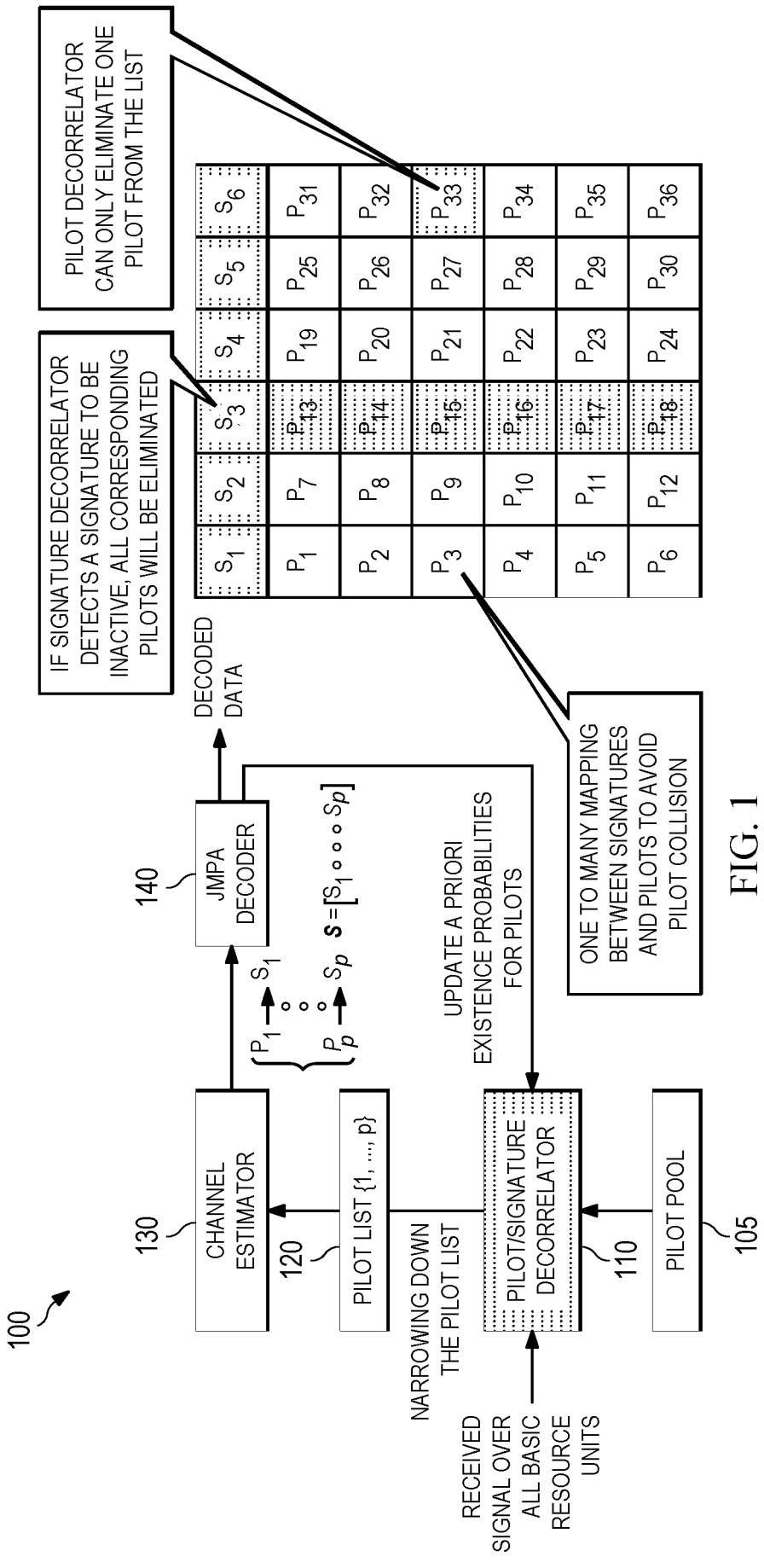
100
130
CHANNEL ESTIMATOR
120
PILOT LIST {1, ..., p}
NARROWING DOWN THE PILOT LIST
110
PILOT/SIGNATURE DECORRELATOR
105
PILOT POOL
RECEIVED SIGNAL OVER ALL BASIC RESOURCE UNITS
UPDATE A PRIORI EXISTENCE PROBABILITIES FOR PILOTS
140
JMPA DECODER
DECODED DATA
IF SIGNATURE DECORRELATOR DETECTS A SIGNATURE TO BE INACTIVE, ALL CORRESPONDING PILOTS WILL BE ELIMINATED
PILOT DECORRELATOR CAN ONLY ELIMINATE ONE PILOT FROM THE LIST
ONE TO MANY MAPPING BETWEEN SIGNATURES AND PILOTS TO AVOID PILOT COLLISION
S1 S2 S3 S4 S5 S6
P1 P2 P3 P4 P5 P6 P7 P8 P9 P10 P11 P12 P13 P14 P15 P16 P17 P18 P19 P20 P21 P22 P23 P24 P25 P26 P27 P28 P29 P30 P31 P32 P33 P34 P35 P36

FIG. 1

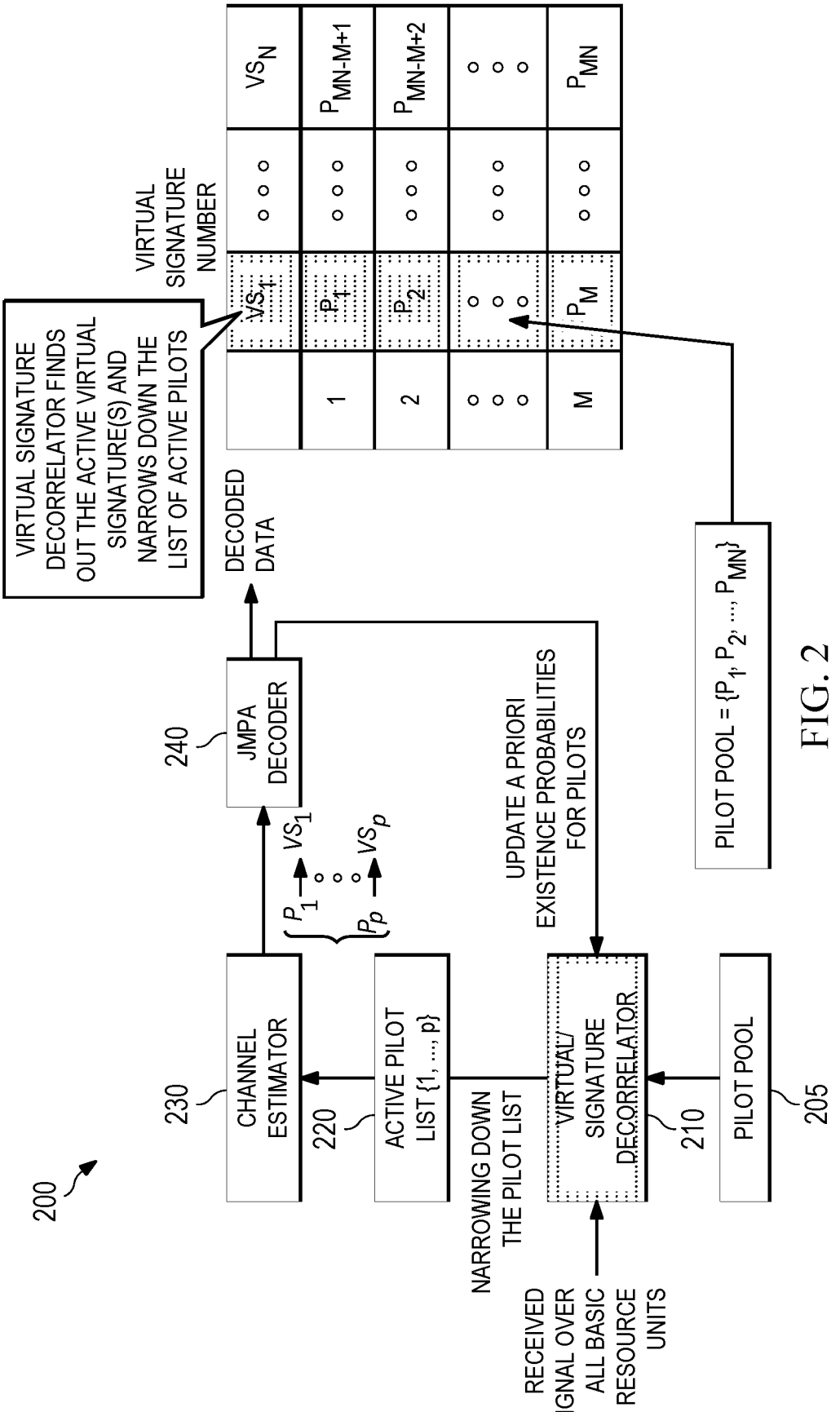
200
230
CHANNEL ESTIMATOR
220
ACTIVE PILOT LIST {1, ..., p}
NARROWING DOWN THE PILOT LIST
RECEIVED SIGNAL OVER ALL BASIC RESOURCE UNITS
VIRTUAL/ SIGNATURE DECORRELATOR
210
PILOT POOL
205
PILOT POOL = {P1, P2, ..., PMN}
UPDATE A PRIORI EXISTENCE PROBABILITIES FOR PILOTS
240
JMPA DECODER
DECODED DATA
VIRTUAL SIGNATURE DECORRELATOR FINDS OUT THE ACTIVE VIRTUAL SIGNATURE(S) AND NARROWS DOWN THE LIST OF ACTIVE PILOTS
VIRTUAL SIGNATURE NUMBER
VS1
VSN
P1
P2
PM
PMN-M+1
PMN-M+2
PMN
1
2
M

FIG. 2

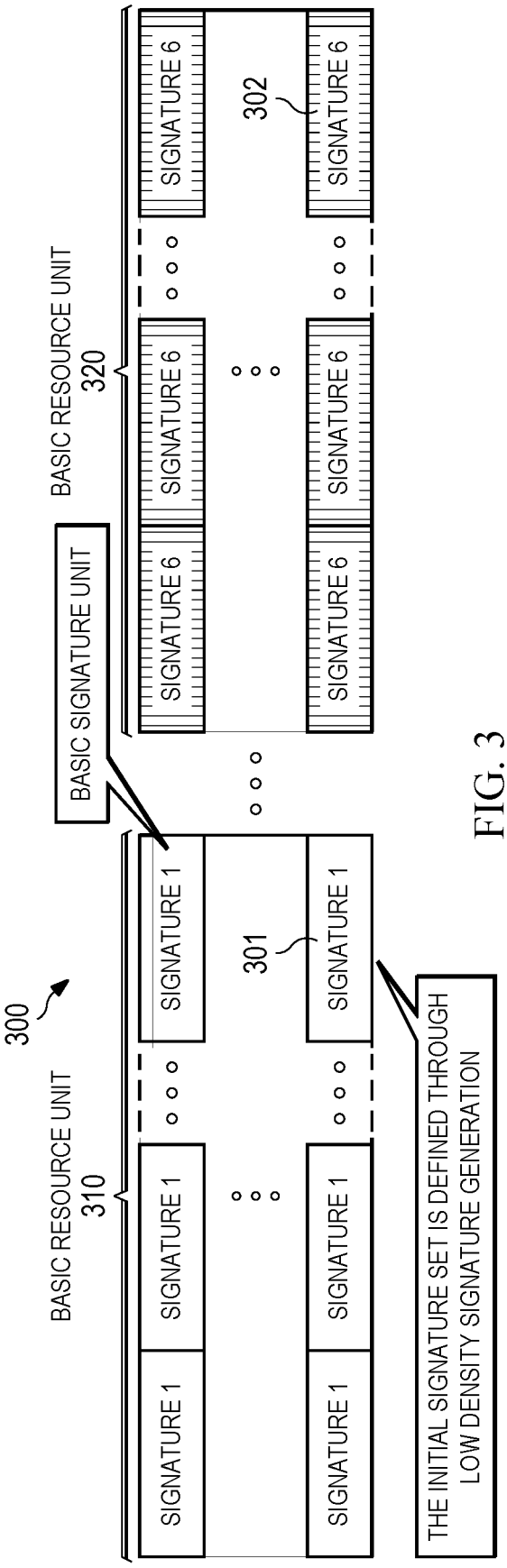
300
BASIC RESOURCE UNIT
310
BASIC SIGNATURE UNIT
BASIC RESOURCE UNIT
320
SIGNATURE 1
SIGNATURE 1
SIGNATURE 1
SIGNATURE 1
SIGNATURE 6
SIGNATURE 6
SIGNATURE 6
SIGNATURE 6
SIGNATURE 6
SIGNATURE 6
301
302
THE INITIAL SIGNATURE SET IS DEFINED THROUGH LOW DENSITY SIGNATURE GENERATION

FIG. 3

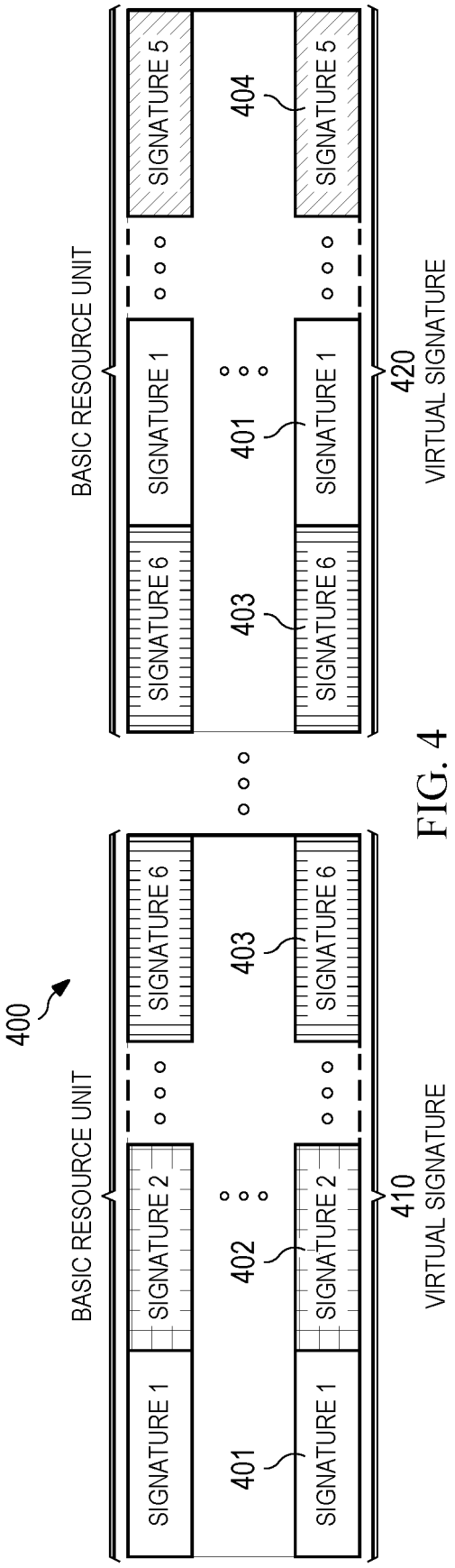
400
BASIC RESOURCE UNIT
410
VIRTUAL SIGNATURE
BASIC RESOURCE UNIT
420
VIRTUAL SIGNATURE
SIGNATURE 1
SIGNATURE 2
SIGNATURE 1
SIGNATURE 2
SIGNATURE 6
SIGNATURE 6
SIGNATURE 6
SIGNATURE 6
SIGNATURE 1
SIGNATURE 1
SIGNATURE 5
SIGNATURE 5
401
402
403
404

FIG. 4

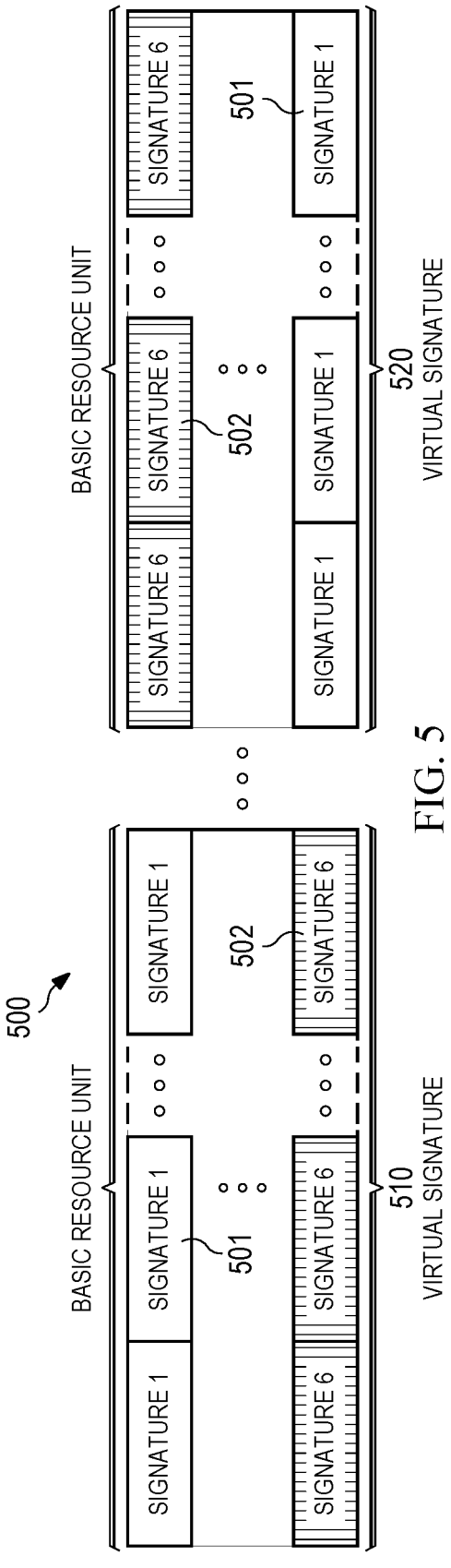
500
BASIC RESOURCE UNIT
SIGNATURE 1
SIGNATURE 1
501
SIGNATURE 1
SIGNATURE 6
502
SIGNATURE 6
SIGNATURE 6
510
VIRTUAL SIGNATURE
BASIC RESOURCE UNIT
SIGNATURE 6
SIGNATURE 6
502
SIGNATURE 6
SIGNATURE 1
SIGNATURE 1
501
SIGNATURE 1
520
VIRTUAL SIGNATURE

FIG. 5

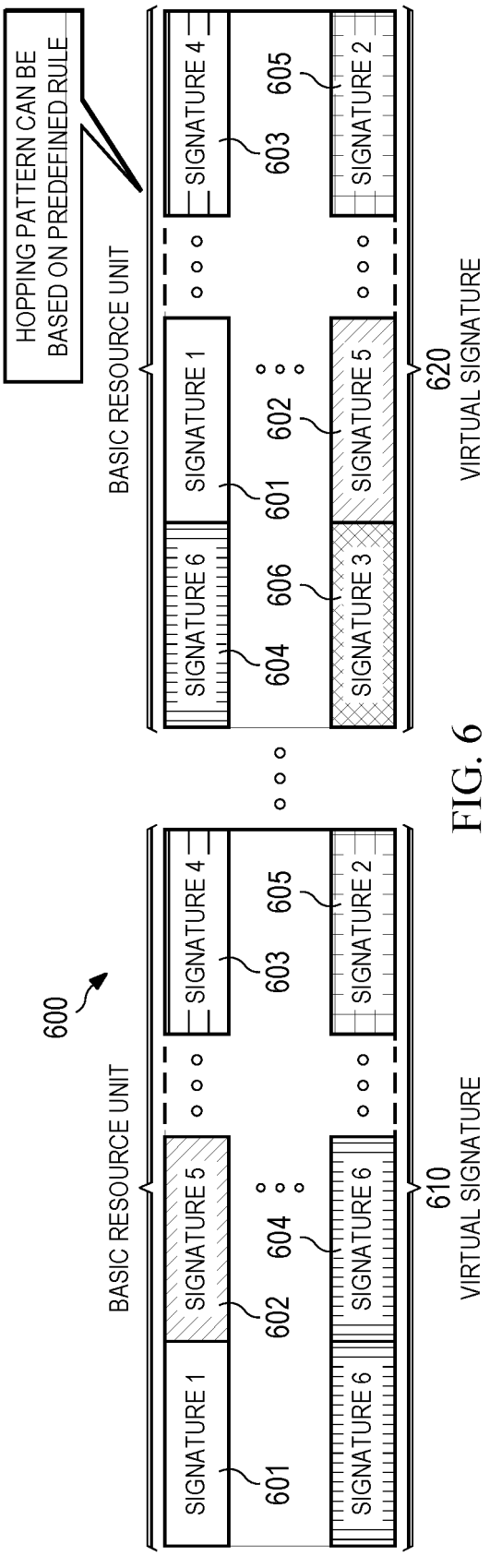
600
BASIC RESOURCE UNIT
SIGNATURE 5
SIGNATURE 4
601
602
603
605
SIGNATURE 6
SIGNATURE 6
604
610
VIRTUAL SIGNATURE
HOPPING PATTERN CAN BE BASED ON PREDEFINED RULE
BASIC RESOURCE UNIT
SIGNATURE 1
SIGNATURE 4
601
602
603
605
SIGNATURE 6
SIGNATURE 3
SIGNATURE 5
SIGNATURE 2
604
606
620
VIRTUAL SIGNATURE

FIG. 6

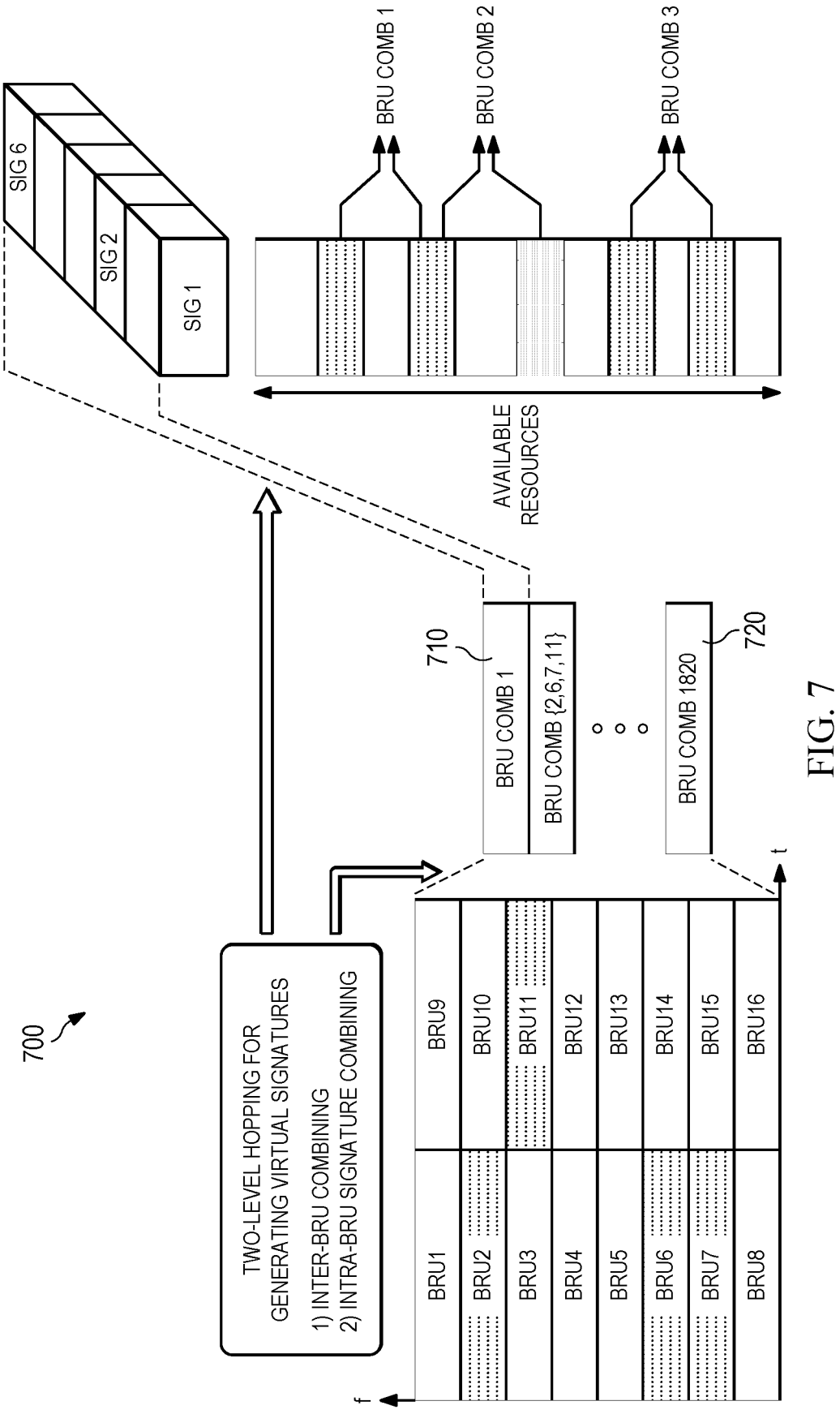
700
TWO-LEVEL HOPPING FOR
GENERATING VIRTUAL SIGNATURES
1) INTER-BRU COMBINING
2) INTRA-BRU SIGNATURE COMBINING
BRU1
BRU2
BRU3
BRU4
BRU5
BRU6
BRU7
BRU8
BRU9
BRU10
BRU11
BRU12
BRU13
BRU14
BRU15
BRU16
f
t
710
BRU COMB 1
BRU COMB {2,6,7,11}
720
BRU COMB 1820
AVAILABLE
RESOURCES
BRU COMB 1
BRU COMB 2
BRU COMB 3
SIG 6
SIG 2
SIG 1

FIG. 7

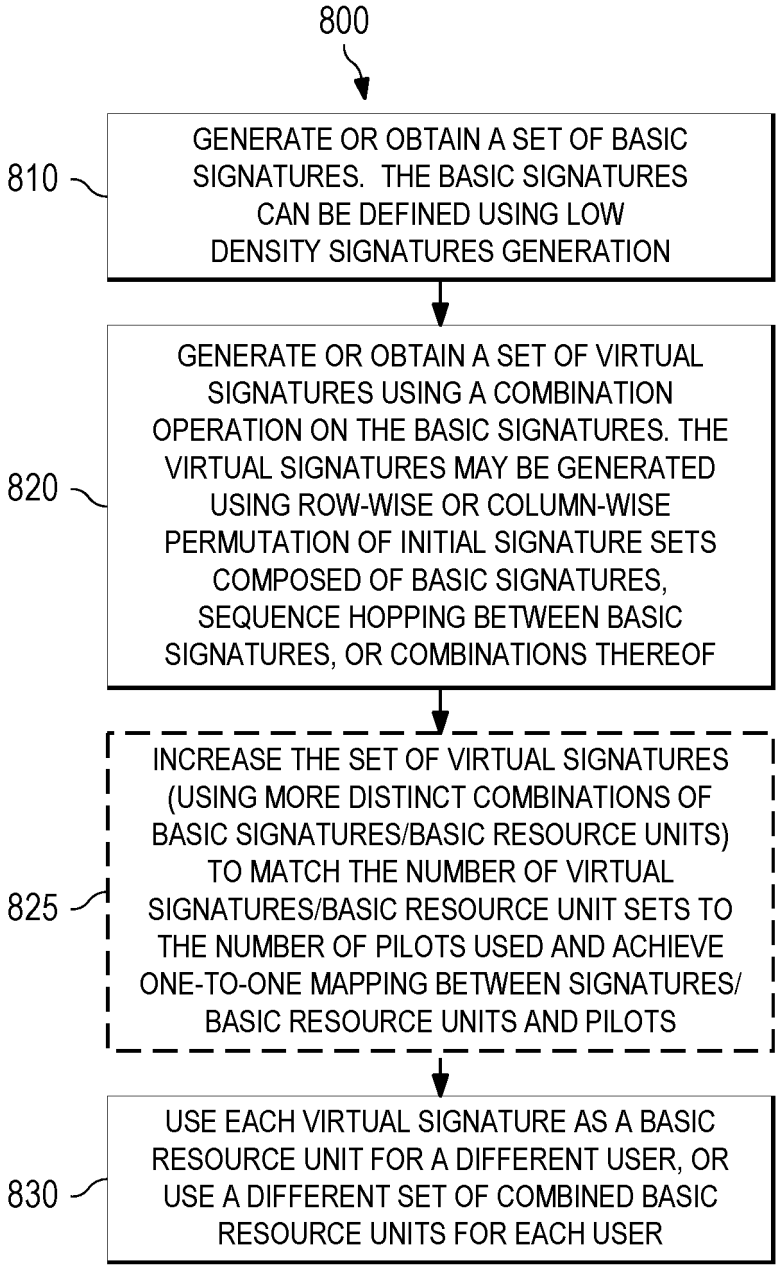
800
810
GENERATE OR OBTAIN A SET OF BASIC SIGNATURES. THE BASIC SIGNATURES CAN BE DEFINED USING LOW DENSITY SIGNATURES GENERATION
820
GENERATE OR OBTAIN A SET OF VIRTUAL SIGNATURES USING A COMBINATION OPERATION ON THE BASIC SIGNATURES. THE VIRTUAL SIGNATURES MAY BE GENERATED USING ROW-WISE OR COLUMN-WISE PERMUTATION OF INITIAL SIGNATURE SETS COMPOSED OF BASIC SIGNATURES, SEQUENCE HOPPING BETWEEN BASIC SIGNATURES, OR COMBINATIONS THEREOF
825
INCREASE THE SET OF VIRTUAL SIGNATURES (USING MORE DISTINCT COMBINATIONS OF BASIC SIGNATURES/BASIC RESOURCE UNITS) TO MATCH THE NUMBER OF VIRTUAL SIGNATURES/BASIC RESOURCE UNIT SETS TO THE NUMBER OF PILOTS USED AND ACHIEVE ONE-TO-ONE MAPPING BETWEEN SIGNATURES/ BASIC RESOURCE UNITS AND PILOTS
830
USE EACH VIRTUAL SIGNATURE AS A BASIC RESOURCE UNIT FOR A DIFFERENT USER, OR USE A DIFFERENT SET OF COMBINED BASIC RESOURCE UNITS FOR EACH USER

FIG. 8

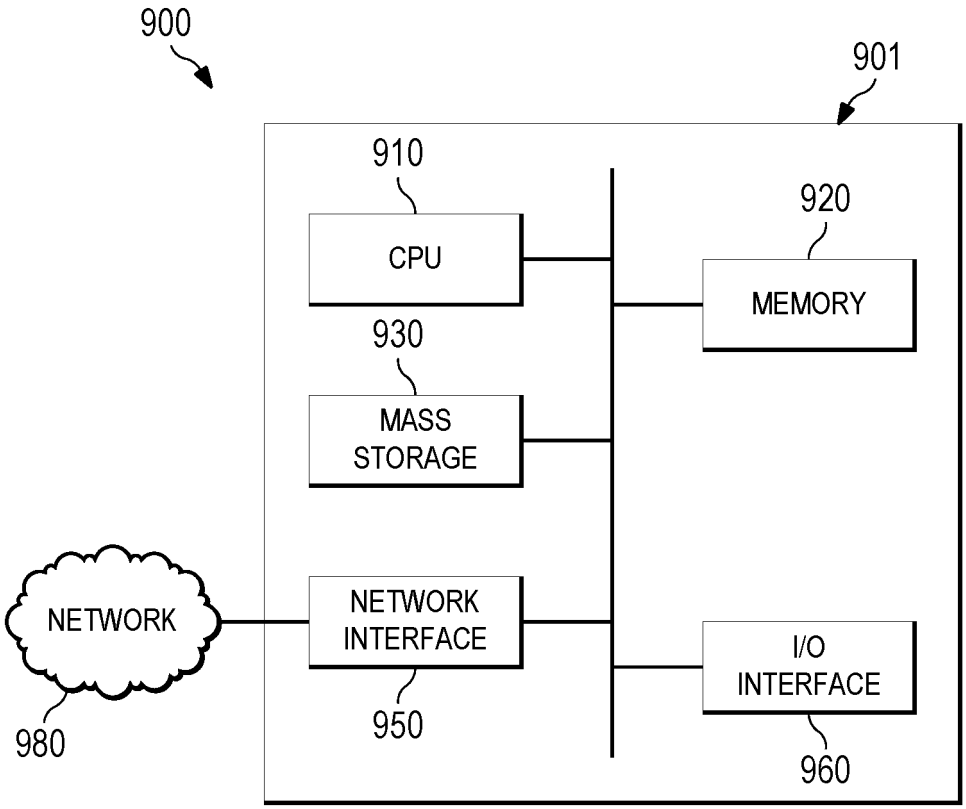
900
901
910
CPU
920
MEMORY
930
MASS STORAGE
NETWORK
NETWORK INTERFACE
I/O INTERFACE
950
960
980

FIG. 9