY MODE INFO
279
SYNC. SIGNAL INFO
281
PILOT INFO
284
POWER INFO
285
RATE INFO
BEACON INFO
282
POWER INFO
283
RATE INFO
280
267
MODE TRANSITION CRITERIA INFO
270
POWER INFO
271
ROUTINES
218
COMMUNICATIONS ROUTINES
222
BASE STATION CONTROL ROUTINE
224
SCHEDULING MODULE
226
BASE STATION MODE TRANSITION MODULE
228
ACTIVE MODE MODULE
230
1ST SYNCHRONIZATION SIGNALING MODULE
240
TRAFFIC CHANNEL SIGNALING MODULE
242
1ST PAGING MODULE
244
TRANSMIT STANDBY MODE MODULE
232
2ND SYNCHRONIZATION SIGNALING MODULE
246
2ND PAGING MODULE
248
RECEIVER CONTROL MODULE
234
TRANSMITTER CONTROL MODULE
236
I/O INTERFACE CONTROL MODULE
238
200
RECEIVER
202
DECODER
214
212
TRANSMITTER
204
ENCODER
216
PROCESSOR
206
I/O INTERFACE
208
203
205
TO OTHER NETWORK NODES /INTERNET

Figure 2

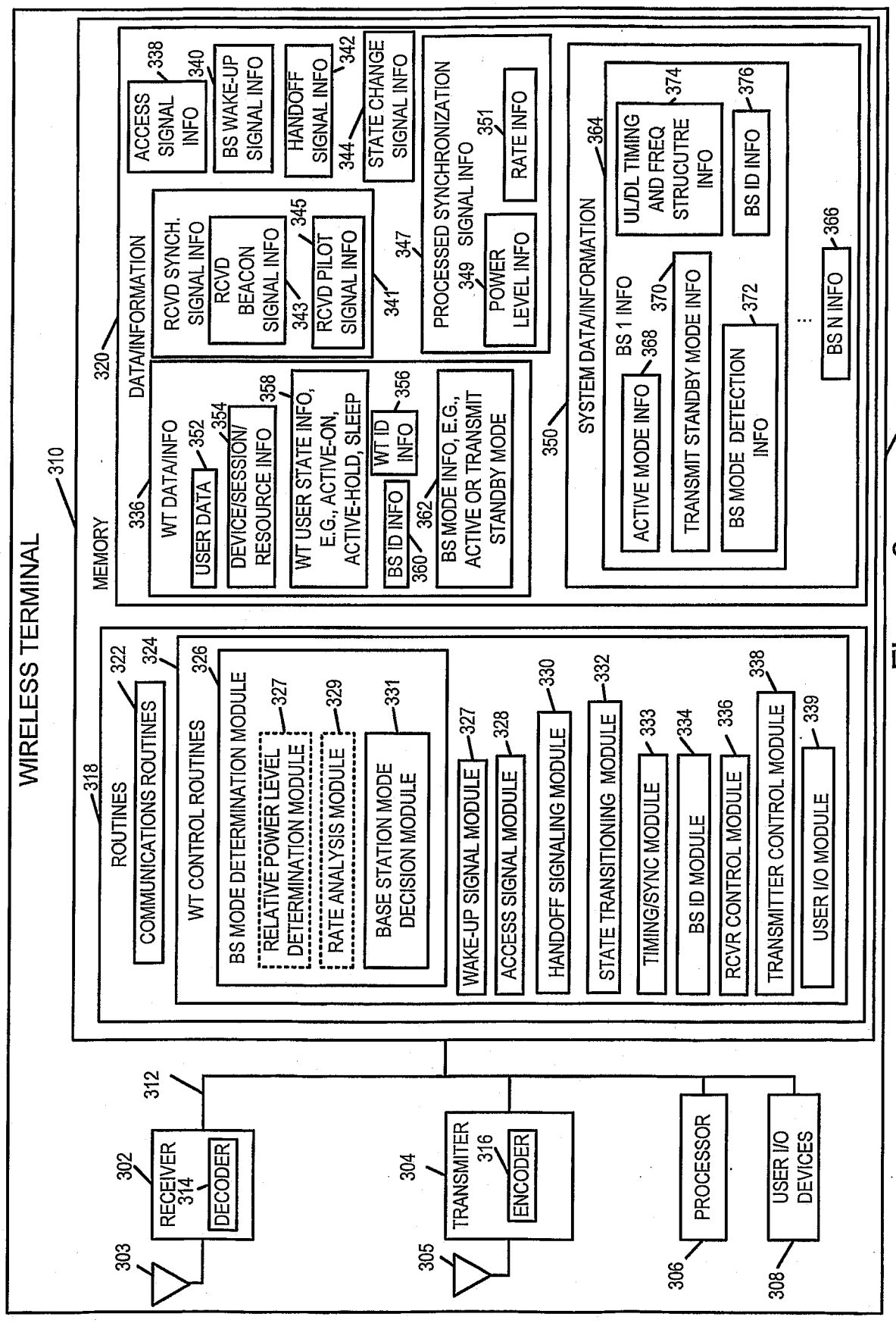

WIRELESS TERMINAL
310
MEMORY
320
DATA/INFORMATION
WT DATA/INFO
336
USER DATA
352
DEVICE/SESSION/ RESOURCE INFO
354
358
WT USER STATE INFO, E.G., ACTIVE-ON, ACTIVE-HOLD, SLEEP
WT ID INFO
356
BS ID INFO
360
BS MODE INFO, E.G., ACTIVE OR TRANSMIT STANDBY MODE
362
RCVD SYNCH. SIGNAL INFO
RCVD BEACON SIGNAL INFO
345
343
RCVD PILOT SIGNAL INFO
341
347
ACCESS SIGNAL INFO
338
BS WAKE-UP SIGNAL INFO
340
HANDOFF SIGNAL INFO
342
344
STATE CHANGE SIGNAL INFO
PROCESSED SYNCHRONIZATION SIGNAL INFO
349
351
POWER LEVEL INFO
RATE INFO
350
SYSTEM DATA/INFORMATION
364
BS 1 INFO
368
ACTIVE MODE INFO
TRANSMIT STANDBY MODE INFO
370
BS MODE DETECTION INFO
372
UL/DL TIMING AND FREQ STRUCUTRE INFO
374
BS ID INFO
376
BS N INFO
366
ROUTINES
318
COMMUNICATIONS ROUTINES
322
WT CONTROL ROUTINES
324
BS MODE DETERMINATION MODULE
326
RELATIVE POWER LEVEL DETERMINATION MODULE
327
RATE ANALYSIS MODULE
329
BASE STATION MODE DECISION MODULE
331
WAKE-UP SIGNAL MODULE
327
ACCESS SIGNAL MODULE
328
HANDOFF SIGNALING MODULE
330
STATE TRANSITIONING MODULE
332
TIMING/SYNC MODULE
333
BS ID MODULE
334
RCVR CONTROL MODULE
336
TRANSMITTER CONTROL MODULE
338
USER I/O MODULE
339
RECEIVER
314
DECODER
302
303
312
TRANSMITER
316
ENCODER
304
305
PROCESSOR
306
USER I/O DEVICES
308
300

Figure 3

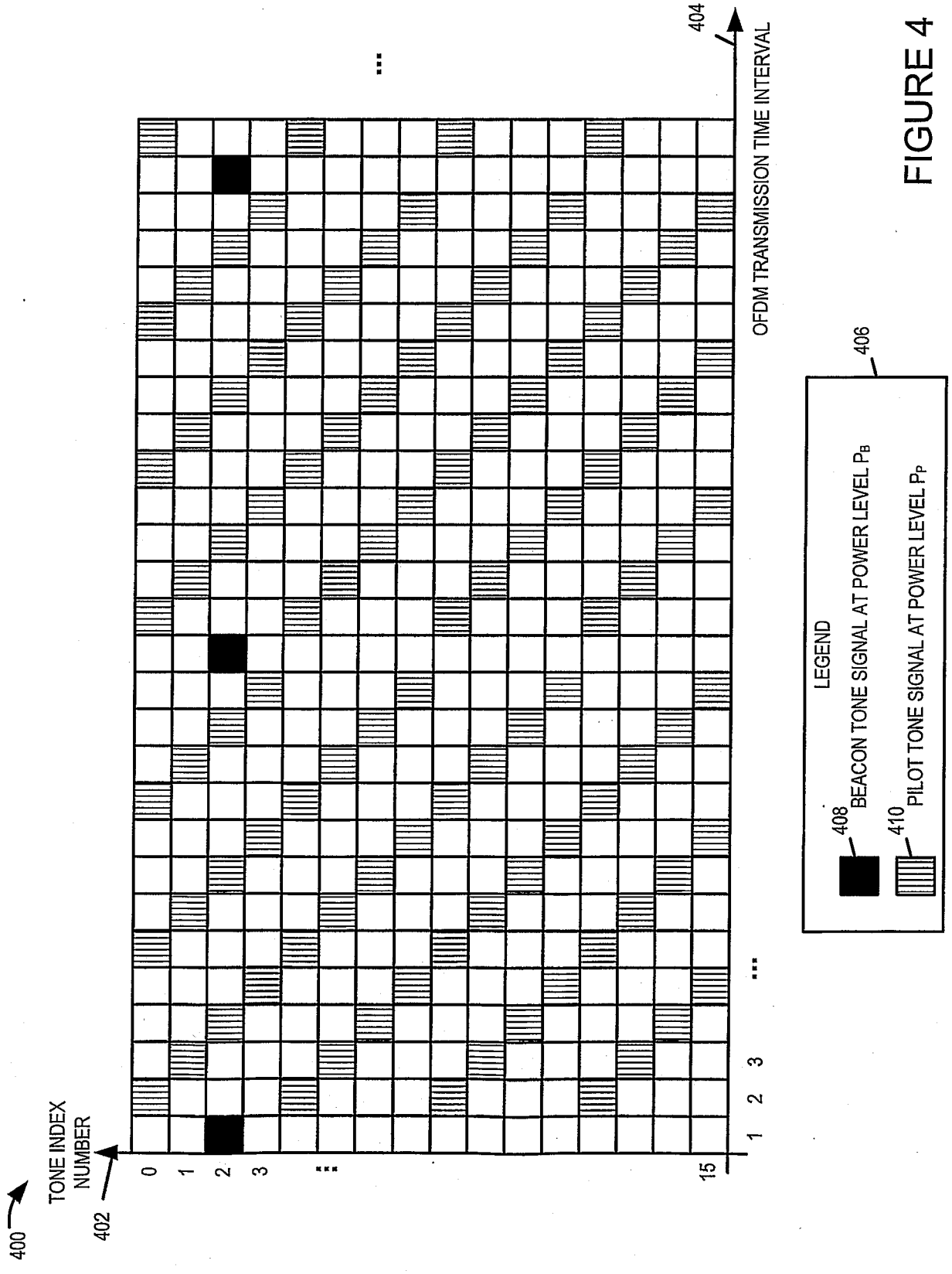

400
TONE INDEX NUMBER
402
0
1
2
3
...
15
1
2
3
...
404
OFDM TRANSMISSION TIME INTERVAL
406
LEGEND
408
BEACON TONE SIGNAL AT POWER LEVEL P_B
410
PILOT TONE SIGNAL AT POWER LEVEL P_P

FIGURE 4

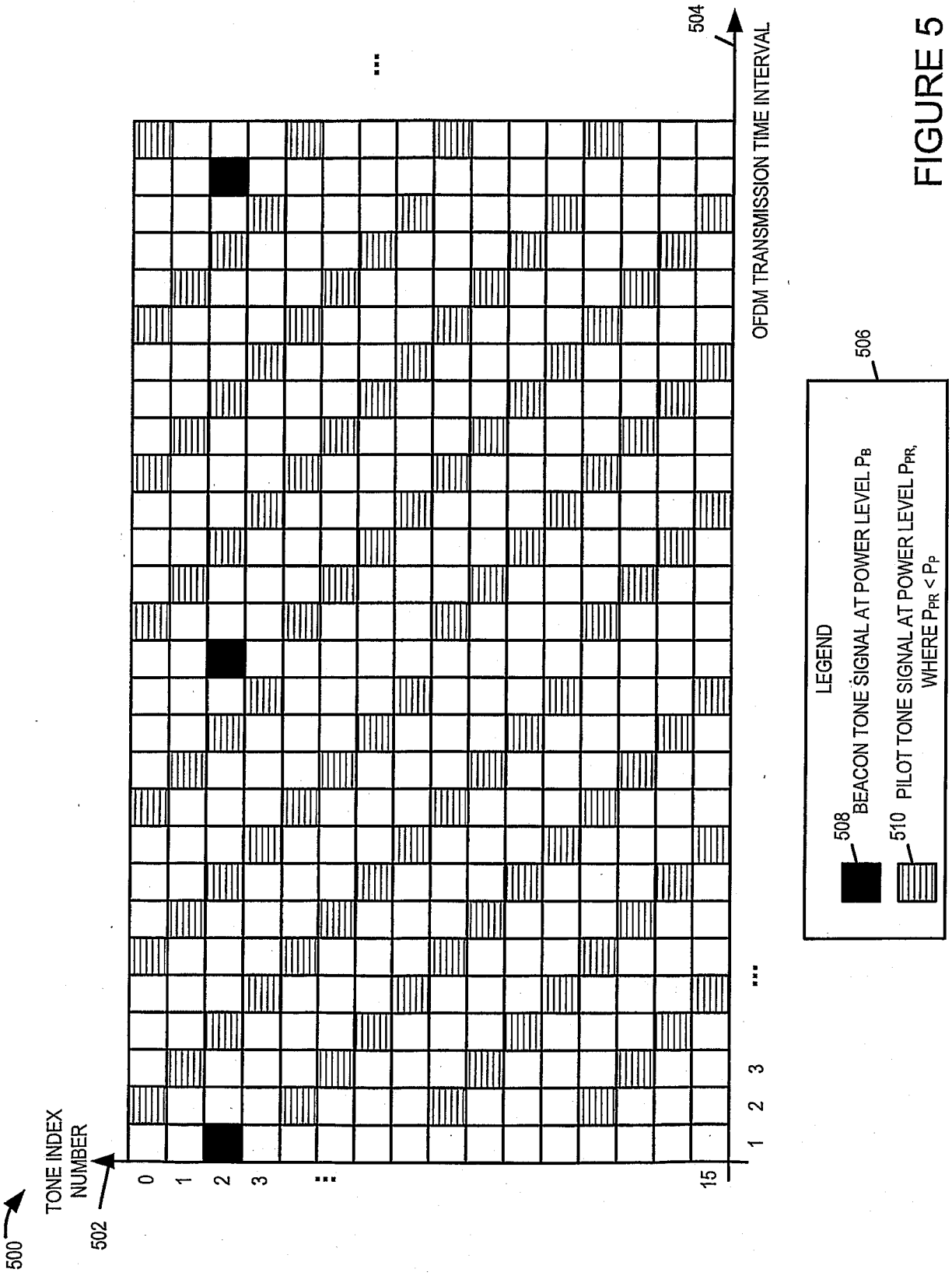

500
TONE INDEX NUMBER
502
0
1
2
3
...
15
1
2
3
...
504
OFDM TRANSMISSION TIME INTERVAL
506
LEGEND
508
BEACON TONE SIGNAL AT POWER LEVEL P_B
510
PILOT TONE SIGNAL AT POWER LEVEL P_{PR}, WHERE $P_{PR} < P_P$

FIGURE 5

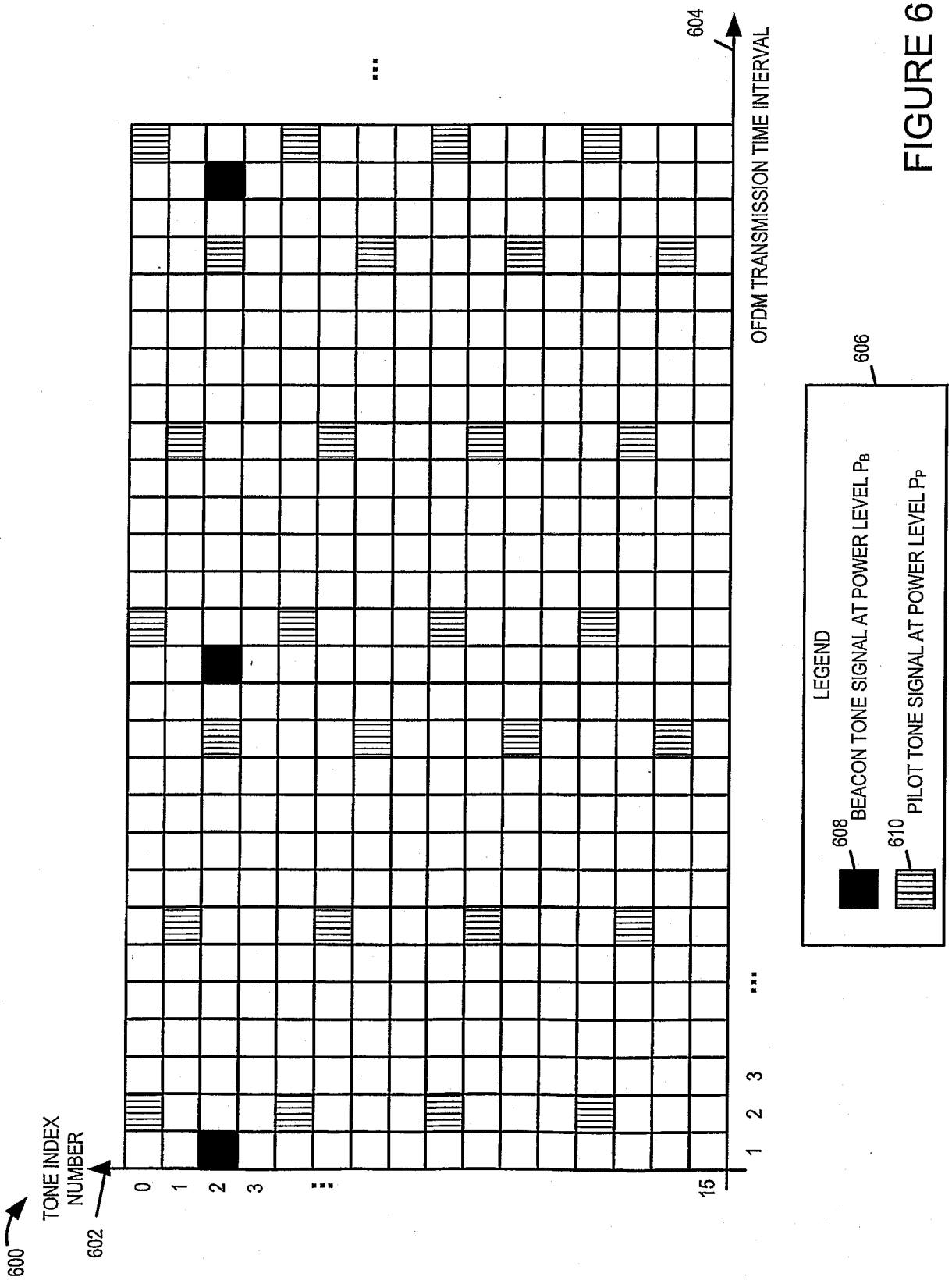

600
TONE INDEX NUMBER
602
0
1
2
3
...
15
1
2
3
...
604
OFDM TRANSMISSION TIME INTERVAL
606
LEGEND
608
BEACON TONE SIGNAL AT POWER LEVEL P_B
610
PILOT TONE SIGNAL AT POWER LEVEL P_P

FIGURE 6

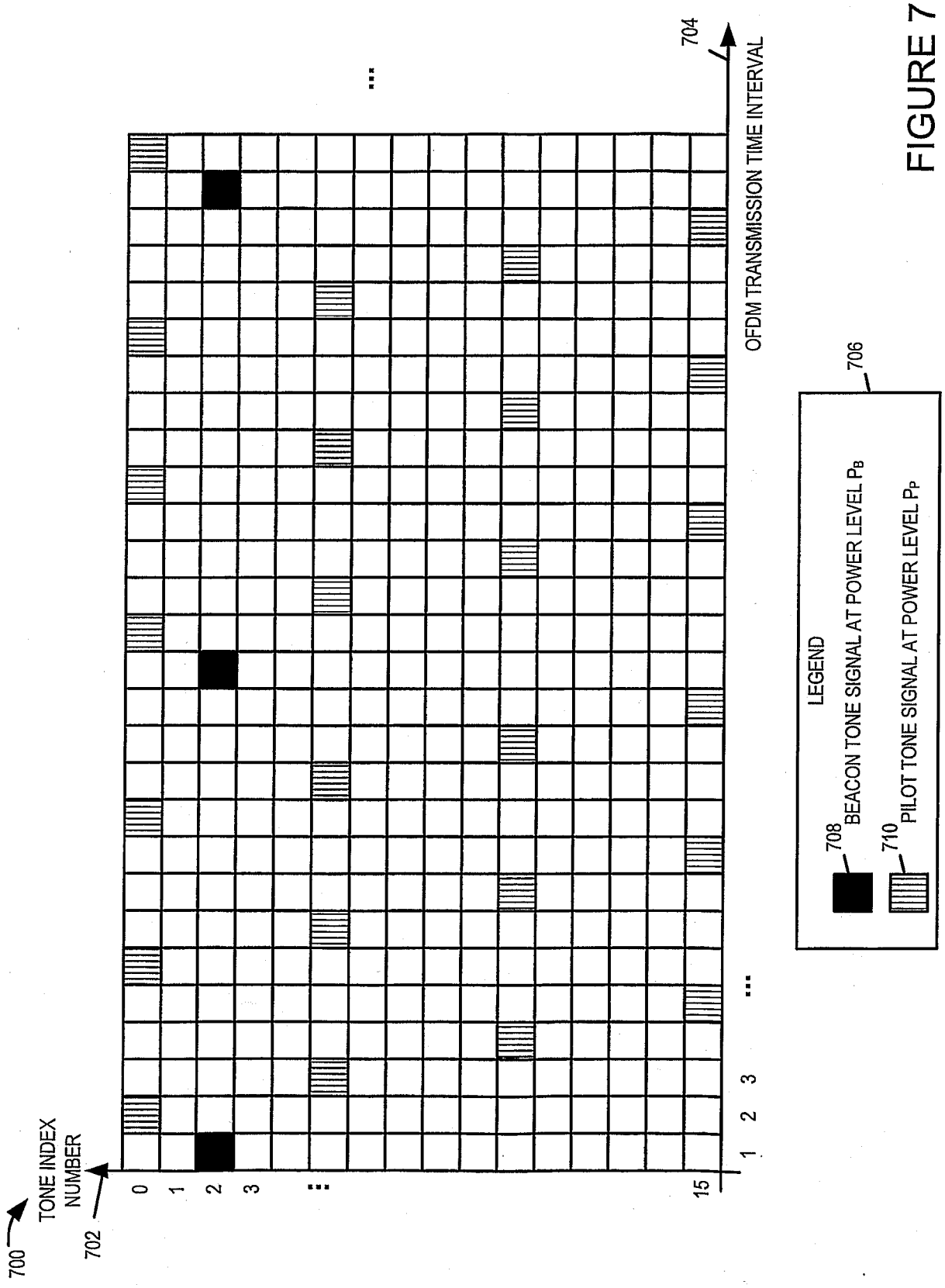

700
TONE INDEX NUMBER
702
0
1
2
3
...
15
1
2
3
...
704
OFDM TRANSMISSION TIME INTERVAL
706
LEGEND
708
BEACON TONE SIGNAL AT POWER LEVEL P_B
710
PILOT TONE SIGNAL AT POWER LEVEL P_P

FIGURE 7

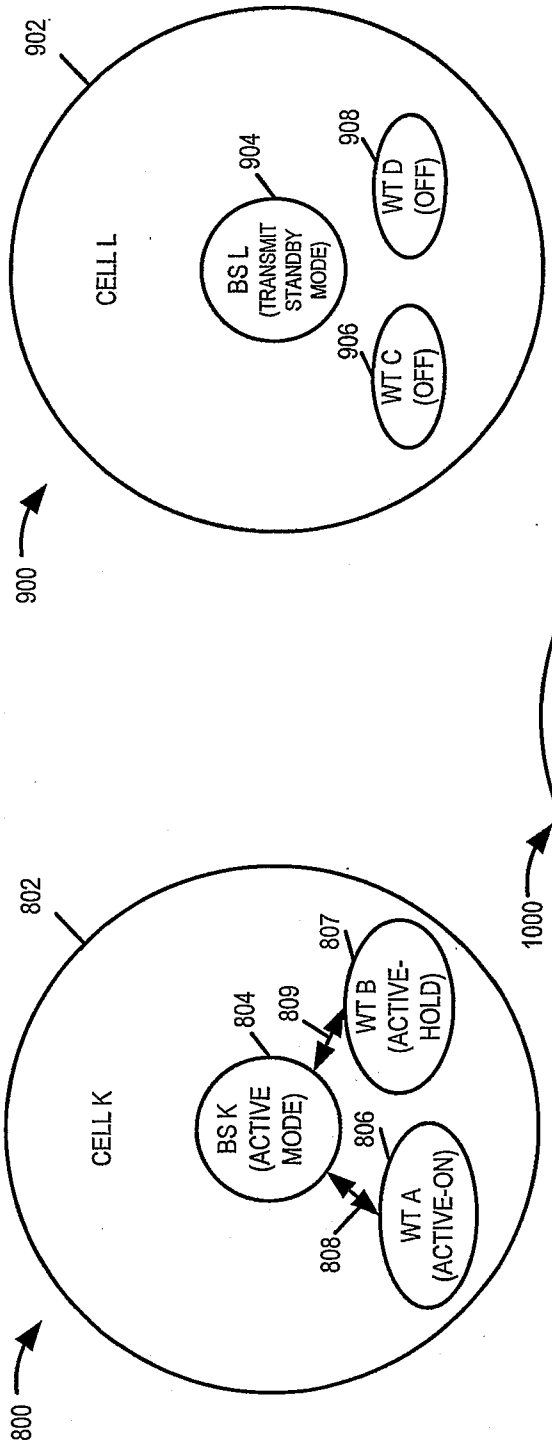


FIGURE 9

FIGURE 8

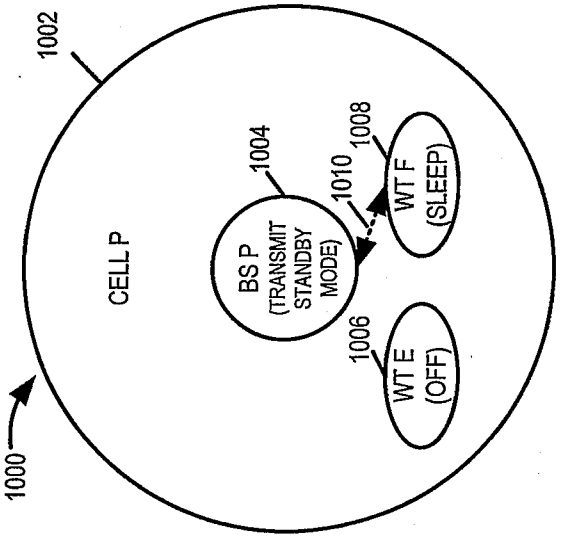


FIGURE 10

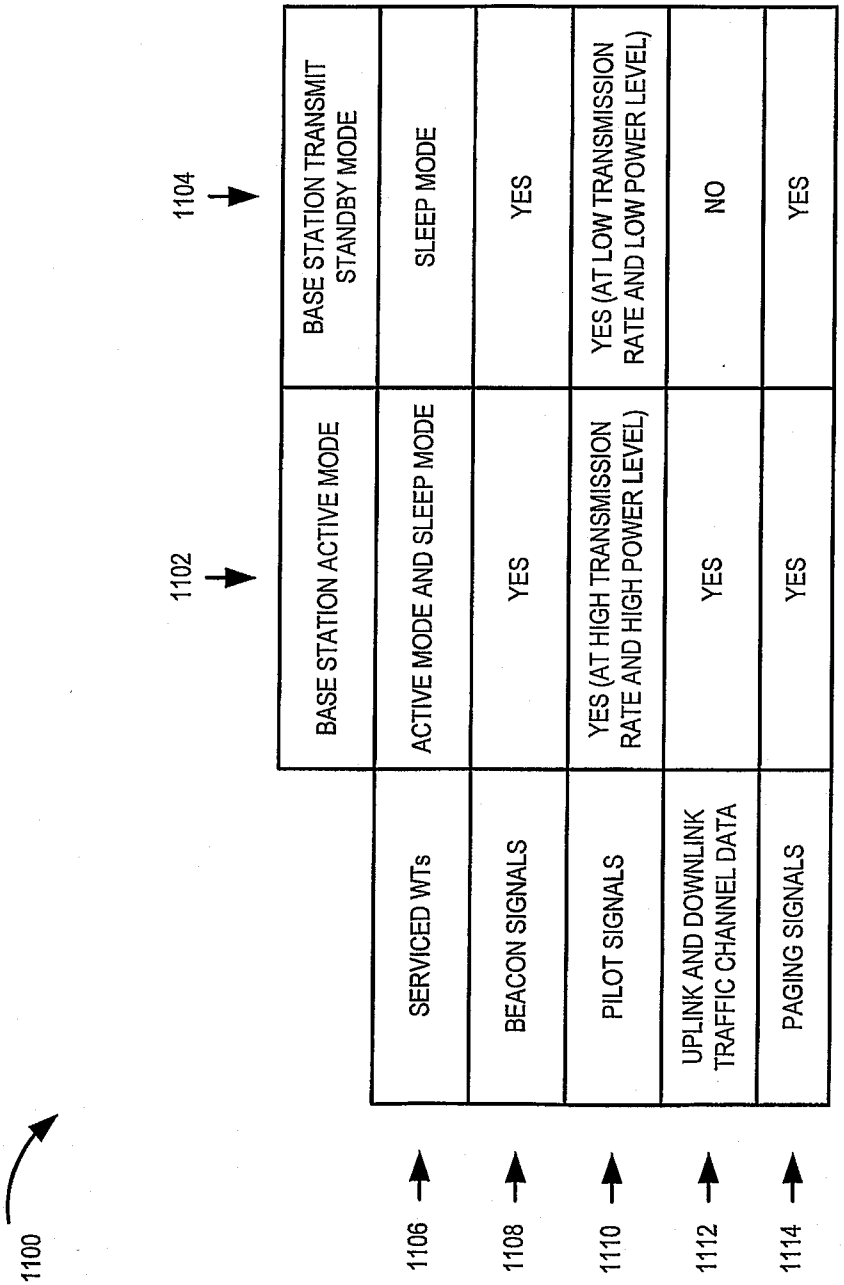

1100
1102
1104
1106
1108
1110
1112
1114
SERVICED WTs
BEACON SIGNALS
PILOT SIGNALS
UPLINK AND DOWNLINK TRAFFIC CHANNEL DATA
PAGING SIGNALS
BASE STATION ACTIVE MODE
ACTIVE MODE AND SLEEP MODE
YES
YES (AT HIGH TRANSMISSION RATE AND HIGH POWER LEVEL)
YES
YES
BASE STATION TRANSMIT STANDBY MODE
SLEEP MODE
YES
YES (AT LOW TRANSMISSION RATE AND LOW POWER LEVEL)
NO
YES

FIGURE 11

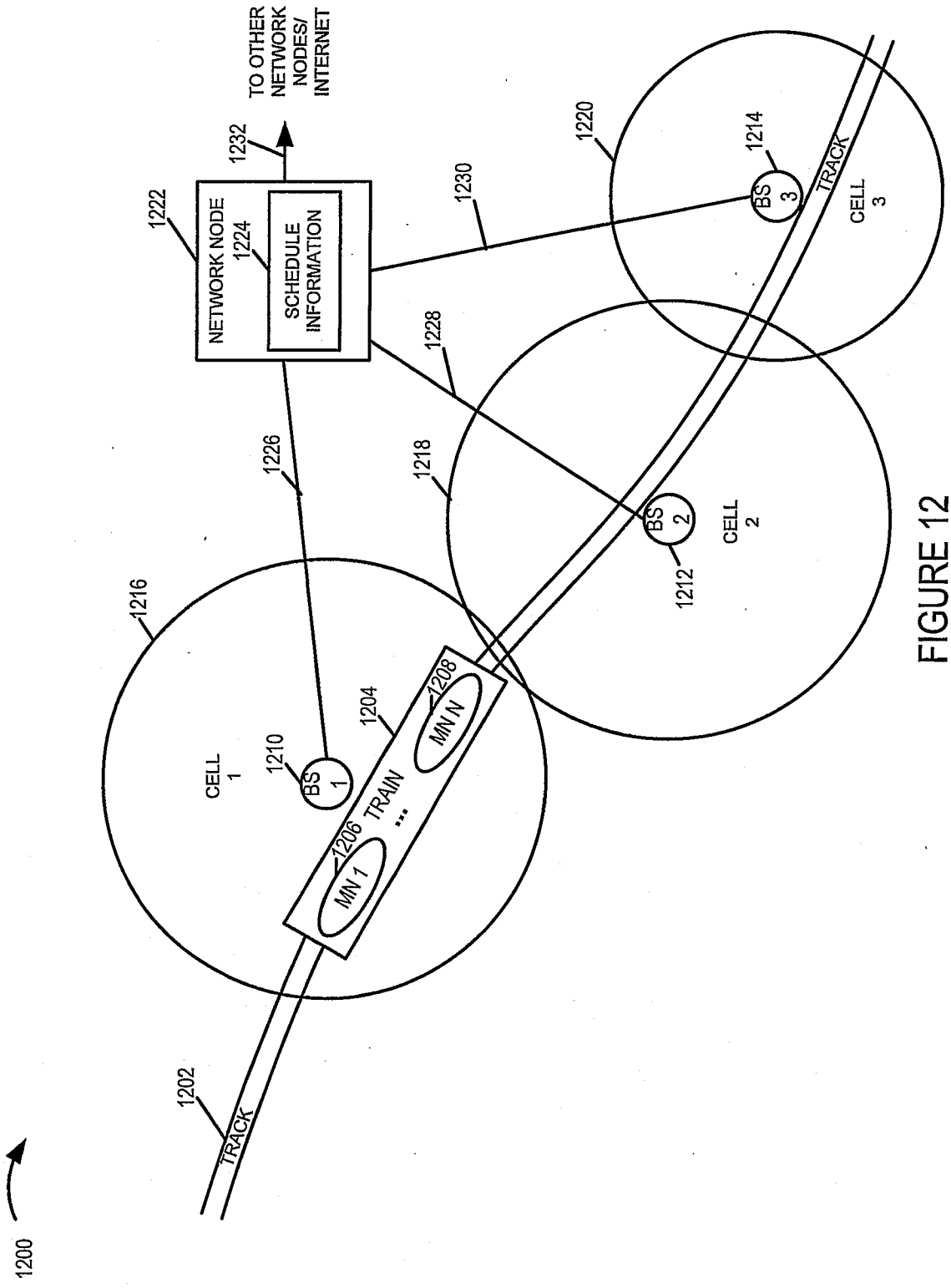

1200
1202
TRACK
1204
TRAIN
1206
MN 1
1208
MN N
1210
BS 1
CELL 1
1216
1212
BS 2
CELL 2
1218
1214
BS 3
CELL 3
1220
1222
NETWORK NODE
1224
SCHEDULE INFORMATION
1226
1228
1230
1232
TO OTHER NETWORK NODES/ INTERNET

FIGURE 12

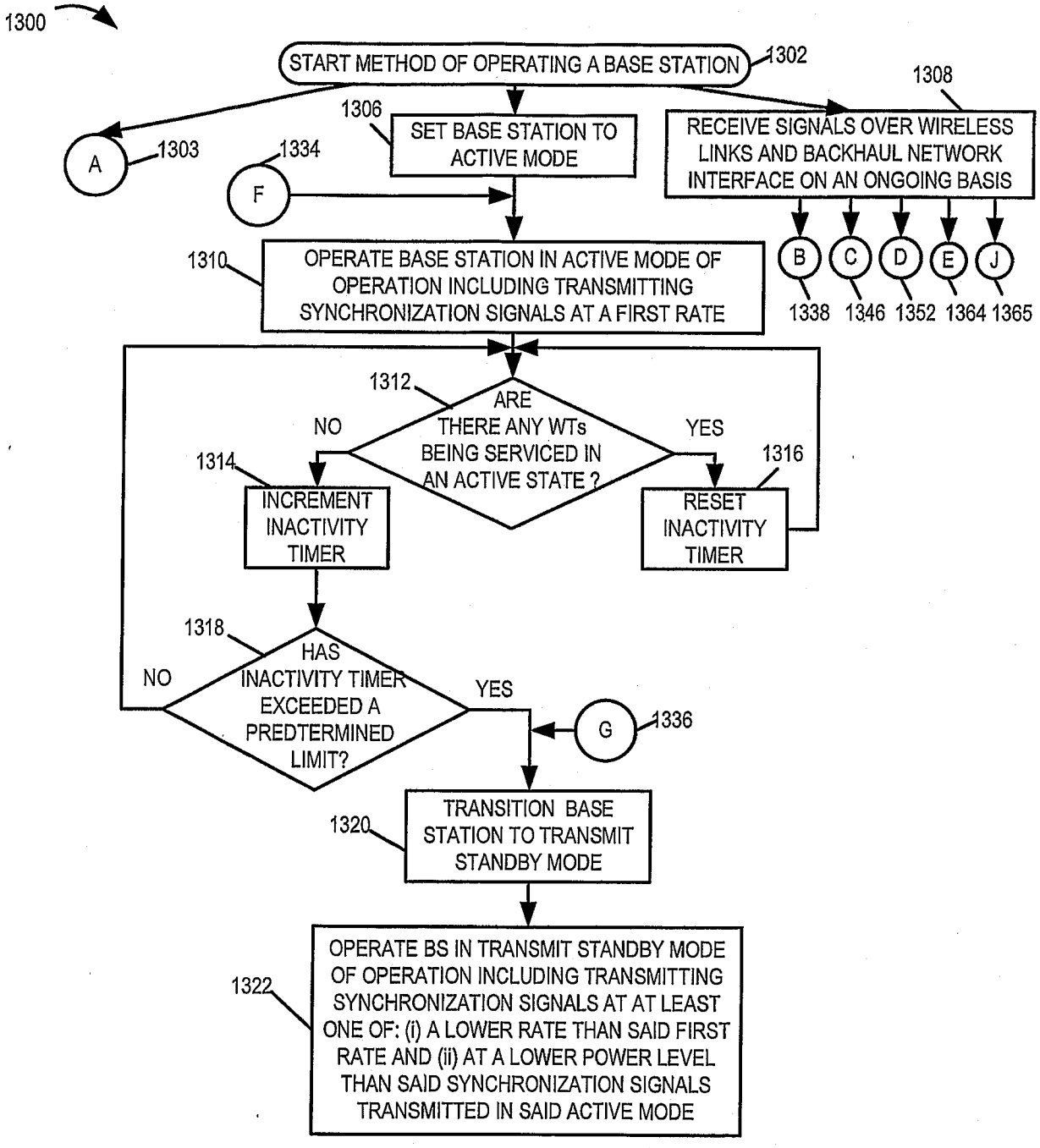


FIGURE 13A

FIGURE 13A
FIGURE 13B
FIGURE 13C

FIGURE 13

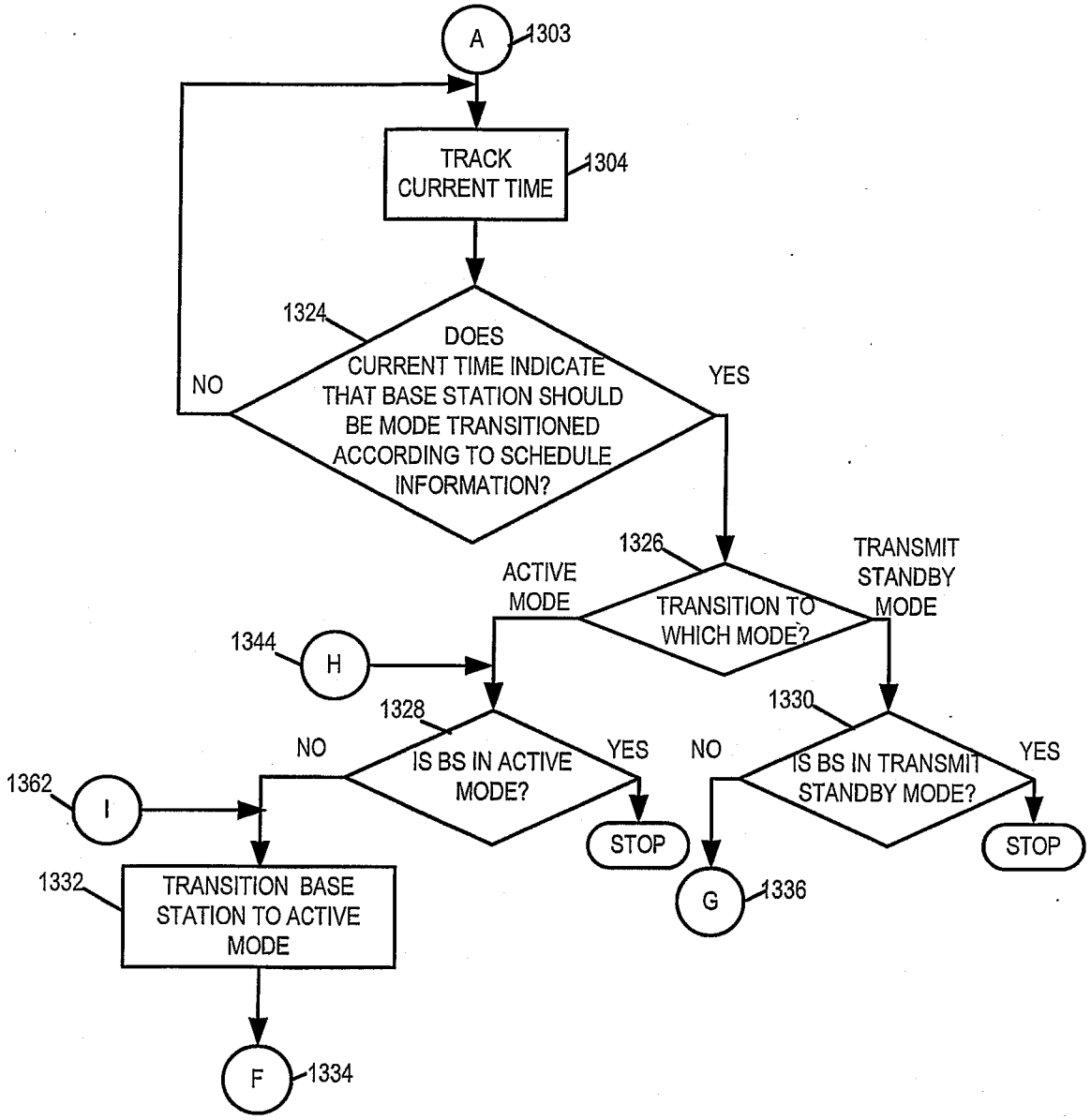

A
1303
TRACK CURRENT TIME
1304
1324
DOES CURRENT TIME INDICATE THAT BASE STATION SHOULD BE MODE TRANSITIONED ACCORDING TO SCHEDULE INFORMATION?
NO
YES
1326
TRANSITION TO WHICH MODE?
ACTIVE MODE
TRANSMIT STANDBY MODE
1344
H
1328
IS BS IN ACTIVE MODE?
NO
YES
1330
IS BS IN TRANSMIT STANDBY MODE?
NO
YES
1362
I
STOP
STOP
1332
TRANSITION BASE STATION TO ACTIVE MODE
G
1336
F
1334

FIGURE 13B

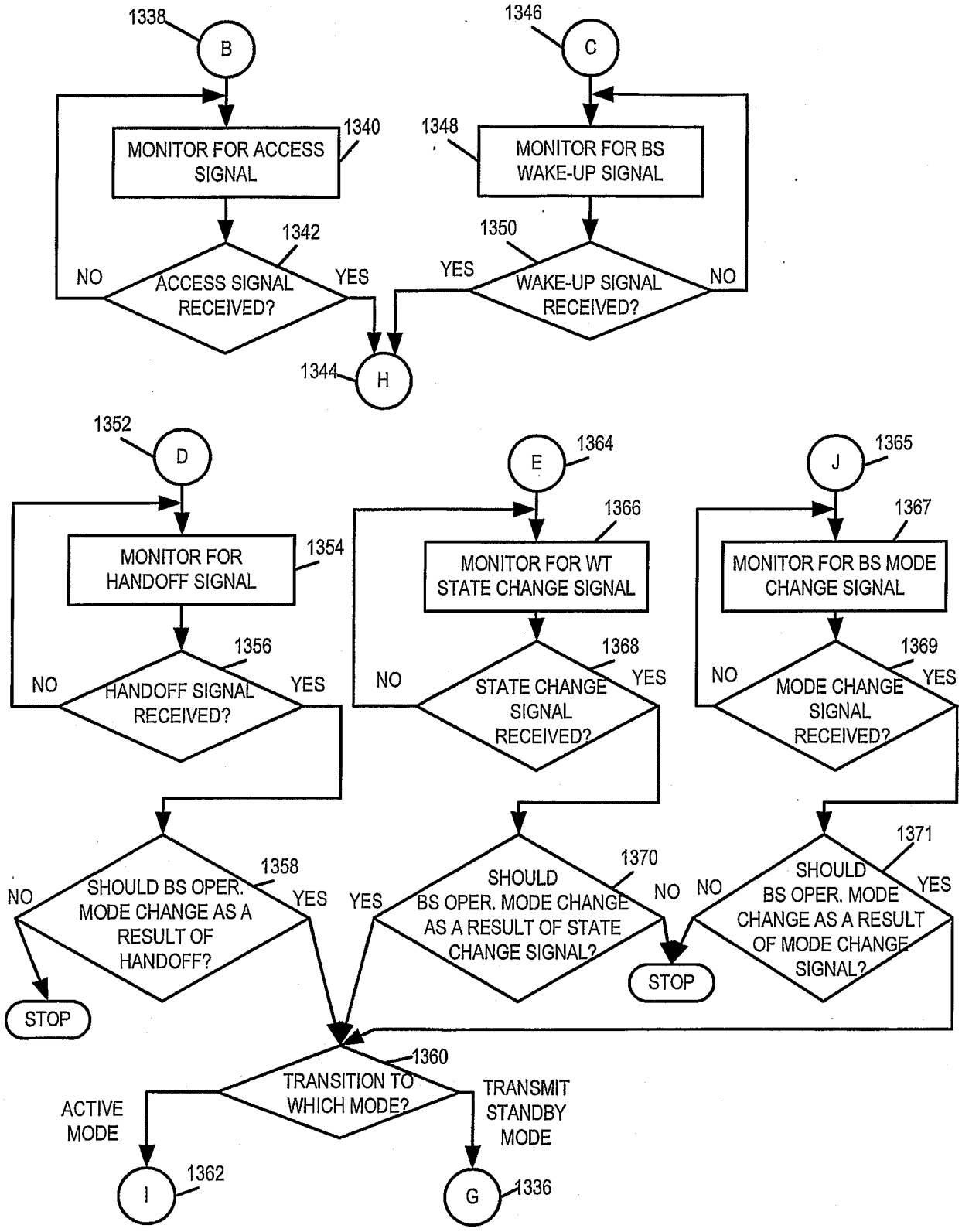

1338
B
MONITOR FOR ACCESS SIGNAL
1340
1342
NO
ACCESS SIGNAL RECEIVED?
YES
1344
H
1346
C
1348
MONITOR FOR BS WAKE-UP SIGNAL
1350
YES
WAKE-UP SIGNAL RECEIVED?
NO
1352
D
MONITOR FOR HANDOFF SIGNAL
1354
1356
NO
HANDOFF SIGNAL RECEIVED?
YES
1364
E
1366
MONITOR FOR WT STATE CHANGE SIGNAL
1368
NO
STATE CHANGE SIGNAL RECEIVED?
YES
1365
J
1367
MONITOR FOR BS MODE CHANGE SIGNAL
1369
NO
MODE CHANGE SIGNAL RECEIVED?
YES
1358
NO
SHOULD BS OPER. MODE CHANGE AS A RESULT OF HANDOFF?
YES
STOP
1370
YES
SHOULD BS OPER. MODE CHANGE AS A RESULT OF STATE CHANGE SIGNAL?
NO
STOP
1371
NO
SHOULD BS OPER. MODE CHANGE AS A RESULT OF MODE CHANGE SIGNAL?
YES
1360
TRANSITION TO WHICH MODE?
ACTIVE MODE
TRANSMIT STANDBY MODE
1362
I
G
1336

FIGURE 13C

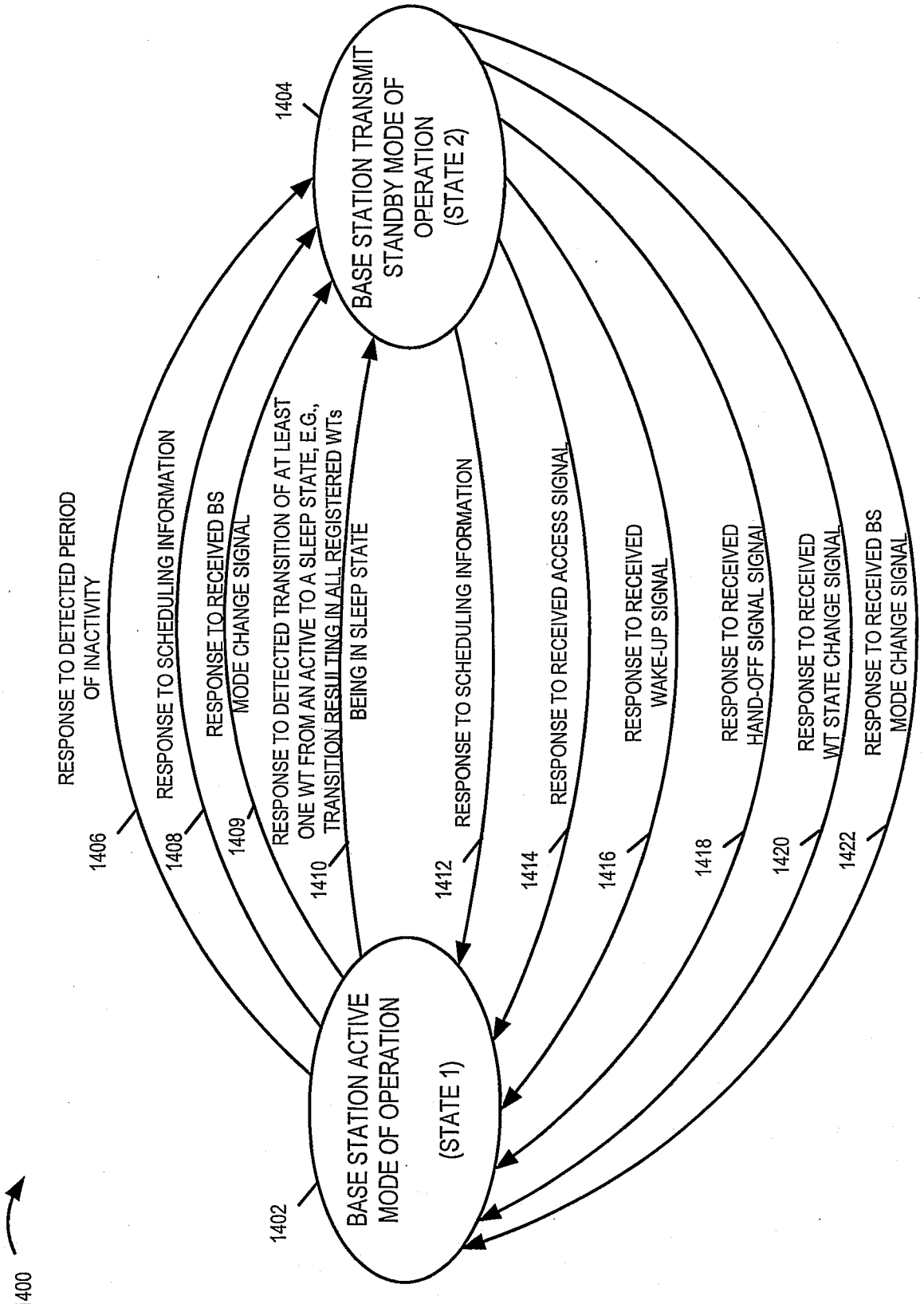

1400
BASE STATION ACTIVE MODE OF OPERATION (STATE 1)
1402
BASE STATION TRANSMIT STANDBY MODE OF OPERATION (STATE 2)
1404
RESPONSE TO DETECTED PERIOD OF INACTIVITY
1406
RESPONSE TO SCHEDULING INFORMATION
1408
RESPONSE TO RECEIVED BS MODE CHANGE SIGNAL
1409
RESPONSE TO DETECTED TRANSITION OF AT LEAST ONE WT FROM AN ACTIVE TO A SLEEP STATE, E.G., TRANSITION RESULTING IN ALL REGISTERED WTs BEING IN SLEEP STATE
1410
RESPONSE TO SCHEDULING INFORMATION
1412
RESPONSE TO RECEIVED ACCESS SIGNAL
1414
RESPONSE TO RECEIVED WAKE-UP SIGNAL
1416
RESPONSE TO RECEIVED HAND-OFF SIGNAL SIGNAL
1418
RESPONSE TO RECEIVED WT STATE CHANGE SIGNAL
1420
RESPONSE TO RECEIVED BS MODE CHANGE SIGNAL
1422

FIGURE 14

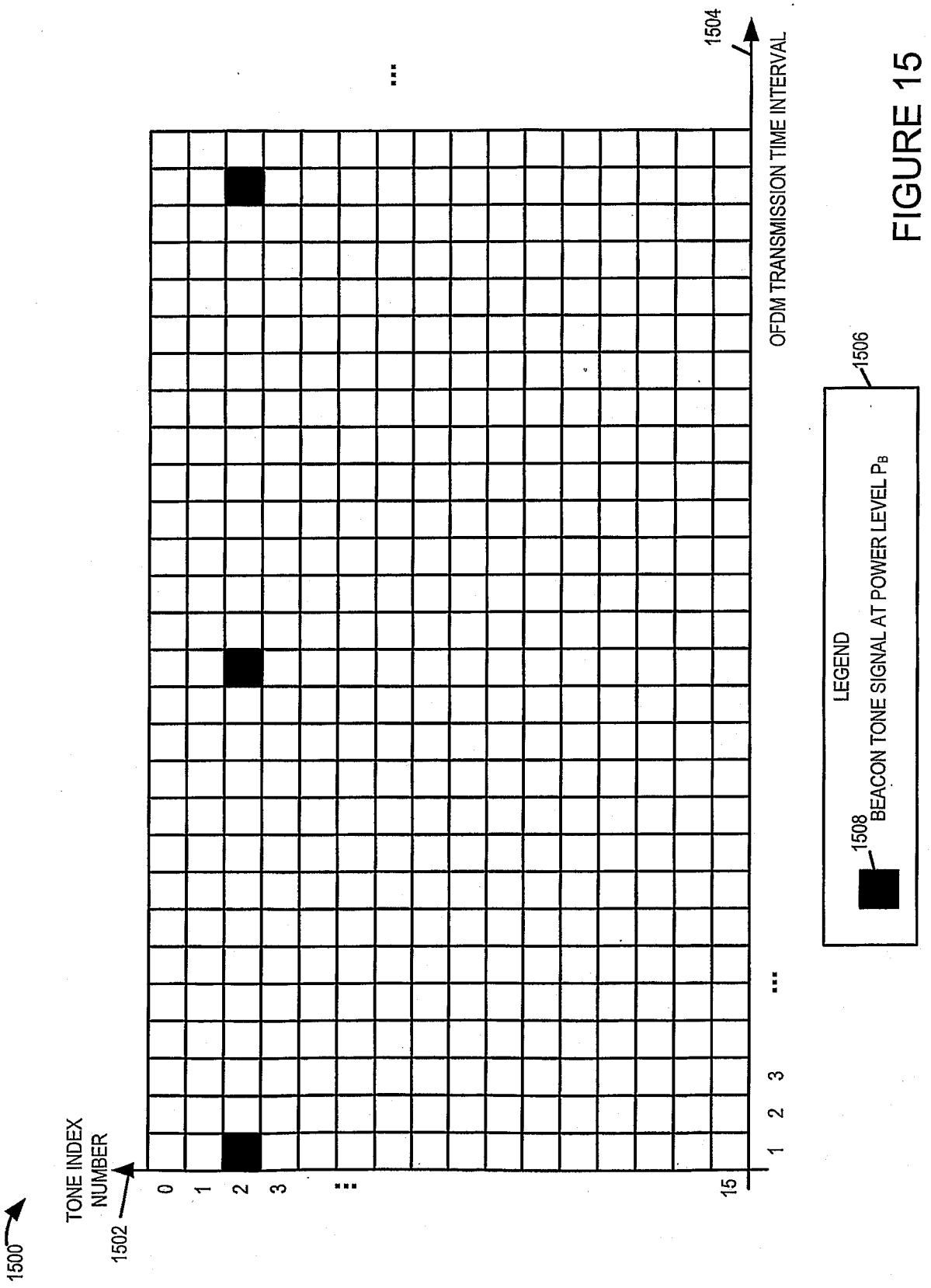

1500
TONE INDEX NUMBER
1502
0
1
2
3
...
15
1504
OFDM TRANSMISSION TIME INTERVAL
1
2
3
...
LEGEND
1506
1508
BEACON TONE SIGNAL AT POWER LEVEL P_B

FIGURE 15

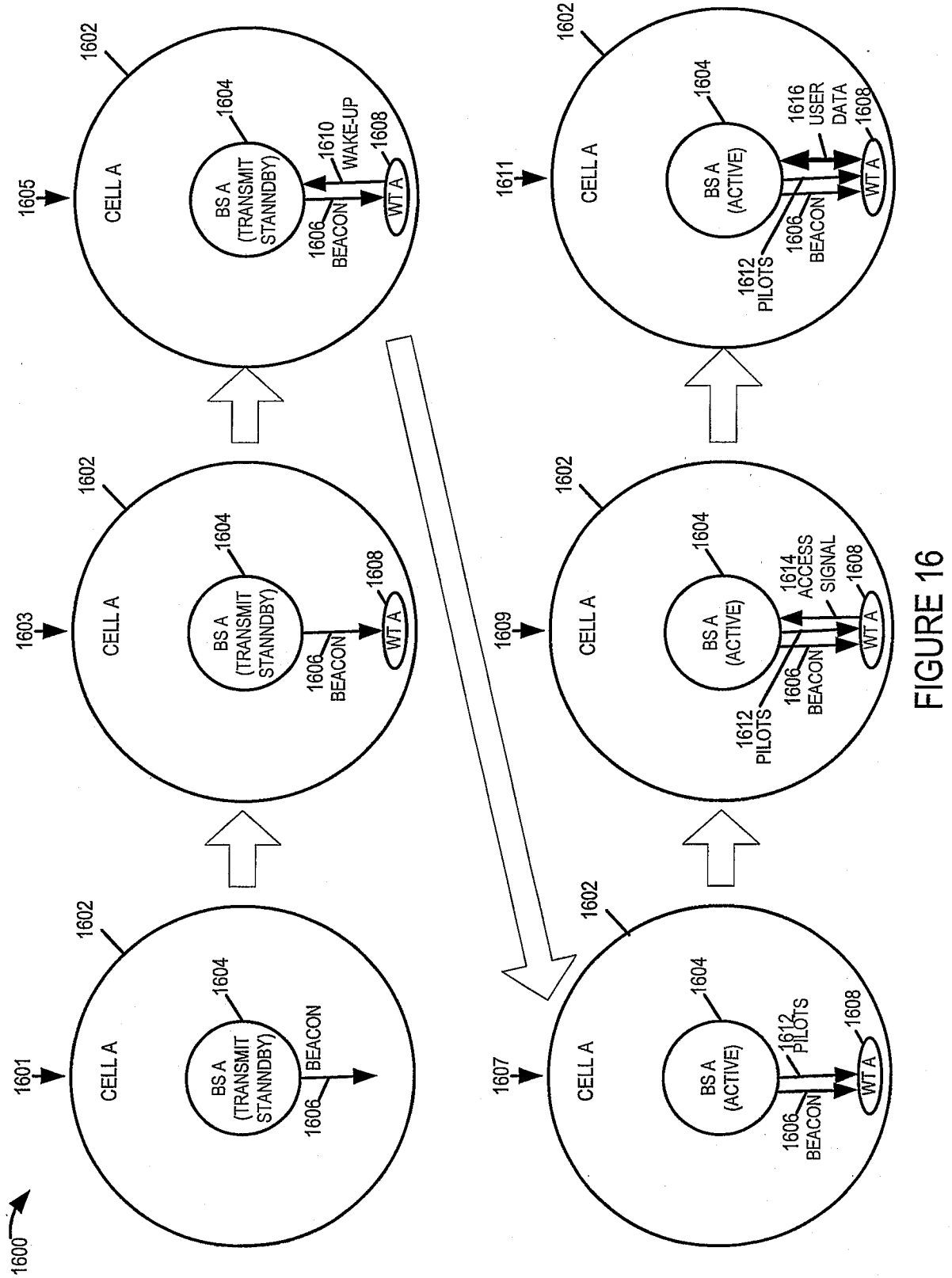

1600
1601
CELL A
1602
BS A (TRANSMIT STANNDBY)
1604
BEACON
1606
1603
CELL A
1602
BS A (TRANSMIT STANNDBY)
1604
1606 BEACON
1608
WT A
1605
CELL A
1602
BS A (TRANSMIT STANNDBY)
1604
1610 WAKE-UP
1608
WT A
1606 BEACON
1607
CELL A
1602
BS A (ACTIVE)
1604
1612 PILOTS
1608
WT A
1606 BEACON
1609
CELL A
1602
BS A (ACTIVE)
1604
1614 ACCESS SIGNAL
1608
WT A
1612 PILOTS
1606 BEACON
1611
CELL A
1602
BS A (ACTIVE)
1604
1616 USER DATA
1608
WT A
1612 PILOTS
1606 BEACON

FIGURE 16

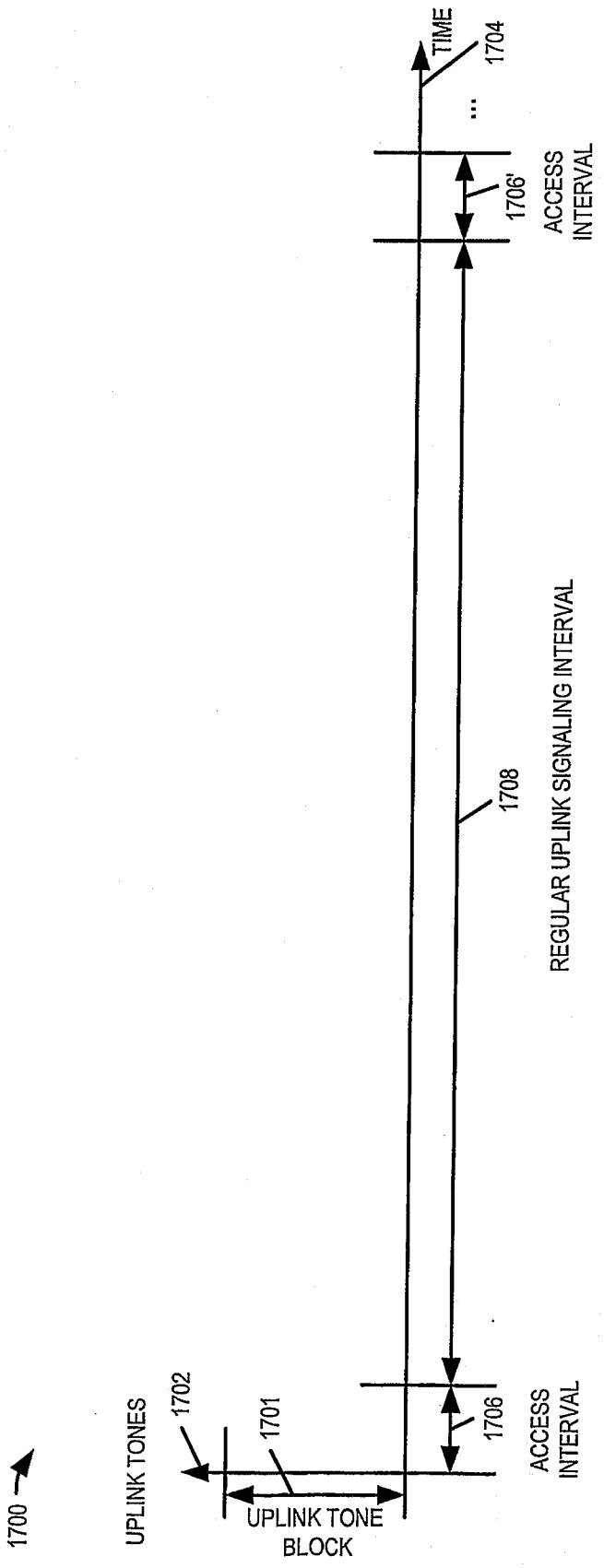

1700
UPLINK TONES
1702
1701
UPLINK TONE BLOCK
TIME
1704
1706
ACCESS INTERVAL
1708
REGULAR UPLINK SIGNALING INTERVAL
1706'
ACCESS INTERVAL

FIGURE 17

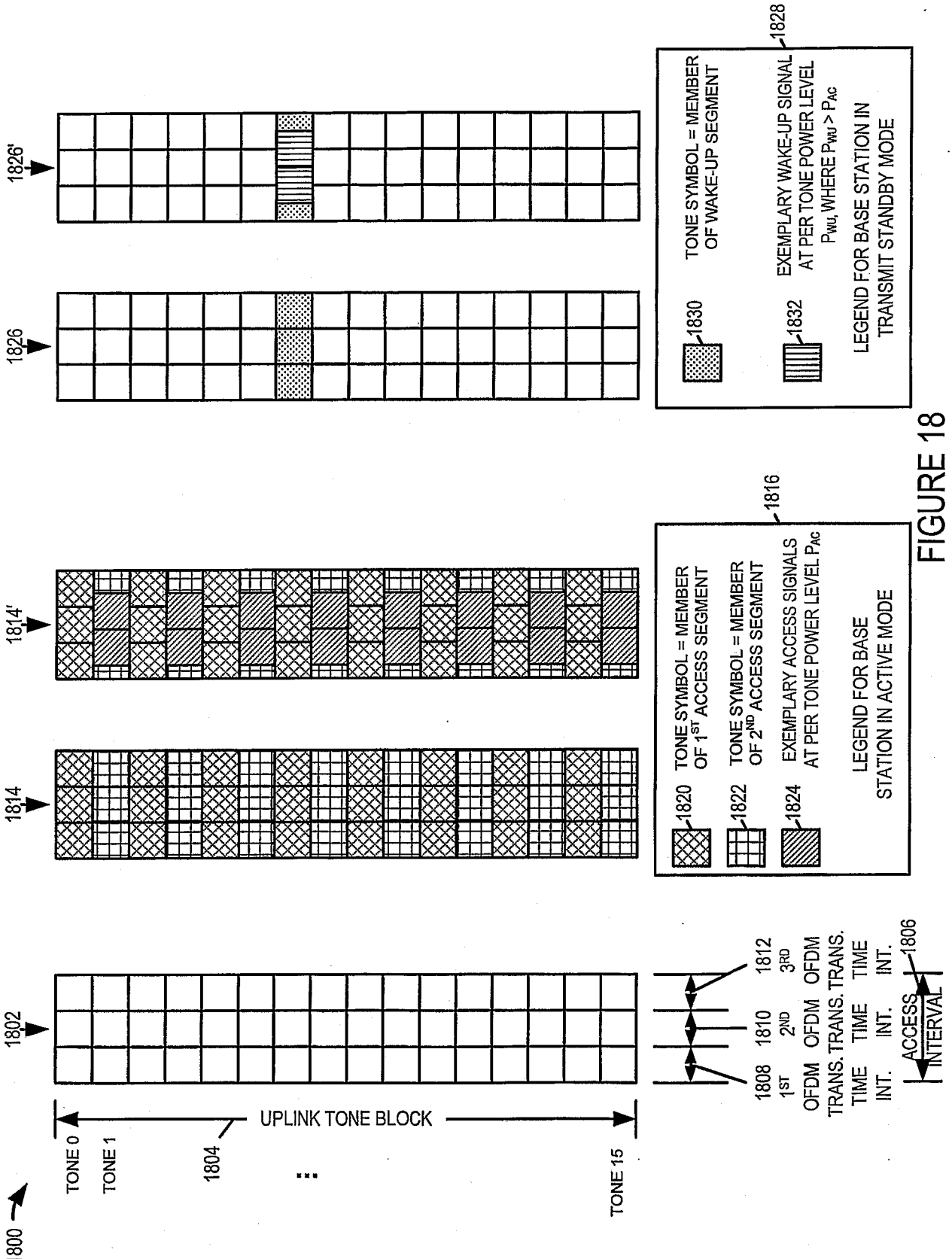

1800
1802
1804
1806
1808
1810
1812
1814
1814'
1816
1820
1822
1824
1826
1826'
1828
1830
1832
TONE 0
TONE 1
TONE 15
UPLINK TONE BLOCK
1ST OFDM TRANS. TIME INT.
2ND OFDM TRANS. TIME INT.
3RD OFDM TRANS. TIME INT.
ACCESS INTERVAL
TONE SYMBOL = MEMBER OF 1ST ACCESS SEGMENT
TONE SYMBOL = MEMBER OF 2ND ACCESS SEGMENT
EXEMPLARY ACCESS SIGNALS AT PER TONE POWER LEVEL PAC
LEGEND FOR BASE STATION IN ACTIVE MODE
TONE SYMBOL = MEMBER OF WAKE-UP SEGMENT
EXEMPLARY WAKE-UP SIGNAL AT PER TONE POWER LEVEL PWU, WHERE PWU > PAC
LEGEND FOR BASE STATION IN TRANSMIT STANDBY MODE

FIGURE 18

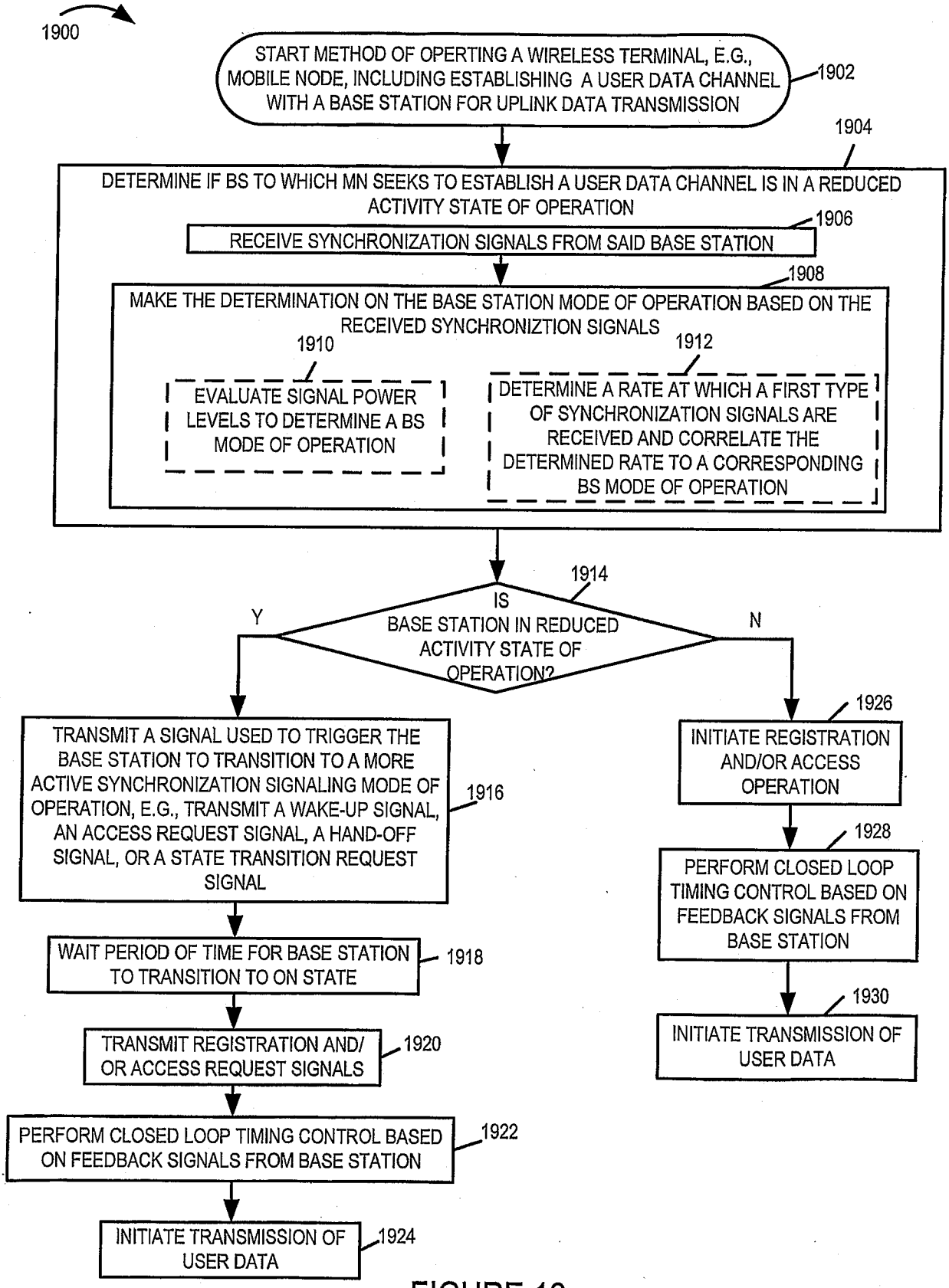

1900
START METHOD OF OPERTING A WIRELESS TERMINAL, E.G., MOBILE NODE, INCLUDING ESTABLISHING A USER DATA CHANNEL WITH A BASE STATION FOR UPLINK DATA TRANSMISSION
1902
1904
DETERMINE IF BS TO WHICH MN SEEKS TO ESTABLISH A USER DATA CHANNEL IS IN A REDUCED ACTIVITY STATE OF OPERATION
1906
RECEIVE SYNCHRONIZATION SIGNALS FROM SAID BASE STATION
1908
MAKE THE DETERMINATION ON THE BASE STATION MODE OF OPERATION BASED ON THE RECEIVED SYNCHRONIZTION SIGNALS
1910
EVALUATE SIGNAL POWER LEVELS TO DETERMINE A BS MODE OF OPERATION
1912
DETERMINE A RATE AT WHICH A FIRST TYPE OF SYNCHRONIZATION SIGNALS ARE RECEIVED AND CORRELATE THE DETERMINED RATE TO A CORRESPONDING BS MODE OF OPERATION
1914
IS BASE STATION IN REDUCED ACTIVITY STATE OF OPERATION?
Y
N
TRANSMIT A SIGNAL USED TO TRIGGER THE BASE STATION TO TRANSITION TO A MORE ACTIVE SYNCHRONIZATION SIGNALING MODE OF OPERATION, E.G., TRANSMIT A WAKE-UP SIGNAL, AN ACCESS REQUEST SIGNAL, A HAND-OFF SIGNAL, OR A STATE TRANSITION REQUEST SIGNAL
1916
WAIT PERIOD OF TIME FOR BASE STATION TO TRANSITION TO ON STATE
1918
TRANSMIT REGISTRATION AND/ OR ACCESS REQUEST SIGNALS
1920
PERFORM CLOSED LOOP TIMING CONTROL BASED ON FEEDBACK SIGNALS FROM BASE STATION
1922
INITIATE TRANSMISSION OF USER DATA
1924
1926
INITIATE REGISTRATION AND/OR ACCESS OPERATION
1928
PERFORM CLOSED LOOP TIMING CONTROL BASED ON FEEDBACK SIGNALS FROM BASE STATION
1930
INITIATE TRANSMISSION OF USER DATA

FIGURE 19