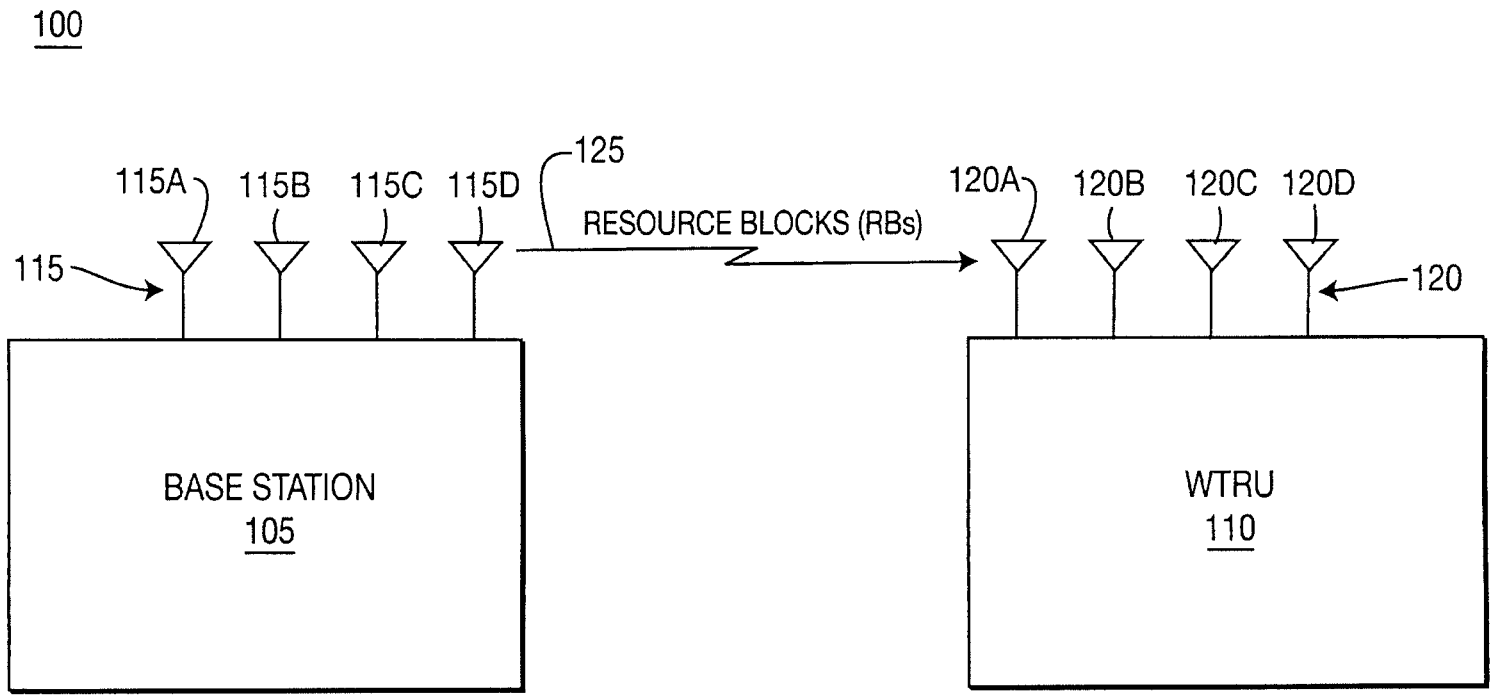
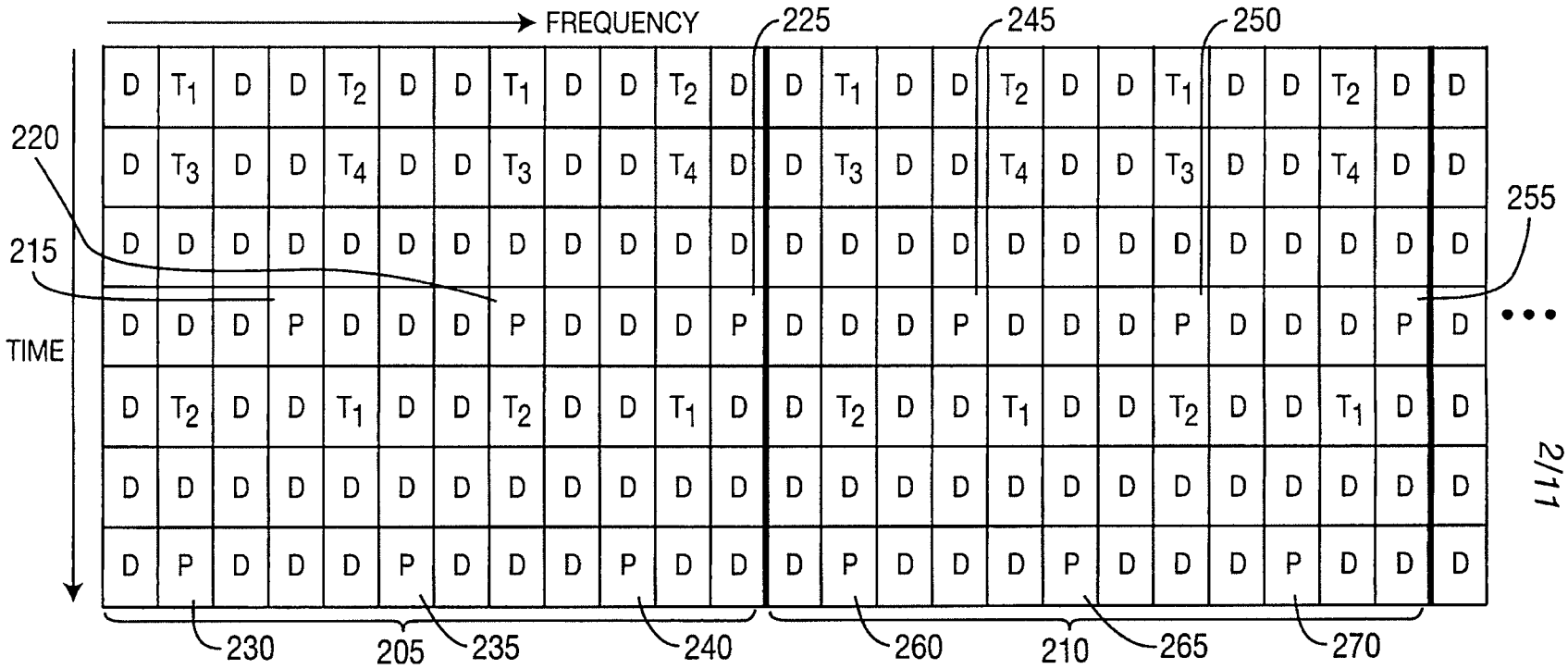

100
115A
115B
115C
115D
125
RESOURCE BLOCKS (RBs)
120A
120B
120C
120D
115
120
BASE STATION
105
WTRU
110

FIG. 1



T_1 COMMON REFERENCE SIGNAL (CRS) FOR BASE STATION TRANSMIT ANTENNA 1

T_2 COMMON REFERENCE SIGNAL (CRS) FOR BASE STATION TRANSMIT ANTENNA 2

T_3 COMMON REFERENCE SIGNAL (CRS) FOR BASE STATION TRANSMIT ANTENNA 3

T_4 COMMON REFERENCE SIGNAL (CRS) FOR BASE STATION TRANSMIT ANTENNA 4

P DEDICATED REFERENCE SIGNAL (DRS) (SINGLE BEAMFORMED OR PRECODED PILOT, OR COMPOSITE BEAMFORMED OR PRECODED PILOT)

D DATA SYMBOL

FIG. 2

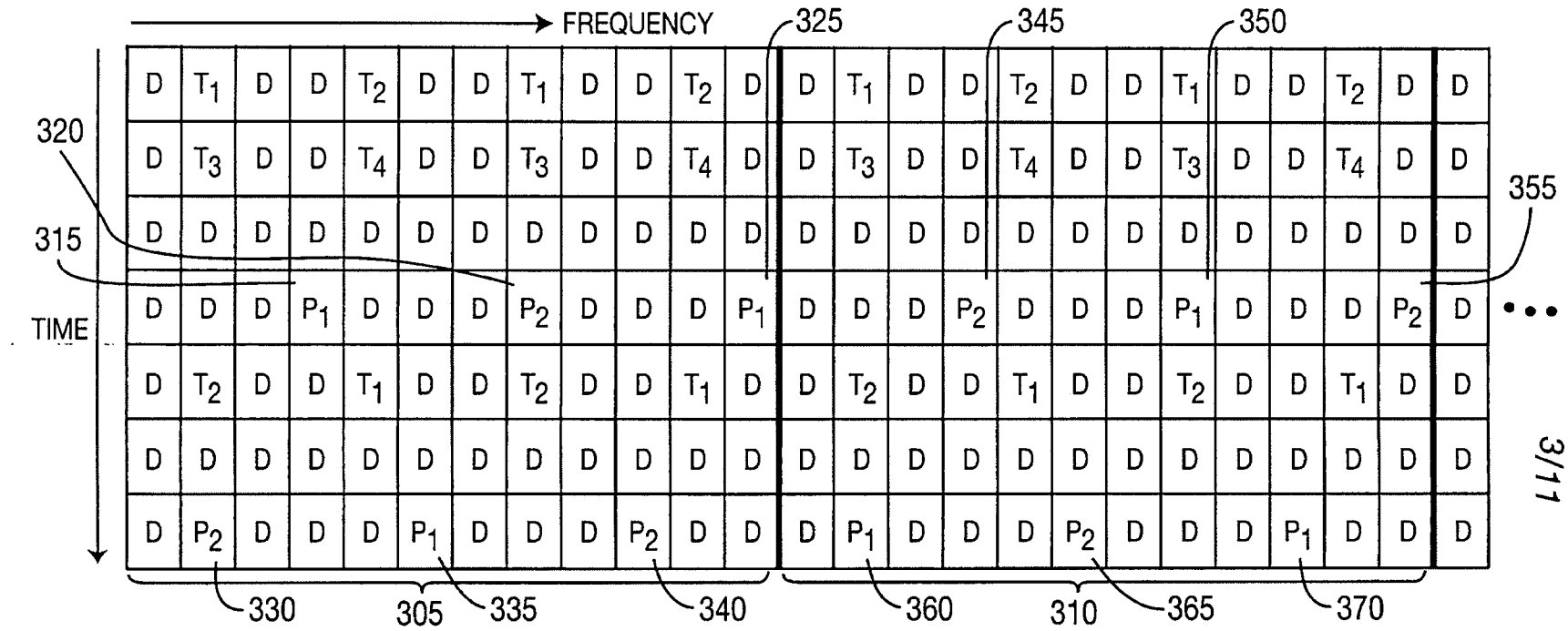
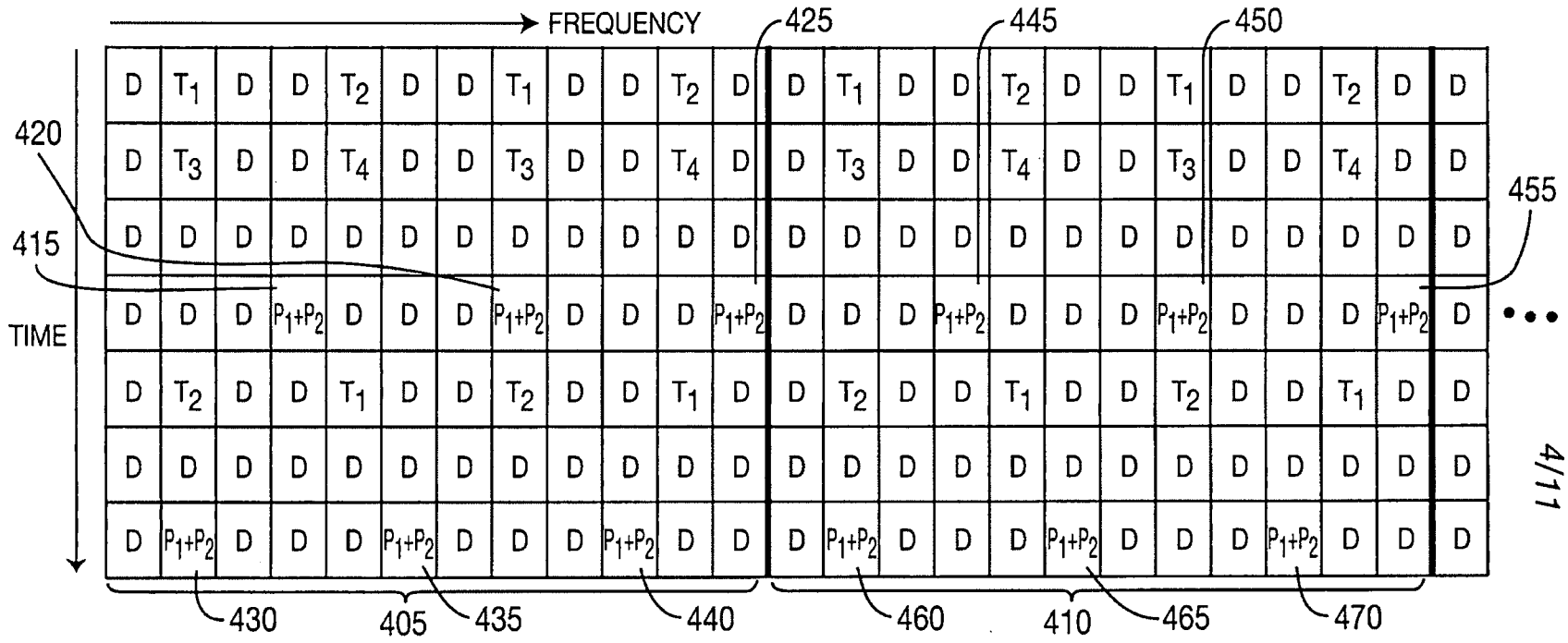

FREQUENCY
TIME
320
315
325
345
350
355
330
305
335
340
360
310
365
370
T1 COMMON REFERENCE SIGNAL (CRS) FOR BASE STATION TRANSMIT ANTENNA 1
T2 COMMON REFERENCE SIGNAL (CRS) FOR BASE STATION TRANSMIT ANTENNA 2
T3 COMMON REFERENCE SIGNAL (CRS) FOR BASE STATION TRANSMIT ANTENNA 3
T4 COMMON REFERENCE SIGNAL (CRS) FOR BASE STATION TRANSMIT ANTENNA 4
P1 DEDICATED REFERENCE SIGNAL (DRS) (SINGLE BEAMFORMED OR PRECODED PILOT)
P2 DEDICATED REFERENCE SIGNAL (DRS) (SINGLE BEAMFORMED OR PRECODED PILOT)
D DATA SYMBOL

FIG. 3



T_1 COMMON REFERENCE SIGNAL (CRS) FOR BASE STATION TRANSMIT ANTENNA 1

T_2 COMMON REFERENCE SIGNAL (CRS) FOR BASE STATION TRANSMIT ANTENNA 2

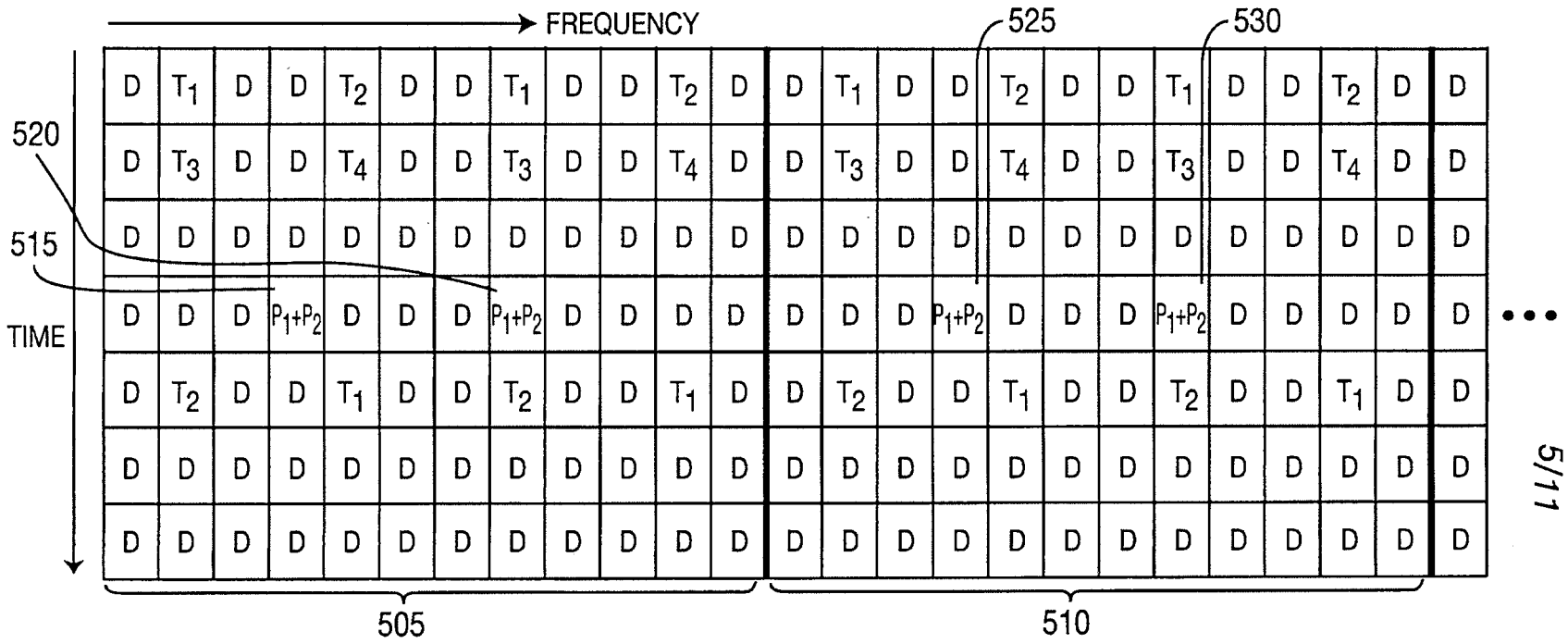
T_3 COMMON REFERENCE SIGNAL (CRS) FOR BASE STATION TRANSMIT ANTENNA 3

T_4 COMMON REFERENCE SIGNAL (CRS) FOR BASE STATION TRANSMIT ANTENNA 4

P_1+P_2 DEDICATED REFERENCE SIGNAL (DRS) (COMPOSITE BEAMFORMED OR PRECODED PILOT)

D DATA SYMBOL

FIG. 4



T_1 COMMON REFERENCE SIGNAL (CRS) FOR BASE STATION TRANSMIT ANTENNA 1

T_2 COMMON REFERENCE SIGNAL (CRS) FOR BASE STATION TRANSMIT ANTENNA 2

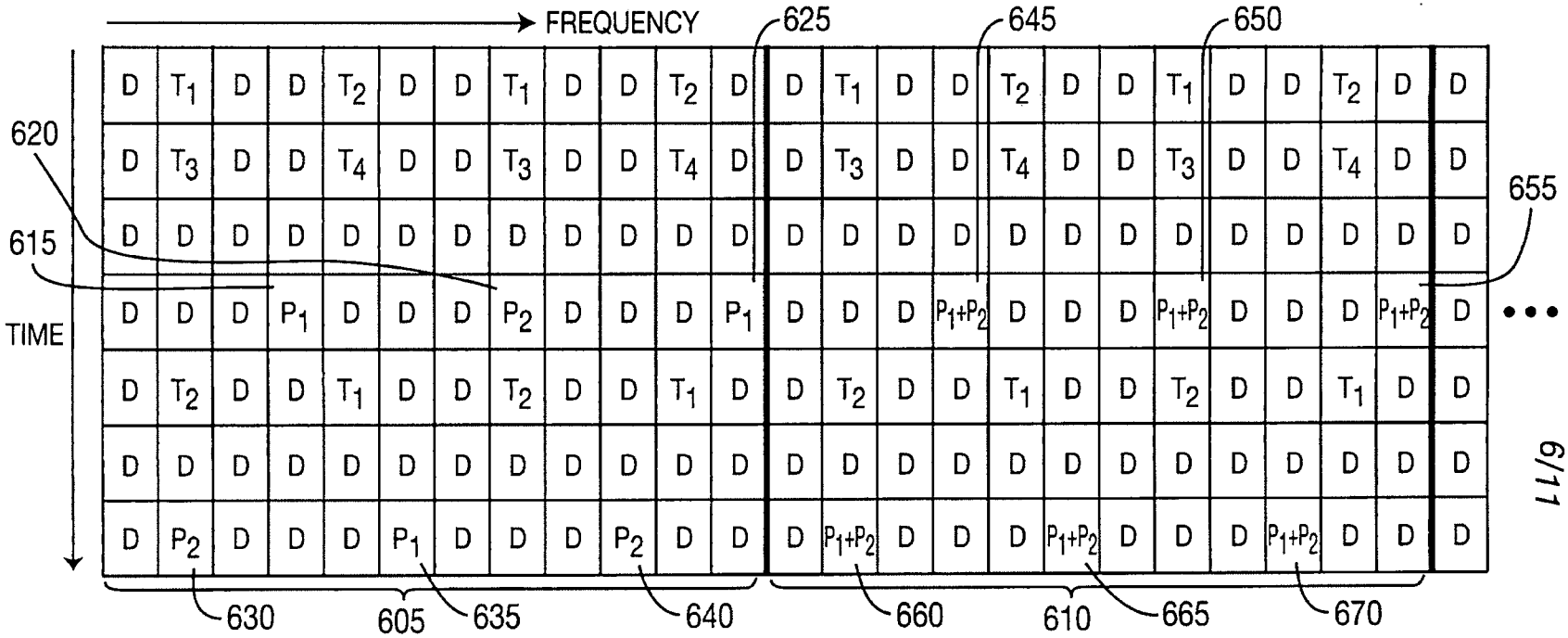
T_3 COMMON REFERENCE SIGNAL (CRS) FOR BASE STATION TRANSMIT ANTENNA 3

T_4 COMMON REFERENCE SIGNAL (CRS) FOR BASE STATION TRANSMIT ANTENNA 4

P_1+P_2 DEDICATED REFERENCE SIGNAL (DRS) (COMPOSITE BEAMFORMED OR PRECODED PILOT)

D DATA SYMBOL

FIG. 5



T_1 COMMON REFERENCE SIGNAL (CRS) FOR BASE STATION TRANSMIT ANTENNA 1

T_2 COMMON REFERENCE SIGNAL (CRS) FOR BASE STATION TRANSMIT ANTENNA 2

T_3 COMMON REFERENCE SIGNAL (CRS) FOR BASE STATION TRANSMIT ANTENNA 3

T_4 COMMON REFERENCE SIGNAL (CRS) FOR BASE STATION TRANSMIT ANTENNA 4

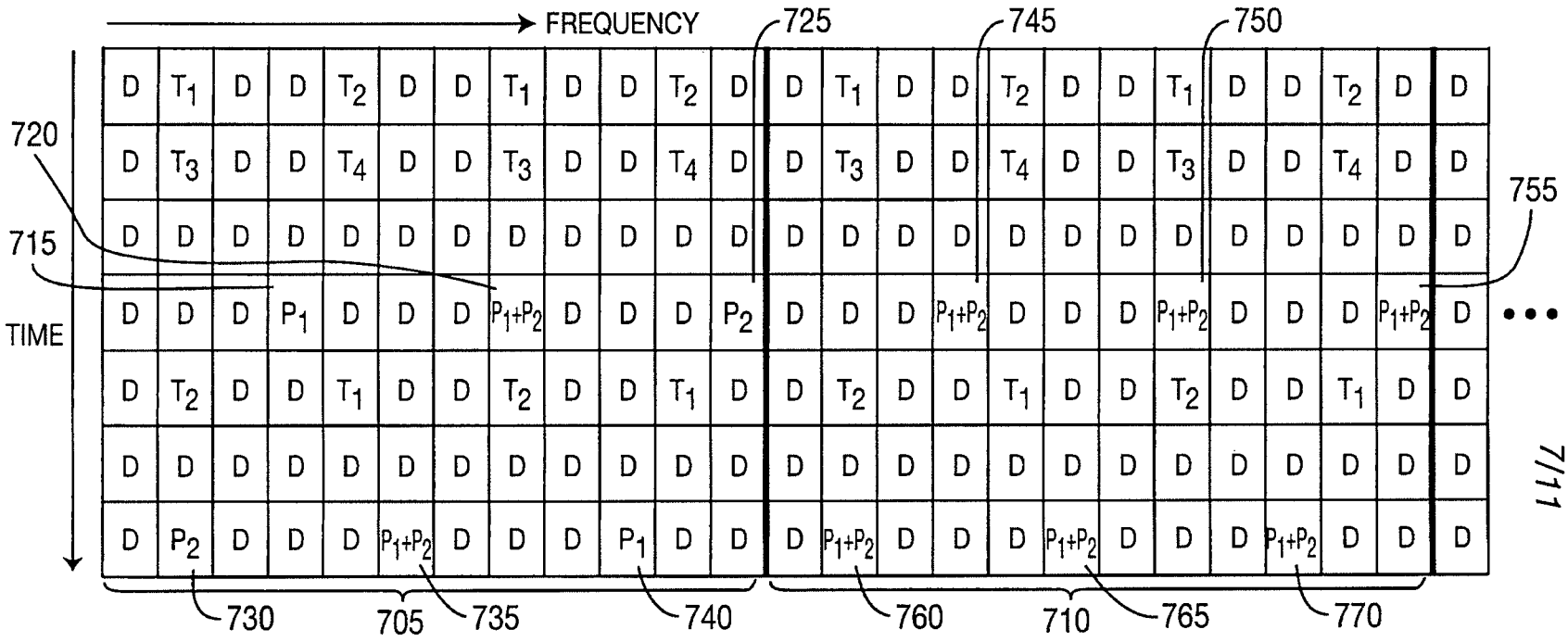
P_1 DEDICATED REFERENCE SIGNAL (DRS) (SINGLE BEAMFORMED OR PRECODED PILOT)

P_2 DEDICATED REFERENCE SIGNAL (DRS) (SINGLE BEAMFORMED OR PRECODED PILOT)

P_1+P_2 DEDICATED REFERENCE SIGNAL (DRS) (COMPOSITE BEAMFORMED OR PRECODED PILOT)

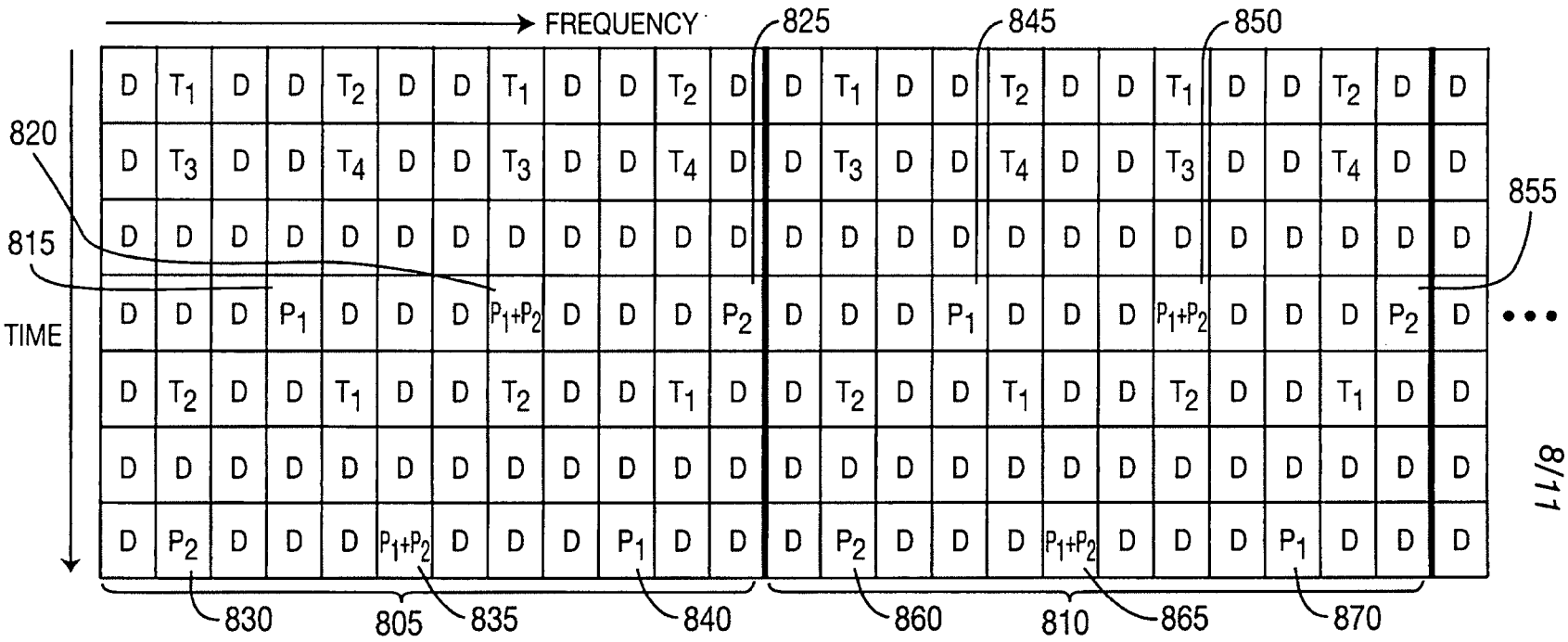
D DATA SYMBOL

FIG. 6



T_1	COMMON REFERENCE SIGNAL (CRS) FOR BASE STATION TRANSMIT ANTENNA 1
T_2	COMMON REFERENCE SIGNAL (CRS) FOR BASE STATION TRANSMIT ANTENNA 2
T_3	COMMON REFERENCE SIGNAL (CRS) FOR BASE STATION TRANSMIT ANTENNA 3
T_4	COMMON REFERENCE SIGNAL (CRS) FOR BASE STATION TRANSMIT ANTENNA 4
P_1	DEDICATED REFERENCE SIGNAL (DRS) (SINGLE BEAMFORMED OR PRECODED PILOT)
P_2	DEDICATED REFERENCE SIGNAL (DRS) (SINGLE BEAMFORMED OR PRECODED PILOT)
P_1+P_2	DEDICATED REFERENCE SIGNAL (DRS) (COMPOSITE BEAMFORMED OR PRECODED PILOT)
D	DATA SYMBOL

FIG. 7



T_1 COMMON REFERENCE SIGNAL (CRS) FOR BASE STATION TRANSMIT ANTENNA 1

T_2 COMMON REFERENCE SIGNAL (CRS) FOR BASE STATION TRANSMIT ANTENNA 2

T_3 COMMON REFERENCE SIGNAL (CRS) FOR BASE STATION TRANSMIT ANTENNA 3

T_4 COMMON REFERENCE SIGNAL (CRS) FOR BASE STATION TRANSMIT ANTENNA 4

P_1 DEDICATED REFERENCE SIGNAL (DRS) (SINGLE BEAMFORMED OR PRECODED PILOT)

P_2 DEDICATED REFERENCE SIGNAL (DRS) (SINGLE BEAMFORMED OR PRECODED PILOT)

P_1+P_2 DEDICATED REFERENCE SIGNAL (DRS) (COMPOSITE BEAMFORMED OR PRECODED PILOT)

D DATA SYMBOL

FIG. 8

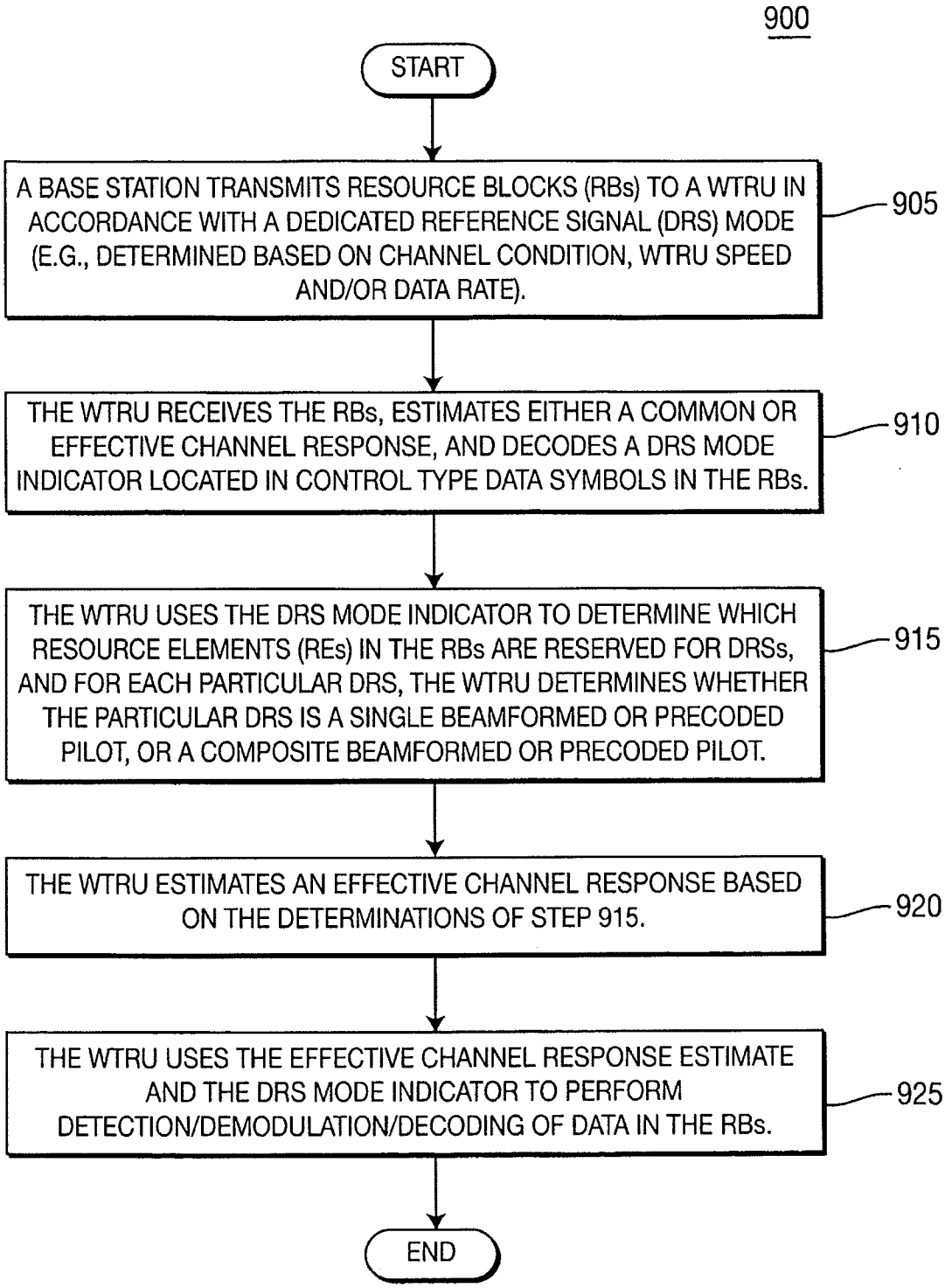

900
START
A BASE STATION TRANSMITS RESOURCE BLOCKS (RBs) TO A WTRU IN ACCORDANCE WITH A DEDICATED REFERENCE SIGNAL (DRS) MODE (E.G., DETERMINED BASED ON CHANNEL CONDITION, WTRU SPEED AND/OR DATA RATE).
905
THE WTRU RECEIVES THE RBs, ESTIMATES EITHER A COMMON OR EFFECTIVE CHANNEL RESPONSE, AND DECODES A DRS MODE INDICATOR LOCATED IN CONTROL TYPE DATA SYMBOLS IN THE RBs.
910
THE WTRU USES THE DRS MODE INDICATOR TO DETERMINE WHICH RESOURCE ELEMENTS (REs) IN THE RBs ARE RESERVED FOR DRSs, AND FOR EACH PARTICULAR DRS, THE WTRU DETERMINES WHETHER THE PARTICULAR DRS IS A SINGLE BEAMFORMED OR PRECODED PILOT, OR A COMPOSITE BEAMFORMED OR PRECODED PILOT.
915
THE WTRU ESTIMATES AN EFFECTIVE CHANNEL RESPONSE BASED ON THE DETERMINATIONS OF STEP 915.
920
THE WTRU USES THE EFFECTIVE CHANNEL RESPONSE ESTIMATE AND THE DRS MODE INDICATOR TO PERFORM DETECTION/DEMODULATION/DECODING OF DATA IN THE RBs.
925
END

FIG. 9

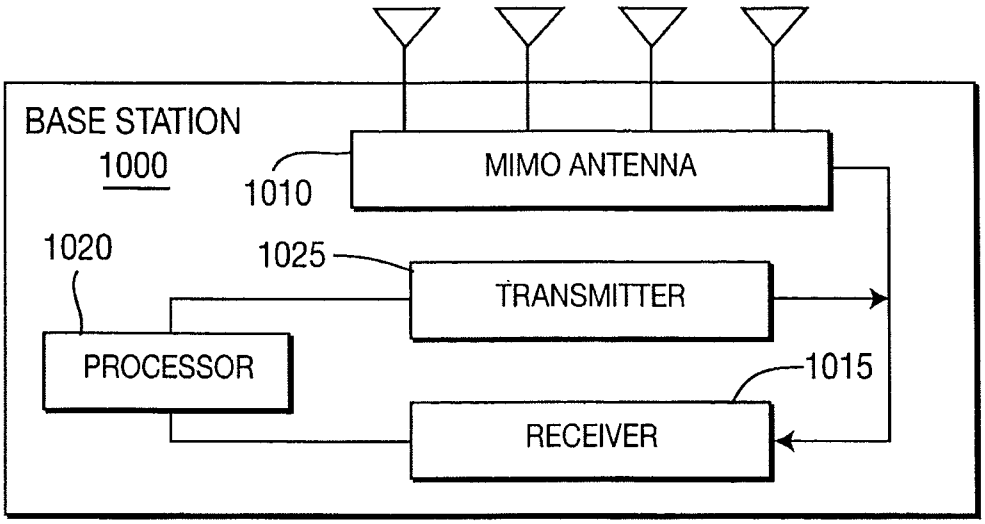

BASE STATION
1000
1010
MIMO ANTENNA
1020
1025
TRANSMITTER
PROCESSOR
1015
RECEIVER

FIG. 10

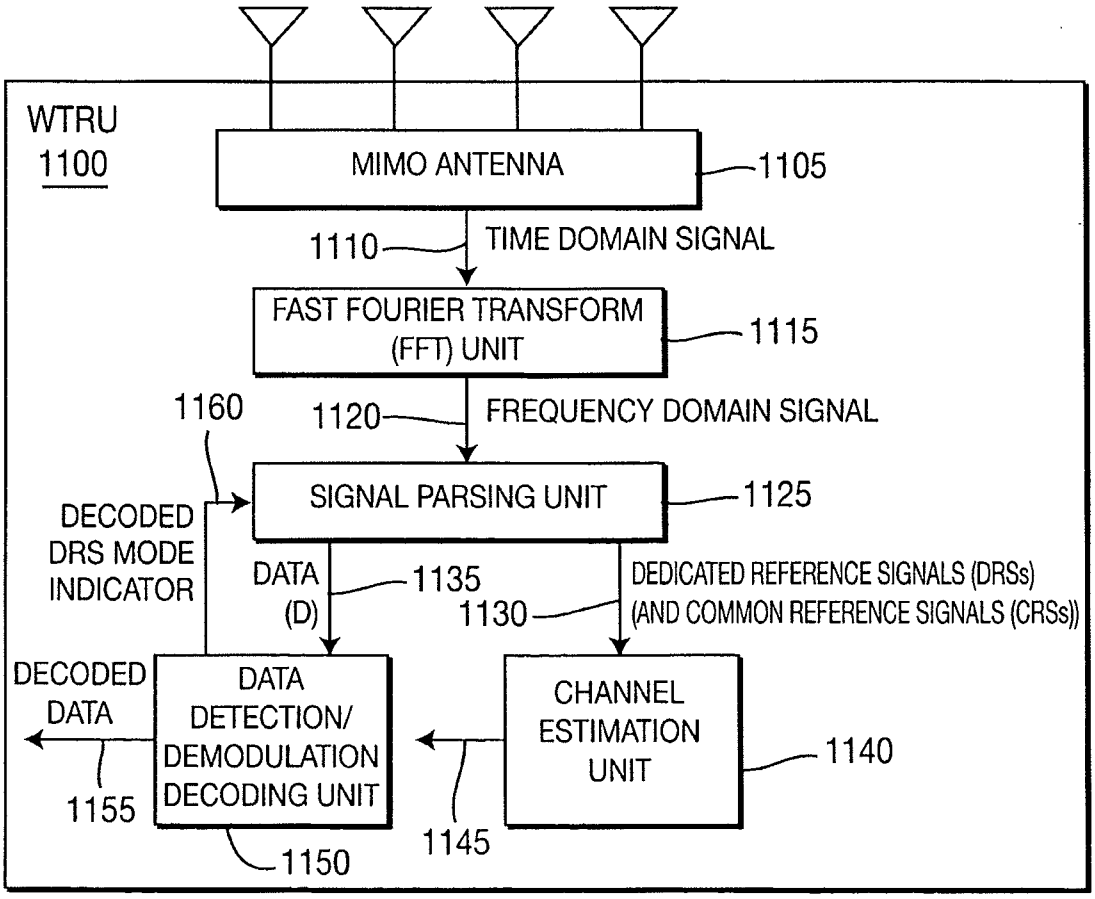

WTRU
1100
MIMO ANTENNA
1105
1110
TIME DOMAIN SIGNAL
FAST FOURIER TRANSFORM (FFT) UNIT
1115
1160
1120
FREQUENCY DOMAIN SIGNAL
SIGNAL PARSING UNIT
1125
DECODED DRS MODE INDICATOR
DATA (D)
1135
1130
DEDICATED REFERENCE SIGNALS (DRSs) (AND COMMON REFERENCE SIGNALS (CRSs))
DECODED DATA
DATA DETECTION/ DEMODULATION DECODING UNIT
CHANNEL ESTIMATION UNIT
1140
1155
1145
1150

FIG. 11

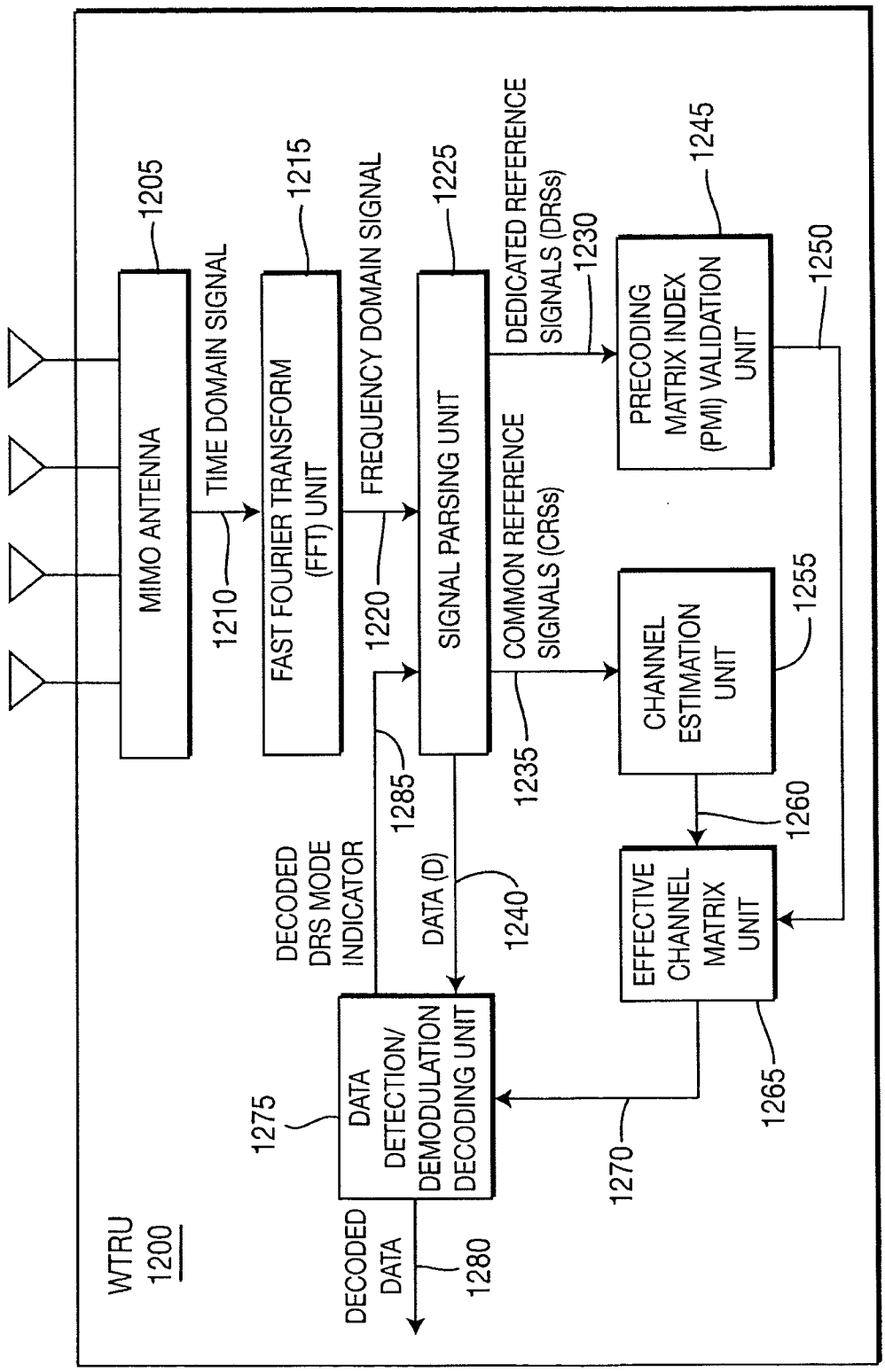

WTRU
1200
MIMO ANTENNA
1205
TIME DOMAIN SIGNAL
1210
FAST FOURIER TRANSFORM (FFT) UNIT
1215
FREQUENCY DOMAIN SIGNAL
1220
SIGNAL PARSING UNIT
1225
DEDICATED REFERENCE SIGNALS (DRSs)
1230
COMMON REFERENCE SIGNALS (CRSs)
1235
PRECODING MATRIX INDEX (PMI) VALIDATION UNIT
1245
1250
CHANNEL ESTIMATION UNIT
1255
DECODED DRS MODE INDICATOR
1285
DATA (D)
1240
EFFECTIVE CHANNEL MATRIX UNIT
1260
1265
DATA DETECTION/ DEMODULATION DECODING UNIT
1275
1270
DECODED DATA
1280

FIG. 12