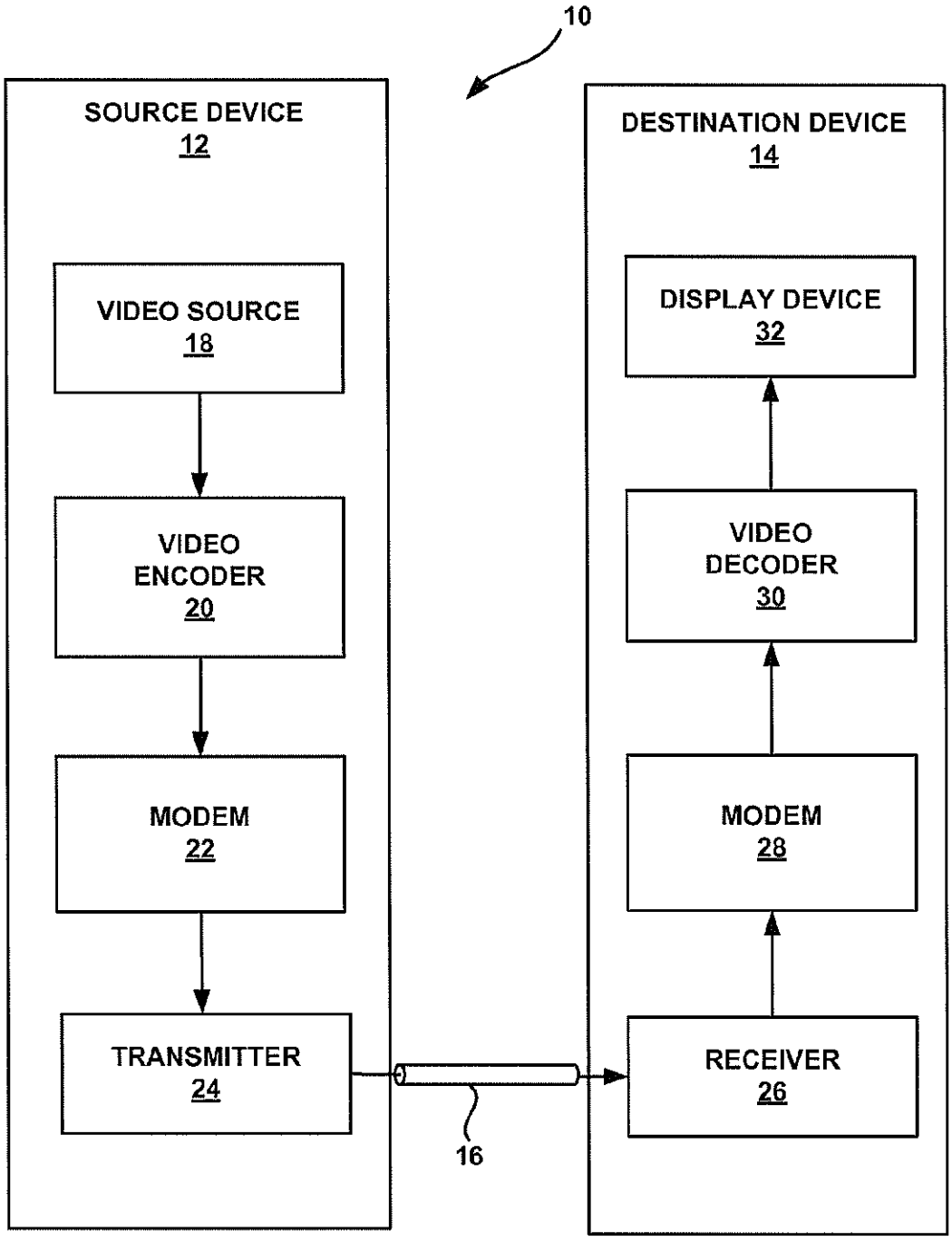

10
SOURCE DEVICE
12
VIDEO SOURCE
18
VIDEO
ENCODER
20
MODEM
22
TRANSMITTER
24
16
DESTINATION DEVICE
14
DISPLAY DEVICE
32
VIDEO
DECODER
30
MODEM
28
RECEIVER
26

FIG. 1

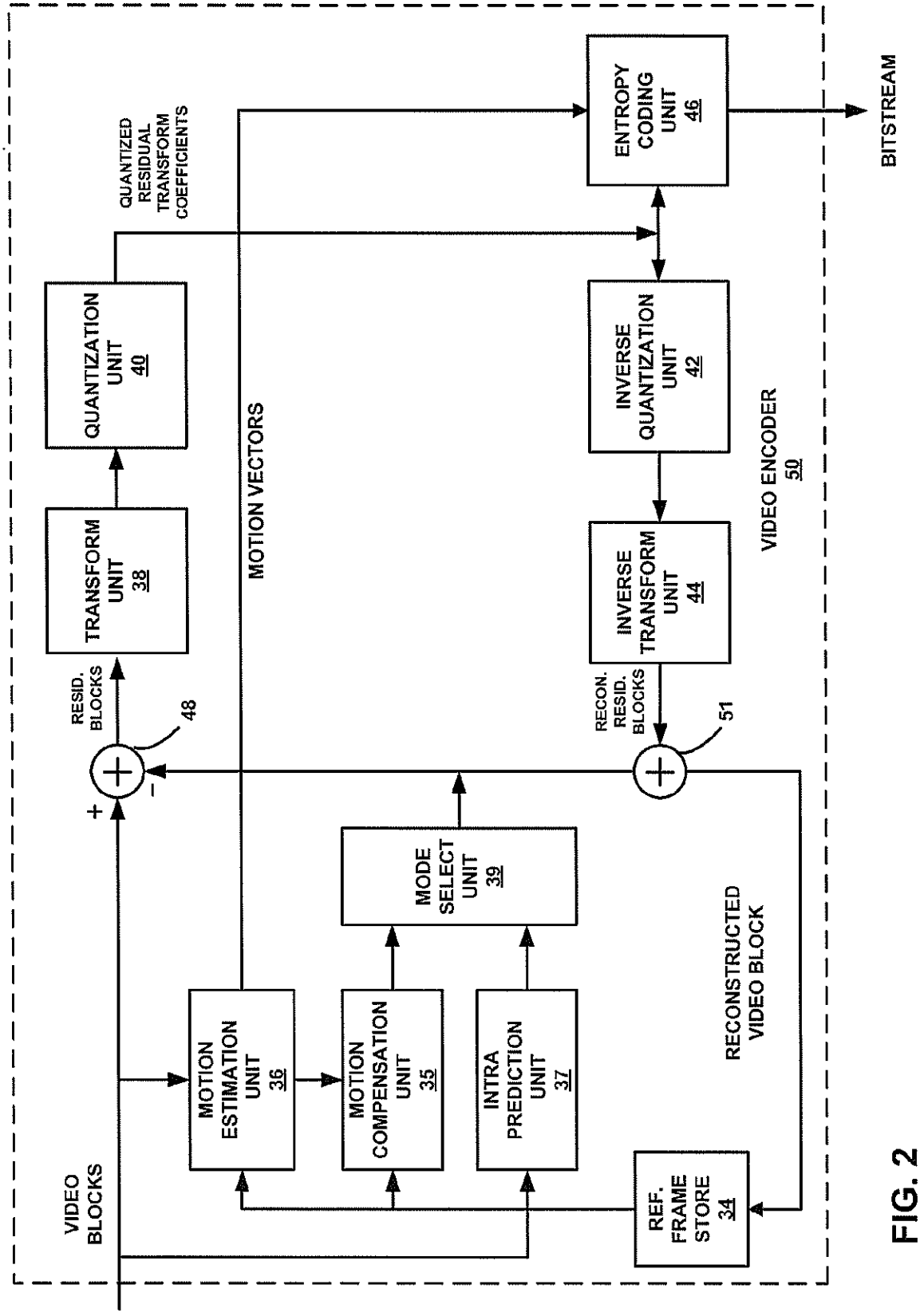

VIDEO BLOCKS
MOTION ESTIMATION UNIT 36
MOTION COMPENSATION UNIT 35
INTRA PREDICTION UNIT 37
MODE SELECT UNIT 39
REF. FRAME STORE 34
RECONSTRUCTED VIDEO BLOCK
RESID. BLOCKS
48
TRANSFORM UNIT 38
QUANTIZATION UNIT 40
QUANTIZED RESIDUAL TRANSFORM COEFFICIENTS
MOTION VECTORS
ENTROPY CODING UNIT 46
BITSTREAM
INVERSE QUANTIZATION UNIT 42
INVERSE TRANSFORM UNIT 44
RECON. RESID. BLOCKS
51
VIDEO ENCODER 50

FIG. 2

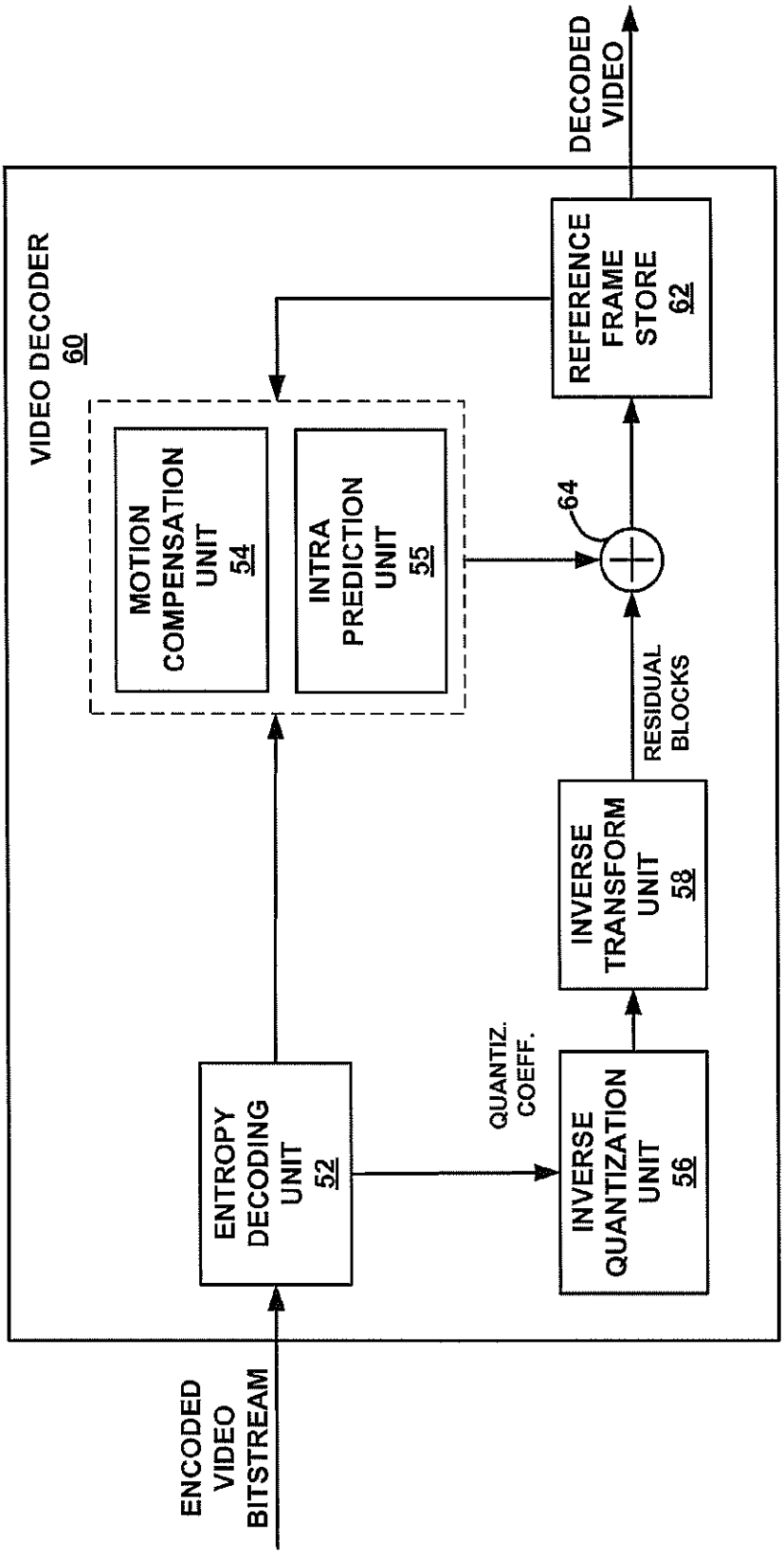

ENCODED VIDEO BITSTREAM
VIDEO DECODER 60
ENTROPY DECODING UNIT 52
QUANTIZ. COEFF.
INVERSE QUANTIZATION UNIT 56
INVERSE TRANSFORM UNIT 58
RESIDUAL BLOCKS
64
MOTION COMPENSATION UNIT 54
INTRA PREDICTION UNIT 55
REFERENCE FRAME STORE 62
DECODED VIDEO

FIG. 3

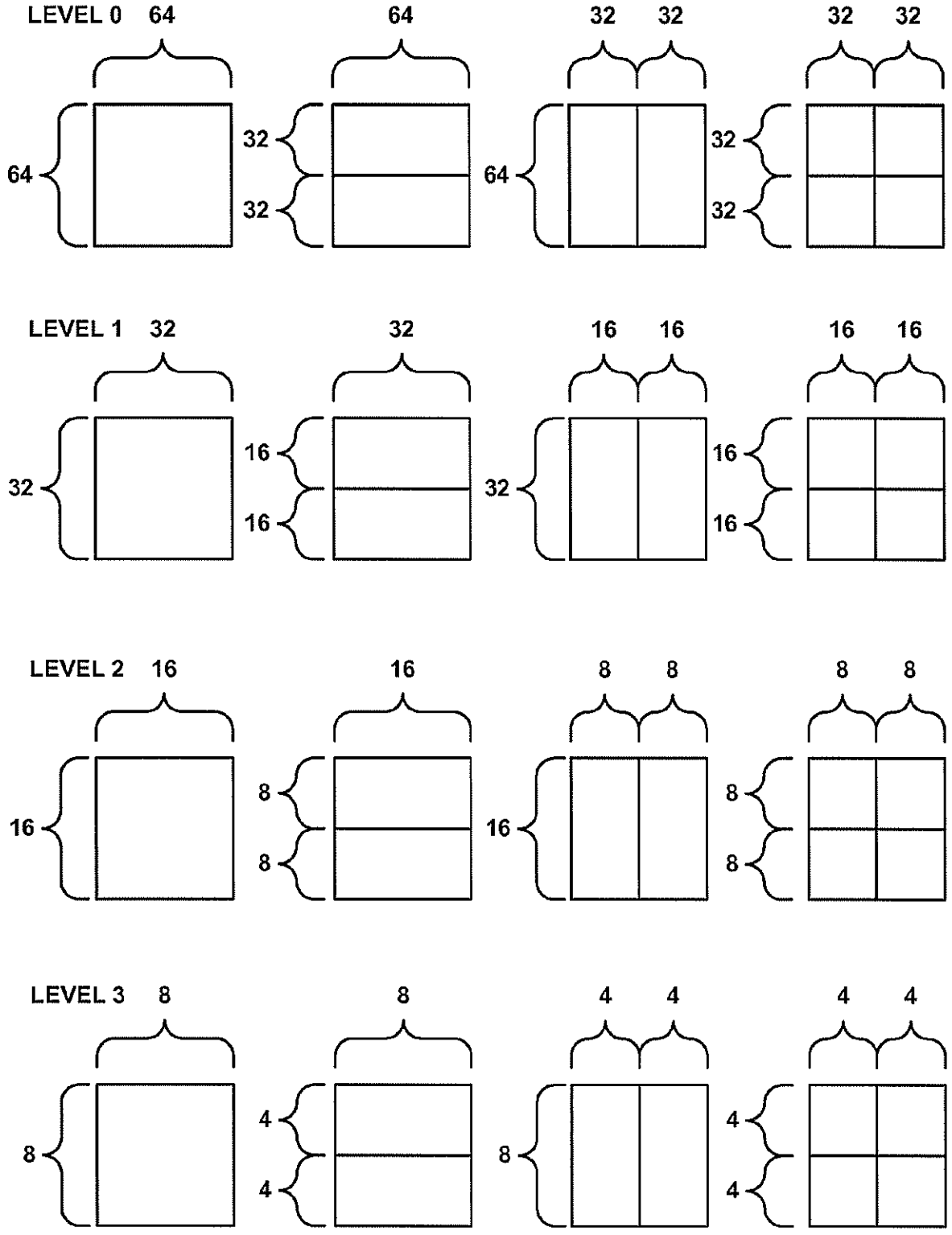

LEVEL 0
64
64
32
32
64
64
32
32
32
32
LEVEL 1
32
32
16
16
32
32
16
16
16
16
LEVEL 2
16
16
8
8
16
16
8
8
8
8
LEVEL 3
8
8
4
4
8
8
4
4
4
4

FIG. 4A

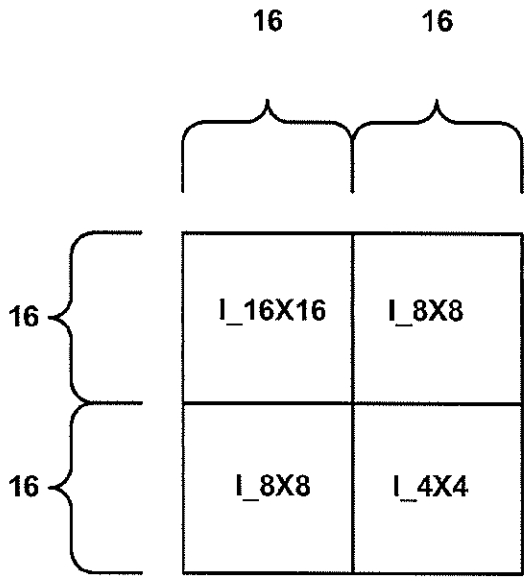


FIG. 4B

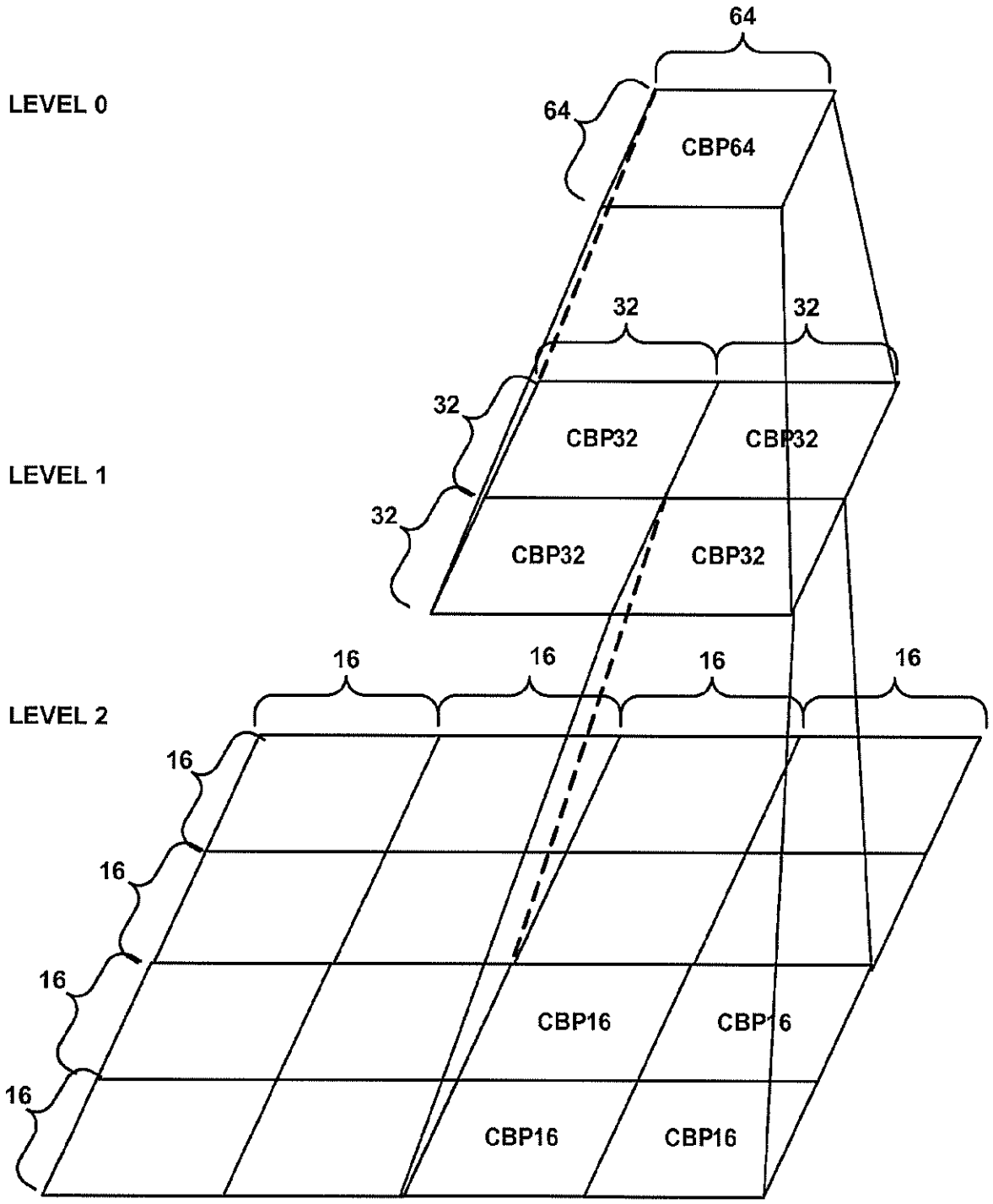

LEVEL 0
LEVEL 1
LEVEL 2
64
64
CBP64
32
32
32
CBP32
CBP32
32
CBP32
CBP32
16
16
16
16
16
16
16
16
CBP16
CBP16
CBP16
CBP16

FIG. 5

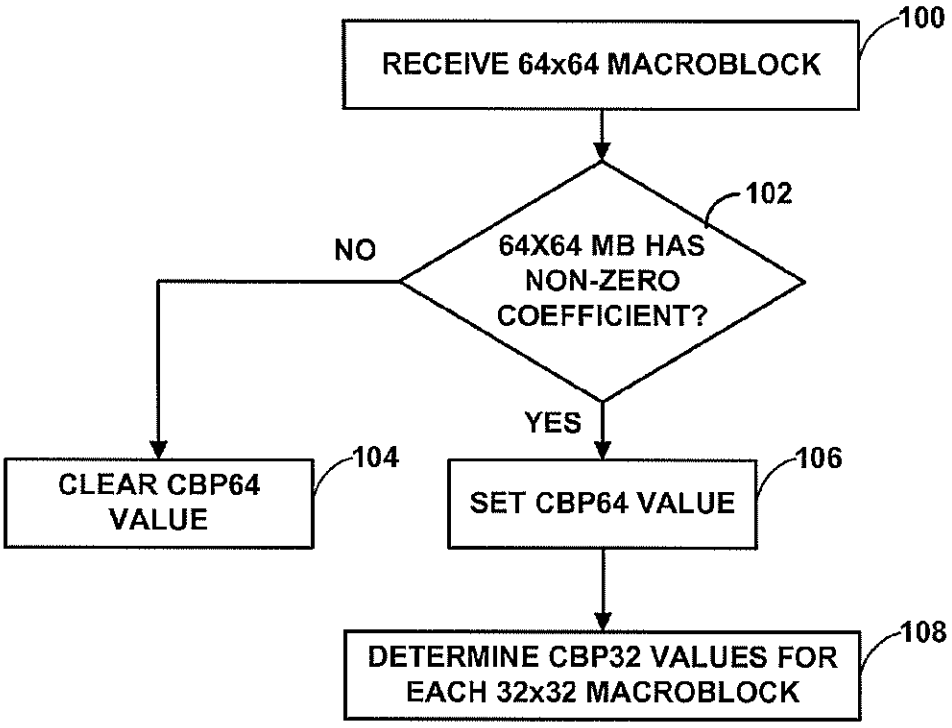

RECEIVE 64x64 MACROBLOCK
100
64X64 MB HAS NON-ZERO COEFFICIENT?
102
NO
YES
CLEAR CBP64 VALUE
104
SET CBP64 VALUE
106
DETERMINE CBP32 VALUES FOR EACH 32x32 MACROBLOCK
108

FIG. 6

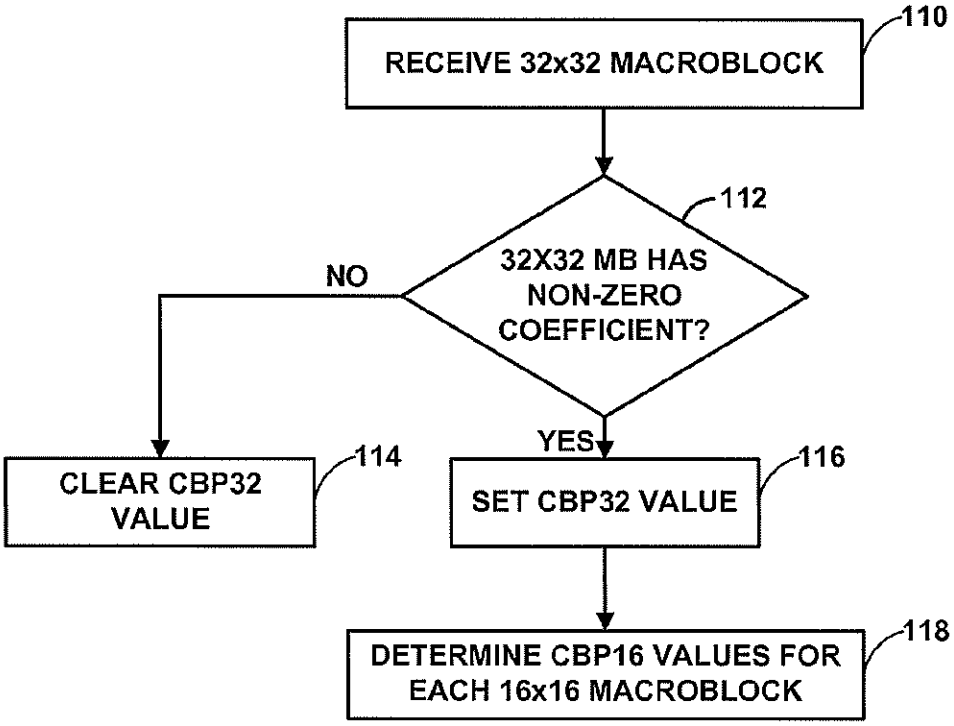

RECEIVE 32x32 MACROBLOCK
110
32X32 MB HAS NON-ZERO COEFFICIENT?
112
NO
YES
CLEAR CBP32 VALUE
114
SET CBP32 VALUE
116
DETERMINE CBP16 VALUES FOR EACH 16x16 MACROBLOCK
118

FIG. 7

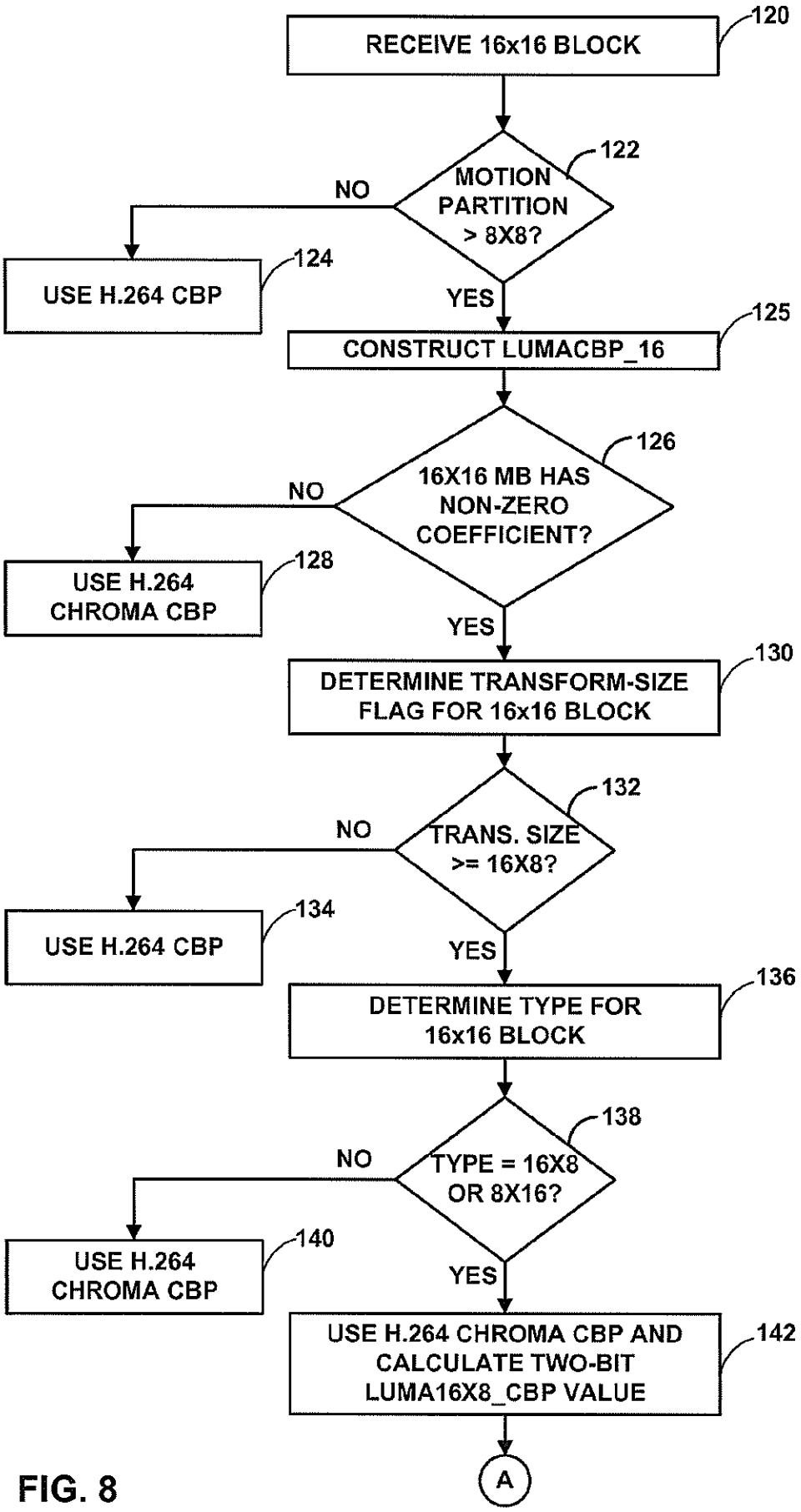

RECEIVE 16x16 BLOCK
120
MOTION PARTITION > 8X8?
122
NO
USE H.264 CBP
124
YES
CONSTRUCT LUMACBP_16
125
16X16 MB HAS NON-ZERO COEFFICIENT?
126
NO
USE H.264 CHROMA CBP
128
YES
DETERMINE TRANSFORM-SIZE FLAG FOR 16x16 BLOCK
130
TRANS. SIZE >= 16X8?
132
NO
USE H.264 CBP
134
YES
DETERMINE TYPE FOR 16x16 BLOCK
136
TYPE = 16X8 OR 8X16?
138
NO
USE H.264 CHROMA CBP
140
YES
USE H.264 CHROMA CBP AND CALCULATE TWO-BIT LUMA16X8_CBP VALUE
142
A

FIG. 8

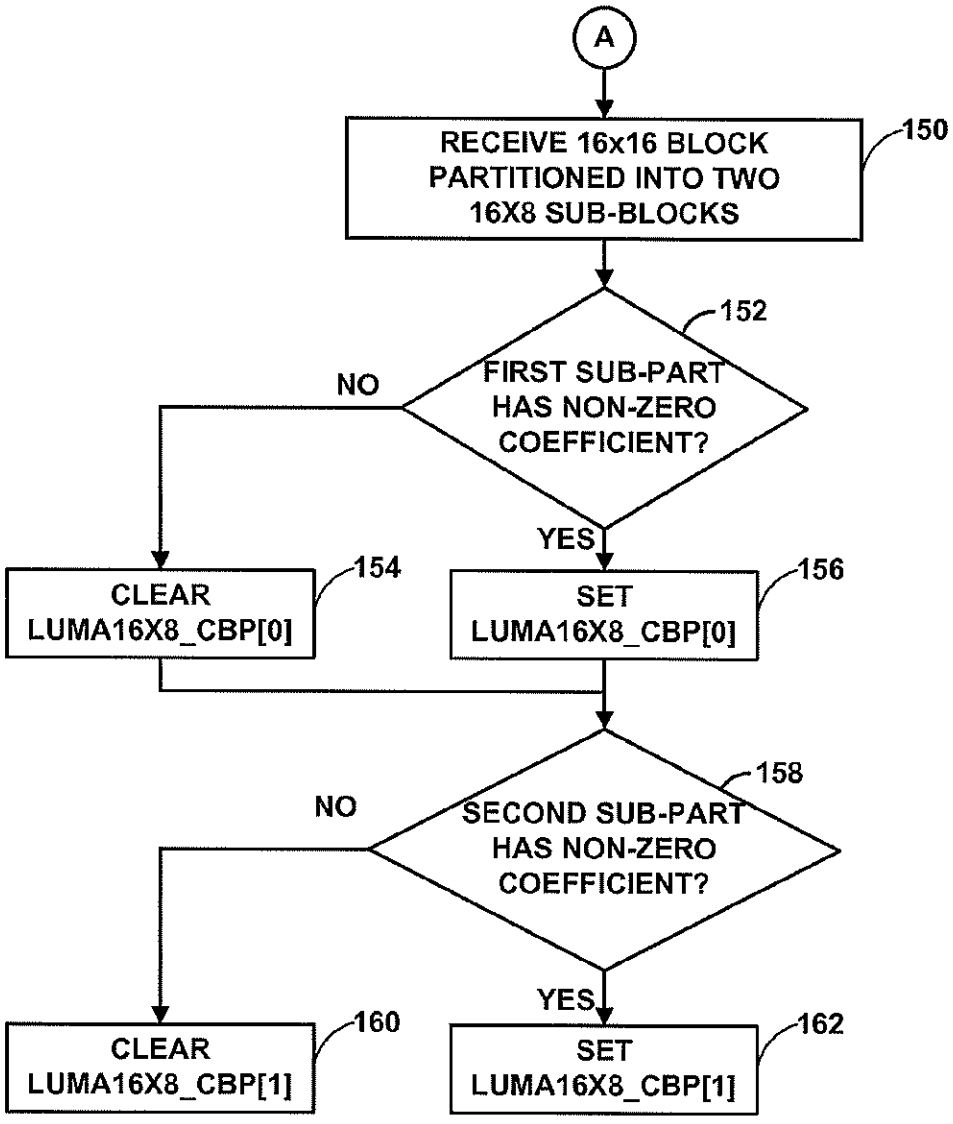

A
RECEIVE 16x16 BLOCK PARTITIONED INTO TWO 16X8 SUB-BLOCKS
150
152
FIRST SUB-PART HAS NON-ZERO COEFFICIENT?
NO
YES
CLEAR LUMA16X8_CBP[0]
154
SET LUMA16X8_CBP[0]
156
158
SECOND SUB-PART HAS NON-ZERO COEFFICIENT?
NO
YES
CLEAR LUMA16X8_CBP[1]
160
SET LUMA16X8_CBP[1]
162

FIG. 9

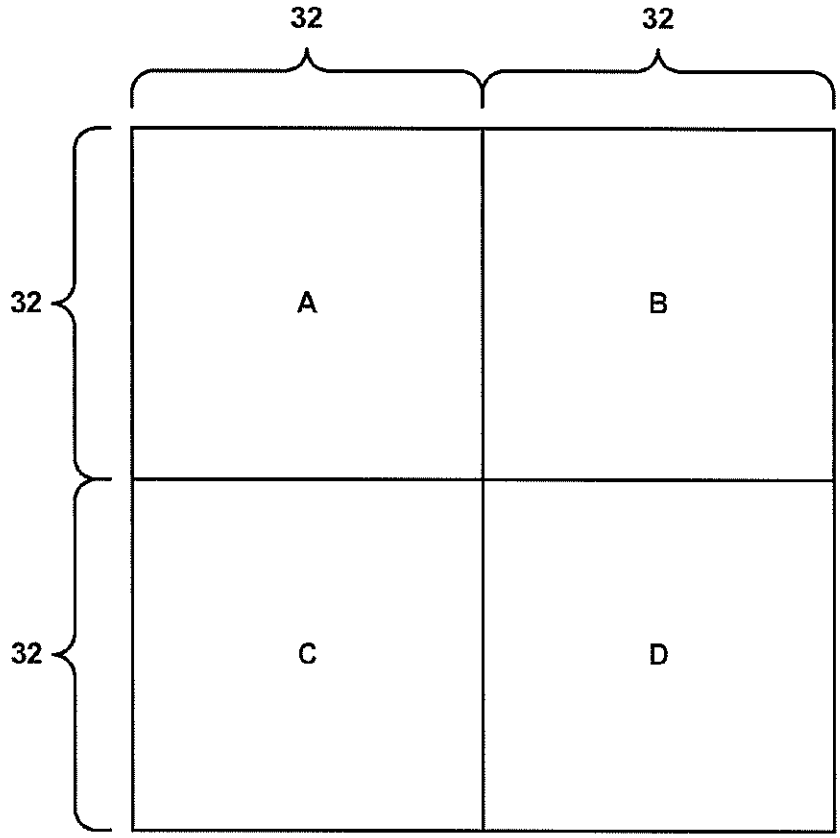


FIG. 10

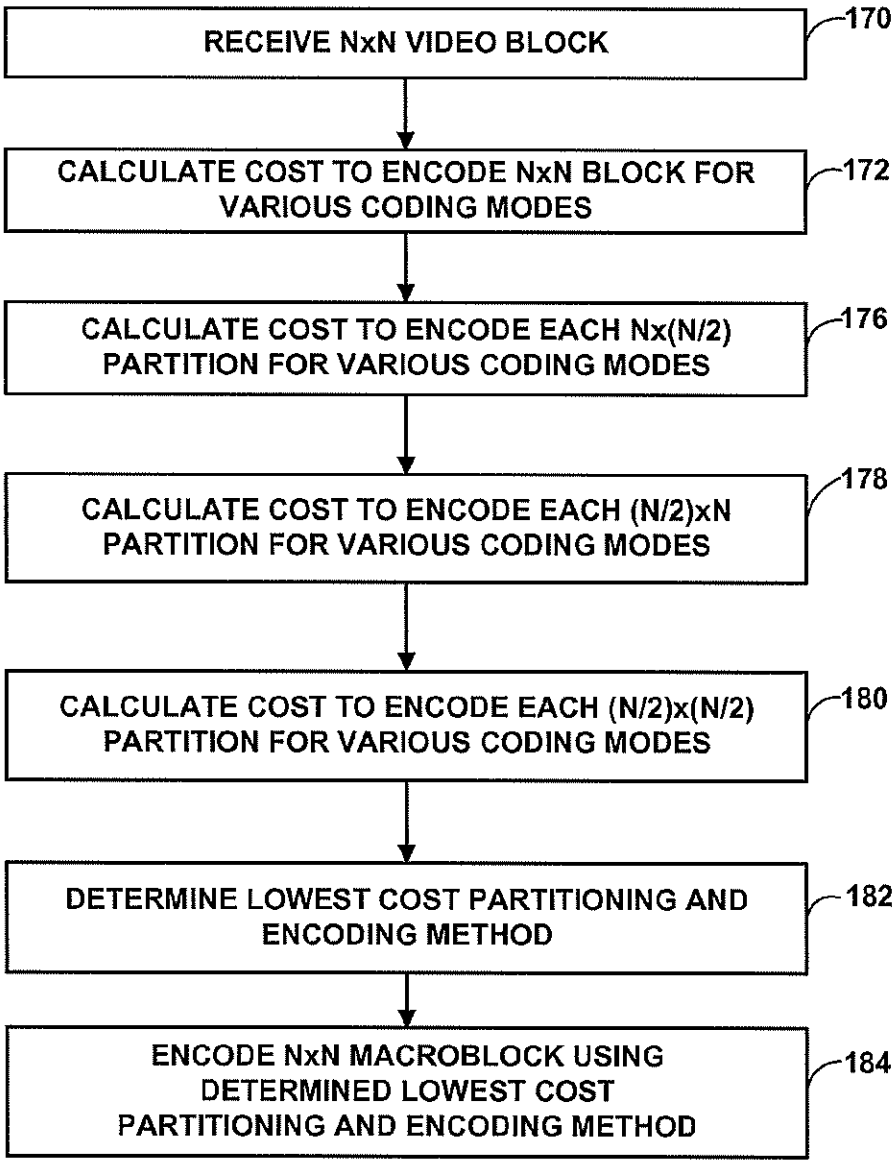

RECEIVE NxN VIDEO BLOCK
170
CALCULATE COST TO ENCODE NxN BLOCK FOR VARIOUS CODING MODES
172
CALCULATE COST TO ENCODE EACH Nx(N/2) PARTITION FOR VARIOUS CODING MODES
176
CALCULATE COST TO ENCODE EACH (N/2)xN PARTITION FOR VARIOUS CODING MODES
178
CALCULATE COST TO ENCODE EACH (N/2)x(N/2) PARTITION FOR VARIOUS CODING MODES
180
DETERMINE LOWEST COST PARTITIONING AND ENCODING METHOD
182
ENCODE NxN MACROBLOCK USING DETERMINED LOWEST COST PARTITIONING AND ENCODING METHOD
184

FIG. 11

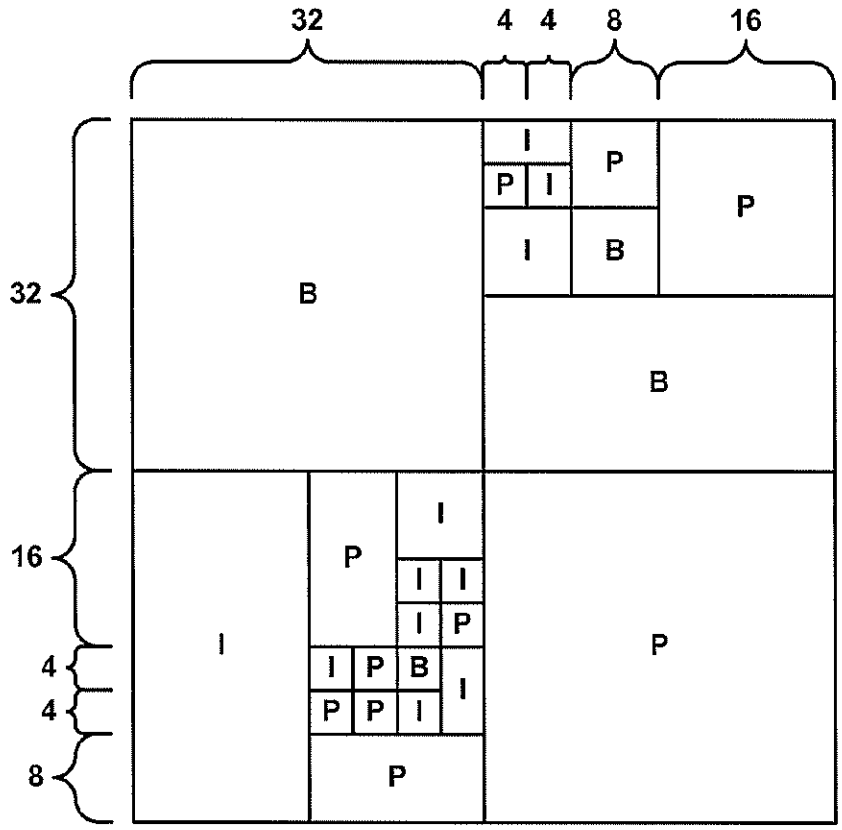


FIG. 12

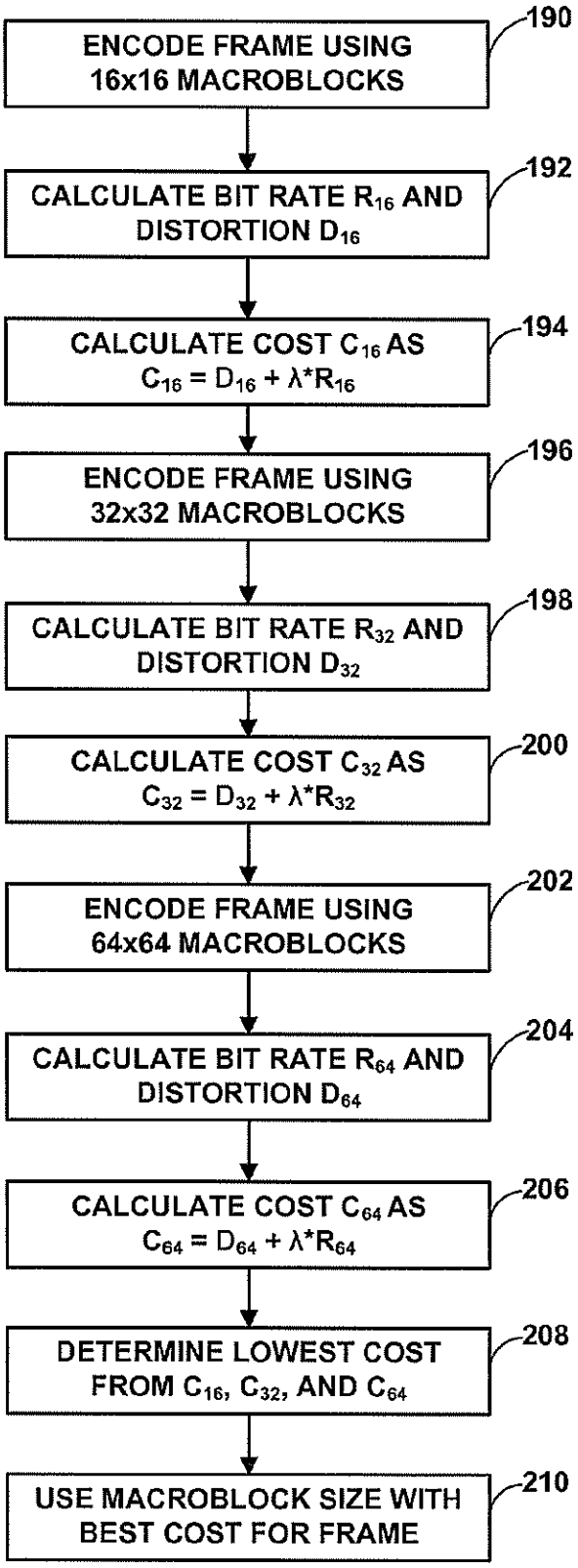

ENCODE FRAME USING 16x16 MACROBLOCKS
190
CALCULATE BIT RATE R_{16} AND DISTORTION D_{16}
192
CALCULATE COST C_{16} AS $C_{16} = D_{16} + \lambda * R_{16}$
194
ENCODE FRAME USING 32x32 MACROBLOCKS
196
CALCULATE BIT RATE R_{32} AND DISTORTION D_{32}
198
CALCULATE COST C_{32} AS $C_{32} = D_{32} + \lambda * R_{32}$
200
ENCODE FRAME USING 64x64 MACROBLOCKS
202
CALCULATE BIT RATE R_{64} AND DISTORTION D_{64}
204
CALCULATE COST C_{64} AS $C_{64} = D_{64} + \lambda * R_{64}$
206
DETERMINE LOWEST COST FROM C_{16}, C_{32}, AND C_{64}
208
USE MACROBLOCK SIZE WITH BEST COST FOR FRAME
210

FIG. 13

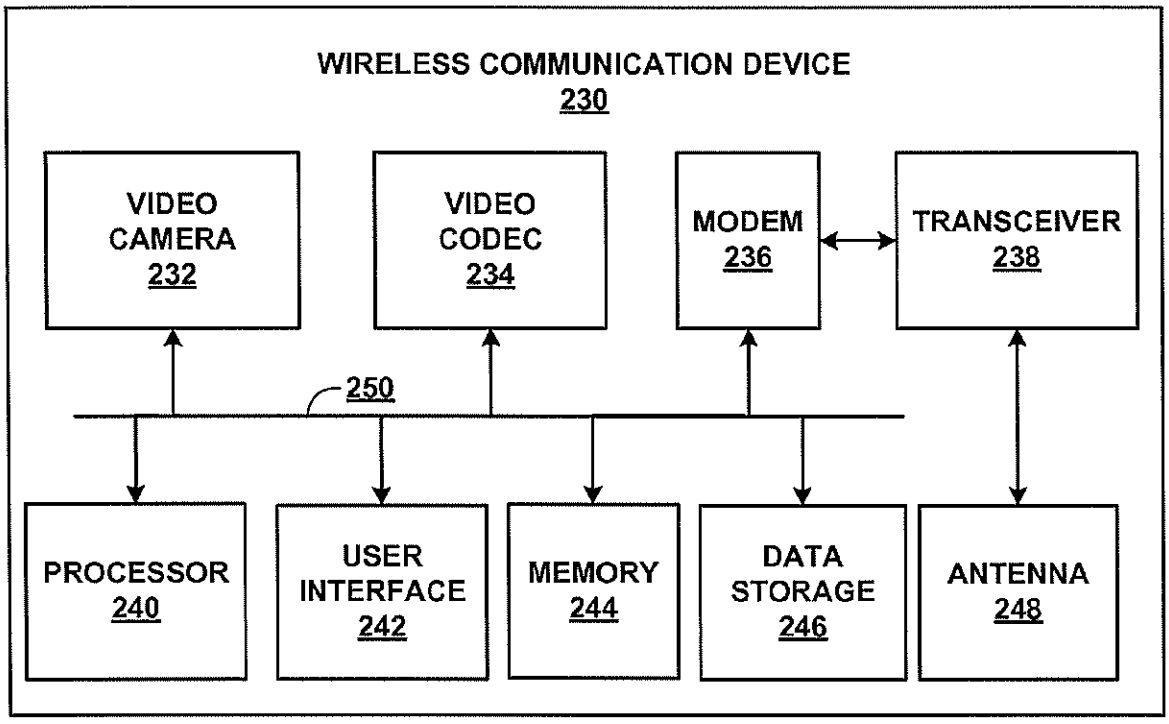

WIRELESS COMMUNICATION DEVICE
230
VIDEO CAMERA
232
VIDEO CODEC
234
MODEM
236
TRANSCEIVER
238
250
PROCESSOR
240
USER INTERFACE
242
MEMORY
244
DATA STORAGE
246
ANTENNA
248

FIG. 14

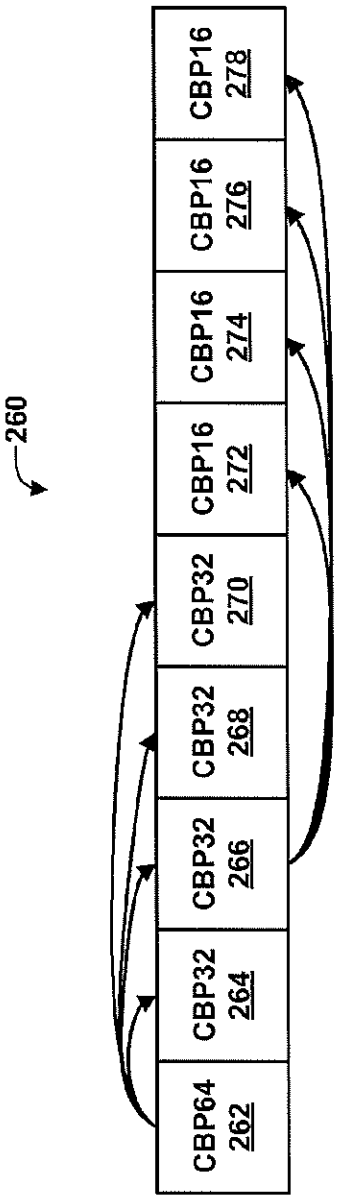

260
CBP64 262
CBP32 264
CBP32 266
CBP32 268
CBP32 270
CBP16 272
CBP16 274
CBP16 276
CBP16 278

FIG. 15

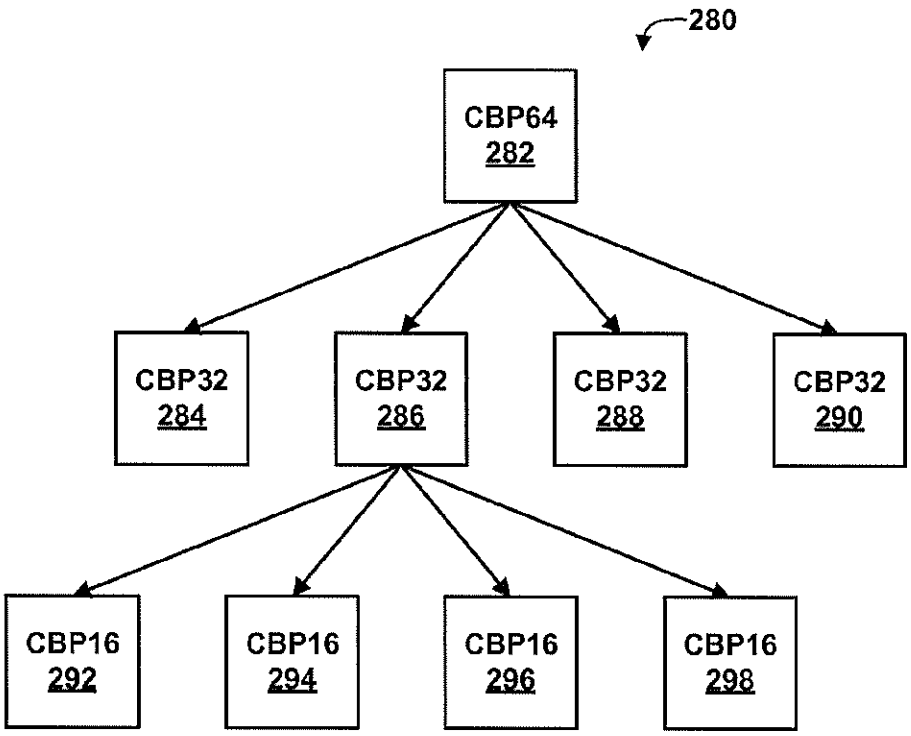

280
CBP64
282
CBP32
284
CBP32
286
CBP32
288
CBP32
290
CBP16
292
CBP16
294
CBP16
296
CBP16
298

FIG. 16

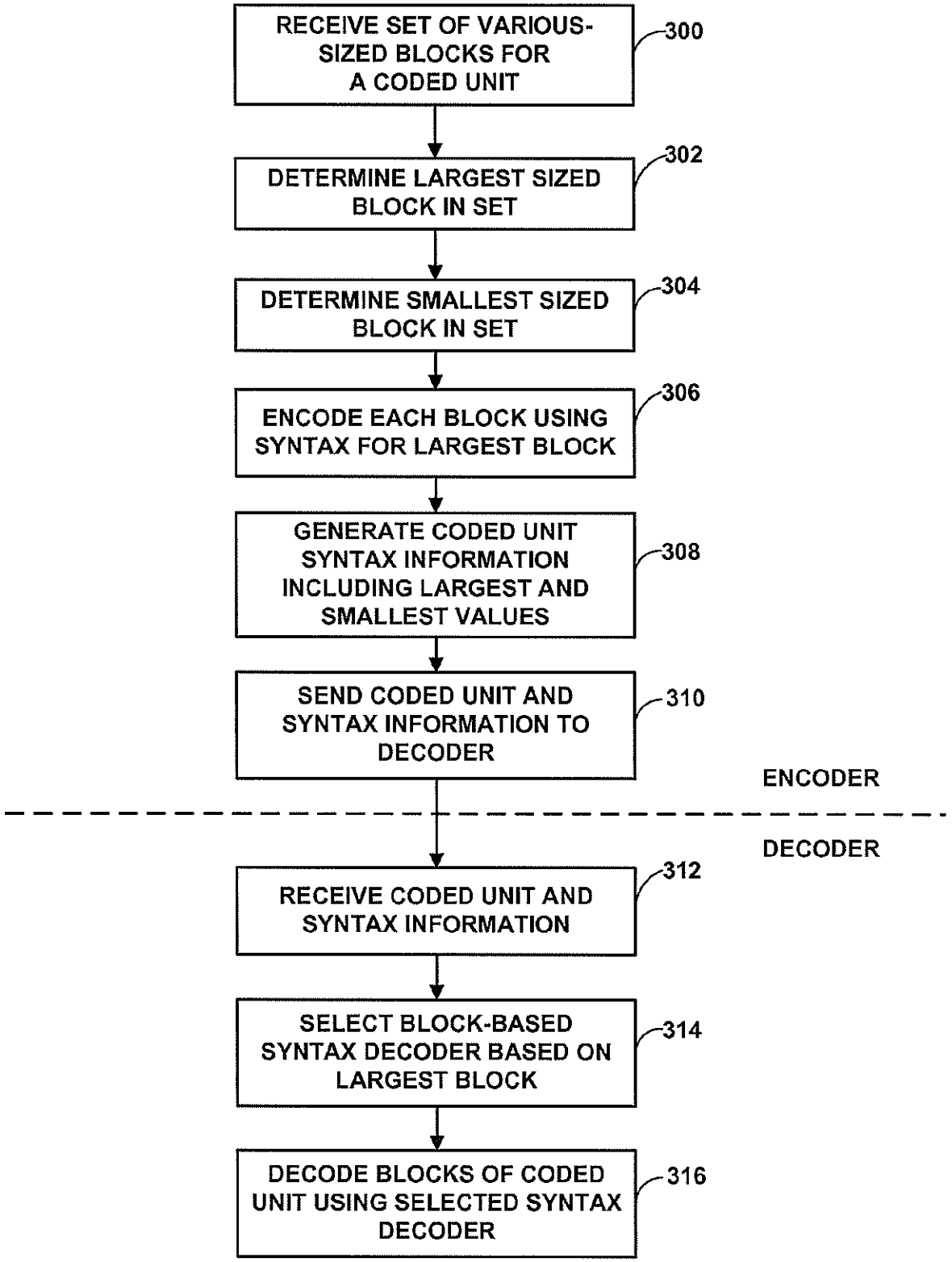

RECEIVE SET OF VARIOUS-SIZED BLOCKS FOR A CODED UNIT
300
DETERMINE LARGEST SIZED BLOCK IN SET
302
DETERMINE SMALLEST SIZED BLOCK IN SET
304
ENCODE EACH BLOCK USING SYNTAX FOR LARGEST BLOCK
306
GENERATE CODED UNIT SYNTAX INFORMATION INCLUDING LARGEST AND SMALLEST VALUES
308
SEND CODED UNIT AND SYNTAX INFORMATION TO DECODER
310
ENCODER
DECODER
RECEIVE CODED UNIT AND SYNTAX INFORMATION
312
SELECT BLOCK-BASED SYNTAX DECODER BASED ON LARGEST BLOCK
314
DECODE BLOCKS OF CODED UNIT USING SELECTED SYNTAX DECODER
316

FIG. 17