FIG. 1

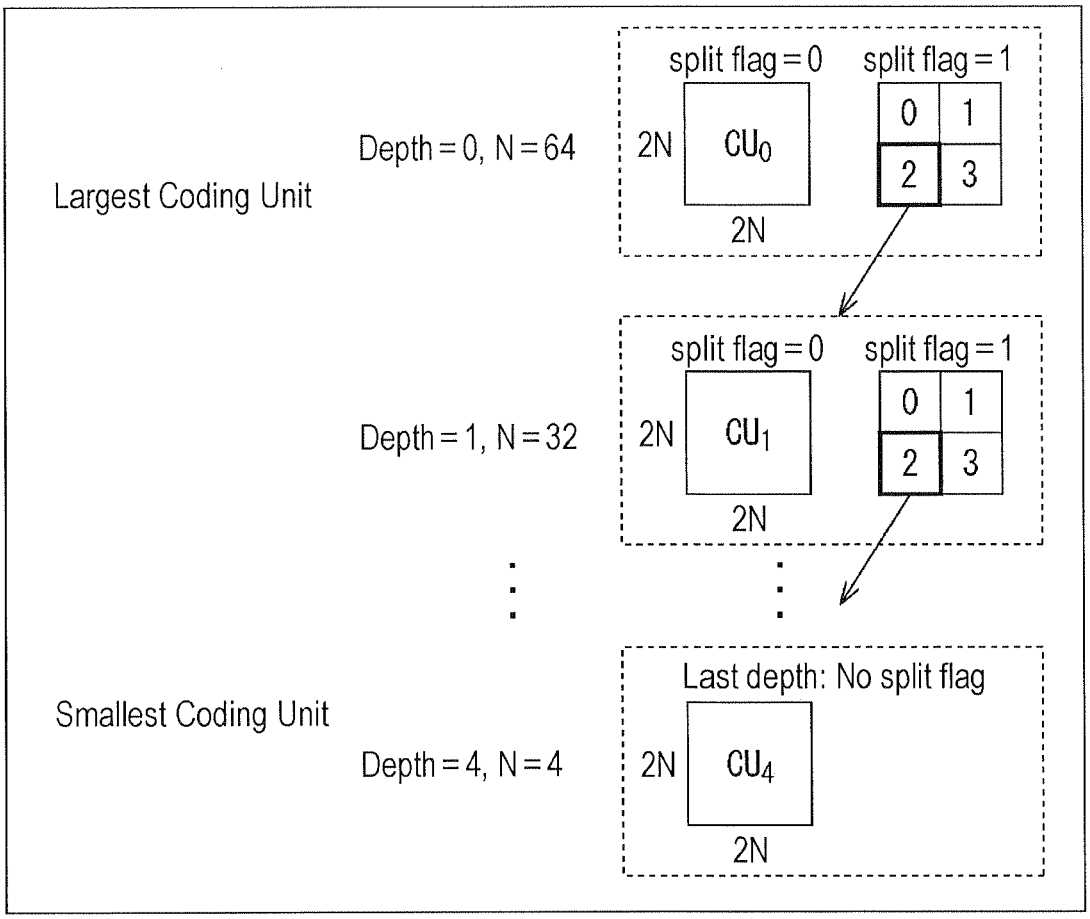

split flag = 0
split flag = 1
Largest Coding Unit
Depth = 0, N = 64
2N
CU0
2N
0
1
2
3
split flag = 0
split flag = 1
Depth = 1, N = 32
2N
CU1
2N
0
1
2
3
Last depth: No split flag
Smallest Coding Unit
Depth = 4, N = 4
2N
CU4
2N

FIG. 2

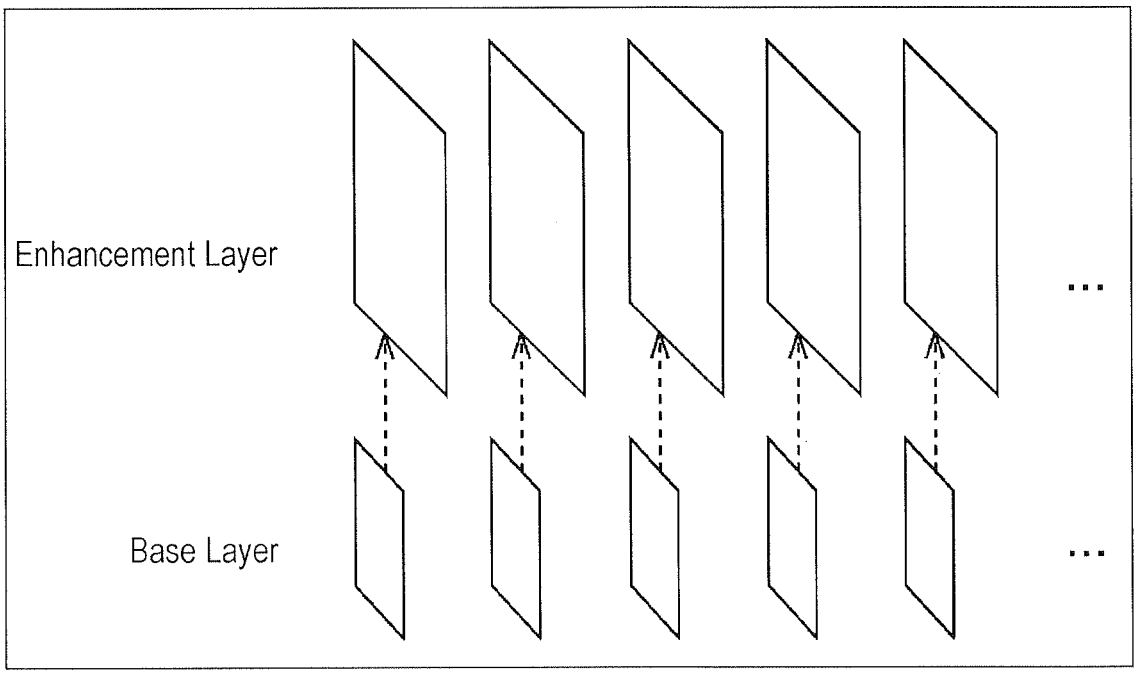

Enhancement Layer
Base Layer

FIG. 3

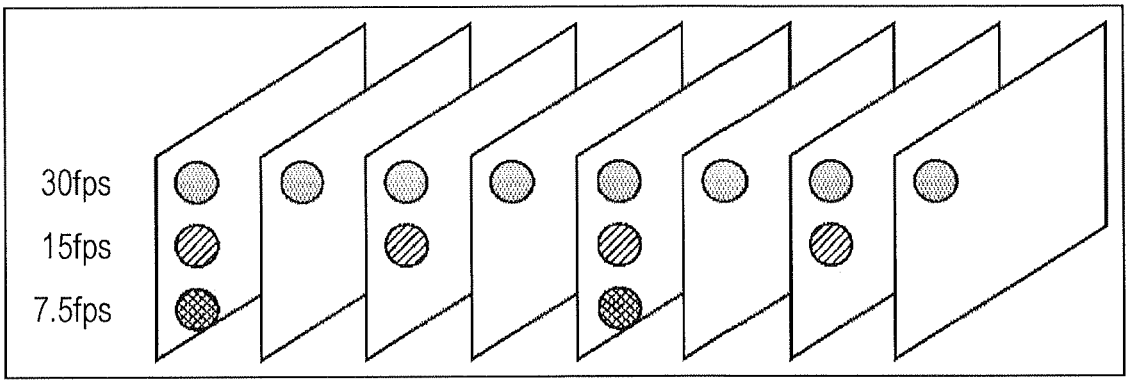

30fps
15fps
7.5fps

FIG. 4

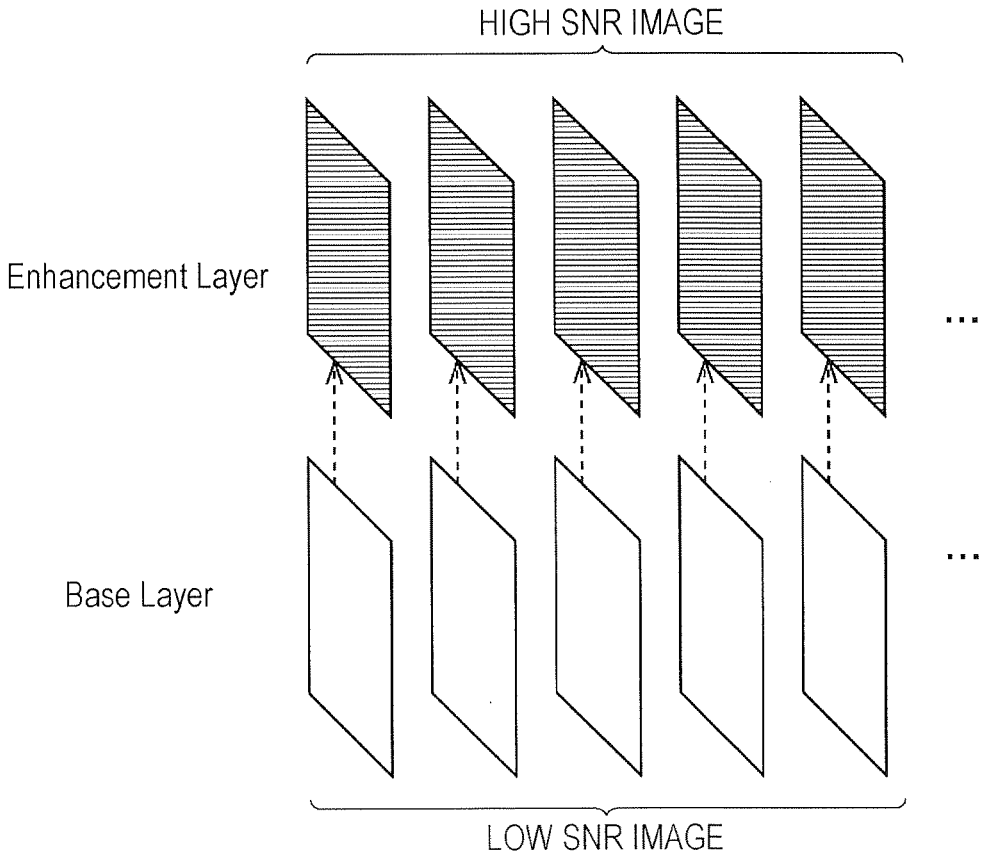

HIGH SNR IMAGE
Enhancement Layer
Base Layer
LOW SNR IMAGE

FIG. 5

video_parameter_set_rbsp( ){	Descriptor
video_parameter_set_id	u(4)
vps_temporal_id_nesting_flag	u(1)
vps_reserved_zero_2bits	u(2)
vps_reserved_zero_6bits	u(6)
vps_max_sub_layers_minus1	u(3)
profile_and_level(1, vps_max_sub_layers_minus1)	
vps_reserved_zero_12bits	u(12)
for(i = 0;i <= vps_max_sub_layers_minus1;i++){	
vps_max_dec_pic_buffering[i]	ue(v)
vps_max_num_reorder_pics[i]	ue(v)
vps_max_latency_increase[i]	ue(v)
}	
vps_num_hrd_parameters	ue(v)
for(i = 0;i < vps_num_hrd_parameters;i++){	
if(i > 0)	
op_point(i)	
hrd_parameters(i = = 0,vps_max_sub_layers_minus1)	
}	
vps_extension_flag	u(1)
if(vps_extension_flag)	
while(more_rbsp_data( ))	
vps_extension_data_flag	u(1)
}	
rbsp_trailing_bits( )	
}	

FIG. 6

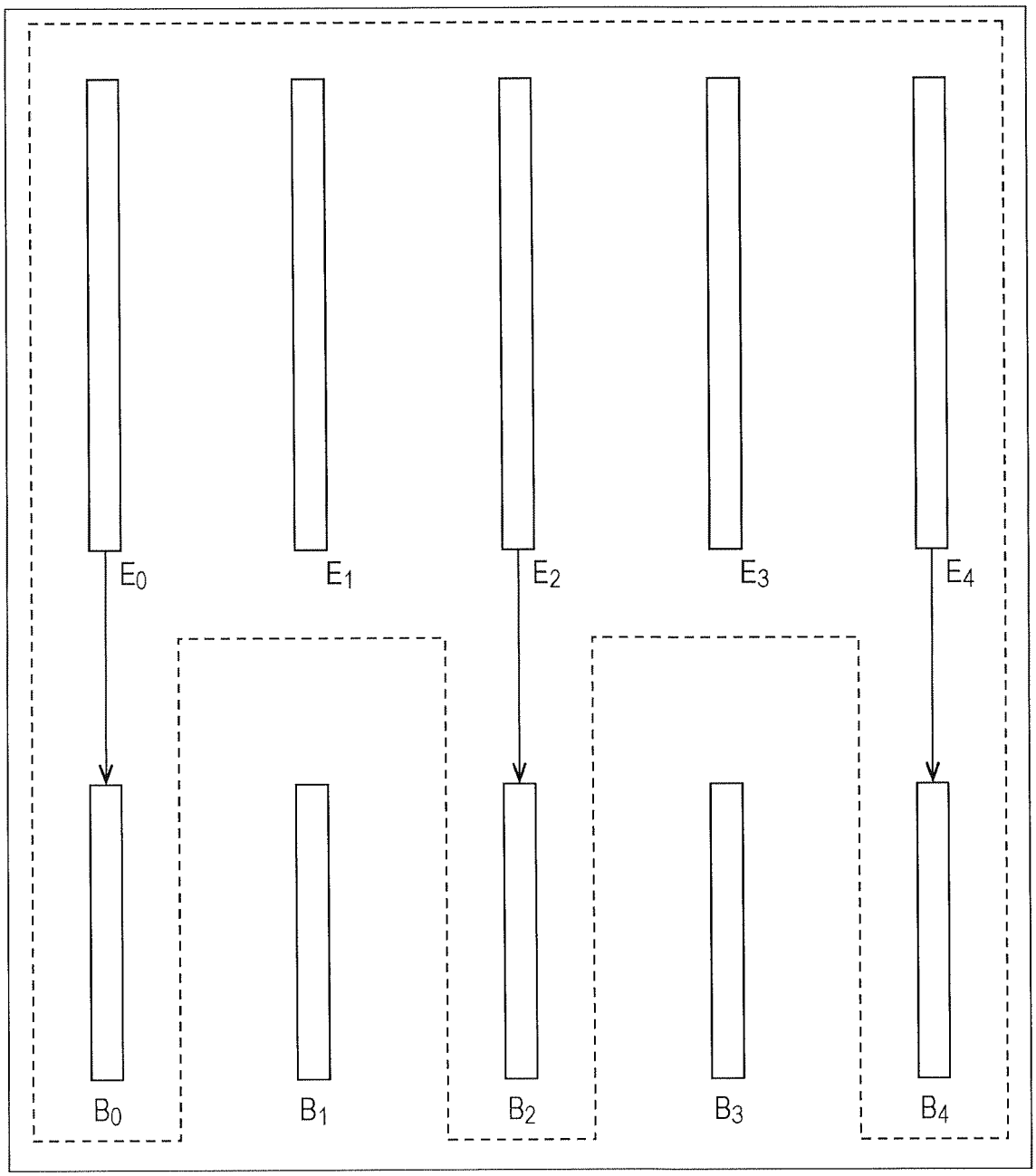


FIG. 7

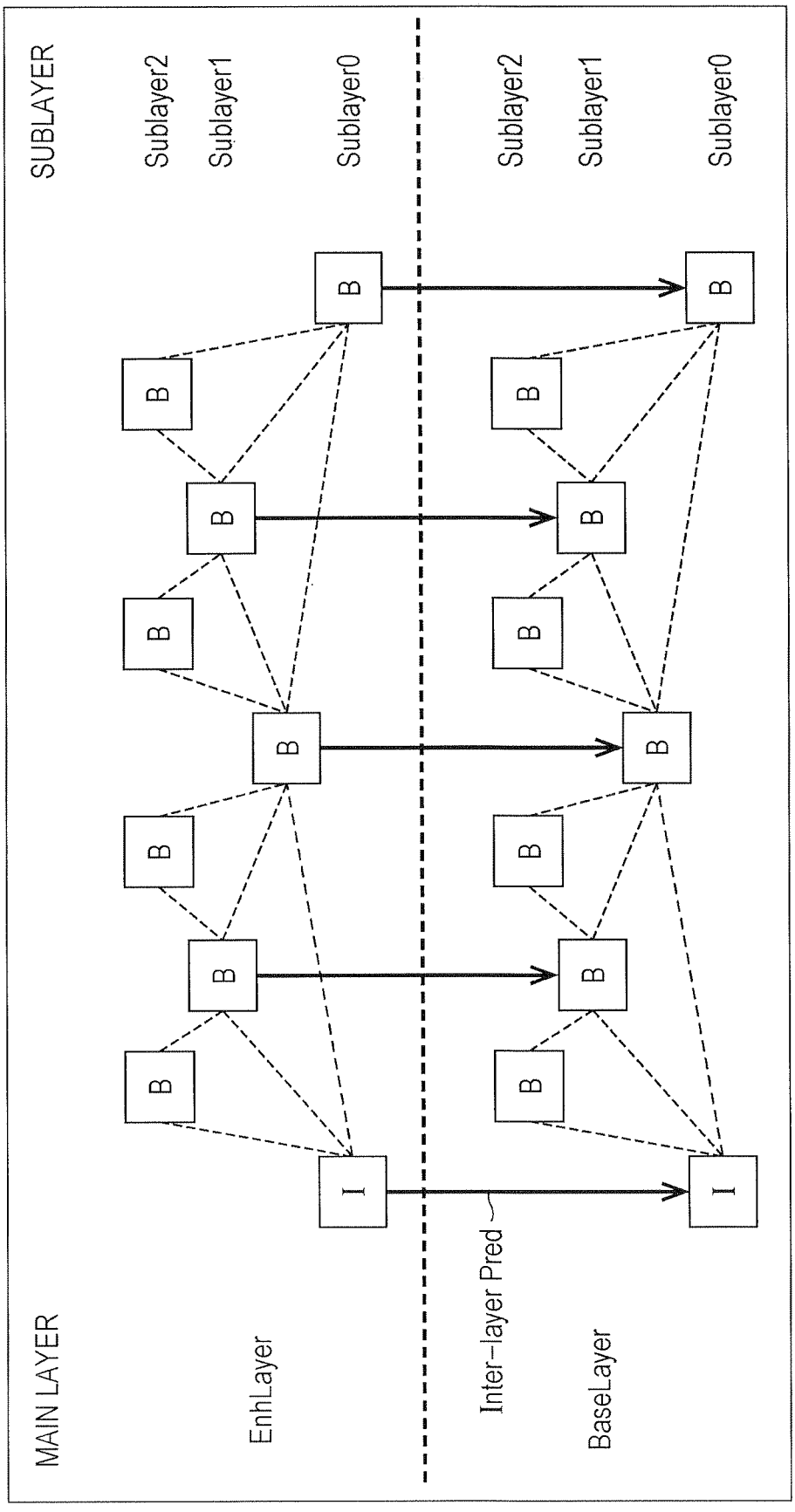

SUBLAYER
Sublayer2
Sublayer1
Sublayer0
Sublayer2
Sublayer1
Sublayer0
MAIN LAYER
EnhLayer
Inter-layer Pred
BaseLayer
B
I

FIG. 8

video_parameter_set_rbsp( ){	Descriptor
video_parameter_set_id	u(4)
vps_temporal_id_nesting_flag	u(1)
vps_reserved_zero_2bits	u(2)
vps_reserved_zero_6bits	u(6)
max_layer_minus1	u(3)
vps_max_sub_layers_minus1	u(3)
for(i = 1;i <= max_layers_minus1;i++)	
max_sub_layer_for_inter_layer_prediction[i]	u(3)
profile_and_level(1,vps_max_sub_layers_minus1)	
vps_reserved_zero_12bits	u(12)
for(i = 0;i <= vps_max_sub_layers_minus1;i++){	
vps_max_dec_pic_buffering[i]	ue(v)
vps_max_num_reorder_pics[i]	ue(v)
vps_max_latency_increase[i]	ue(v)
}	
vps_num_hrd_parameters	ue(v)
for(i = 0;i < vps_num_hrd_parameters;i++){	
if(i > 0)	
op_point(i)	
hrd_parameters(i = = 0,vps_max_sub_layers_minus1)	
}	
vps_extension_flag	u(1)
if(vps_extension_flag)	
while(more_rbsp_data( ))	
vps_extension_data_flag	u(1)
}	
rbsp_trailing_bits( )	
}	

FIG. 10

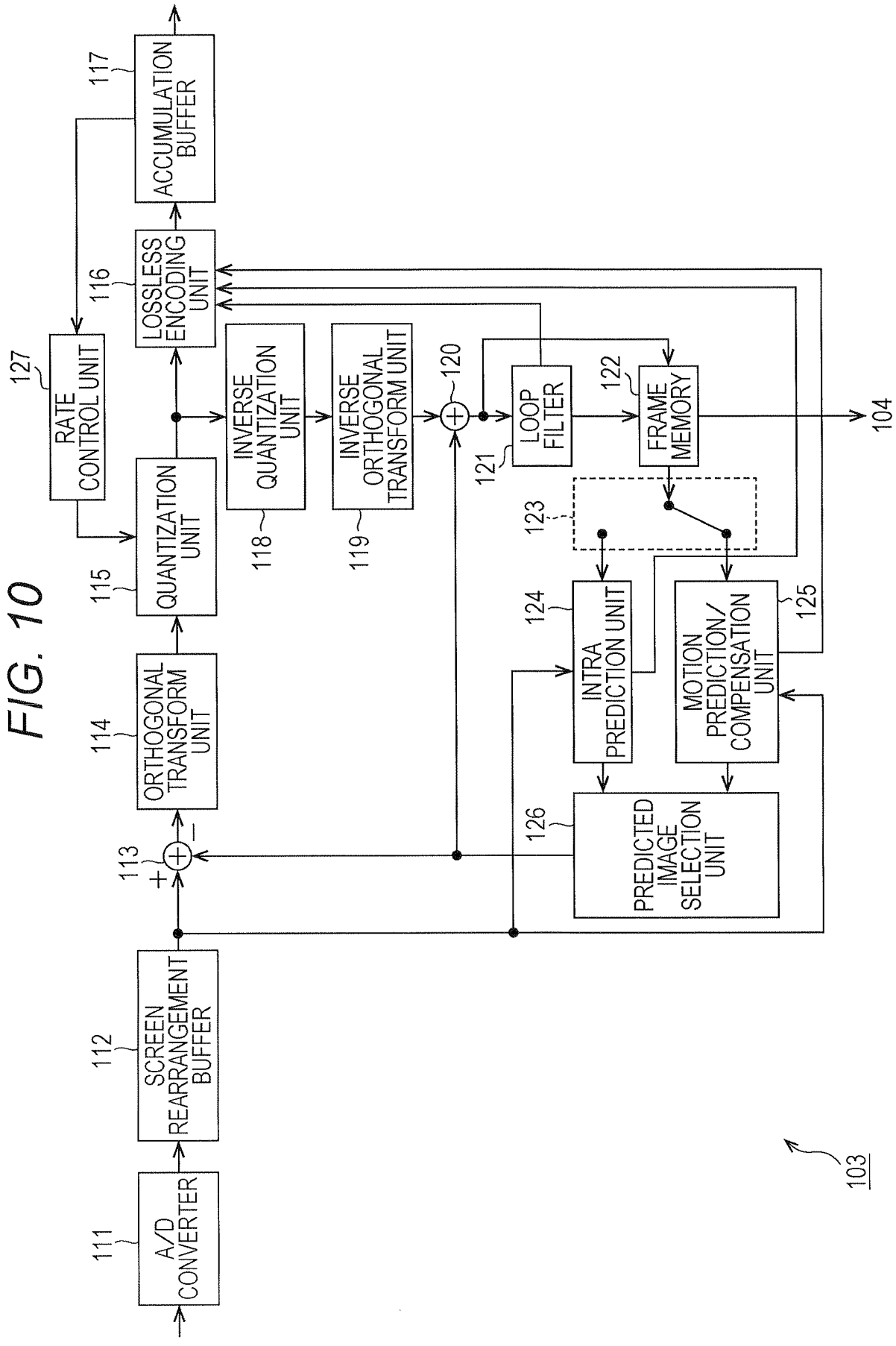

A/D CONVERTER
111
SCREEN REARRANGEMENT BUFFER
112
113
ORTHOGONAL TRANSFORM UNIT
114
QUANTIZATION UNIT
115
LOSSLESS ENCODING UNIT
116
ACCUMULATION BUFFER
117
INVERSE QUANTIZATION UNIT
118
INVERSE ORTHOGONAL TRANSFORM UNIT
119
120
LOOP FILTER
121
FRAME MEMORY
122
123
INTRA PREDICTION UNIT
124
MOTION PREDICTION/ COMPENSATION UNIT
125
PREDICTED IMAGE SELECTION UNIT
126
RATE CONTROL UNIT
127
104
103

FIG. 11

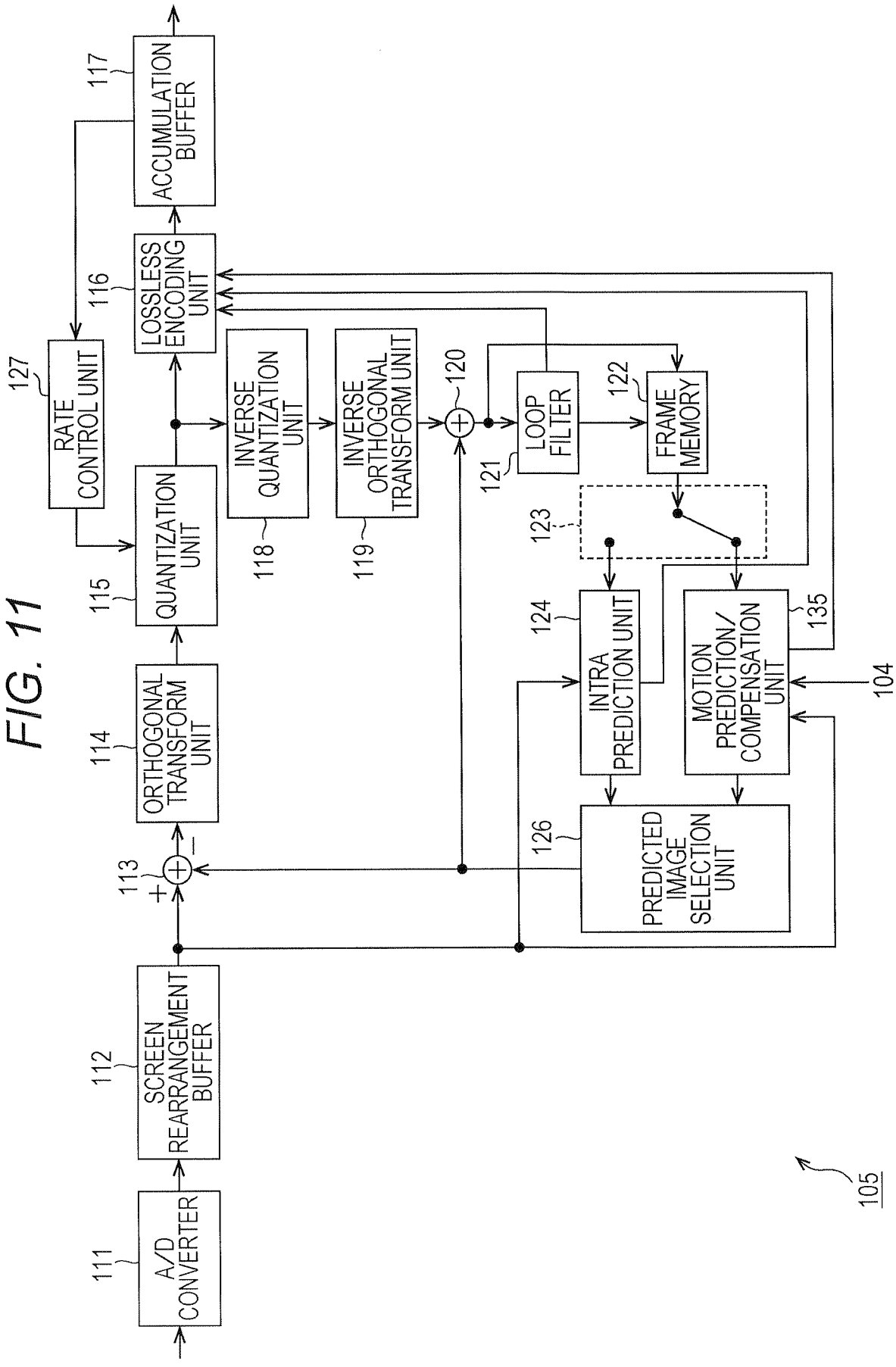

A/D CONVERTER
111
SCREEN REARRANGEMENT BUFFER
112
113
ORTHOGONAL TRANSFORM UNIT
114
QUANTIZATION UNIT
115
RATE CONTROL UNIT
127
LOSSLESS ENCODING UNIT
116
ACCUMULATION BUFFER
117
INVERSE QUANTIZATION UNIT
118
INVERSE ORTHOGONAL TRANSFORM UNIT
119
120
LOOP FILTER
121
FRAME MEMORY
122
123
INTRA PREDICTION UNIT
124
MOTION PREDICTION/ COMPENSATION UNIT
135
PREDICTED IMAGE SELECTION UNIT
126
104
105

FIG. 12

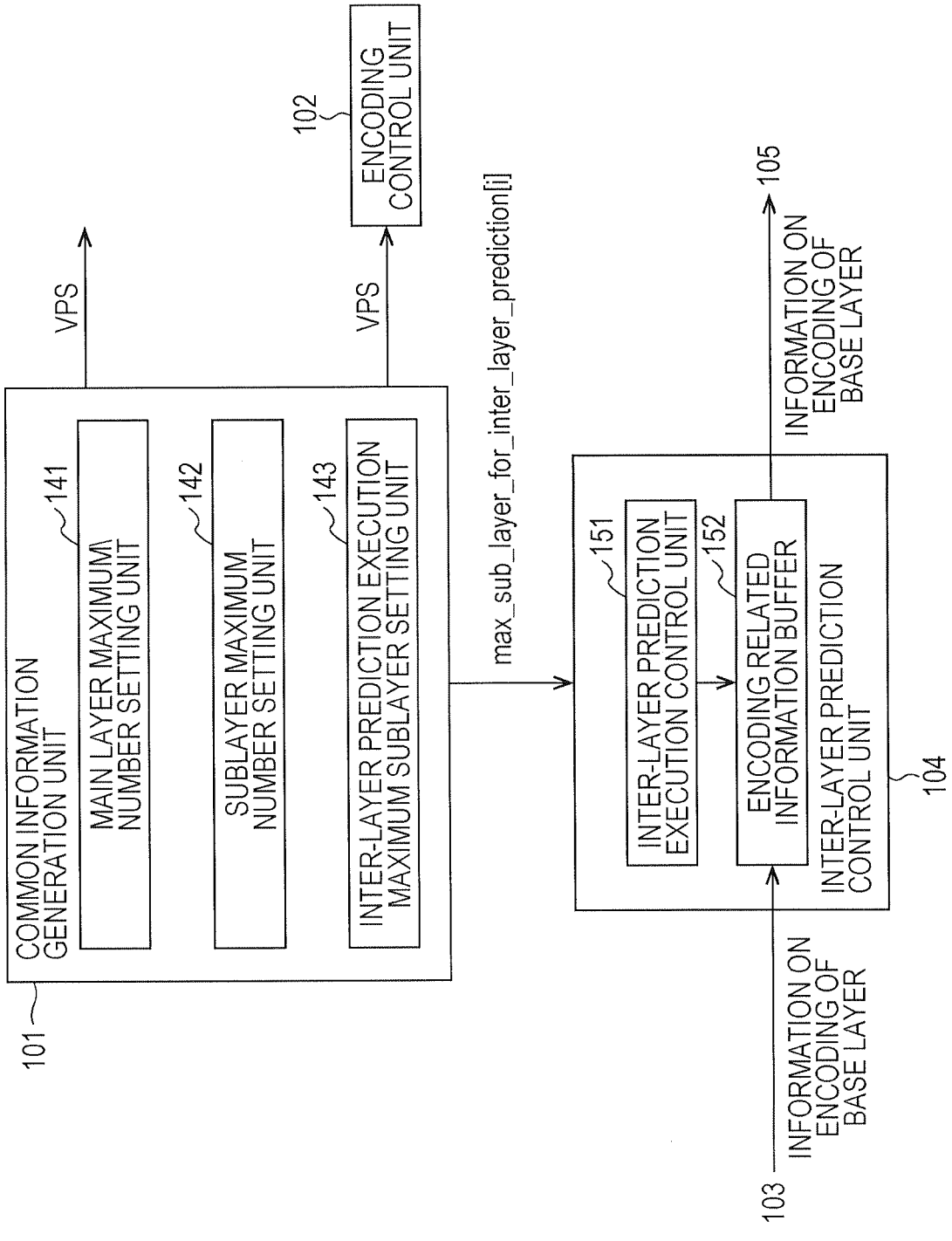

101
COMMON INFORMATION GENERATION UNIT
141
MAIN LAYER MAXIMUM NUMBER SETTING UNIT
142
SUBLAYER MAXIMUM NUMBER SETTING UNIT
143
INTER-LAYER PREDICTION EXECUTION MAXIMUM SUBLAYER SETTING UNIT
VPS
102
ENCODING CONTROL UNIT
VPS
max_sub_layer_for_inter_layer_prediction[i]
104
INTER-LAYER PREDICTION CONTROL UNIT
151
INTER-LAYER PREDICTION EXECUTION CONTROL UNIT
152
ENCODING RELATED INFORMATION BUFFER
105
INFORMATION ON ENCODING OF BASE LAYER
103
INFORMATION ON ENCODING OF BASE LAYER

FIG. 13

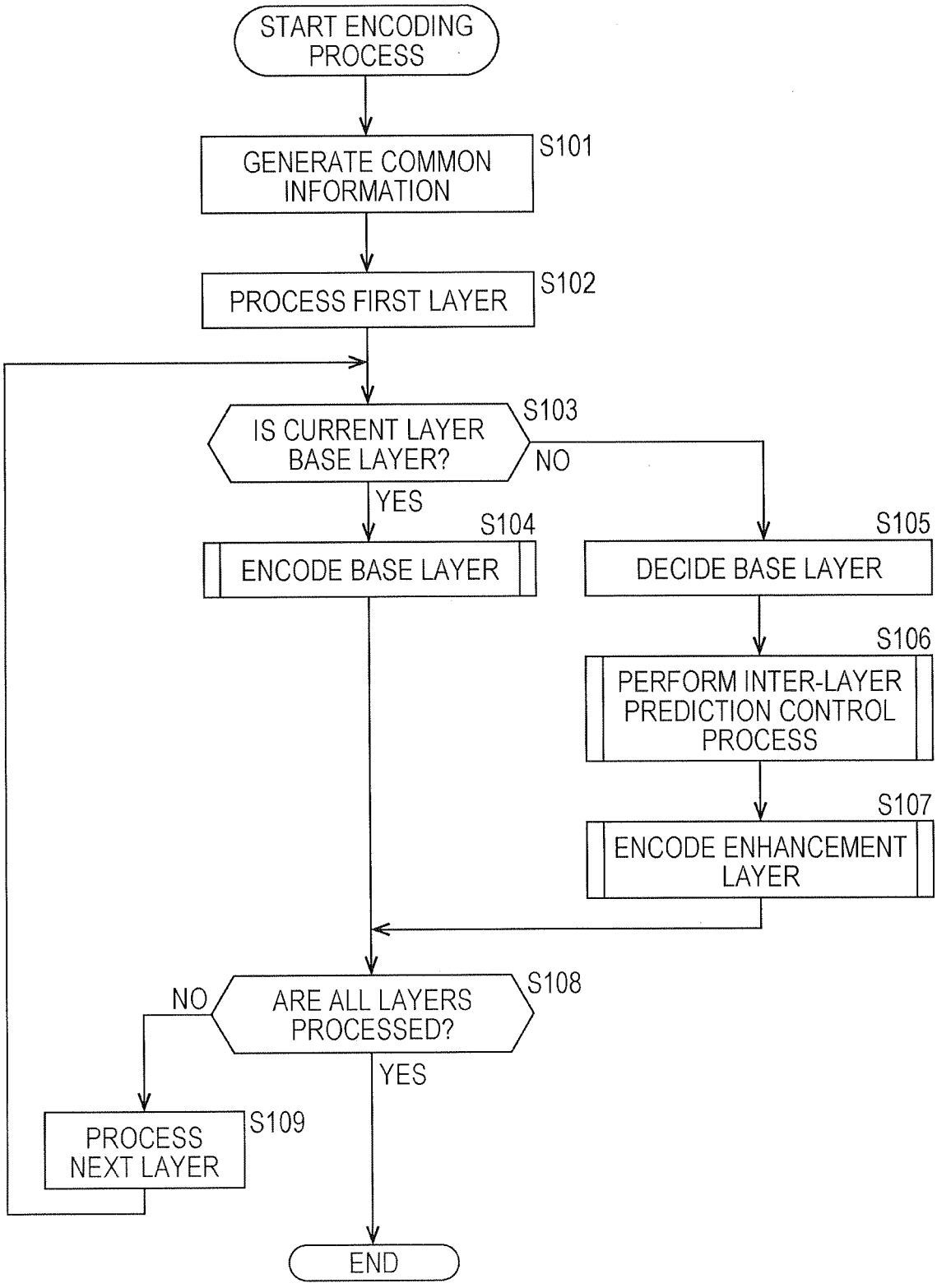

START ENCODING PROCESS
GENERATE COMMON INFORMATION
S101
PROCESS FIRST LAYER
S102
IS CURRENT LAYER BASE LAYER?
S103
NO
YES
S104
ENCODE BASE LAYER
S105
DECIDE BASE LAYER
S106
PERFORM INTER-LAYER PREDICTION CONTROL PROCESS
S107
ENCODE ENHANCEMENT LAYER
ARE ALL LAYERS PROCESSED?
S108
NO
YES
PROCESS NEXT LAYER
S109
END

FIG. 14

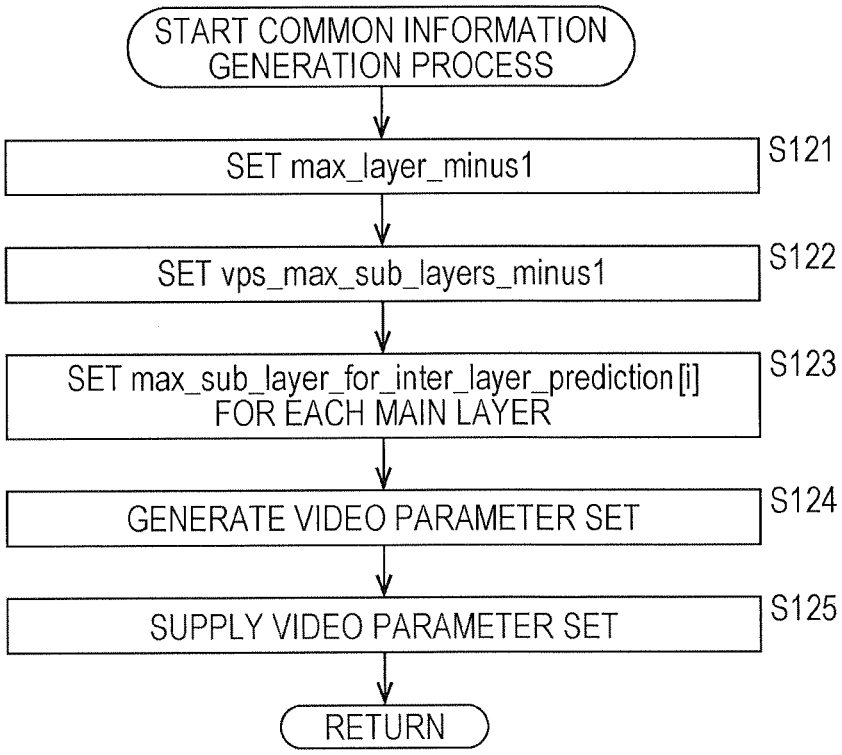

START COMMON INFORMATION GENERATION PROCESS
SET max_layer_minus1
S121
SET vps_max_sub_layers_minus1
S122
SET max_sub_layer_for_inter_layer_prediction[i] FOR EACH MAIN LAYER
S123
GENERATE VIDEO PARAMETER SET
S124
SUPPLY VIDEO PARAMETER SET
S125
RETURN

FIG. 15

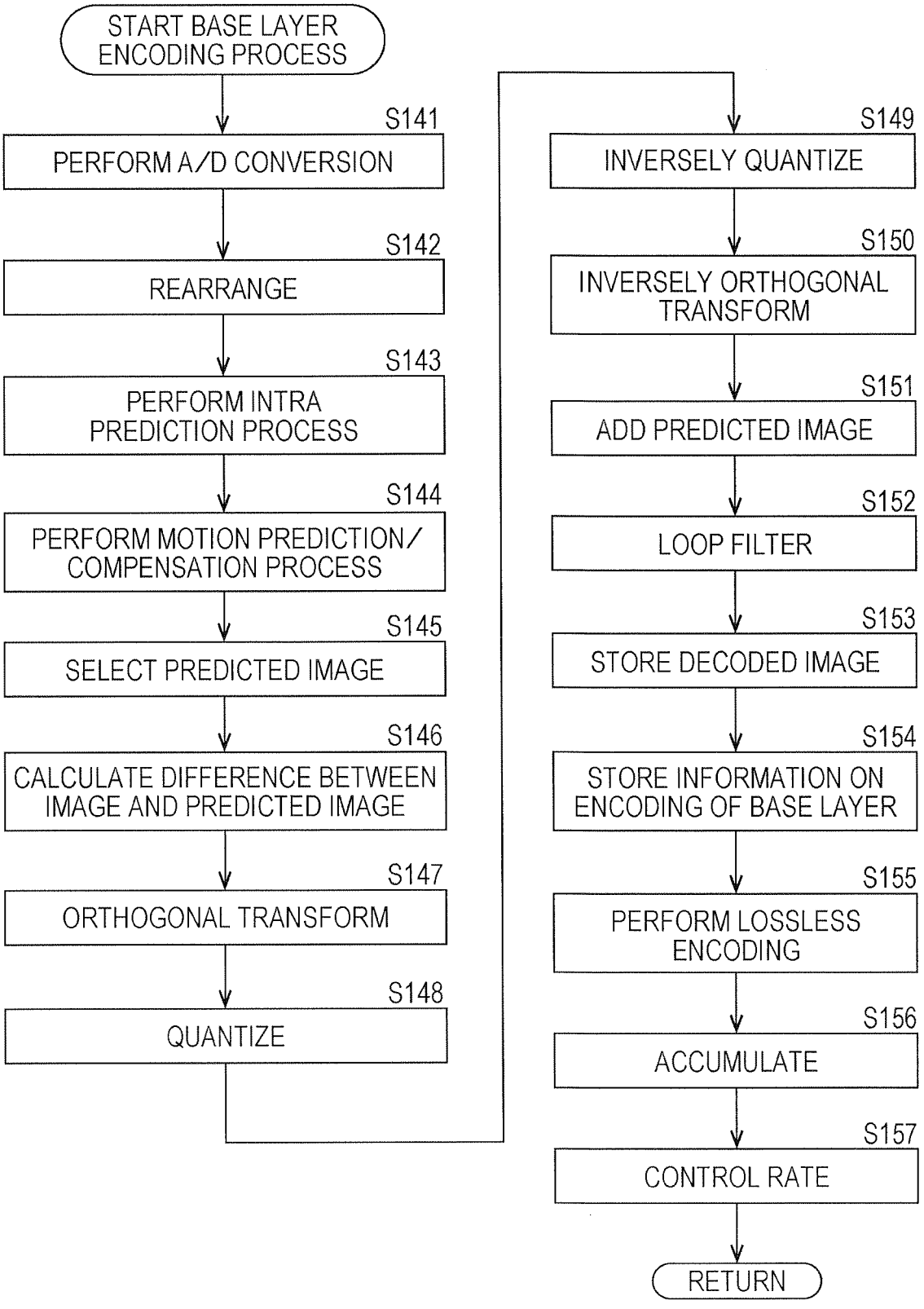

START BASE LAYER ENCODING PROCESS
S141
PERFORM A/D CONVERSION
S142
REARRANGE
S143
PERFORM INTRA PREDICTION PROCESS
S144
PERFORM MOTION PREDICTION/ COMPENSATION PROCESS
S145
SELECT PREDICTED IMAGE
S146
CALCULATE DIFFERENCE BETWEEN IMAGE AND PREDICTED IMAGE
S147
ORTHOGONAL TRANSFORM
S148
QUANTIZE
S149
INVERSELY QUANTIZE
S150
INVERSELY ORTHOGONAL TRANSFORM
S151
ADD PREDICTED IMAGE
S152
LOOP FILTER
S153
STORE DECODED IMAGE
S154
STORE INFORMATION ON ENCODING OF BASE LAYER
S155
PERFORM LOSSLESS ENCODING
S156
ACCUMULATE
S157
CONTROL RATE
RETURN

FIG. 16

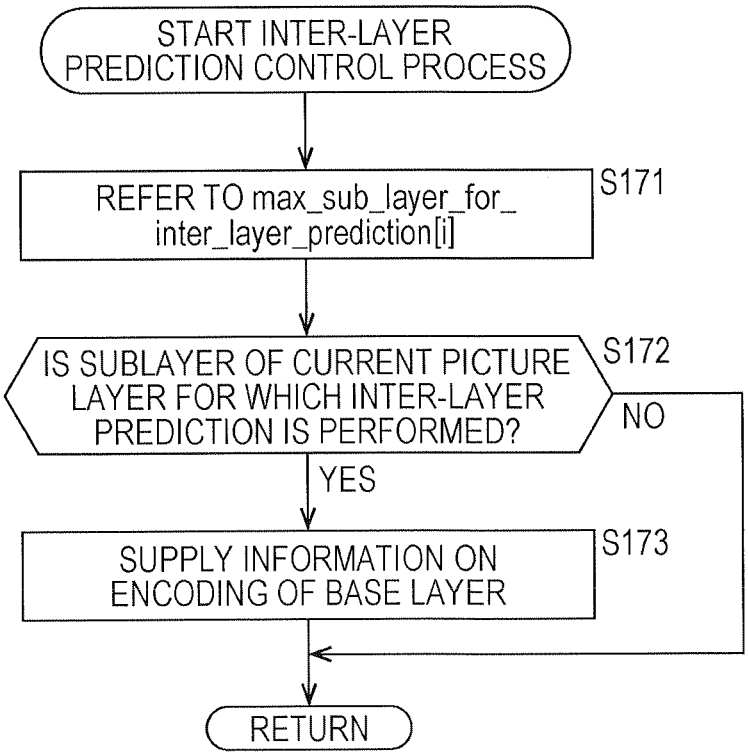

START INTER-LAYER PREDICTION CONTROL PROCESS
REFER TO max_sub_layer_for_ inter_layer_prediction[i]
S171
IS SUBLAYER OF CURRENT PICTURE LAYER FOR WHICH INTER-LAYER PREDICTION IS PERFORMED?
S172
NO
YES
SUPPLY INFORMATION ON ENCODING OF BASE LAYER
S173
RETURN

FIG. 17

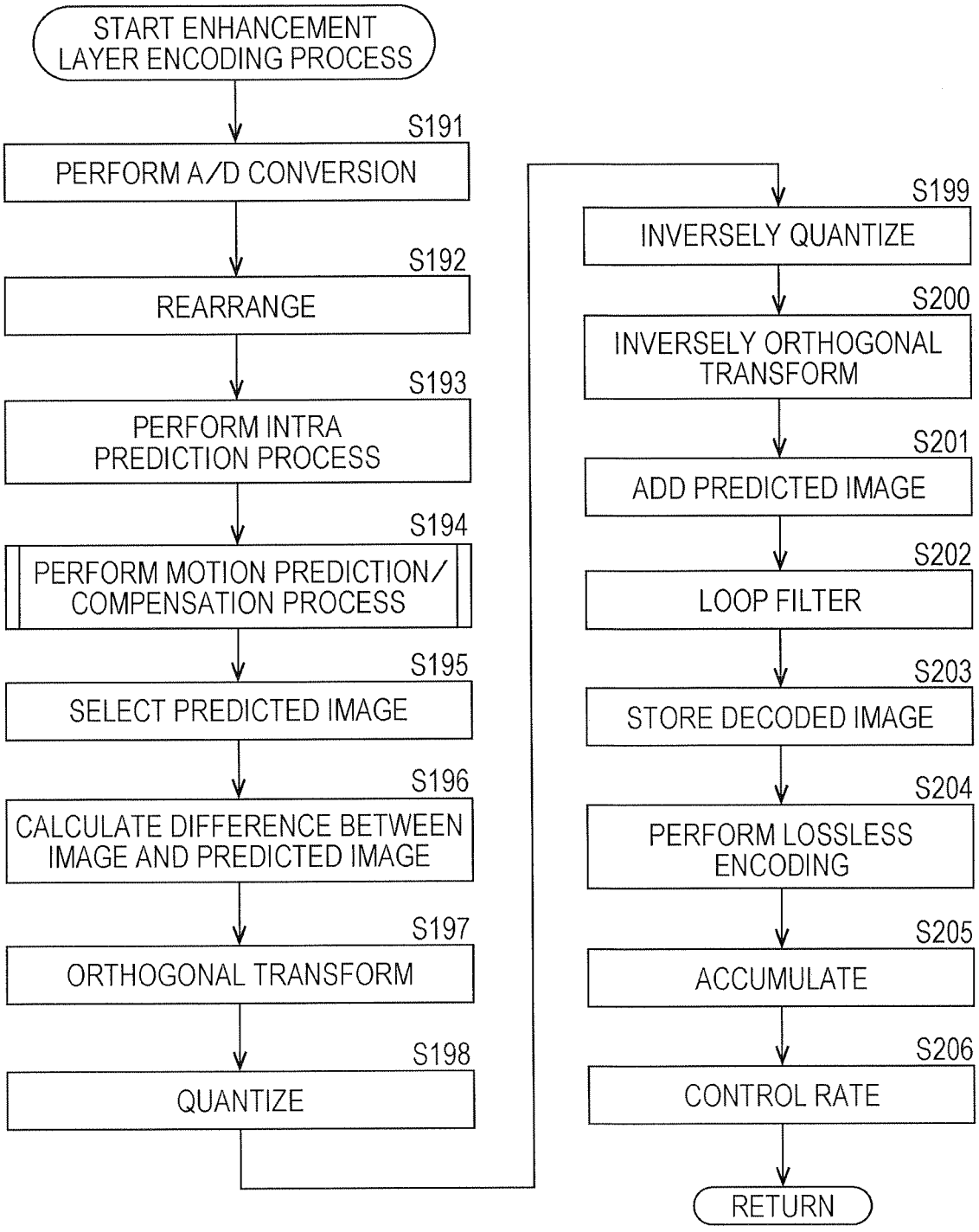

START ENHANCEMENT LAYER ENCODING PROCESS
S191
PERFORM A/D CONVERSION
S192
REARRANGE
S193
PERFORM INTRA PREDICTION PROCESS
S194
PERFORM MOTION PREDICTION/ COMPENSATION PROCESS
S195
SELECT PREDICTED IMAGE
S196
CALCULATE DIFFERENCE BETWEEN IMAGE AND PREDICTED IMAGE
S197
ORTHOGONAL TRANSFORM
S198
QUANTIZE
S199
INVERSELY QUANTIZE
S200
INVERSELY ORTHOGONAL TRANSFORM
S201
ADD PREDICTED IMAGE
S202
LOOP FILTER
S203
STORE DECODED IMAGE
S204
PERFORM LOSSLESS ENCODING
S205
ACCUMULATE
S206
CONTROL RATE
RETURN

FIG. 18

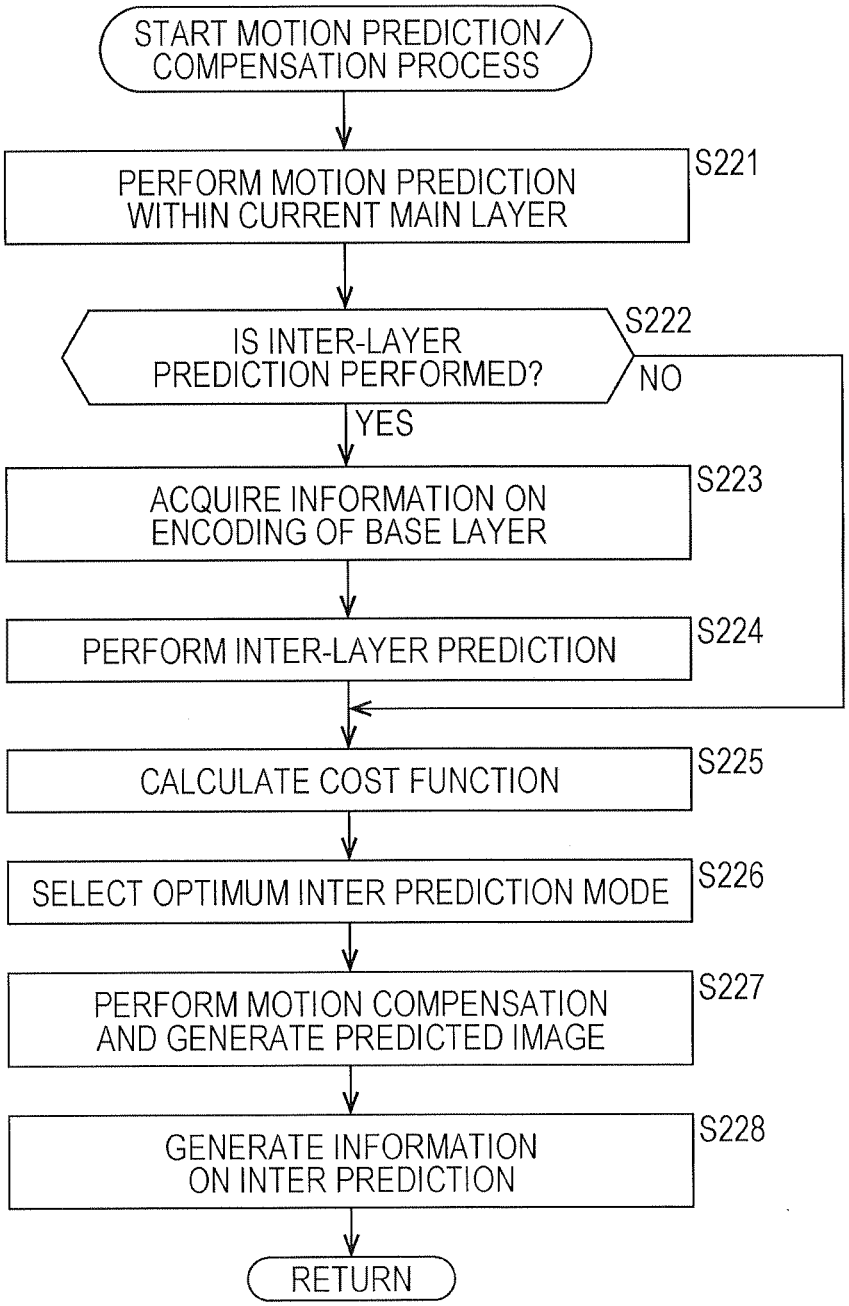

START MOTION PREDICTION/ COMPENSATION PROCESS
PERFORM MOTION PREDICTION WITHIN CURRENT MAIN LAYER
S221
IS INTER-LAYER PREDICTION PERFORMED?
S222
NO
YES
ACQUIRE INFORMATION ON ENCODING OF BASE LAYER
S223
PERFORM INTER-LAYER PREDICTION
S224
CALCULATE COST FUNCTION
S225
SELECT OPTIMUM INTER PREDICTION MODE
S226
PERFORM MOTION COMPENSATION AND GENERATE PREDICTED IMAGE
S227
GENERATE INFORMATION ON INTER PREDICTION
S228
RETURN

FIG. 19

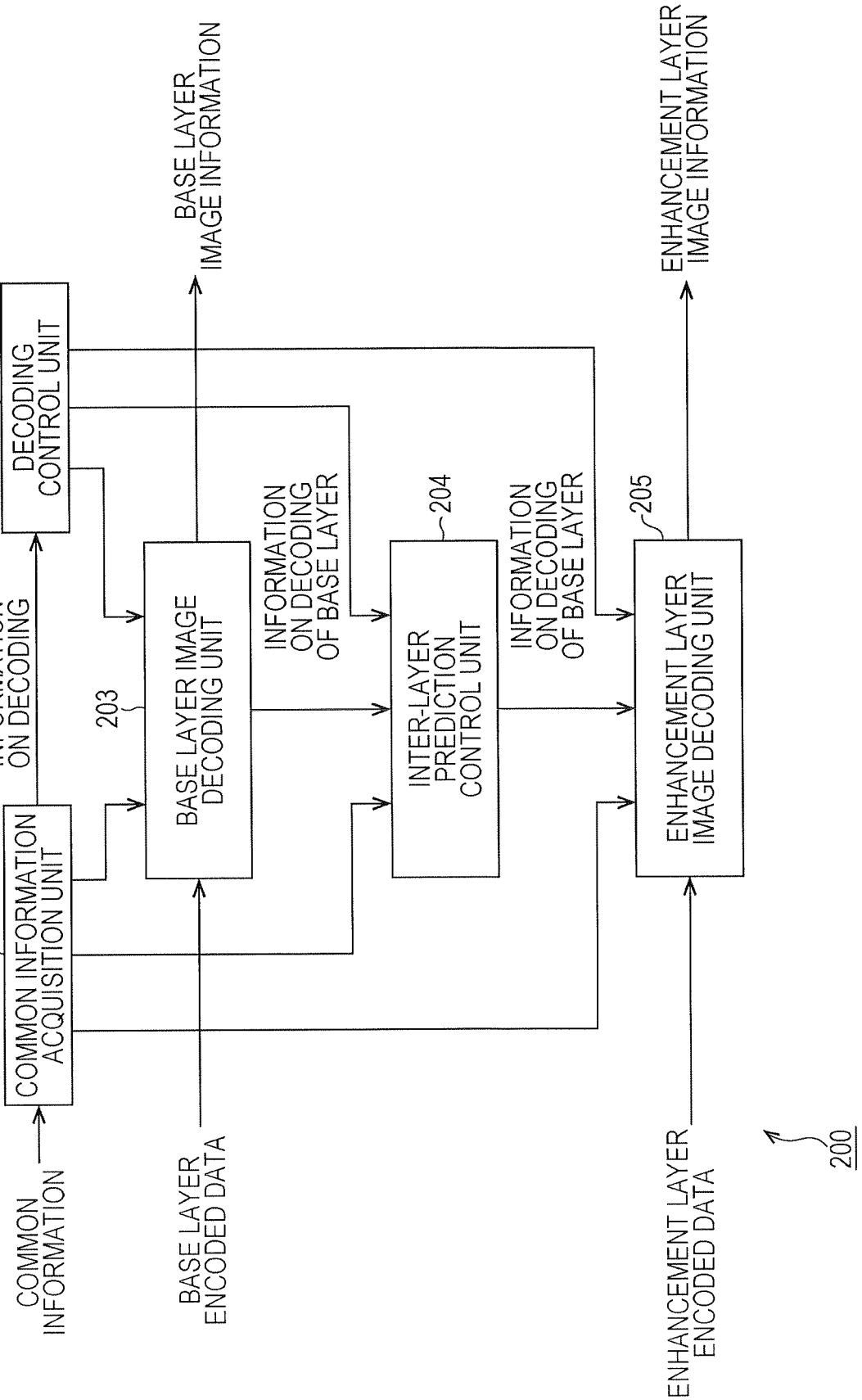

COMMON INFORMATION
BASE LAYER ENCODED DATA
ENHANCEMENT LAYER ENCODED DATA
200
201
COMMON INFORMATION ACQUISITION UNIT
INFORMATION ON DECODING
202
DECODING CONTROL UNIT
203
BASE LAYER IMAGE DECODING UNIT
BASE LAYER IMAGE INFORMATION
INFORMATION ON DECODING OF BASE LAYER
204
INTER-LAYER PREDICTION CONTROL UNIT
INFORMATION ON DECODING OF BASE LAYER
205
ENHANCEMENT LAYER IMAGE DECODING UNIT
ENHANCEMENT LAYER IMAGE INFORMATION

FIG. 20

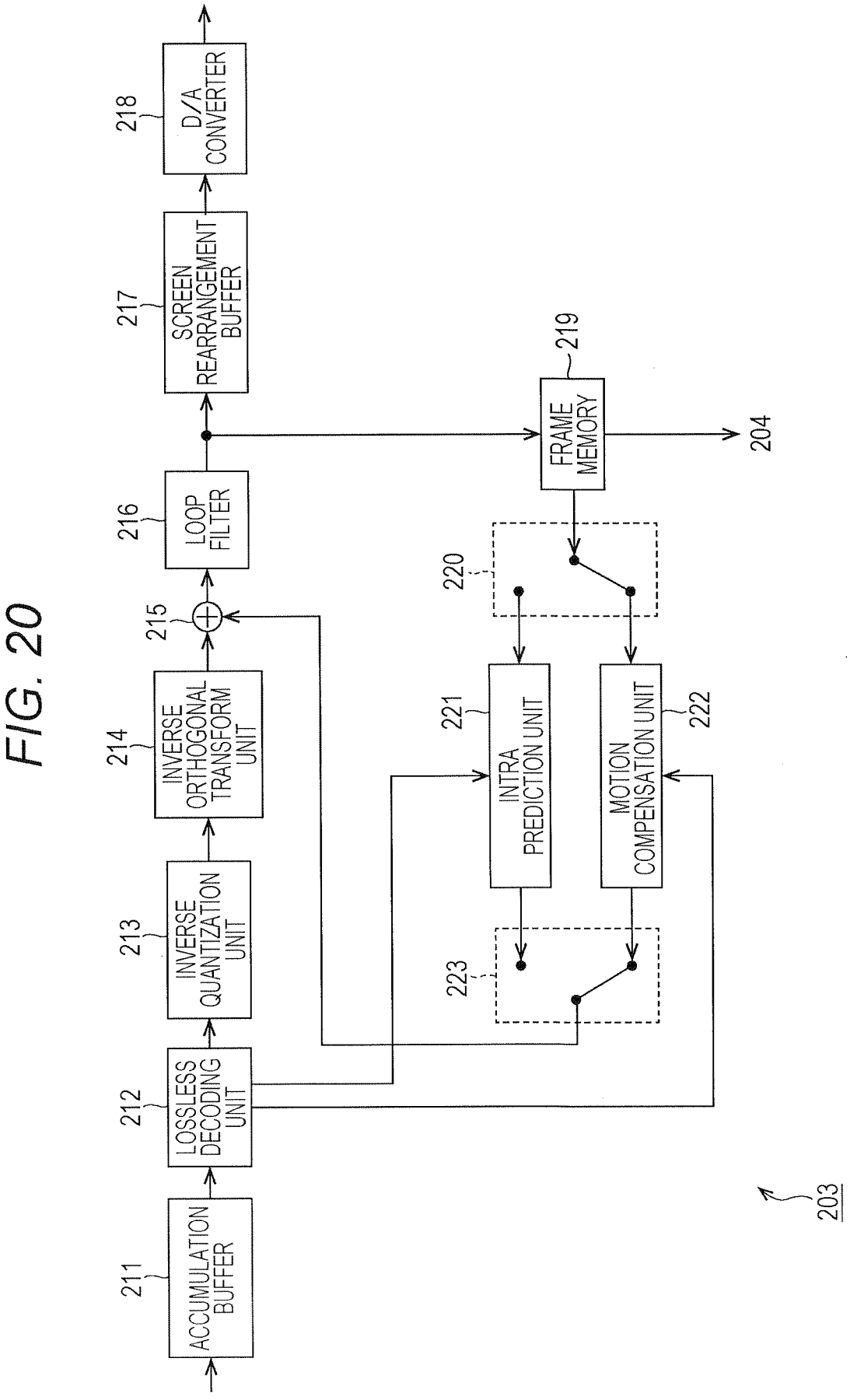

ACCUMULATION BUFFER
211
LOSSLESS DECODING UNIT
212
INVERSE QUANTIZATION UNIT
213
INVERSE ORTHOGONAL TRANSFORM UNIT
214
215
LOOP FILTER
216
SCREEN REARRANGEMENT BUFFER
217
D/A CONVERTER
218
FRAME MEMORY
219
204
220
INTRA PREDICTION UNIT
221
MOTION COMPENSATION UNIT
222
223
203

FIG. 21

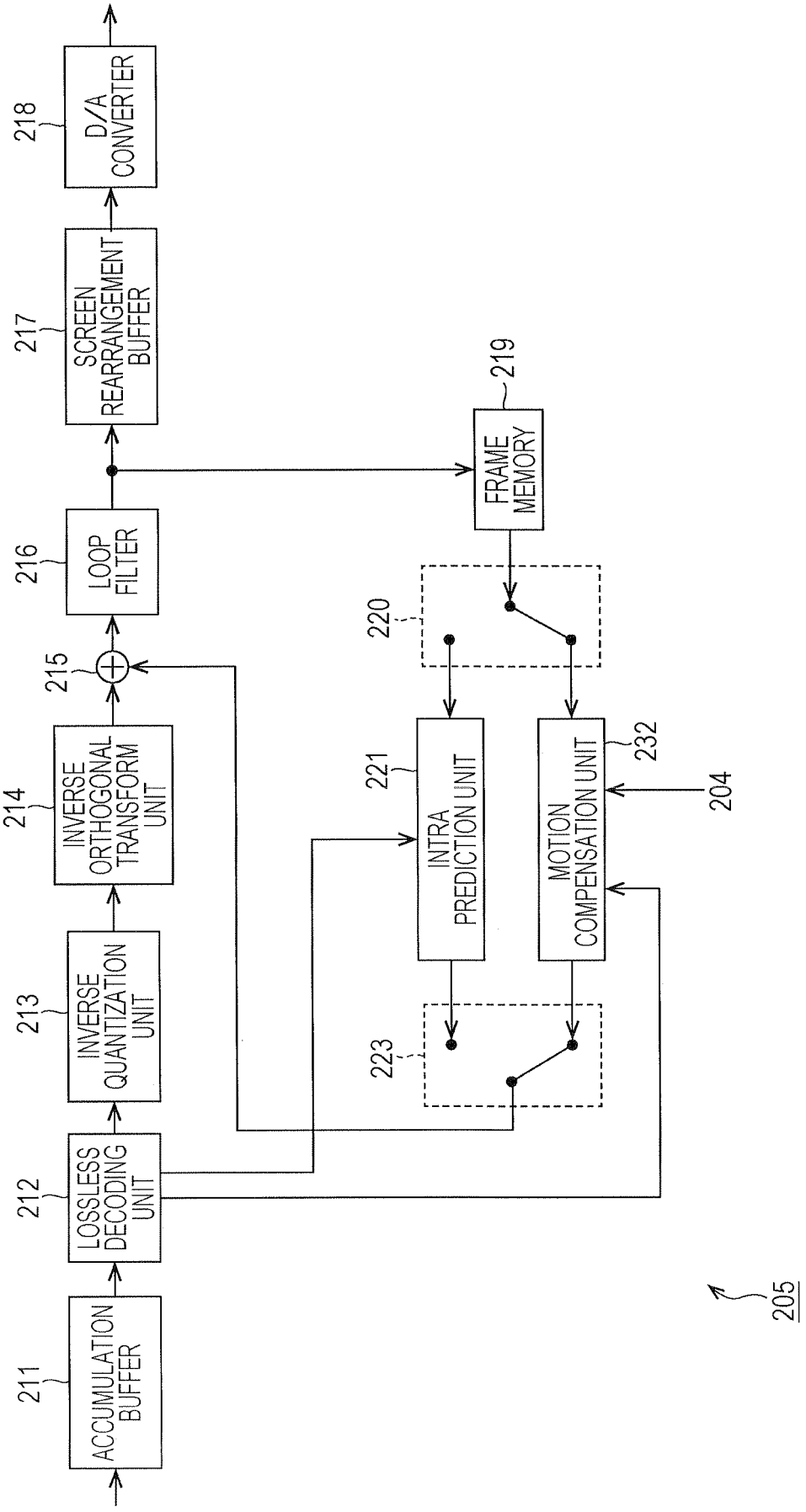

ACCUMULATION BUFFER
211
LOSSLESS DECODING UNIT
212
INVERSE QUANTIZATION UNIT
213
INVERSE ORTHOGONAL TRANSFORM UNIT
214
215
LOOP FILTER
216
SCREEN REARRANGEMENT BUFFER
217
D/A CONVERTER
218
FRAME MEMORY
219
220
INTRA PREDICTION UNIT
221
MOTION COMPENSATION UNIT
232
204
223
205

FIG. 22

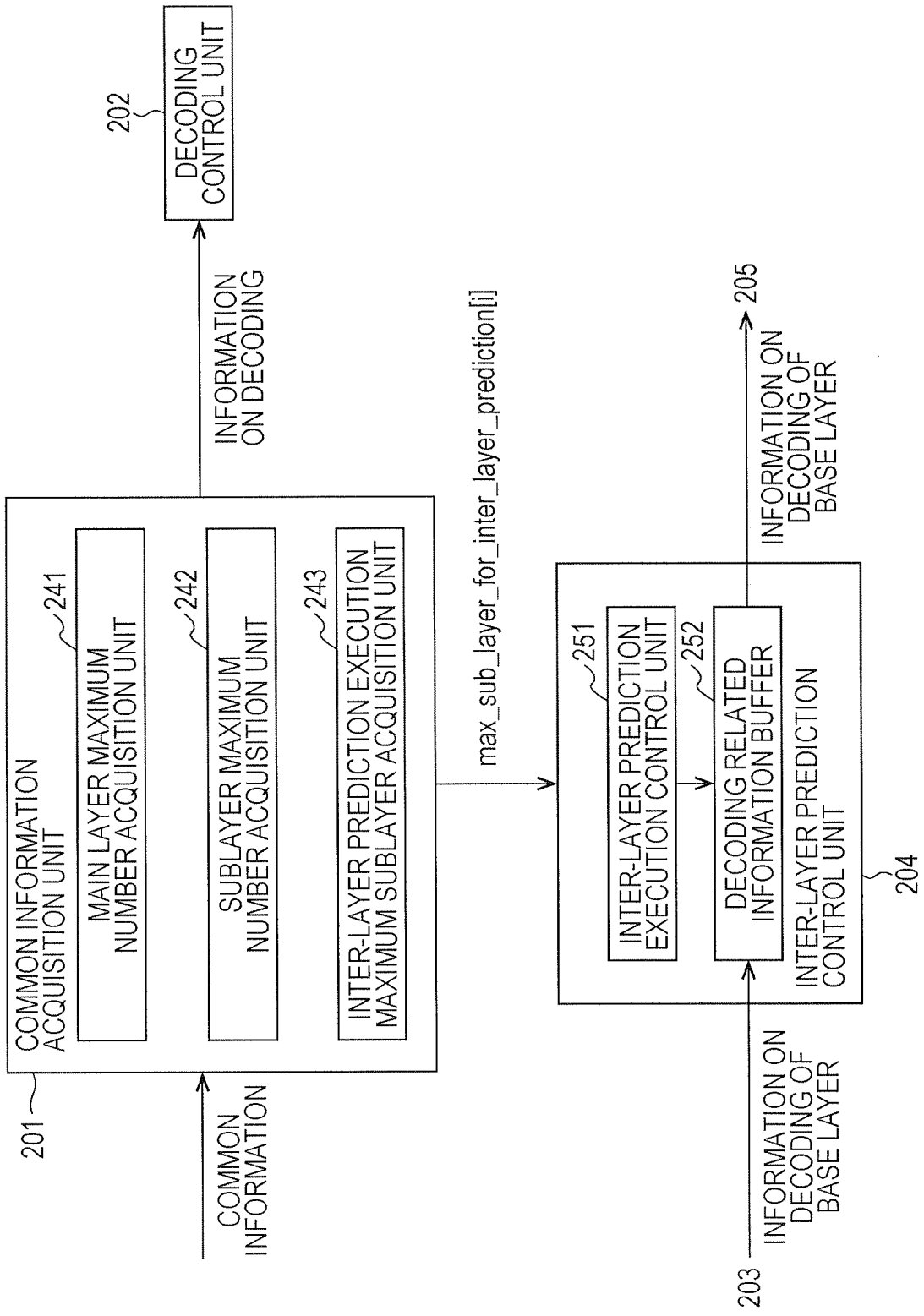

201
COMMON INFORMATION ACQUISITION UNIT
241
MAIN LAYER MAXIMUM NUMBER ACQUISITION UNIT
242
SUBLAYER MAXIMUM NUMBER ACQUISITION UNIT
243
INTER-LAYER PREDICTION EXECUTION MAXIMUM SUBLAYER ACQUISITION UNIT
COMMON INFORMATION
202
DECODING CONTROL UNIT
INFORMATION ON DECODING
max_sub_layer_for_inter_layer_prediction[i]
204
INTER-LAYER PREDICTION CONTROL UNIT
251
INTER-LAYER PREDICTION EXECUTION CONTROL UNIT
252
DECODING RELATED INFORMATION BUFFER
203
INFORMATION ON DECODING OF BASE LAYER
205
INFORMATION ON DECODING OF BASE LAYER

FIG. 23

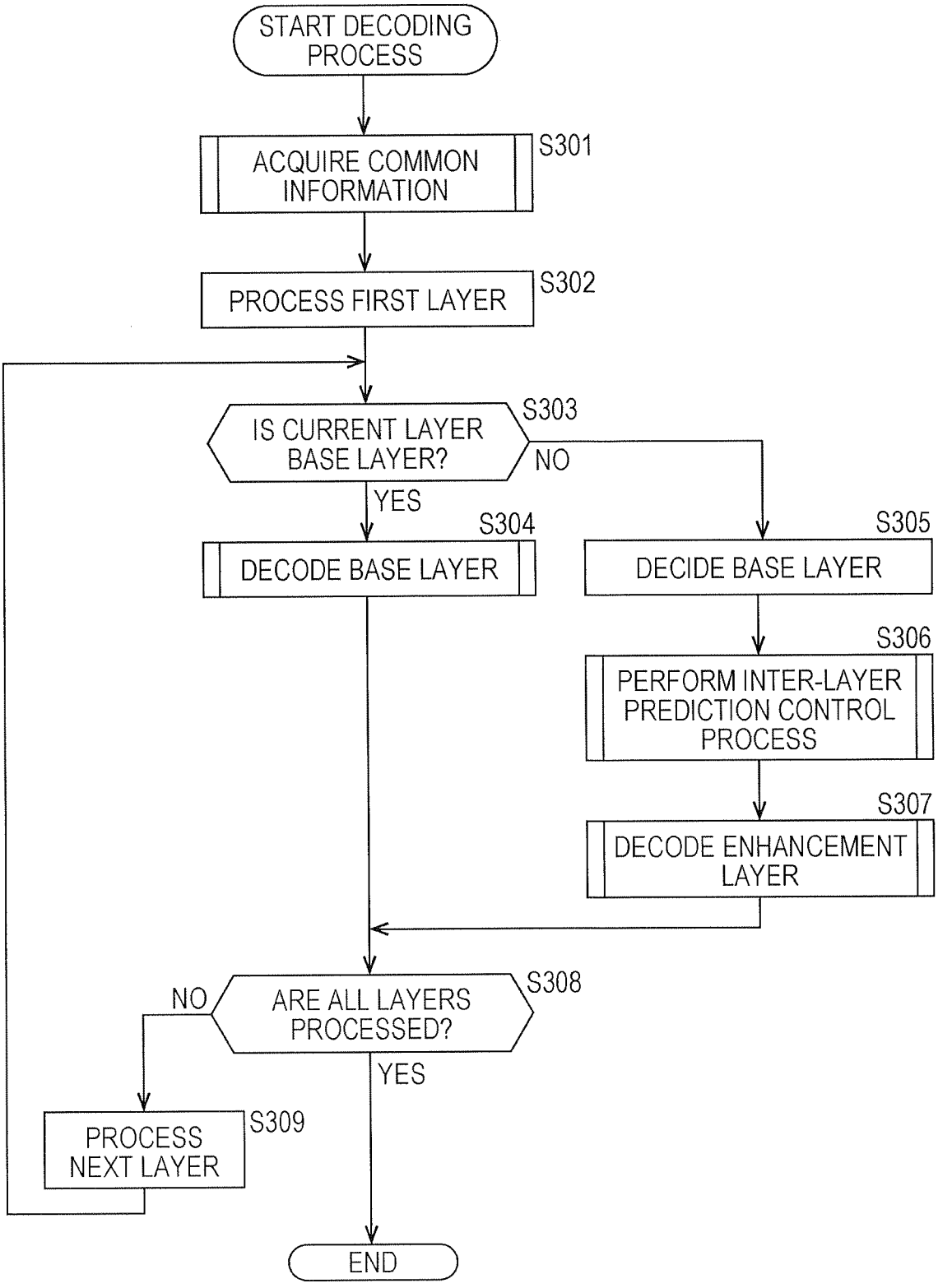

START DECODING PROCESS
ACQUIRE COMMON INFORMATION
S301
PROCESS FIRST LAYER
S302
IS CURRENT LAYER BASE LAYER?
S303
NO
YES
DECODE BASE LAYER
S304
DECIDE BASE LAYER
S305
PERFORM INTER-LAYER PREDICTION CONTROL PROCESS
S306
DECODE ENHANCEMENT LAYER
S307
ARE ALL LAYERS PROCESSED?
S308
NO
YES
PROCESS NEXT LAYER
S309
END

FIG. 24

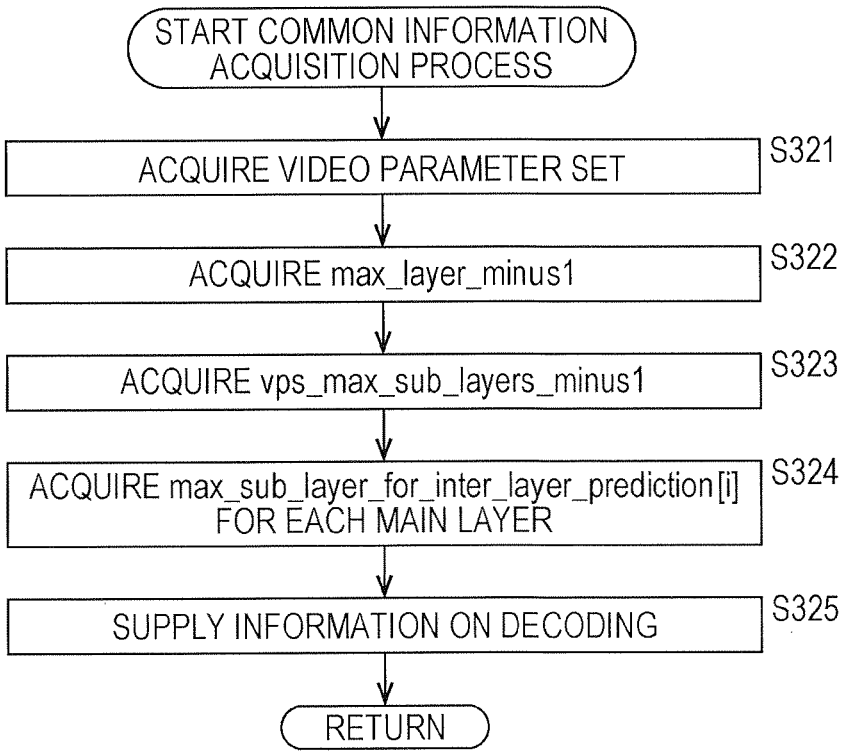

START COMMON INFORMATION ACQUISITION PROCESS
ACQUIRE VIDEO PARAMETER SET
S321
ACQUIRE max_layer_minus1
S322
ACQUIRE vps_max_sub_layers_minus1
S323
ACQUIRE max_sub_layer_for_inter_layer_prediction[i] FOR EACH MAIN LAYER
S324
SUPPLY INFORMATION ON DECODING
S325
RETURN

FIG. 25

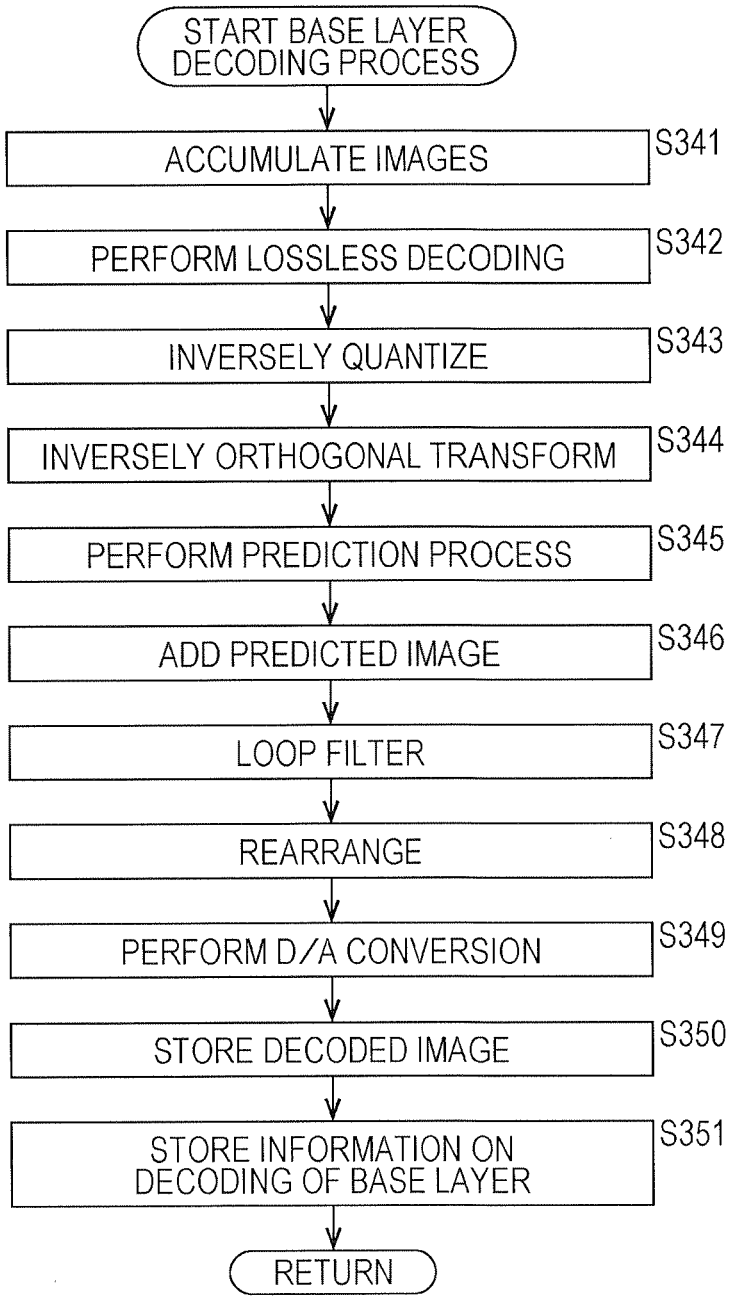

START BASE LAYER DECODING PROCESS
ACCUMULATE IMAGES
S341
PERFORM LOSSLESS DECODING
S342
INVERSELY QUANTIZE
S343
INVERSELY ORTHOGONAL TRANSFORM
S344
PERFORM PREDICTION PROCESS
S345
ADD PREDICTED IMAGE
S346
LOOP FILTER
S347
REARRANGE
S348
PERFORM D/A CONVERSION
S349
STORE DECODED IMAGE
S350
STORE INFORMATION ON DECODING OF BASE LAYER
S351
RETURN

FIG. 26

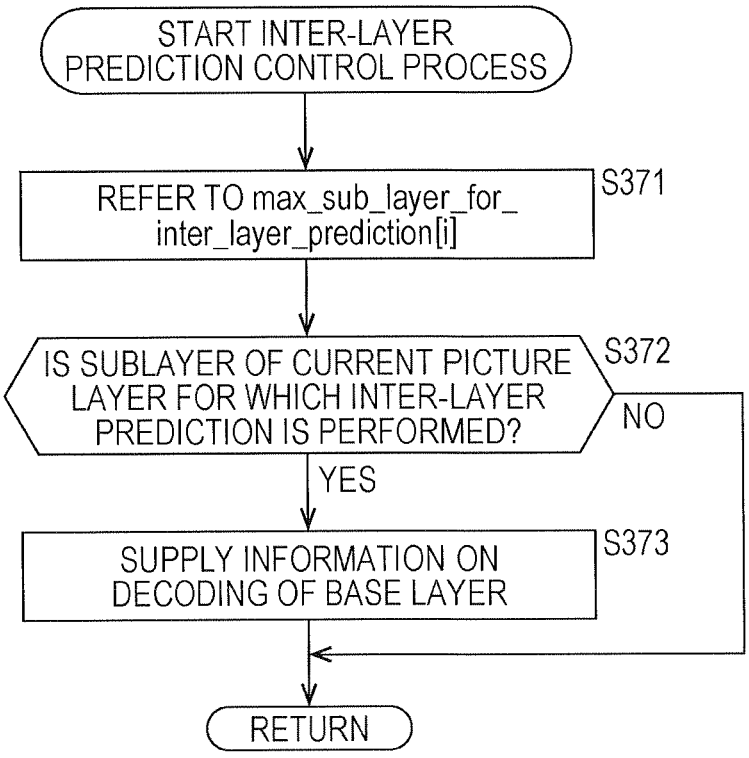

START INTER-LAYER PREDICTION CONTROL PROCESS
REFER TO max_sub_layer_for_ inter_layer_prediction[i]
S371
IS SUBLAYER OF CURRENT PICTURE LAYER FOR WHICH INTER-LAYER PREDICTION IS PERFORMED?
S372
NO
YES
SUPPLY INFORMATION ON DECODING OF BASE LAYER
S373
RETURN

FIG. 27

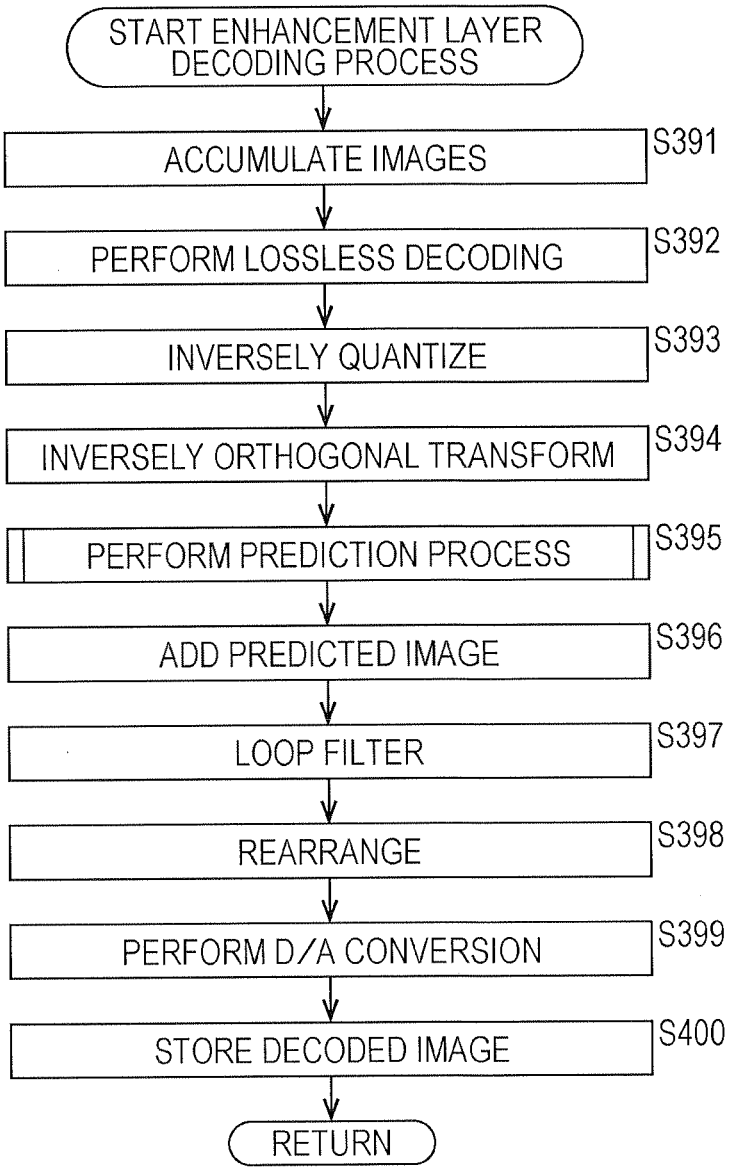

START ENHANCEMENT LAYER DECODING PROCESS
ACCUMULATE IMAGES
S391
PERFORM LOSSLESS DECODING
S392
INVERSELY QUANTIZE
S393
INVERSELY ORTHOGONAL TRANSFORM
S394
PERFORM PREDICTION PROCESS
S395
ADD PREDICTED IMAGE
S396
LOOP FILTER
S397
REARRANGE
S398
PERFORM D/A CONVERSION
S399
STORE DECODED IMAGE
S400
RETURN

FIG. 28

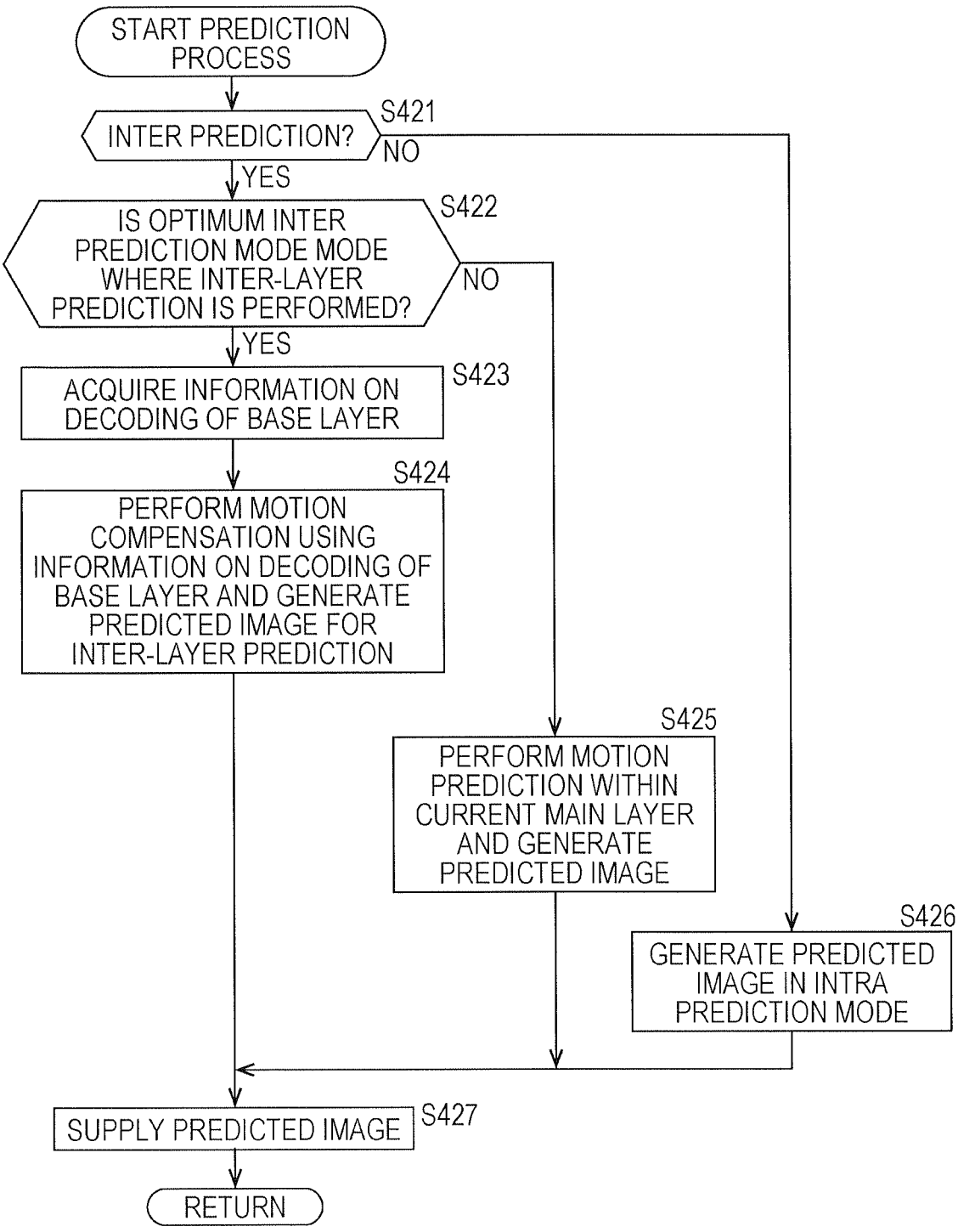

START PREDICTION PROCESS
INTER PREDICTION?
S421
NO
YES
IS OPTIMUM INTER PREDICTION MODE MODE WHERE INTER-LAYER PREDICTION IS PERFORMED?
S422
NO
YES
ACQUIRE INFORMATION ON DECODING OF BASE LAYER
S423
PERFORM MOTION COMPENSATION USING INFORMATION ON DECODING OF BASE LAYER AND GENERATE PREDICTED IMAGE FOR INTER-LAYER PREDICTION
S424
PERFORM MOTION PREDICTION WITHIN CURRENT MAIN LAYER AND GENERATE PREDICTED IMAGE
S425
GENERATE PREDICTED IMAGE IN INTRA PREDICTION MODE
S426
SUPPLY PREDICTED IMAGE
S427
RETURN

FIG. 29

video_parameter_set_rbsp( ){	Descriptor
video_parameter_set_id	u(4)
vps_temporal_id_nesting_flag	u(1)
vps_reserved_zero_2bits	u(2)
vps_reserved_zero_6bits	u(6)
max_layer_minus1	u(3)
for(i = 0;i <= max_layers_minus1;i++)	
vps_num_sub_layers_minus1[i]	u(3)
for(i = 1;i <= max_layers_minus1;i++)	
max_sub_layer_for_inter_layer_prediction[i]	u(3)
profile_and_level(1,vps_max_sub_layers_minus1)	
vps_reserved_zero_12bits	u(12)
for(i = 0;i <= vps_max_sub_layers_minus1;i++){	
vps_max_dec_pic_buffering[i]	ue(v)
vps_max_num_reorder_pics[i]	ue(v)
vps_max_latency_increase[i]	ue(v)
}	
vps_num_hrd_parameters	ue(v)
for(i = 0;i < vps_num_hrd_parameters;i++){	
if(i > 0)	
op_point(i)	
hrd_parameters(i = = 0,vps_max_sub_layers_minus1)	
}	
vps_extension_flag	u(1)
if(vps_extension_flag)	
while(more_rbsp_data( ))	
vps_extension_data_flag	u(1)
}	
rbsp_trailing_bits( )	
}	

FIG. 30

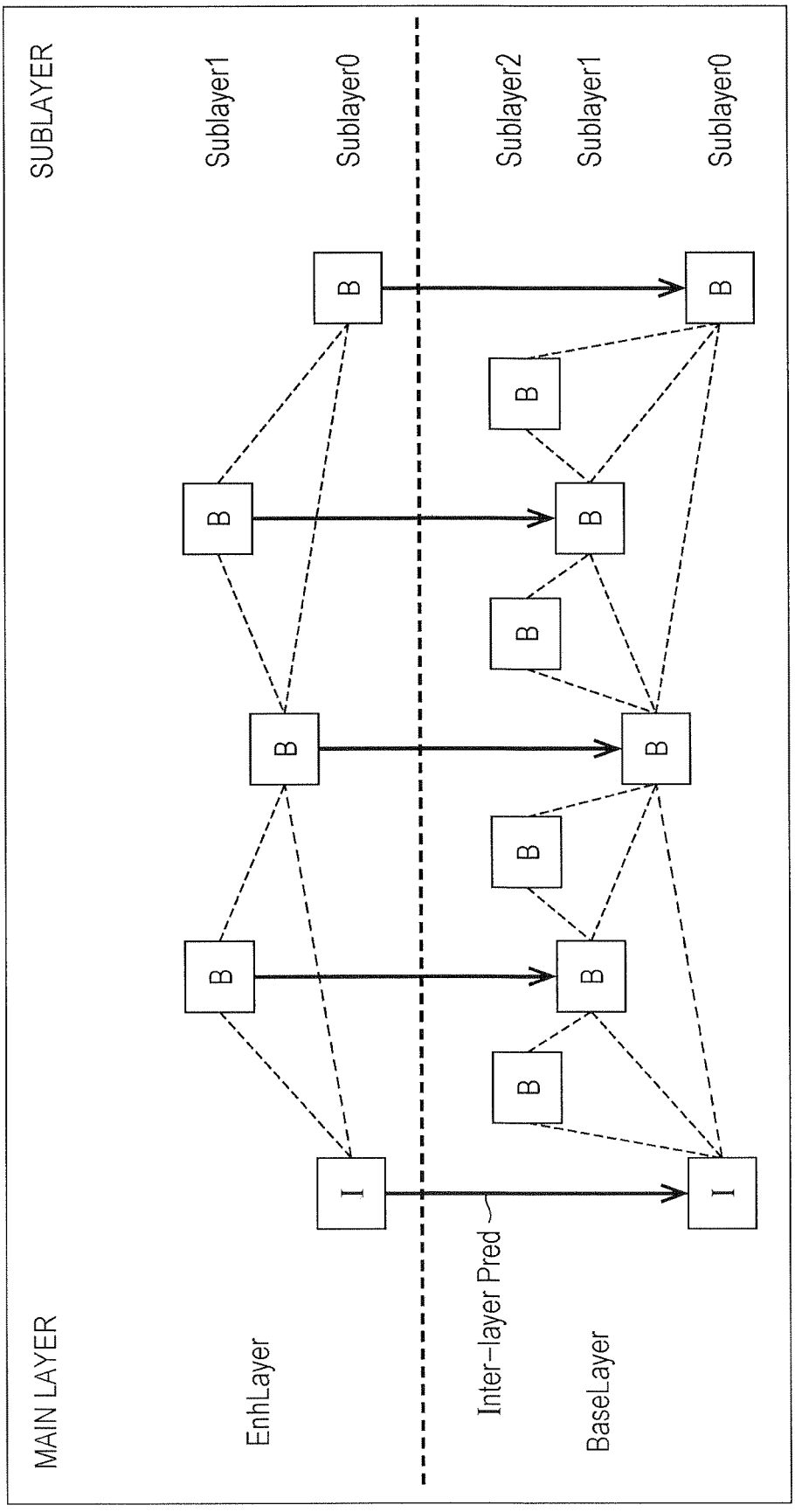

MAIN LAYER
SUBLAYER
EnhLayer
BaseLayer
Inter-layer Pred
Sublayer1
Sublayer0
Sublayer2
Sublayer1
Sublayer0
B
I

FIG. 31

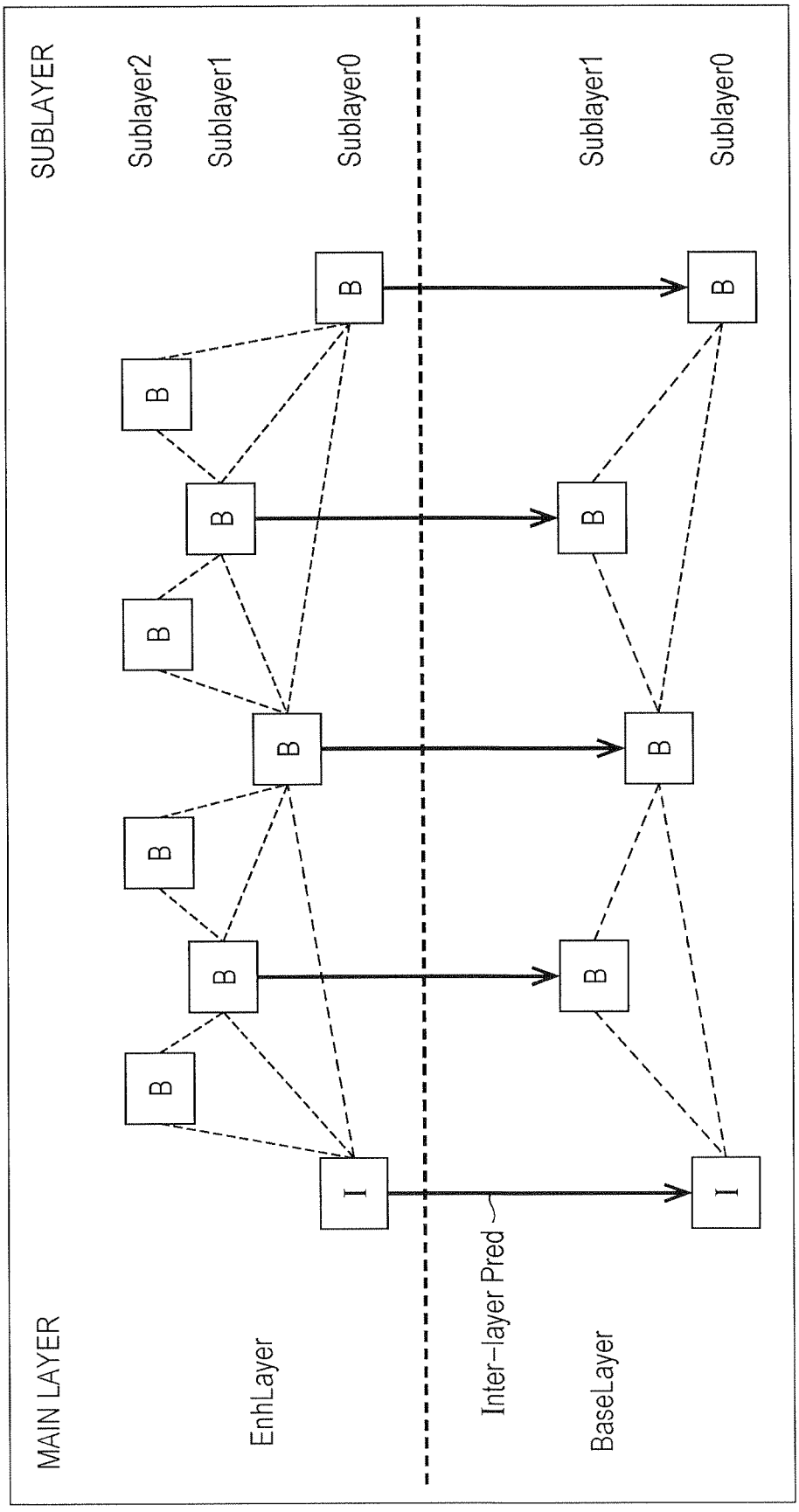

SUBLAYER
Sublayer2
Sublayer1
Sublayer0
Sublayer1
Sublayer0
MAIN LAYER
EnhLayer
Inter-layer Pred
BaseLayer
B
I

FIG. 32

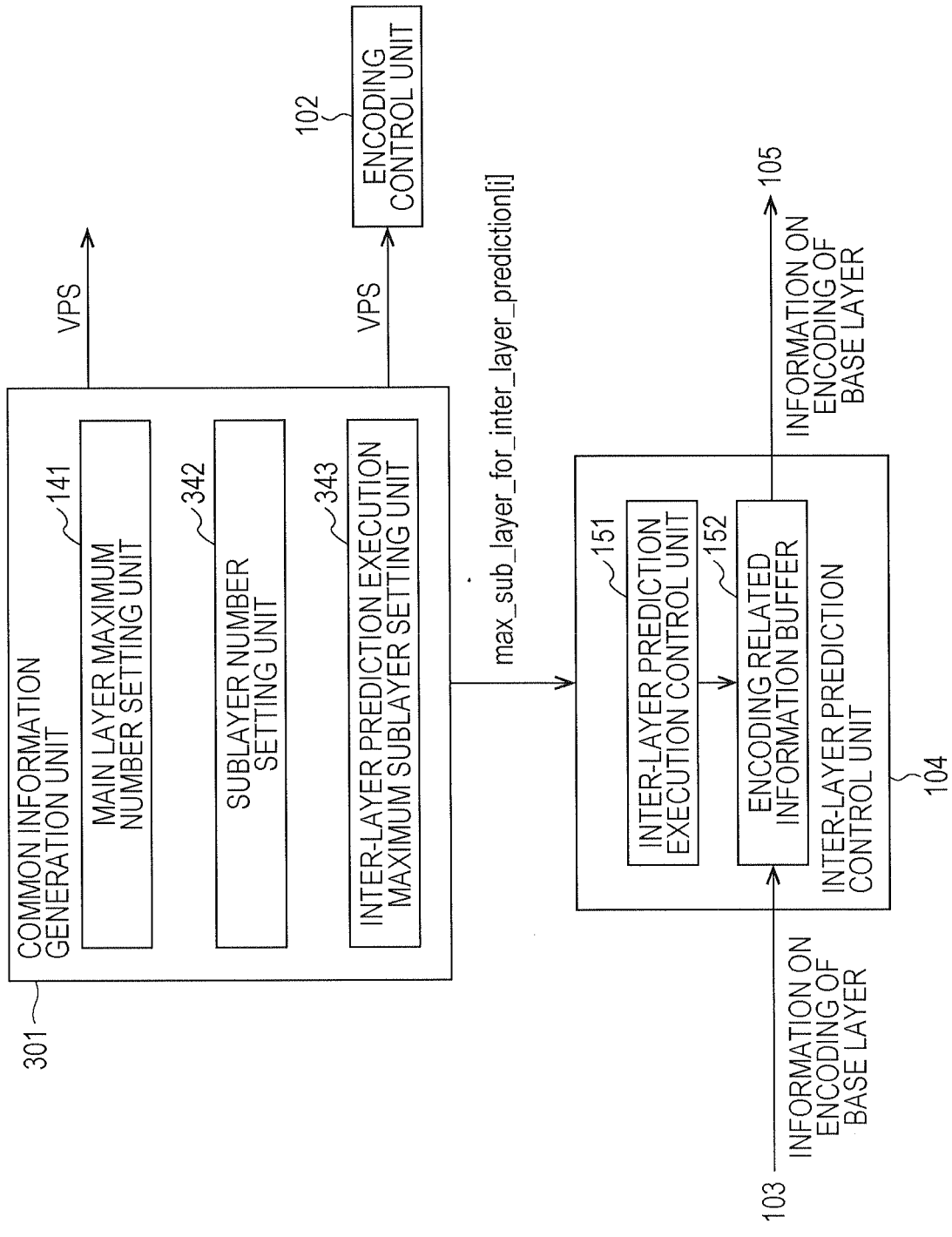

301
COMMON INFORMATION GENERATION UNIT
141
MAIN LAYER MAXIMUM NUMBER SETTING UNIT
342
SUBLAYER NUMBER SETTING UNIT
343
INTER-LAYER PREDICTION EXECUTION MAXIMUM SUBLAYER SETTING UNIT
VPS
VPS
102
ENCODING CONTROL UNIT
max_sub_layer_for_inter_layer_prediction[i]
104
INTER-LAYER PREDICTION CONTROL UNIT
151
INTER-LAYER PREDICTION EXECUTION CONTROL UNIT
152
ENCODING RELATED INFORMATION BUFFER
105
INFORMATION ON ENCODING OF BASE LAYER
103
INFORMATION ON ENCODING OF BASE LAYER

FIG. 33

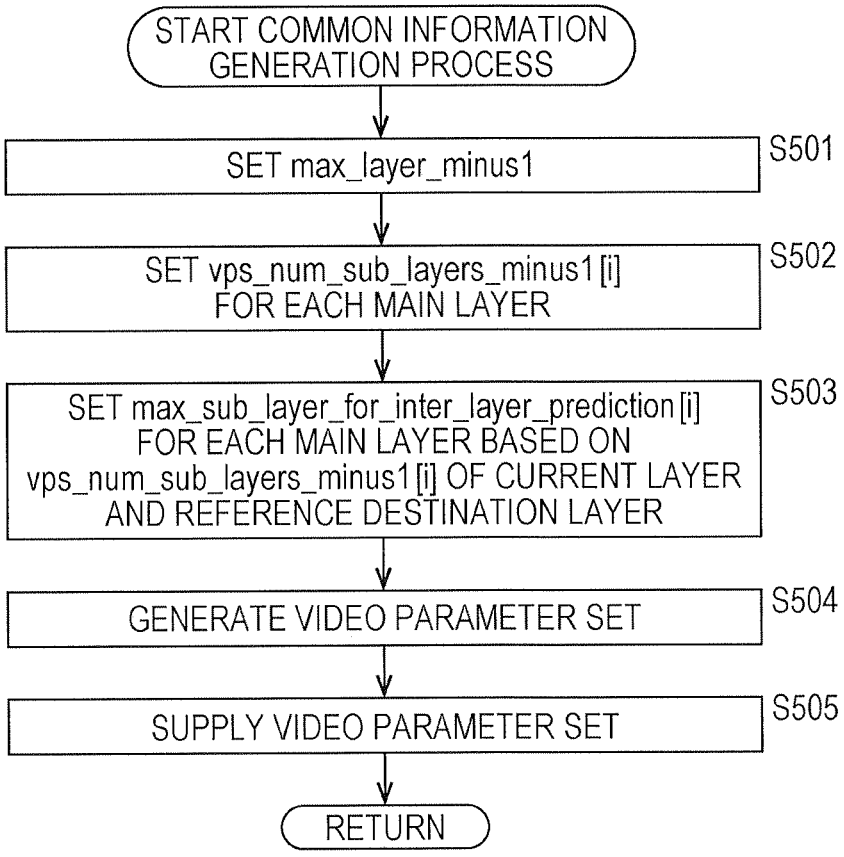

START COMMON INFORMATION GENERATION PROCESS
SET max_layer_minus1
S501
SET vps_num_sub_layers_minus1[i] FOR EACH MAIN LAYER
S502
SET max_sub_layer_for_inter_layer_prediction[i] FOR EACH MAIN LAYER BASED ON vps_num_sub_layers_minus1[i] OF CURRENT LAYER AND REFERENCE DESTINATION LAYER
S503
GENERATE VIDEO PARAMETER SET
S504
SUPPLY VIDEO PARAMETER SET
S505
RETURN

FIG. 34

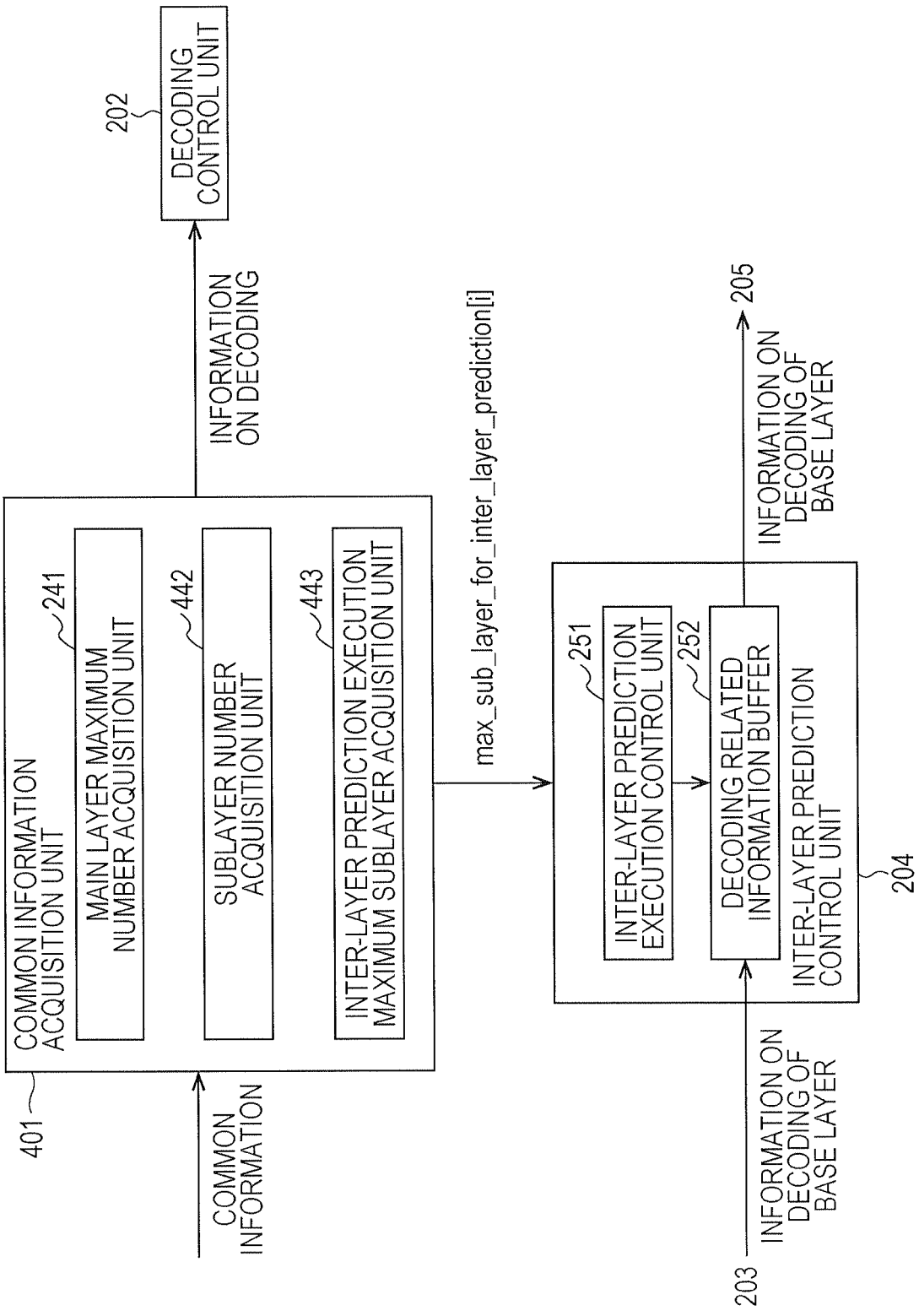

401
COMMON INFORMATION ACQUISITION UNIT
241
MAIN LAYER MAXIMUM NUMBER ACQUISITION UNIT
442
SUBLAYER NUMBER ACQUISITION UNIT
443
INTER-LAYER PREDICTION EXECUTION MAXIMUM SUBLAYER ACQUISITION UNIT
COMMON INFORMATION
202
DECODING CONTROL UNIT
INFORMATION ON DECODING
max_sub_layer_for_inter_layer_prediction[i]
204
INTER-LAYER PREDICTION CONTROL UNIT
251
INTER-LAYER PREDICTION EXECUTION CONTROL UNIT
252
DECODING RELATED INFORMATION BUFFER
205
INFORMATION ON DECODING OF BASE LAYER
203
INFORMATION ON DECODING OF BASE LAYER

FIG. 35

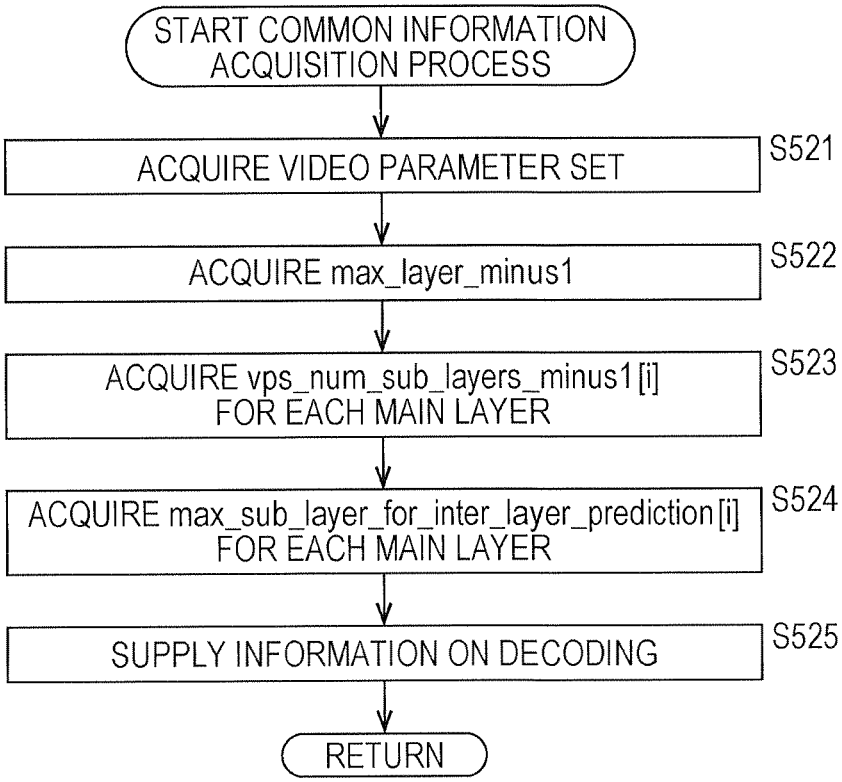

START COMMON INFORMATION ACQUISITION PROCESS
ACQUIRE VIDEO PARAMETER SET
S521
ACQUIRE max_layer_minus1
S522
ACQUIRE vps_num_sub_layers_minus1[i] FOR EACH MAIN LAYER
S523
ACQUIRE max_sub_layer_for_inter_layer_prediction[i] FOR EACH MAIN LAYER
S524
SUPPLY INFORMATION ON DECODING
S525
RETURN

FIG. 36

video_parameter_set_rbsp( ){	Descriptor
video_parameter_set_id	u(4)
vps_temporal_id_nesting_flag	u(1)
vps_reserved_zero_2bits	u(2)
vps_reserved_zero_6bits	u(6)
max_layer_minus1	u(3)
vps_max_sub_layers_minus1	u(3)
unified_max_sub_layer_for_inter_layer_prediction_flag	u(1)
if(unified_max_sub_layer_for_inter_prediction_flag)	
unified_max_sub_layer_for_inter_layer_prediction	u(3)
else	
for(i = 1;i <= max_layers_minus1;i++)	
max_sub_layer_for_inter_layer_prediction[i]	u(3)
profile_and_level(1, vps_max_sub_layers_minus1)	
vps_reserved_zero_12bits	u(12)
for(i = 0;i <= vps_max_sub_layers_minus1;i++){	
vps_max_dec_pic_buffering[i]	ue(v)
vps_max_num_reorder_pics[i]	ue(v)
vps_max_latency_increase[i]	ue(v)
}	
vps_num_hrd_parameters	ue(v)
for(i = 0;i < vps_num_hrd_parameters;i++){	
if(i > 0)	
op_point(i)	
hrd_parameters(i = = 0,vps_max_sub_layers_minus1)	
}	
vps_extension_flag	u(1)
if(vps_extension_flag)	
while(more_rbsp_data( ))	
vps_extension_data_flag	u(1)
}	
rbsp_trailing_bits( )	
}	

FIG. 37

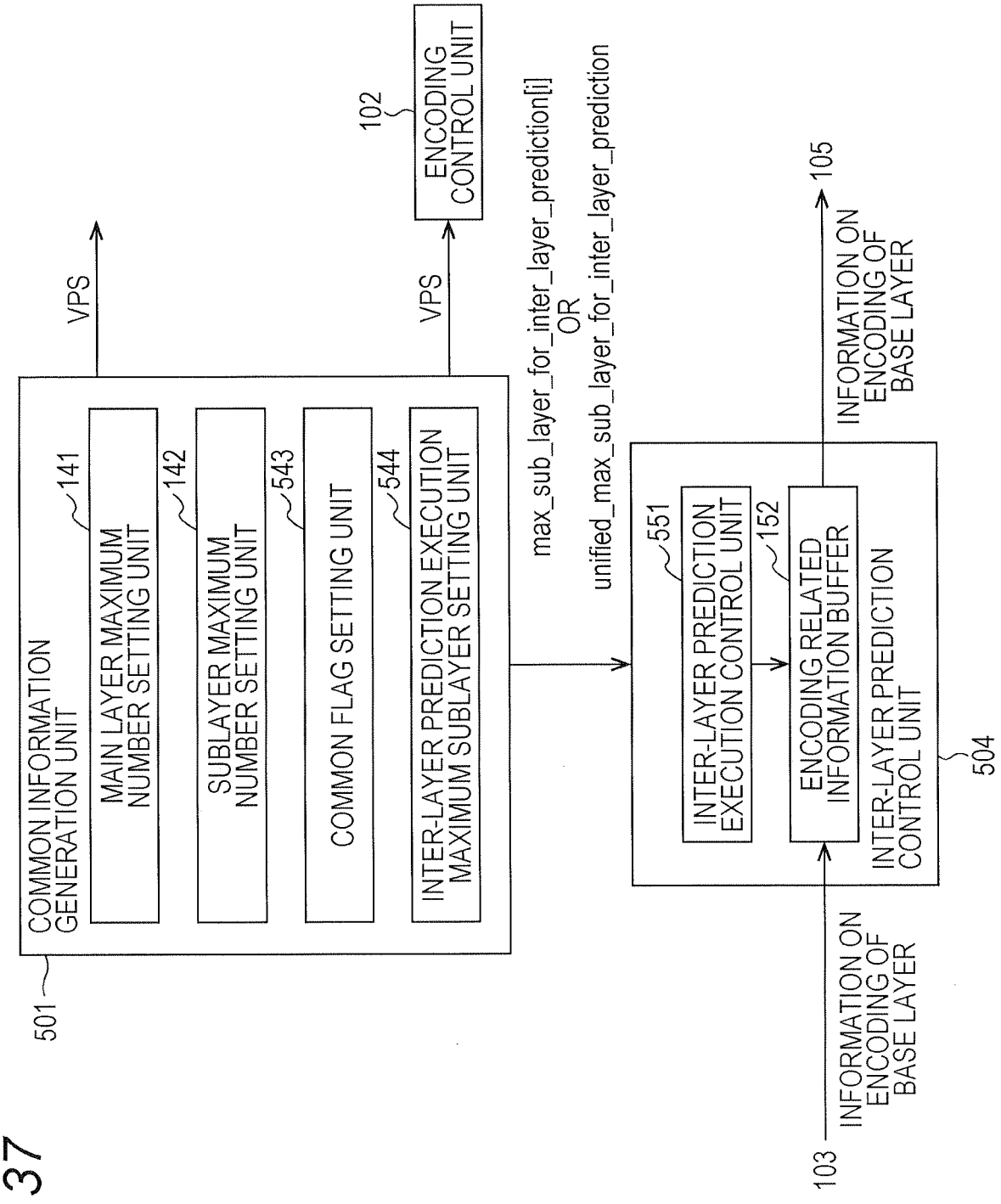

501
COMMON INFORMATION GENERATION UNIT
141
MAIN LAYER MAXIMUM NUMBER SETTING UNIT
142
SUBLAYER MAXIMUM NUMBER SETTING UNIT
543
COMMON FLAG SETTING UNIT
544
INTER-LAYER PREDICTION EXECUTION MAXIMUM SUBLAYER SETTING UNIT
VPS
VPS
102
ENCODING CONTROL UNIT
max_sub_layer_for_inter_layer_prediction[i]
OR
unified_max_sub_layer_for_inter_layer_prediction
504
INTER-LAYER PREDICTION CONTROL UNIT
551
INTER-LAYER PREDICTION EXECUTION CONTROL UNIT
152
ENCODING RELATED INFORMATION BUFFER
105
INFORMATION ON ENCODING OF BASE LAYER
103
INFORMATION ON ENCODING OF BASE LAYER

FIG. 38

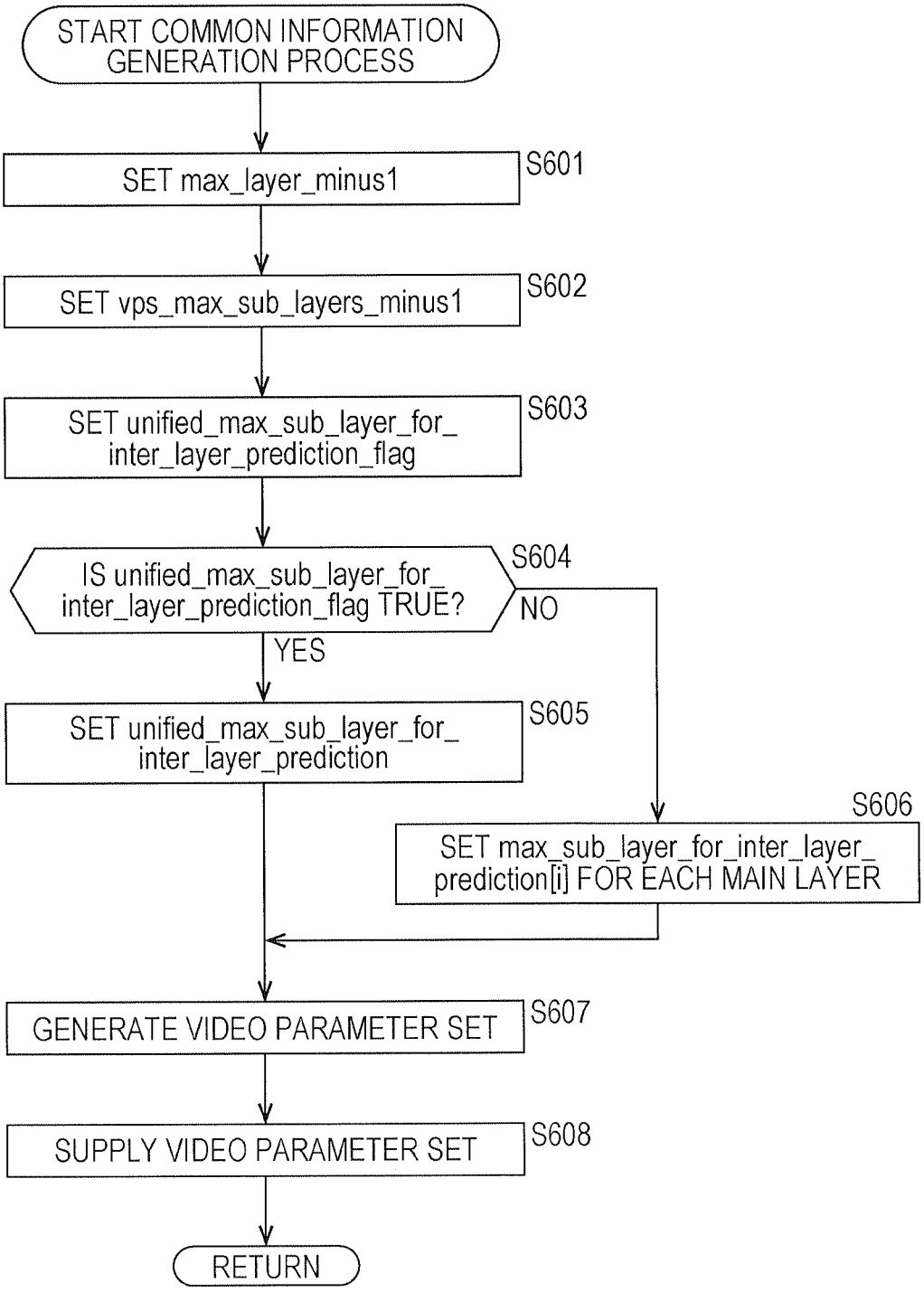

START COMMON INFORMATION GENERATION PROCESS
SET max_layer_minus1
S601
SET vps_max_sub_layers_minus1
S602
SET unified_max_sub_layer_for_ inter_layer_prediction_flag
S603
IS unified_max_sub_layer_for_ inter_layer_prediction_flag TRUE?
S604
NO
YES
SET unified_max_sub_layer_for_ inter_layer_prediction
S605
S606
SET max_sub_layer_for_inter_layer_ prediction[i] FOR EACH MAIN LAYER
GENERATE VIDEO PARAMETER SET
S607
SUPPLY VIDEO PARAMETER SET
S608
RETURN

FIG. 39

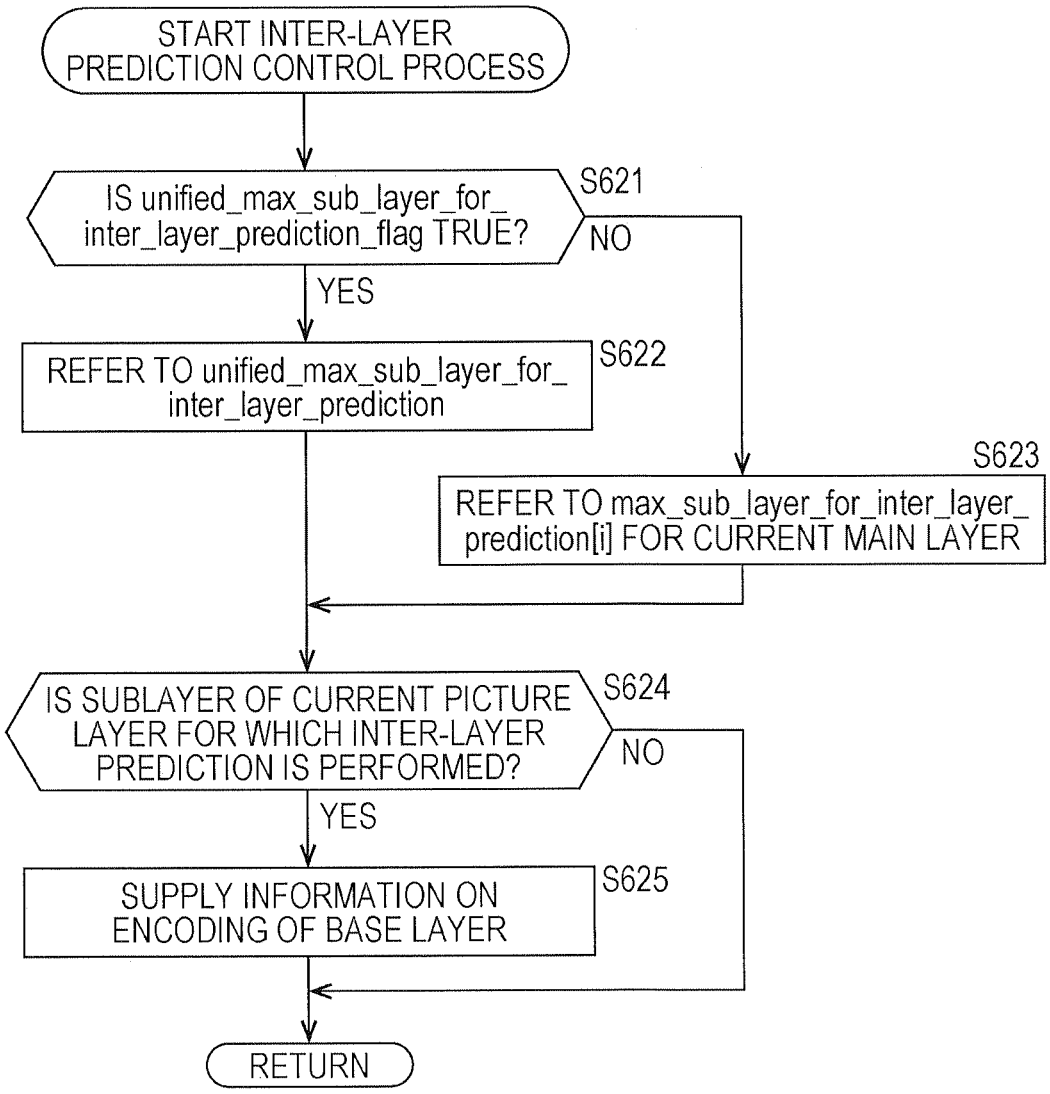

START INTER-LAYER PREDICTION CONTROL PROCESS
IS unified_max_sub_layer_for_ inter_layer_prediction_flag TRUE?
S621
NO
YES
REFER TO unified_max_sub_layer_for_ inter_layer_prediction
S622
S623
REFER TO max_sub_layer_for_inter_layer_ prediction[i] FOR CURRENT MAIN LAYER
IS SUBLAYER OF CURRENT PICTURE LAYER FOR WHICH INTER-LAYER PREDICTION IS PERFORMED?
S624
NO
YES
SUPPLY INFORMATION ON ENCODING OF BASE LAYER
S625
RETURN

FIG. 40

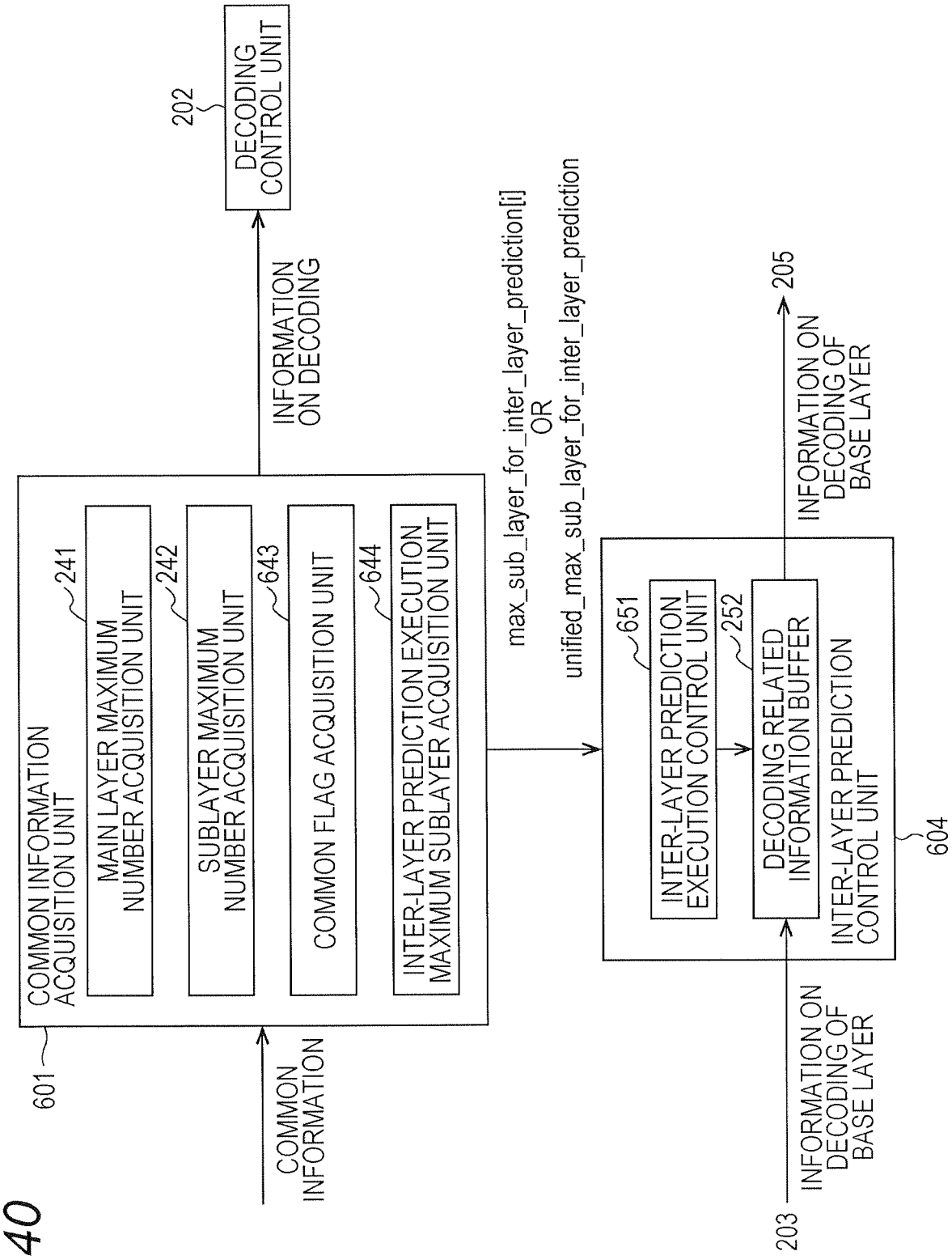

601
COMMON INFORMATION ACQUISITION UNIT
241
MAIN LAYER MAXIMUM NUMBER ACQUISITION UNIT
242
SUBLAYER MAXIMUM NUMBER ACQUISITION UNIT
643
COMMON FLAG ACQUISITION UNIT
644
INTER-LAYER PREDICTION EXECUTION MAXIMUM SUBLAYER ACQUISITION UNIT
COMMON INFORMATION
202
DECODING CONTROL UNIT
INFORMATION ON DECODING
max_sub_layer_for_inter_layer_prediction[i]
OR
unified_max_sub_layer_for_inter_layer_prediction
604
651
INTER-LAYER PREDICTION EXECUTION CONTROL UNIT
252
DECODING RELATED INFORMATION BUFFER
INTER-LAYER PREDICTION CONTROL UNIT
205
INFORMATION ON DECODING OF BASE LAYER
203
INFORMATION ON DECODING OF BASE LAYER

FIG. 41

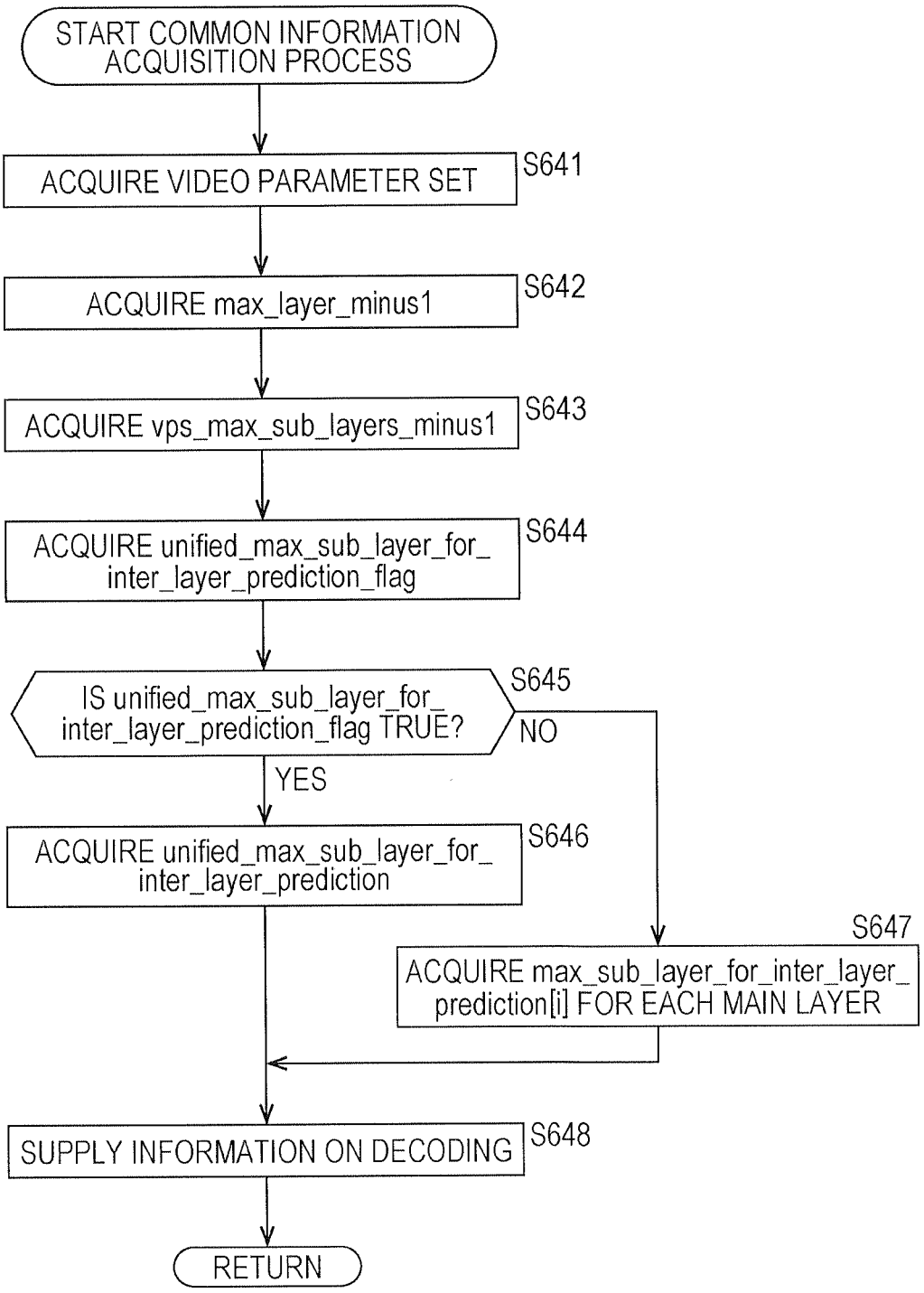

START COMMON INFORMATION ACQUISITION PROCESS
ACQUIRE VIDEO PARAMETER SET
S641
ACQUIRE max_layer_minus1
S642
ACQUIRE vps_max_sub_layers_minus1
S643
ACQUIRE unified_max_sub_layer_for_ inter_layer_prediction_flag
S644
IS unified_max_sub_layer_for_ inter_layer_prediction_flag TRUE?
S645
NO
YES
ACQUIRE unified_max_sub_layer_for_ inter_layer_prediction
S646
S647
ACQUIRE max_sub_layer_for_inter_layer_ prediction[i] FOR EACH MAIN LAYER
SUPPLY INFORMATION ON DECODING
S648
RETURN

FIG. 42

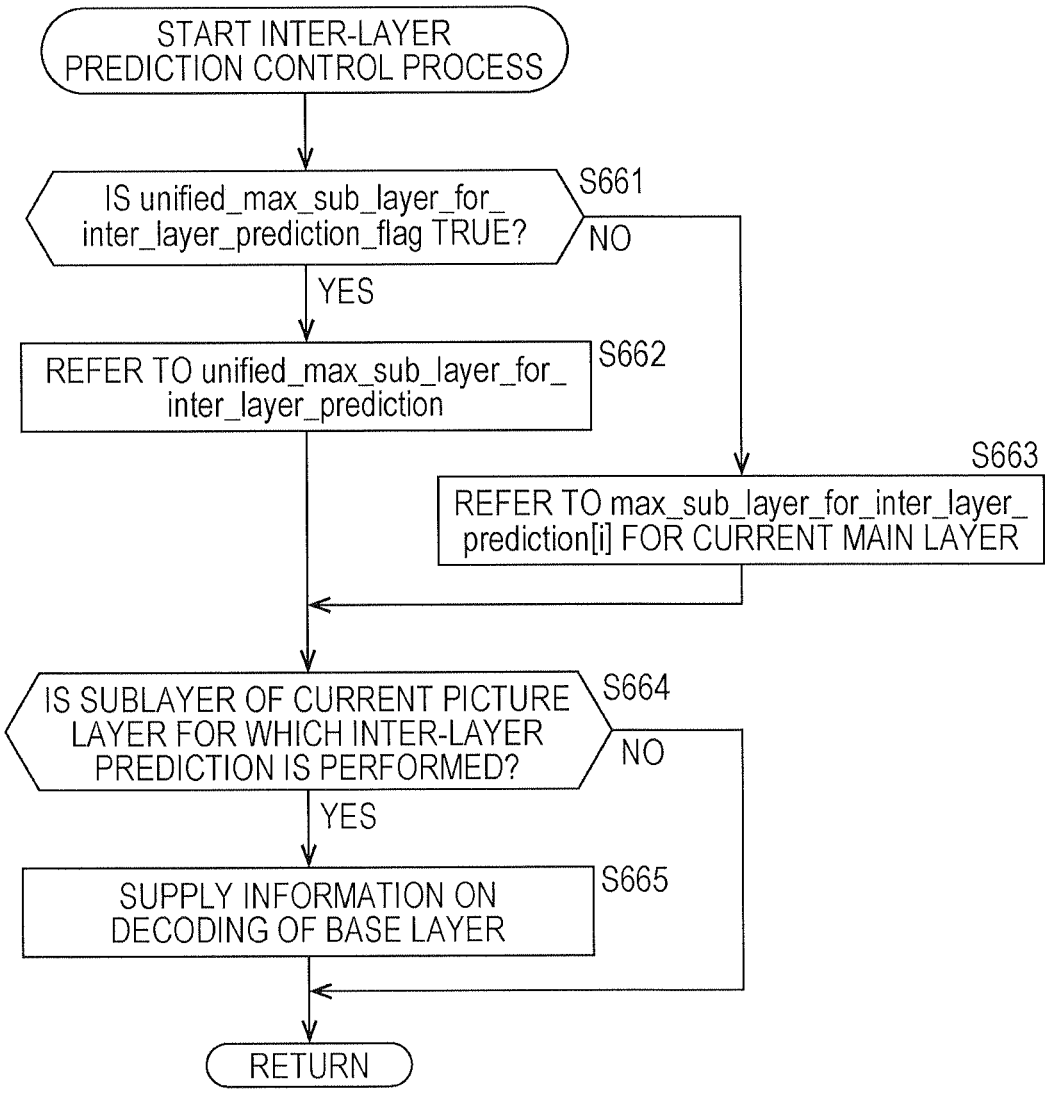

START INTER-LAYER PREDICTION CONTROL PROCESS
IS unified_max_sub_layer_for_ inter_layer_prediction_flag TRUE?
S661
NO
YES
REFER TO unified_max_sub_layer_for_ inter_layer_prediction
S662
S663
REFER TO max_sub_layer_for_inter_layer_ prediction[i] FOR CURRENT MAIN LAYER
IS SUBLAYER OF CURRENT PICTURE LAYER FOR WHICH INTER-LAYER PREDICTION IS PERFORMED?
S664
NO
YES
SUPPLY INFORMATION ON DECODING OF BASE LAYER
S665
RETURN

FIG. 43

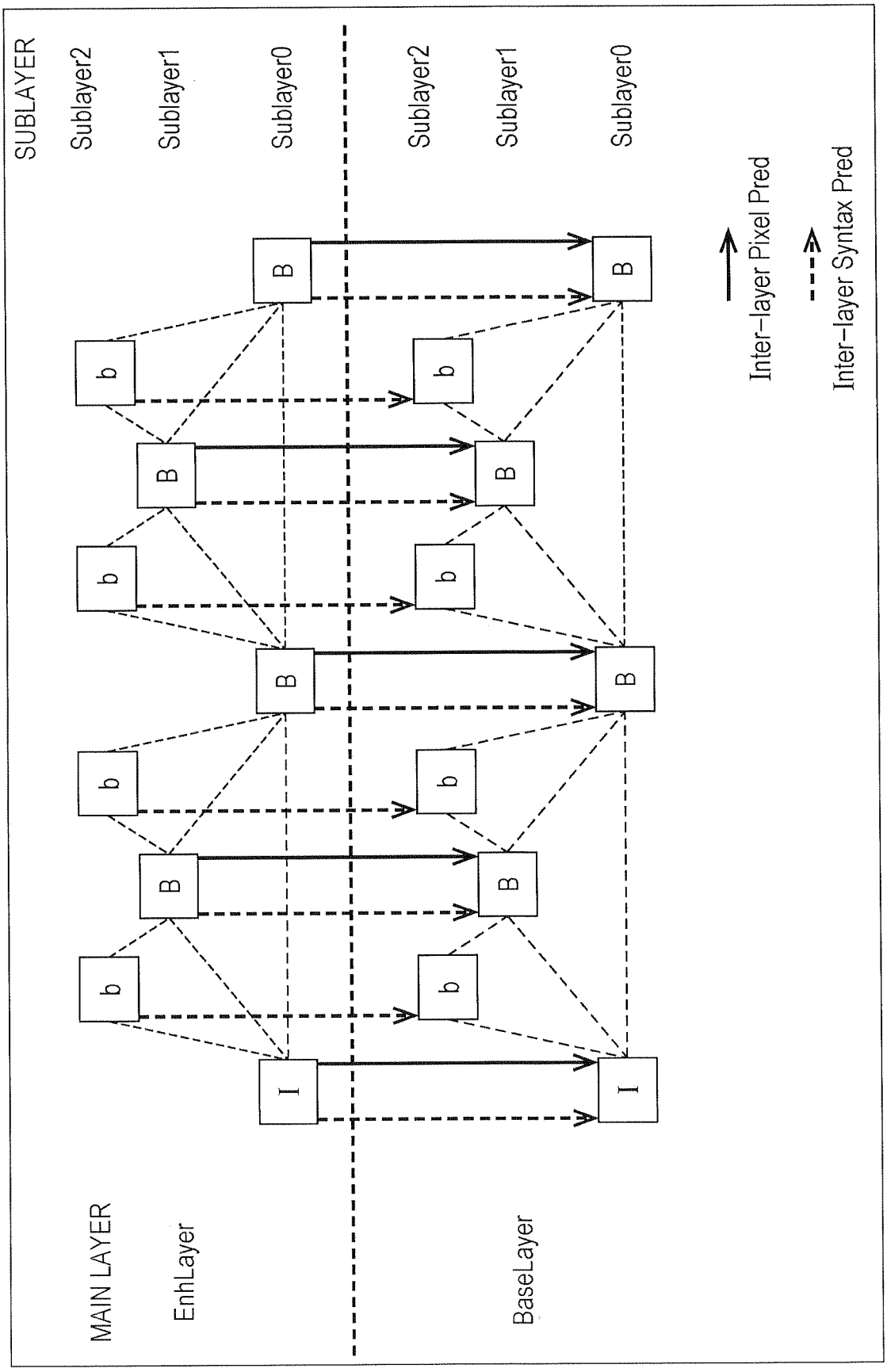

SUBLAYER
Sublayer2
Sublayer1
Sublayer0
Sublayer2
Sublayer1
Sublayer0
MAIN LAYER
EnhLayer
BaseLayer
Inter-layer Pixel Pred
Inter-layer Syntax Pred
I
B
b

FIG. 44

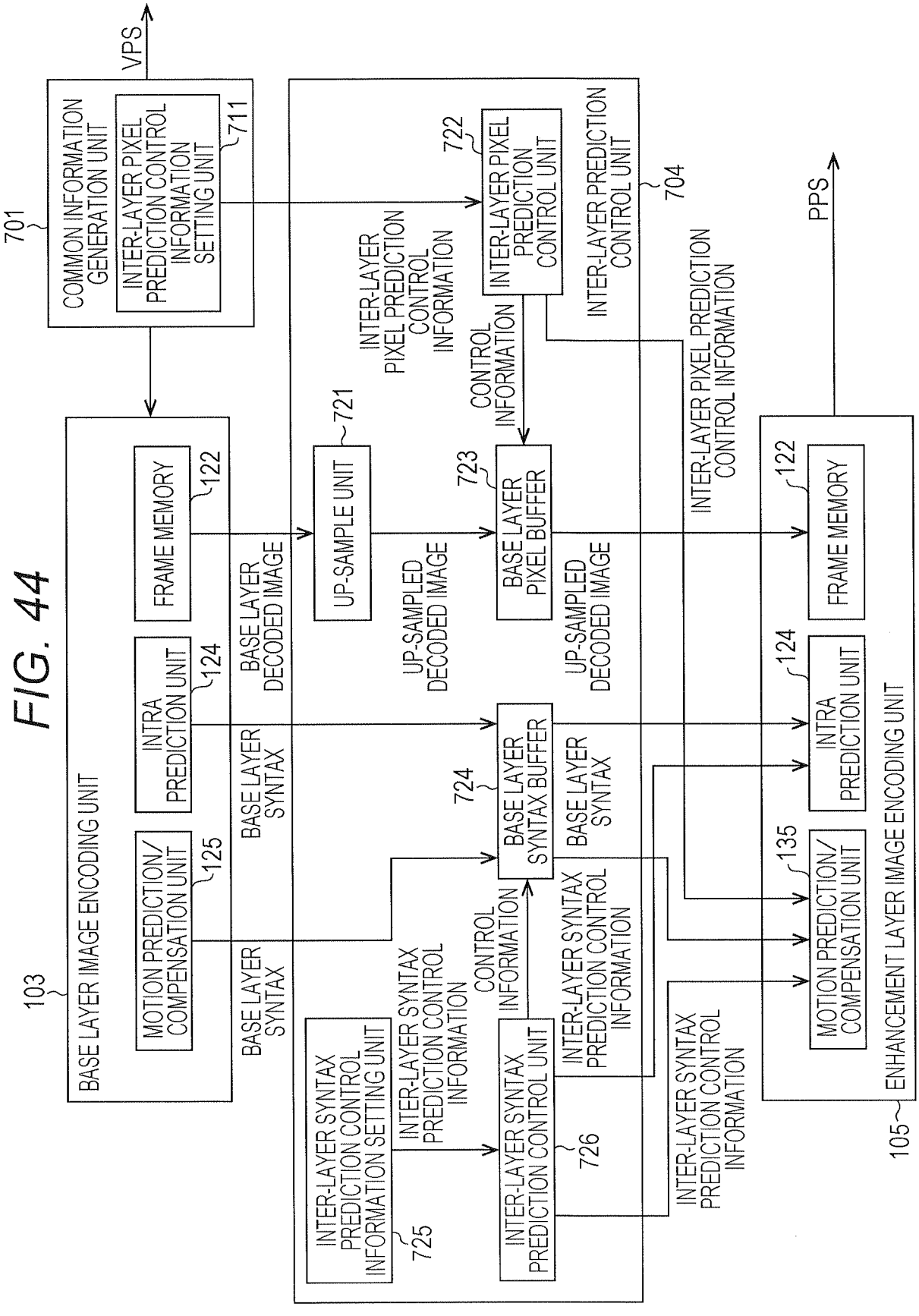

701
COMMON INFORMATION GENERATION UNIT
INTER-LAYER PIXEL PREDICTION CONTROL INFORMATION SETTING UNIT
711
VPS
103
BASE LAYER IMAGE ENCODING UNIT
FRAME MEMORY
122
INTRA PREDICTION UNIT
124
MOTION PREDICTION/ COMPENSATION UNIT
125
BASE LAYER DECODED IMAGE
BASE LAYER SYNTAX
BASE LAYER SYNTAX
UP-SAMPLE UNIT
721
INTER-LAYER PIXEL PREDICTION CONTROL INFORMATION
INTER-LAYER PIXEL PREDICTION CONTROL UNIT
722
CONTROL INFORMATION
704
INTER-LAYER PREDICTION CONTROL UNIT
INTER-LAYER PIXEL PREDICTION CONTROL INFORMATION
UP-SAMPLED DECODED IMAGE
723
BASE LAYER PIXEL BUFFER
UP-SAMPLED DECODED IMAGE
724
BASE LAYER SYNTAX BUFFER
BASE LAYER SYNTAX
INTER-LAYER SYNTAX PREDICTION CONTROL INFORMATION SETTING UNIT
725
INTER-LAYER SYNTAX PREDICTION CONTROL INFORMATION
CONTROL INFORMATION
INTER-LAYER SYNTAX PREDICTION CONTROL UNIT
726
INTER-LAYER SYNTAX PREDICTION CONTROL INFORMATION
INTER-LAYER SYNTAX PREDICTION CONTROL INFORMATION
PPS
122
FRAME MEMORY
124
INTRA PREDICTION UNIT
135
MOTION PREDICTION/ COMPENSATION UNIT
ENHANCEMENT LAYER IMAGE ENCODING UNIT
105

FIG. 45

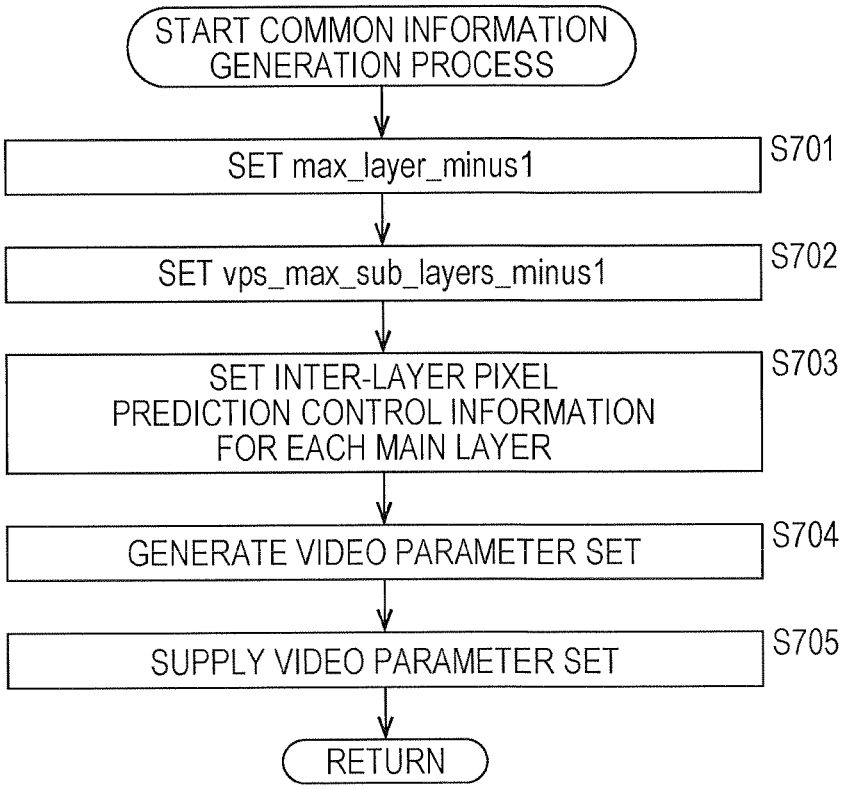

START COMMON INFORMATION GENERATION PROCESS
SET max_layer_minus1
S701
SET vps_max_sub_layers_minus1
S702
SET INTER-LAYER PIXEL PREDICTION CONTROL INFORMATION FOR EACH MAIN LAYER
S703
GENERATE VIDEO PARAMETER SET
S704
SUPPLY VIDEO PARAMETER SET
S705
RETURN

FIG. 46

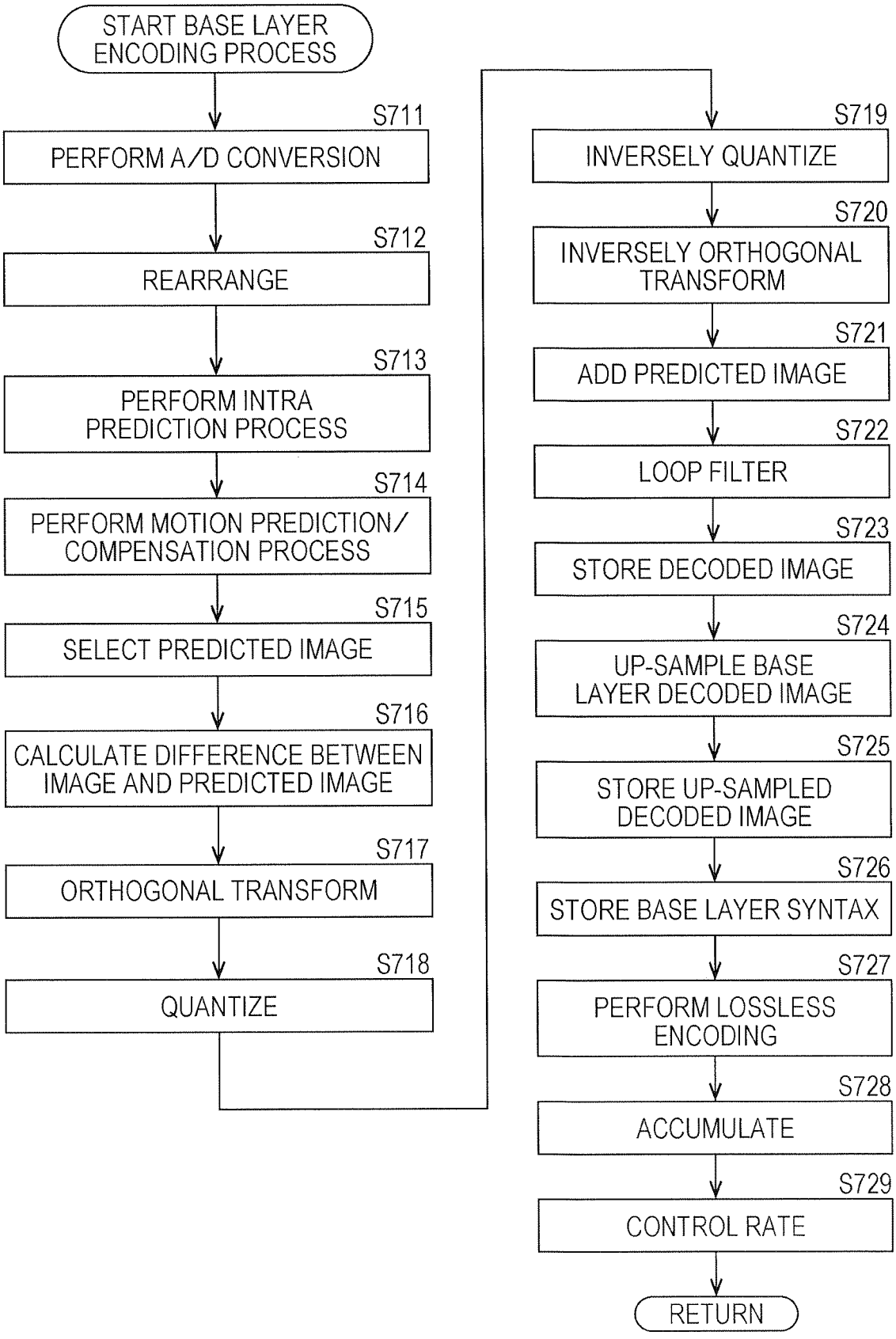

START BASE LAYER ENCODING PROCESS
S711
PERFORM A/D CONVERSION
S712
REARRANGE
S713
PERFORM INTRA PREDICTION PROCESS
S714
PERFORM MOTION PREDICTION/ COMPENSATION PROCESS
S715
SELECT PREDICTED IMAGE
S716
CALCULATE DIFFERENCE BETWEEN IMAGE AND PREDICTED IMAGE
S717
ORTHOGONAL TRANSFORM
S718
QUANTIZE
S719
INVERSELY QUANTIZE
S720
INVERSELY ORTHOGONAL TRANSFORM
S721
ADD PREDICTED IMAGE
S722
LOOP FILTER
S723
STORE DECODED IMAGE
S724
UP-SAMPLE BASE LAYER DECODED IMAGE
S725
STORE UP-SAMPLED DECODED IMAGE
S726
STORE BASE LAYER SYNTAX
S727
PERFORM LOSSLESS ENCODING
S728
ACCUMULATE
S729
CONTROL RATE
RETURN

FIG. 47

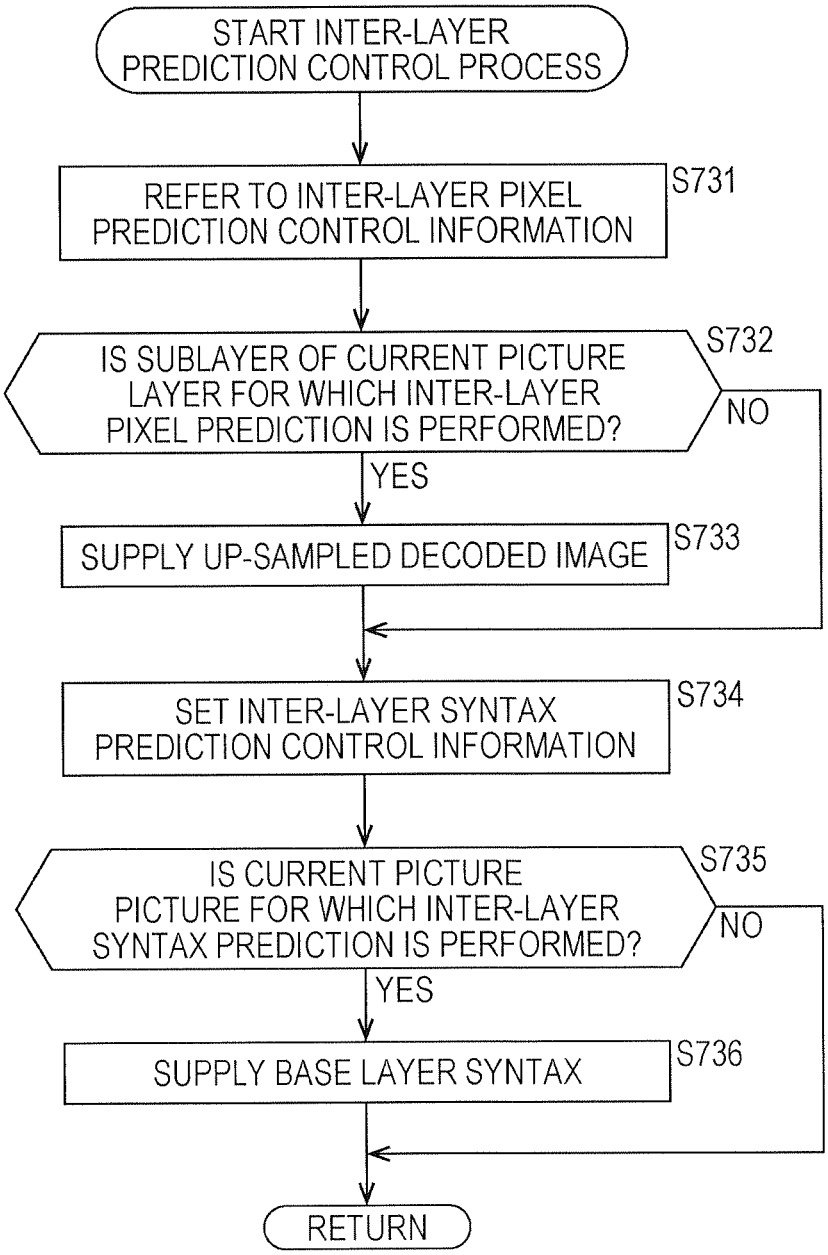

START INTER-LAYER PREDICTION CONTROL PROCESS
REFER TO INTER-LAYER PIXEL PREDICTION CONTROL INFORMATION
S731
IS SUBLAYER OF CURRENT PICTURE LAYER FOR WHICH INTER-LAYER PIXEL PREDICTION IS PERFORMED?
S732
NO
YES
SUPPLY UP-SAMPLED DECODED IMAGE
S733
SET INTER-LAYER SYNTAX PREDICTION CONTROL INFORMATION
S734
IS CURRENT PICTURE PICTURE FOR WHICH INTER-LAYER SYNTAX PREDICTION IS PERFORMED?
S735
NO
YES
SUPPLY BASE LAYER SYNTAX
S736
RETURN

FIG. 48

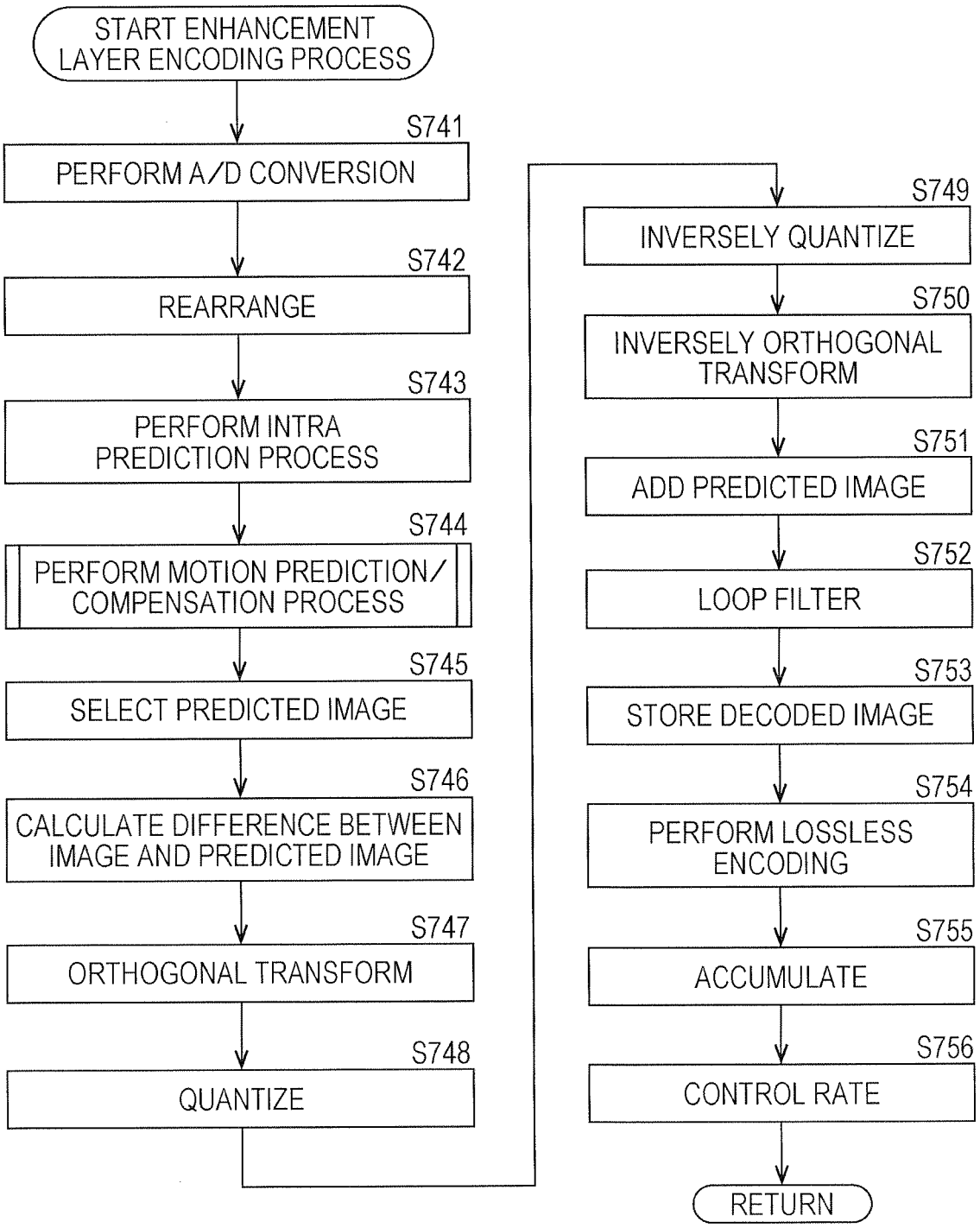

START ENHANCEMENT LAYER ENCODING PROCESS
S741
PERFORM A/D CONVERSION
S742
REARRANGE
S743
PERFORM INTRA PREDICTION PROCESS
S744
PERFORM MOTION PREDICTION/ COMPENSATION PROCESS
S745
SELECT PREDICTED IMAGE
S746
CALCULATE DIFFERENCE BETWEEN IMAGE AND PREDICTED IMAGE
S747
ORTHOGONAL TRANSFORM
S748
QUANTIZE
S749
INVERSELY QUANTIZE
S750
INVERSELY ORTHOGONAL TRANSFORM
S751
ADD PREDICTED IMAGE
S752
LOOP FILTER
S753
STORE DECODED IMAGE
S754
PERFORM LOSSLESS ENCODING
S755
ACCUMULATE
S756
CONTROL RATE
RETURN

FIG. 49

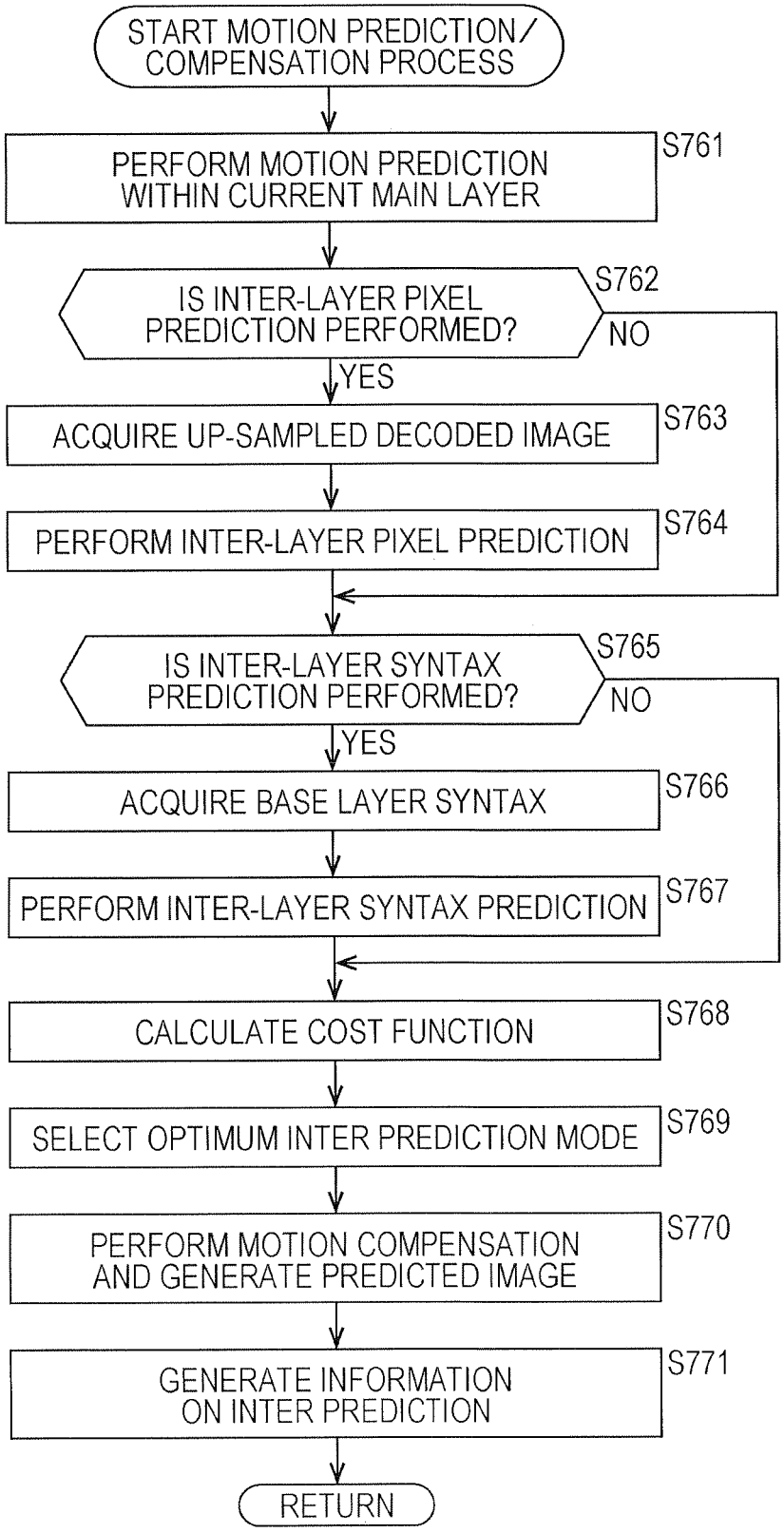

START MOTION PREDICTION/ COMPENSATION PROCESS
PERFORM MOTION PREDICTION WITHIN CURRENT MAIN LAYER
S761
IS INTER-LAYER PIXEL PREDICTION PERFORMED?
S762
NO
YES
ACQUIRE UP-SAMPLED DECODED IMAGE
S763
PERFORM INTER-LAYER PIXEL PREDICTION
S764
IS INTER-LAYER SYNTAX PREDICTION PERFORMED?
S765
NO
YES
ACQUIRE BASE LAYER SYNTAX
S766
PERFORM INTER-LAYER SYNTAX PREDICTION
S767
CALCULATE COST FUNCTION
S768
SELECT OPTIMUM INTER PREDICTION MODE
S769
PERFORM MOTION COMPENSATION AND GENERATE PREDICTED IMAGE
S770
GENERATE INFORMATION ON INTER PREDICTION
S771
RETURN

FIG. 50

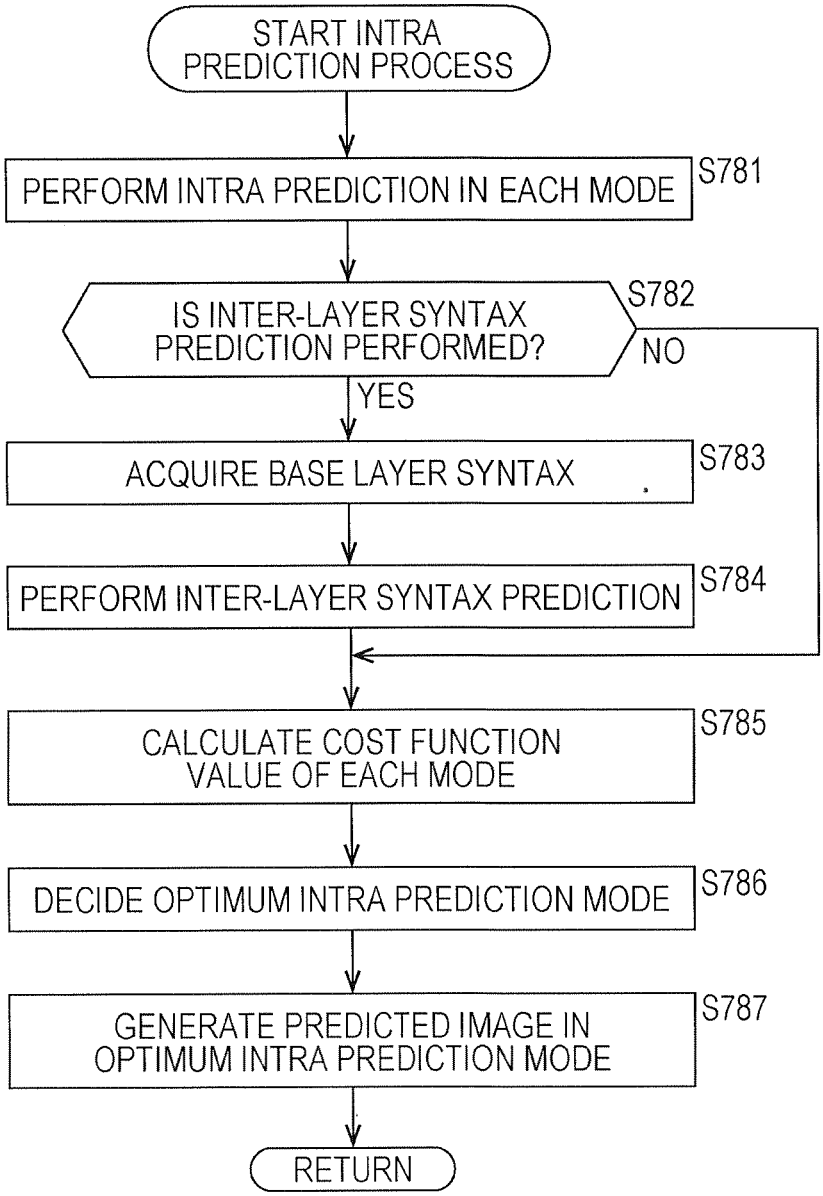

START INTRA PREDICTION PROCESS
PERFORM INTRA PREDICTION IN EACH MODE
S781
IS INTER-LAYER SYNTAX PREDICTION PERFORMED?
S782
NO
YES
ACQUIRE BASE LAYER SYNTAX
S783
PERFORM INTER-LAYER SYNTAX PREDICTION
S784
CALCULATE COST FUNCTION VALUE OF EACH MODE
S785
DECIDE OPTIMUM INTRA PREDICTION MODE
S786
GENERATE PREDICTED IMAGE IN OPTIMUM INTRA PREDICTION MODE
S787
RETURN

FIG. 51

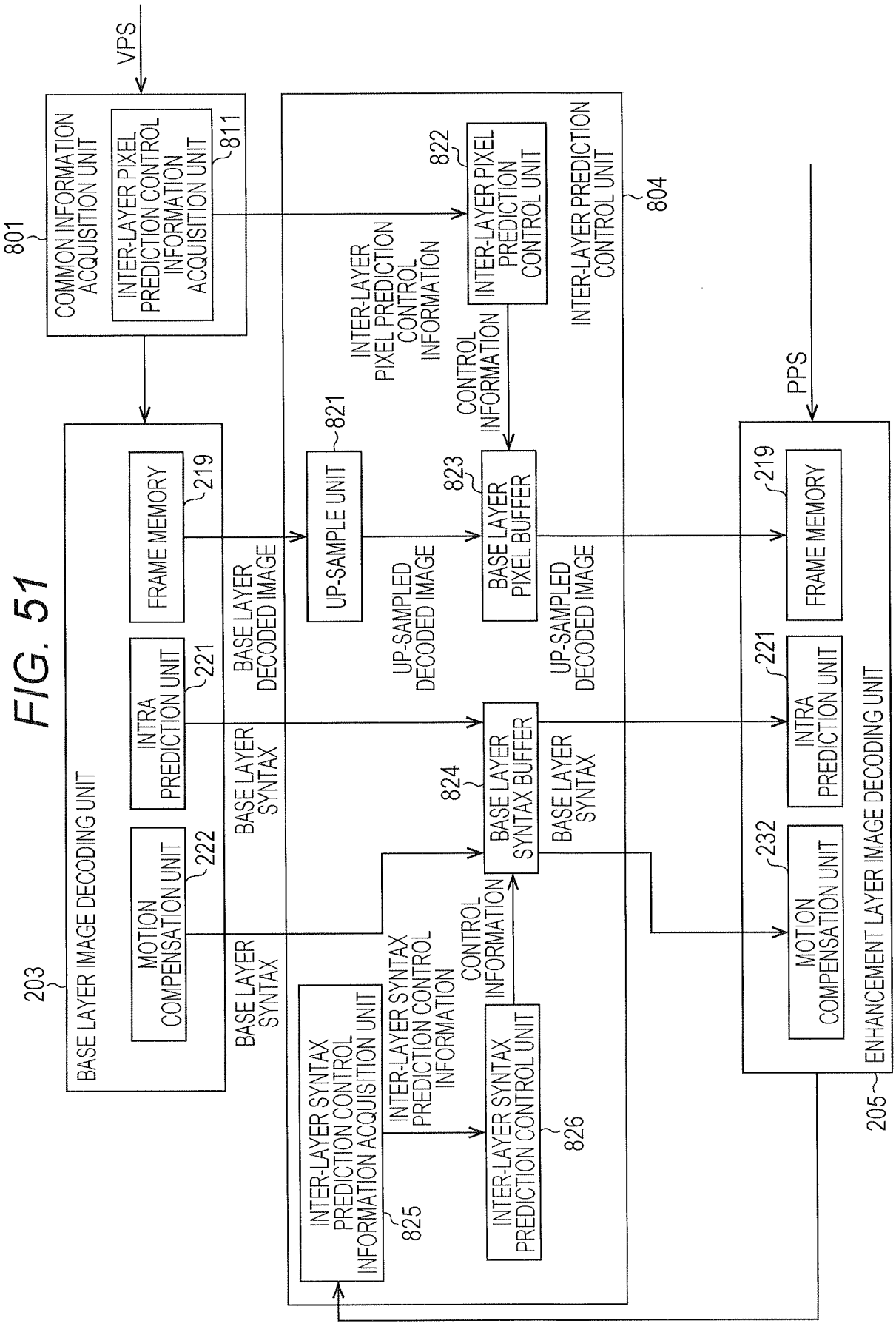

VPS
801
COMMON INFORMATION ACQUISITION UNIT
INTER-LAYER PIXEL PREDICTION CONTROL INFORMATION ACQUISITION UNIT
811
822
INTER-LAYER PIXEL PREDICTION CONTROL UNIT
804
INTER-LAYER PREDICTION CONTROL UNIT
INTER-LAYER PIXEL PREDICTION CONTROL INFORMATION
CONTROL INFORMATION
PPS
203
BASE LAYER IMAGE DECODING UNIT
FRAME MEMORY
219
821
UP-SAMPLE UNIT
823
BASE LAYER PIXEL BUFFER
219
FRAME MEMORY
INTRA PREDICTION UNIT
221
BASE LAYER DECODED IMAGE
UP-SAMPLED DECODED IMAGE
UP-SAMPLED DECODED IMAGE
221
INTRA PREDICTION UNIT
MOTION COMPENSATION UNIT
222
BASE LAYER SYNTAX
824
BASE LAYER SYNTAX BUFFER
BASE LAYER SYNTAX
232
MOTION COMPENSATION UNIT
BASE LAYER SYNTAX
INTER-LAYER SYNTAX PREDICTION CONTROL INFORMATION ACQUISITION UNIT
825
INTER-LAYER SYNTAX PREDICTION CONTROL INFORMATION
CONTROL INFORMATION
INTER-LAYER SYNTAX PREDICTION CONTROL UNIT
826
ENHANCEMENT LAYER IMAGE DECODING UNIT
205

FIG. 52

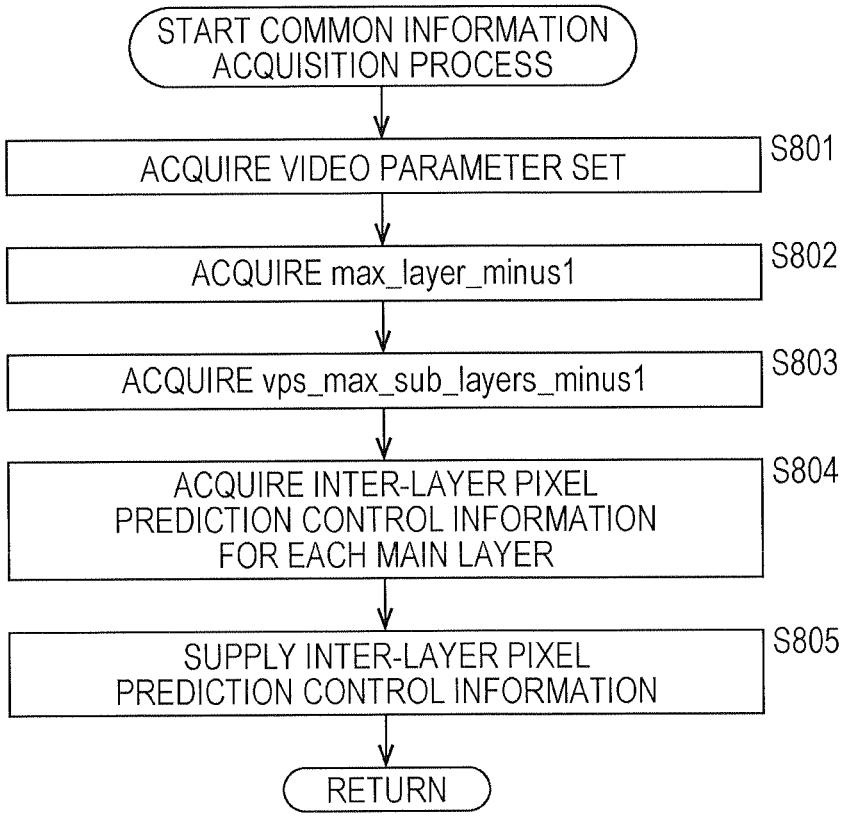

START COMMON INFORMATION ACQUISITION PROCESS
ACQUIRE VIDEO PARAMETER SET
S801
ACQUIRE max_layer_minus1
S802
ACQUIRE vps_max_sub_layers_minus1
S803
ACQUIRE INTER-LAYER PIXEL PREDICTION CONTROL INFORMATION FOR EACH MAIN LAYER
S804
SUPPLY INTER-LAYER PIXEL PREDICTION CONTROL INFORMATION
S805
RETURN

FIG. 53

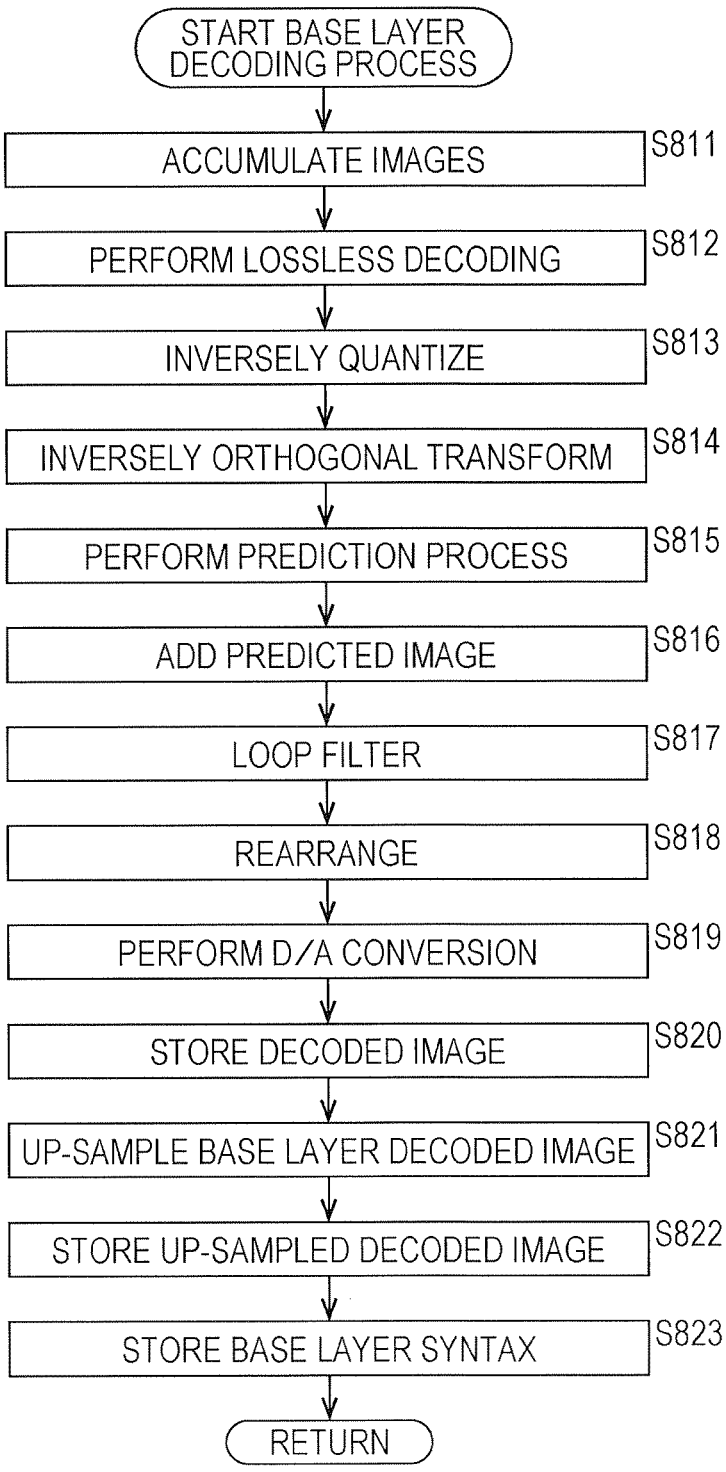

START BASE LAYER DECODING PROCESS
ACCUMULATE IMAGES
S811
PERFORM LOSSLESS DECODING
S812
INVERSELY QUANTIZE
S813
INVERSELY ORTHOGONAL TRANSFORM
S814
PERFORM PREDICTION PROCESS
S815
ADD PREDICTED IMAGE
S816
LOOP FILTER
S817
REARRANGE
S818
PERFORM D/A CONVERSION
S819
STORE DECODED IMAGE
S820
UP-SAMPLE BASE LAYER DECODED IMAGE
S821
STORE UP-SAMPLED DECODED IMAGE
S822
STORE BASE LAYER SYNTAX
S823
RETURN

FIG. 54

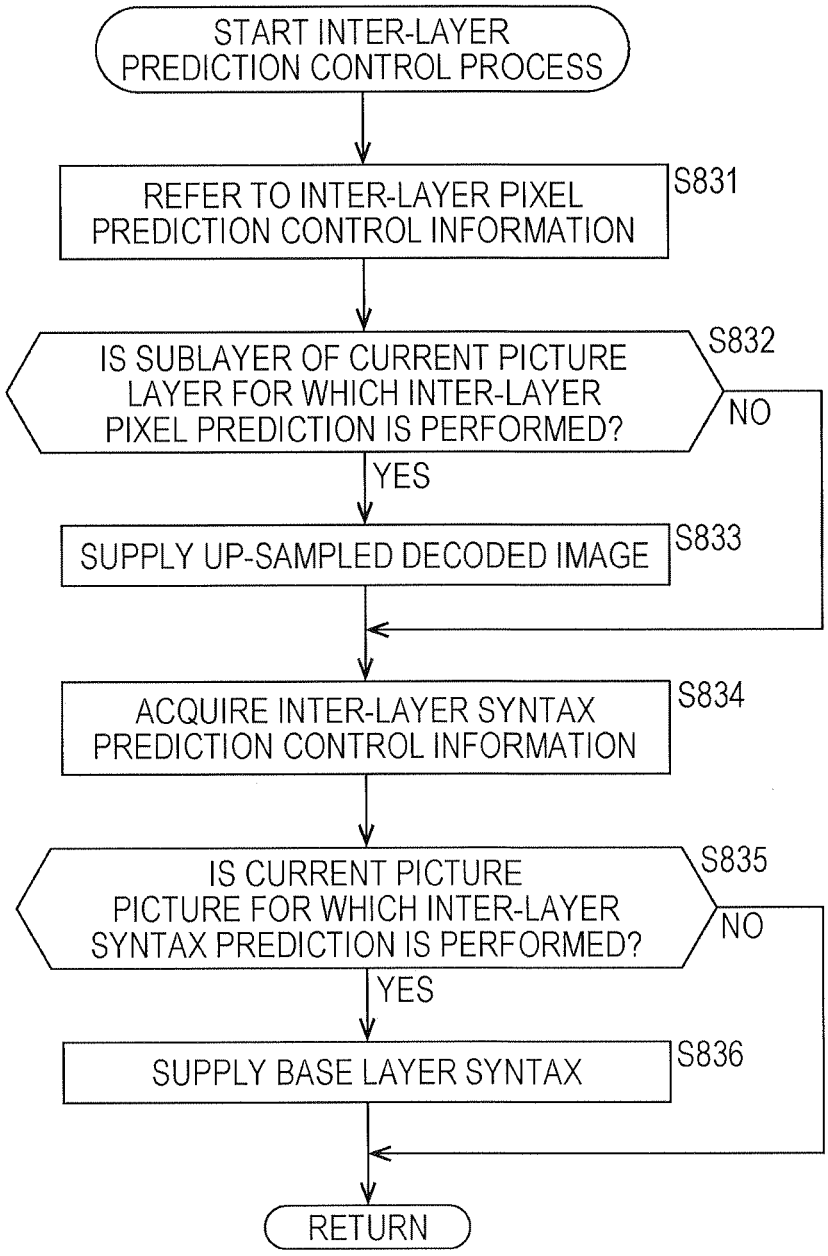

START INTER-LAYER PREDICTION CONTROL PROCESS
REFER TO INTER-LAYER PIXEL PREDICTION CONTROL INFORMATION
S831
IS SUBLAYER OF CURRENT PICTURE LAYER FOR WHICH INTER-LAYER PIXEL PREDICTION IS PERFORMED?
S832
NO
YES
SUPPLY UP-SAMPLED DECODED IMAGE
S833
ACQUIRE INTER-LAYER SYNTAX PREDICTION CONTROL INFORMATION
S834
IS CURRENT PICTURE PICTURE FOR WHICH INTER-LAYER SYNTAX PREDICTION IS PERFORMED?
S835
NO
YES
SUPPLY BASE LAYER SYNTAX
S836
RETURN

FIG. 55

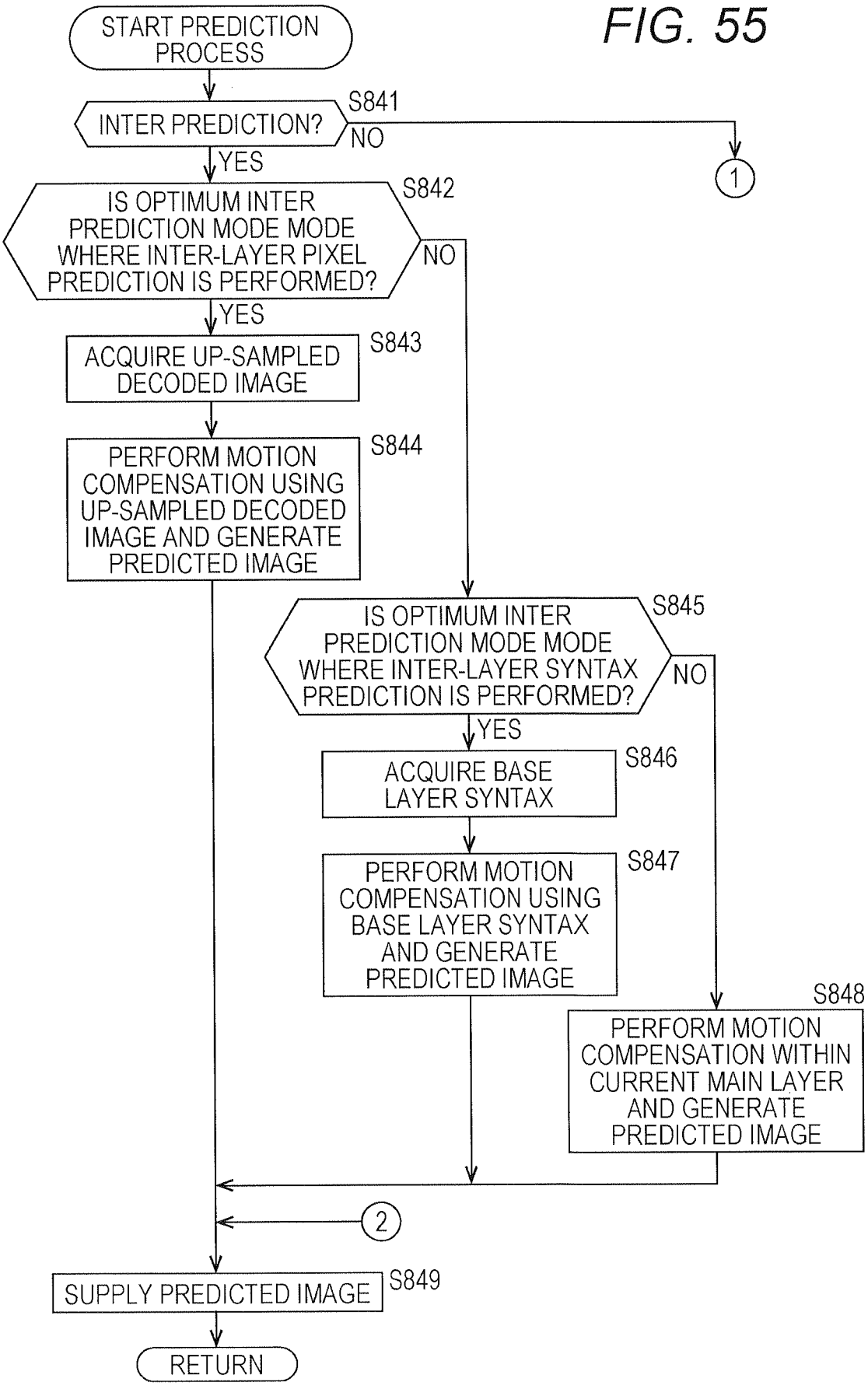

START PREDICTION PROCESS
INTER PREDICTION?
S841
NO
YES
1
IS OPTIMUM INTER PREDICTION MODE MODE WHERE INTER-LAYER PIXEL PREDICTION IS PERFORMED?
S842
NO
YES
ACQUIRE UP-SAMPLED DECODED IMAGE
S843
PERFORM MOTION COMPENSATION USING UP-SAMPLED DECODED IMAGE AND GENERATE PREDICTED IMAGE
S844
IS OPTIMUM INTER PREDICTION MODE MODE WHERE INTER-LAYER SYNTAX PREDICTION IS PERFORMED?
S845
NO
YES
ACQUIRE BASE LAYER SYNTAX
S846
PERFORM MOTION COMPENSATION USING BASE LAYER SYNTAX AND GENERATE PREDICTED IMAGE
S847
PERFORM MOTION COMPENSATION WITHIN CURRENT MAIN LAYER AND GENERATE PREDICTED IMAGE
S848
2
SUPPLY PREDICTED IMAGE
S849
RETURN

FIG. 56

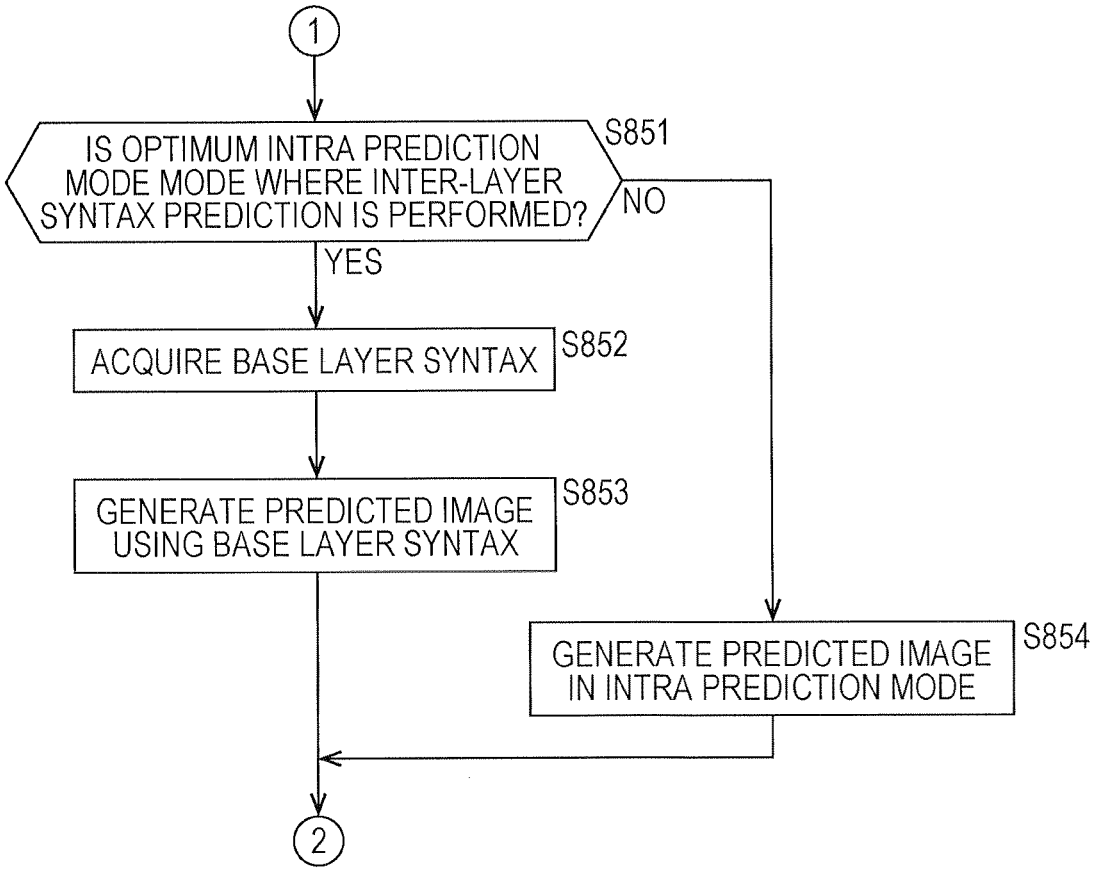

1
IS OPTIMUM INTRA PREDICTION MODE MODE WHERE INTER-LAYER SYNTAX PREDICTION IS PERFORMED?
S851
NO
YES
ACQUIRE BASE LAYER SYNTAX
S852
GENERATE PREDICTED IMAGE USING BASE LAYER SYNTAX
S853
GENERATE PREDICTED IMAGE IN INTRA PREDICTION MODE
S854
2

FIG. 57

seq_parameter_set_rbsp( ) {	Descriptor
sps_video_parameter_set_id	u(4)
sps_max_sub_layers_minus1	u(3)
sps_temporal_id_nesting_flag	u(1)
profile_tier_level(sps_max_sub_layers_minus1)	
sps_seq_parameter_set_id	ue(v)
chroma_format_idc	ue(v)
if(chroma_format_idc == 3)	
separate_colour_plane_flag	u(1)
pic_width_in_luma_samples	ue(v)
pic_height_in_luma_samples	ue(v)
conformance_window_flag	u(1)
if(conformance_window_flag) {	
conf_win_left_offset	ue(v)
conf_win_right_offset	ue(v)
conf_win_top_offset	ue(v)
conf_win_bottom_offset	ue(v)
}	
bit_depth_luma_minus8	ue(v)
bit_depth_chroma_minus8	ue(v)
log2_max_pic_order_cnt_lsb_minus4	ue(v)
sps_sub_layer_ordering_info_present_flag	u(1)
for(i=(sps_sub_layer_ordering_info_present_flag?0:sps_max_sub_layers_minus1); i<=sps_max_sub_layers_minus1;i++) {	
sps_max_dec_pic_buffering_minus1[i]	ue(v)
sps_max_num_reorder_pics[i]	ue(v)
sps_max_latency_increase_plus1[i]	ue(v)
}	
log2_min_luma_coding_block_size_minus3	ue(v)
log2_diff_max_min_luma_coding_block_size	ue(v)
log2_min_transform_block_size_minus2	ue(v)
log2_diff_max_min_transform_block_size	ue(v)
max_transform_hierarchy_depth_inter	ue(v)
max_transform_hierarchy_depth_intra	ue(v)
scaling_list_enabled_flag	u(1)
if(scaling_list_enabled_flag) {	
sps_scaling_list_data_present_flag	u(1)
if(sps_scaling_list_data_present_flag)	
scaling_list_data( )	
}	
amp_enabled_flag	u(1)
sample_adaptive_offset_enabled_flag	u(1)
pcm_enabled_flag	u(1)
if(pcm_enabled_flag) {	

FIG. 58

pcm_sample_bit_depth_luma_minus1	u(4)
pcm_sample_bit_depth_chroma_minus1	u(4)
log2_min_pcm_luma_coding_block_size_minus3	ue(v)
log2_diff_max_min_pcm_luma_coding_block_size	ue(v)
pcm_loop_filter_disabled_flag	u(1)
}	
num_short_term_ref_pic_sets	ue(v)
for(i=0;i<num_short_term_ref_pic_sets;i++)	
short_term_ref_pic_set(i)	
long_term_ref_pics_present_flag	u(1)
if(long_term_ref_pics_present_flag){	
num_long_term_ref_pics_sps	ue(v)
for(i=0;i<num_long_term_ref_pics_sps;i++){	
lt_ref_pic_poc_lsb_sps[i]	u(v)
used_by_curr_pic_lt_sps_flag[i]	u(1)
}	
}	
sps_temporal_mvp_enabled_flag	u(1)
strong_intra_smoothing_enabled_flag	u(1)
vui_parameters_present_flag	u(1)
if(vui_parameters_present_flag)	
vui_parameters( )	
sps_extension_flag	u(1)
if(sps_extension_flag){	
inter_view_mv_vert_constraint_flag	u(1)
sps_inter_layer_mfm_enable_flag	u(1)
while(more_rbsp_data( ))	
sps_extension_data_flag	u(1)
rbsp_trailing_bits( )	
}	
}	

FIG. 59

slice_segment_header( ){	Descriptor
first_slice_segment_in_pic_flag	u(1)
if(nal_unit_type >= BLA_W_LP && nal_unit_type <= RSV_IRAP_VCL23)	
no_output_of_prior_pics_flag	u(1)
slice_pic_parameter_set_id	ue(v)
if(!first_slice_segment_in_pic_flag){	
if(dependent_slice_segments_enabled_flag)	
dependent_slice_segment_flag	u(1)
slice_segment_address	u(v)
}	
if(!dependent_slice_segment_flag){	
for(i=0;i<num_extra_slice_header_bits;i++)	
slice_reserved_flag[i]	u(1)
slice_type	ue(v)
if(output_flag_present_flag)	
pic_output_flag	u(1)
if(separate_colour_plane_flag == 1)	
colour_plane_id	u(2)
if(nal_unit_type != IDR_W_RADL && nal_unit_type != IDR_N_LP){	
slice_pic_order_cnt_lsb	u(v)
short_term_ref_pic_set_sps_flag	u(1)
if(!short_term_ref_pic_set_sps_flag)	
short_term_ref_pic_set(num_short_term_ref_pic_sets)	
else if(num_short_term_ref_pic_sets>1)	
short_term_ref_pic_set_idx	u(v)
if(long_term_ref_pics_present_flag){	
if(num_long_term_ref_pics_sps>0)	
num_long_term_sps	ue(v)
num_long_term_pics	ue(v)
for(i=0;i<num_long_term_sps + num_long_term_pics;i++){	
if(i<num_long_term_sps){	
if(num_long_term_ref_pics_sps>1)	
lt_idx_sps[i]	u(v)
}else{	
poc_lsb_lt[i]	u(v)
used_by_curr_pic_lt_flag[i]	u(1)
}	
delta_poc_msb_present_flag[i]	u(1)
if(delta_poc_msb_present_flag[i])	
delta_poc_msb_cycle_lt[i]	ue(v)
}	
}	
if(sps_temporal_mvp_enabled_flag)	

FIG. 60

slice_temporal_mvp_enabled_flag	u(1)
}	
if(sample_adaptive_offset_enabled_flag){	
slice_sao_luma_flag	u(1)
slice_sao_chroma_flag	u(1)
}	
if(slice_type == P || slice_type == B){	
num_ref_idx_active_override_flag	u(1)
if(num_ref_idx_active_override_flag){	
num_ref_idx_l0_active_minus1	ue(v)
if(slice_type == B)	
num_ref_idx_l1_active_minus1	ue(v)
}	
if(lists_modification_present_flag && NumPocTotalCurr>1)	
ref_pic_lists_modification( )	
if(slice_type == B)	
mvd_l1_zero_flag	u(1)
if(cabac_init_present_flag)	
cabac_init_flag	u(1)
if(slice_temporal_mvp_enabled_flag){	
if(slice_type == B)	
collocated_from_l0_flag	u(1)
if((collocated_from_l0_flag && num_ref_idx_l0_active_minus1>0)|| (!collocated_from_l0_flag && num_ref_idx_l1_active_minus1>0))	
collocated_ref_idx	ue(v)
}	
if((weighted_pred_flag && slice_type == P)|| (weighted_bipred_flag && slice_type == B))	
pred_weight_table( )	
five_minus_max_num_merge_cand	ue(v)
}	
slice_qp_delta	se(v)
if(pps_slice_chroma_qp_offsets_present_flag){	
slice_cb_qp_offset	se(v)
slice_cr_qp_offset	se(v)
}	
if(deblocking_filter_override_enabled_flag)	
deblocking_filter_override_flag	u(1)
if(deblocking_filter_override_flag){	
slice_deblocking_filter_disabled_flag	u(1)
if(!slice_deblocking_filter_disabled_flag){	
slice_beta_offset_div2	se(v)
slice_tc_offset_div2	se(v)
}	

FIG. 61

}	
if(pps_loop_filter_across_slices_enabled_flag && (slice_sao_luma_flag || slice_sao_chroma_flag || !slice_deblocking_filter_disabled_flag))	
slice_loop_filter_across_slices_enabled_flag	u(1)
}	
if(tiles_enabled_flag || entropy_coding_sync_enabled_flag){	
num_entry_point_offsets	ue(v)
if(num_entry_point_offsets>0){	
offset_len_minus1	ue(v)
for(i=0;i<num_entry_point_offsets;i++)	
entry_point_offset_minus1[i]	u(v)
}	
}	
if(slice_segment_header_extension_present_flag){	
slice_segment_header_extension_length	ue(v)
for(i=0;i<slice_segment_header_extension_length;i++)	
slice_segment_header_extension_data_byte[i]	u(8)
}	
byte_alignment( )	
}	

FIG. 62

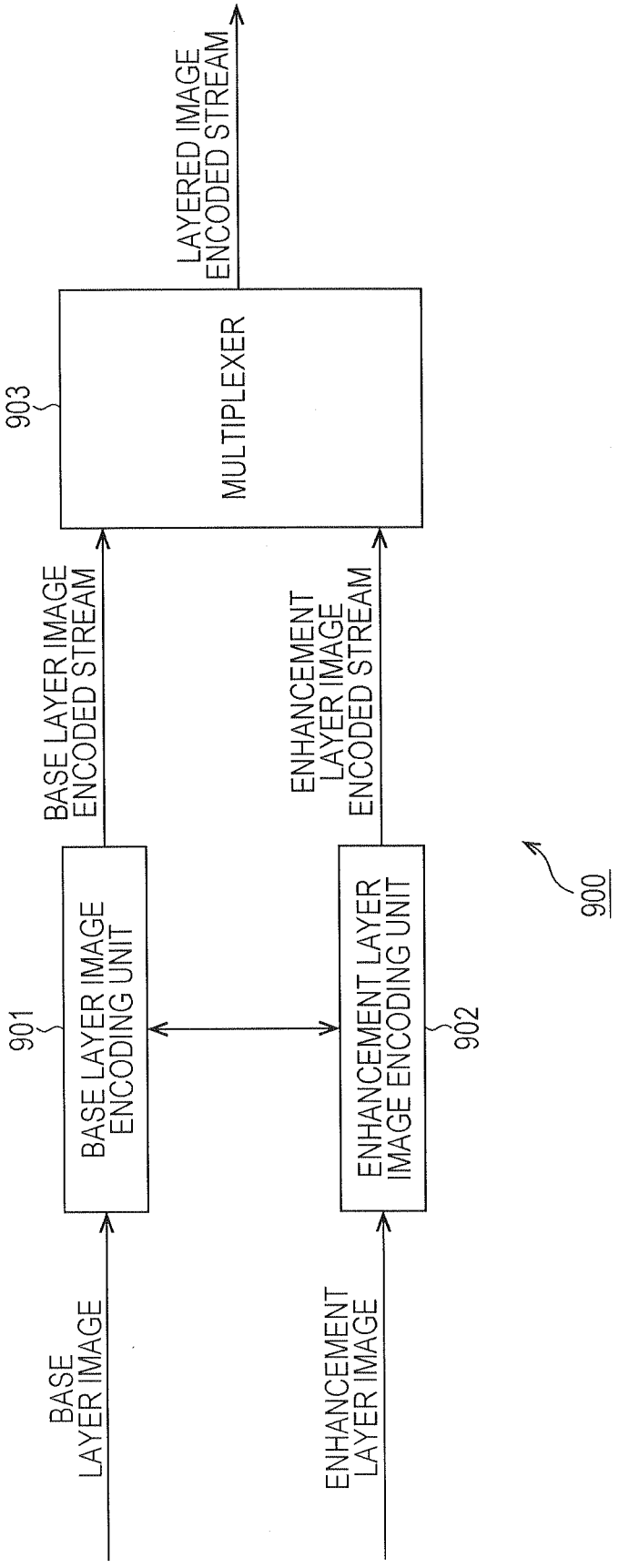

BASE LAYER IMAGE
ENHANCEMENT LAYER IMAGE
BASE LAYER IMAGE ENCODING UNIT
ENHANCEMENT LAYER IMAGE ENCODING UNIT
901
902
BASE LAYER IMAGE ENCODED STREAM
ENHANCEMENT LAYER IMAGE ENCODED STREAM
MULTIPLEXER
903
LAYERED IMAGE ENCODED STREAM
900

FIG. 63

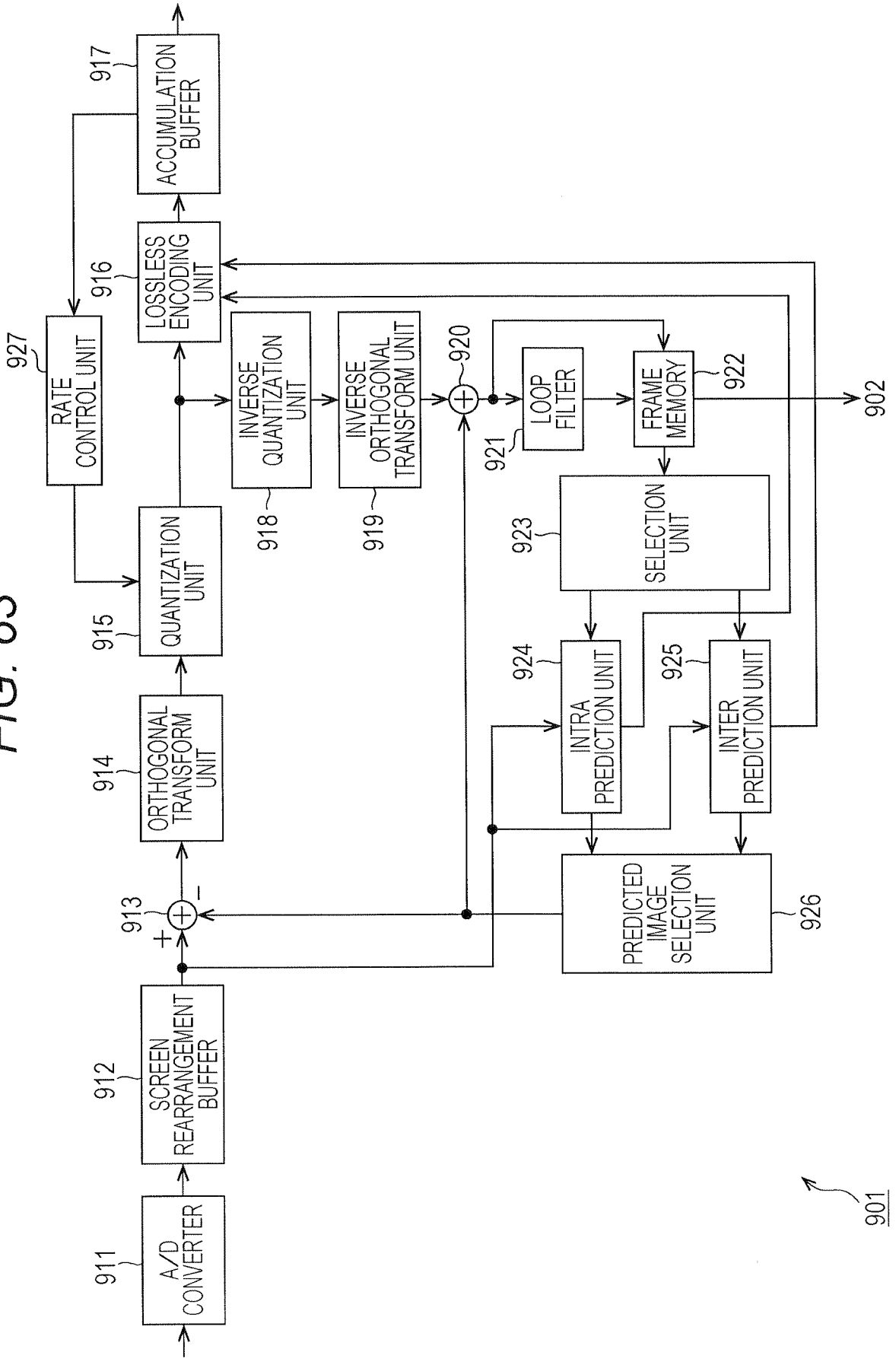

A/D CONVERTER
911
SCREEN REARRANGEMENT BUFFER
912
913
ORTHOGONAL TRANSFORM UNIT
914
QUANTIZATION UNIT
915
LOSSLESS ENCODING UNIT
916
ACCUMULATION BUFFER
917
INVERSE QUANTIZATION UNIT
918
INVERSE ORTHOGONAL TRANSFORM UNIT
919
920
LOOP FILTER
921
FRAME MEMORY
922
SELECTION UNIT
923
INTRA PREDICTION UNIT
924
INTER PREDICTION UNIT
925
PREDICTED IMAGE SELECTION UNIT
926
RATE CONTROL UNIT
927
902
901

FIG. 64

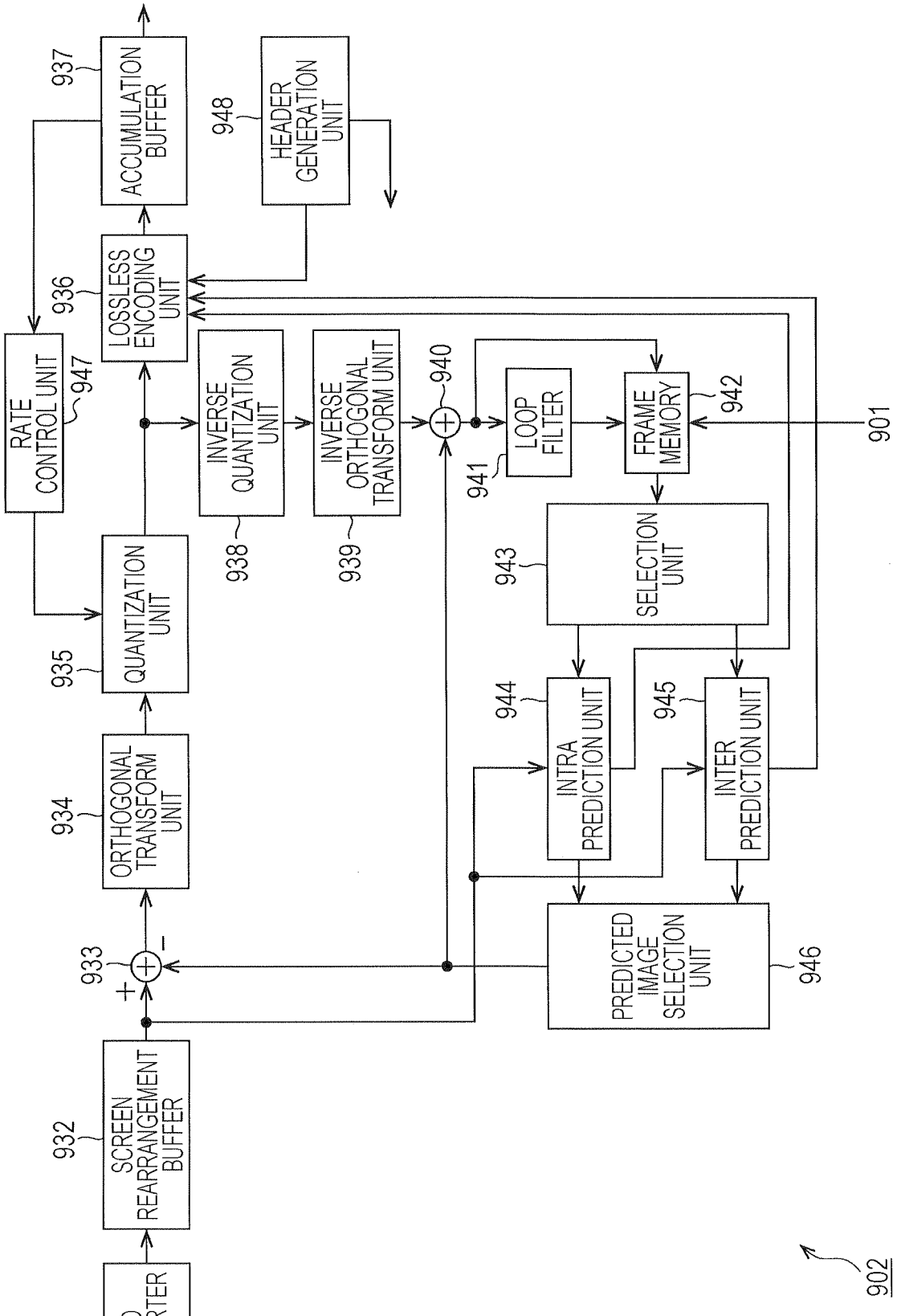

902
931
A/D CONVERTER
932
SCREEN REARRANGEMENT BUFFER
933
934
ORTHOGONAL TRANSFORM UNIT
935
QUANTIZATION UNIT
936
LOSSLESS ENCODING UNIT
937
ACCUMULATION BUFFER
938
INVERSE QUANTIZATION UNIT
939
INVERSE ORTHOGONAL TRANSFORM UNIT
940
941
LOOP FILTER
942
FRAME MEMORY
943
SELECTION UNIT
944
INTRA PREDICTION UNIT
945
INTER PREDICTION UNIT
946
PREDICTED IMAGE SELECTION UNIT
947
RATE CONTROL UNIT
948
HEADER GENERATION UNIT
901

FIG. 65

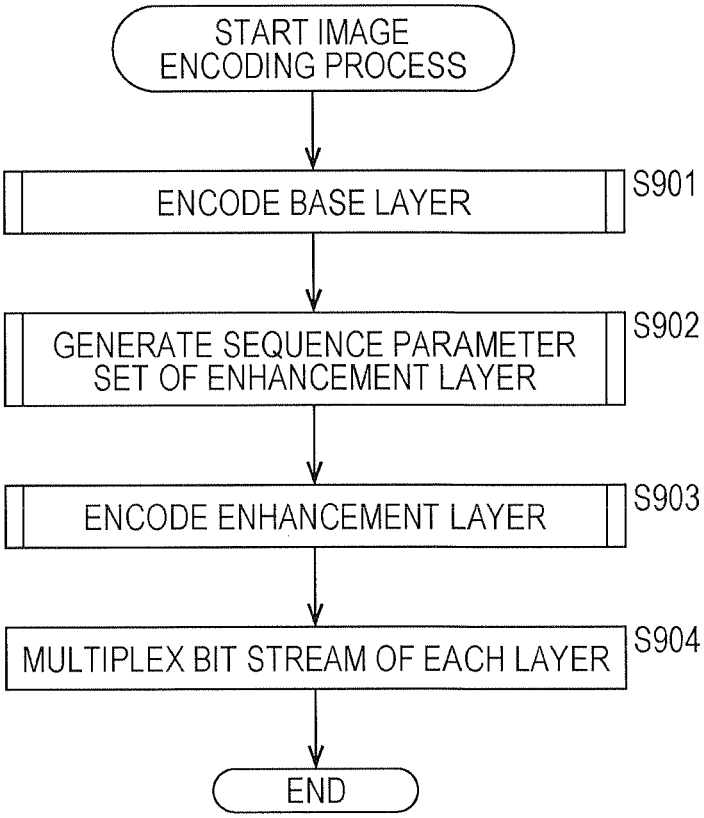

START IMAGE ENCODING PROCESS
ENCODE BASE LAYER
S901
GENERATE SEQUENCE PARAMETER SET OF ENHANCEMENT LAYER
S902
ENCODE ENHANCEMENT LAYER
S903
MULTIPLEX BIT STREAM OF EACH LAYER
S904
END

FIG. 66

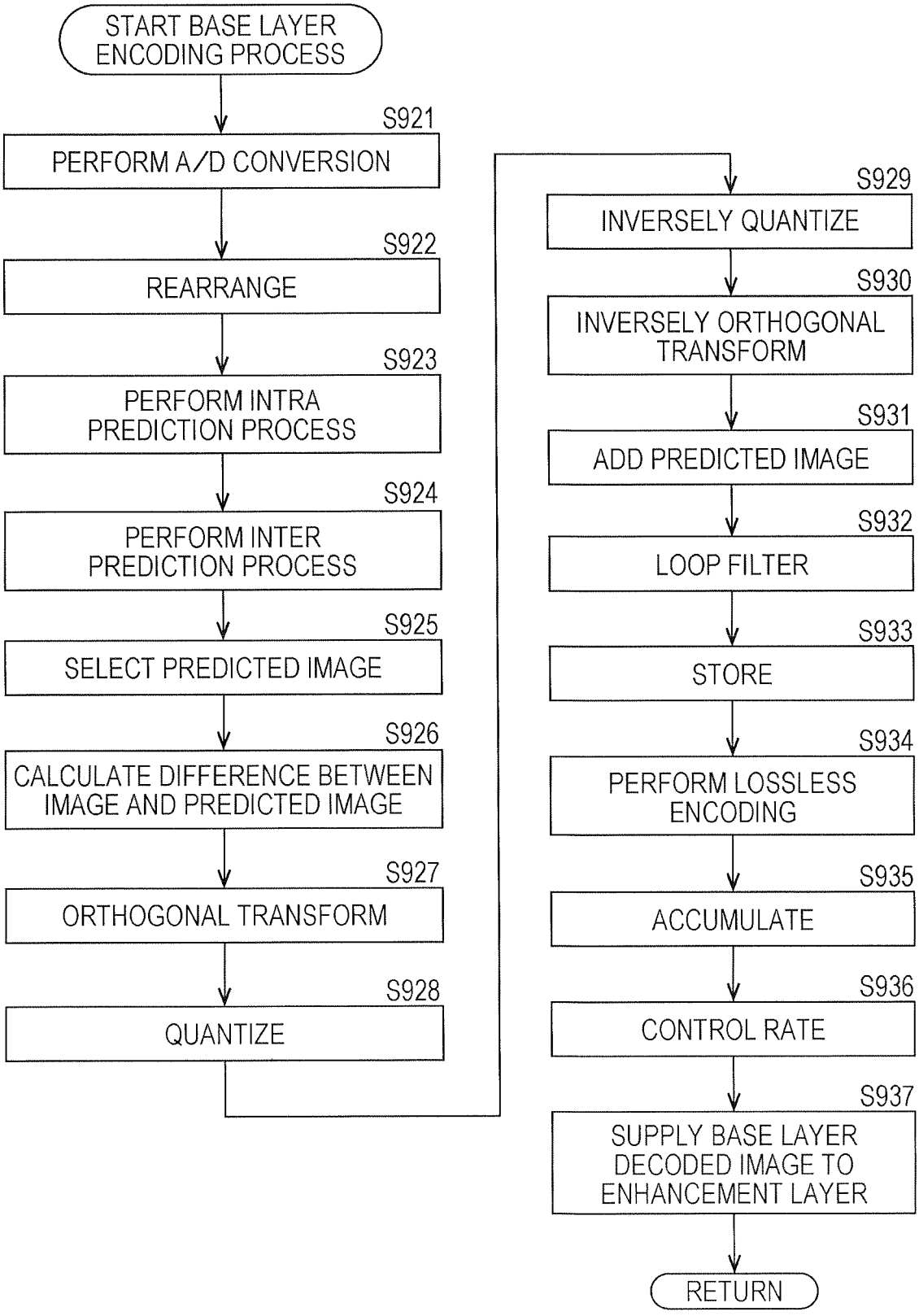

START BASE LAYER ENCODING PROCESS
S921
PERFORM A/D CONVERSION
S922
REARRANGE
S923
PERFORM INTRA PREDICTION PROCESS
S924
PERFORM INTER PREDICTION PROCESS
S925
SELECT PREDICTED IMAGE
S926
CALCULATE DIFFERENCE BETWEEN IMAGE AND PREDICTED IMAGE
S927
ORTHOGONAL TRANSFORM
S928
QUANTIZE
S929
INVERSELY QUANTIZE
S930
INVERSELY ORTHOGONAL TRANSFORM
S931
ADD PREDICTED IMAGE
S932
LOOP FILTER
S933
STORE
S934
PERFORM LOSSLESS ENCODING
S935
ACCUMULATE
S936
CONTROL RATE
S937
SUPPLY BASE LAYER DECODED IMAGE TO ENHANCEMENT LAYER
RETURN

FIG. 67

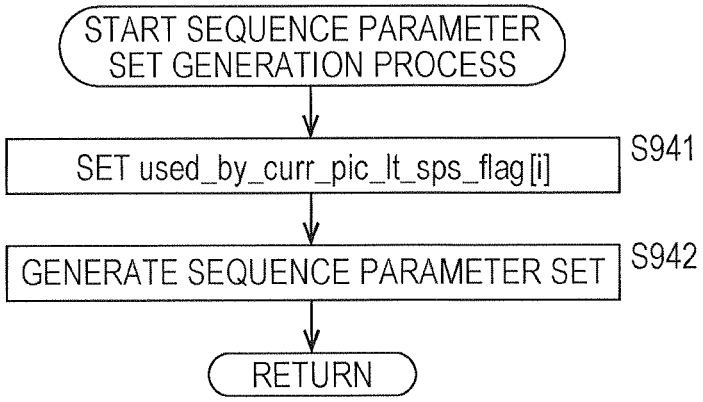

START SEQUENCE PARAMETER SET GENERATION PROCESS
SET used_by_curr_pic_lt_sps_flag[i]
S941
GENERATE SEQUENCE PARAMETER SET
S942
RETURN

FIG. 68

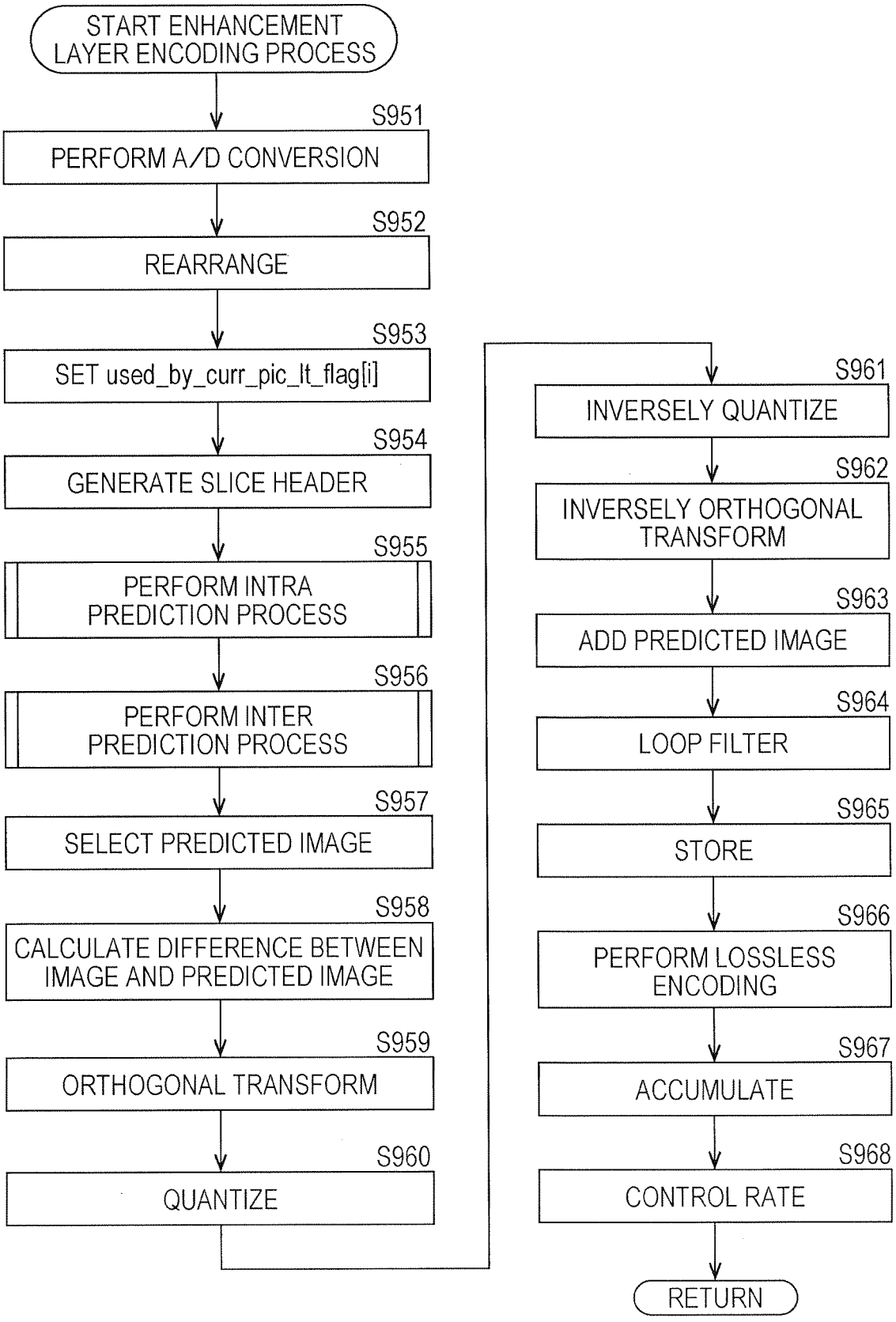

START ENHANCEMENT LAYER ENCODING PROCESS
S951
PERFORM A/D CONVERSION
S952
REARRANGE
S953
SET used_by_curr_pic_lt_flag[i]
S954
GENERATE SLICE HEADER
S955
PERFORM INTRA PREDICTION PROCESS
S956
PERFORM INTER PREDICTION PROCESS
S957
SELECT PREDICTED IMAGE
S958
CALCULATE DIFFERENCE BETWEEN IMAGE AND PREDICTED IMAGE
S959
ORTHOGONAL TRANSFORM
S960
QUANTIZE
S961
INVERSELY QUANTIZE
S962
INVERSELY ORTHOGONAL TRANSFORM
S963
ADD PREDICTED IMAGE
S964
LOOP FILTER
S965
STORE
S966
PERFORM LOSSLESS ENCODING
S967
ACCUMULATE
S968
CONTROL RATE
RETURN

FIG. 69

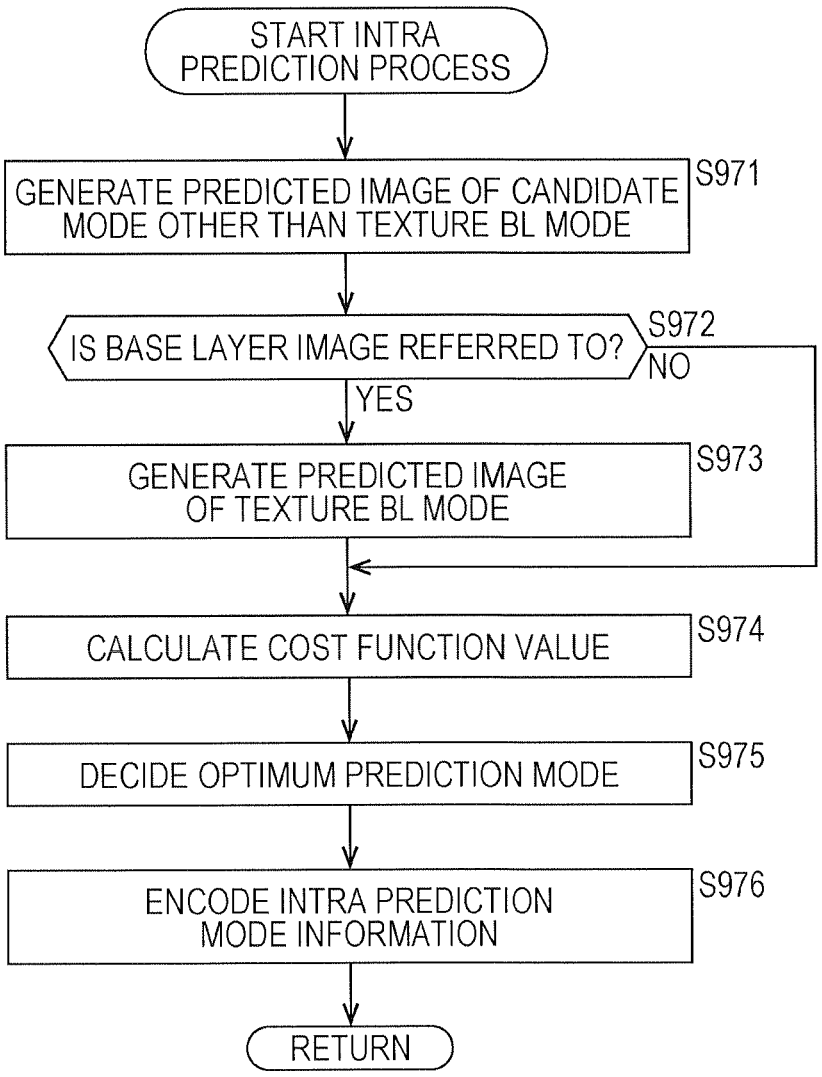

START INTRA PREDICTION PROCESS
GENERATE PREDICTED IMAGE OF CANDIDATE MODE OTHER THAN TEXTURE BL MODE
S971
IS BASE LAYER IMAGE REFERRED TO?
S972
NO
YES
GENERATE PREDICTED IMAGE OF TEXTURE BL MODE
S973
CALCULATE COST FUNCTION VALUE
S974
DECIDE OPTIMUM PREDICTION MODE
S975
ENCODE INTRA PREDICTION MODE INFORMATION
S976
RETURN

FIG. 70

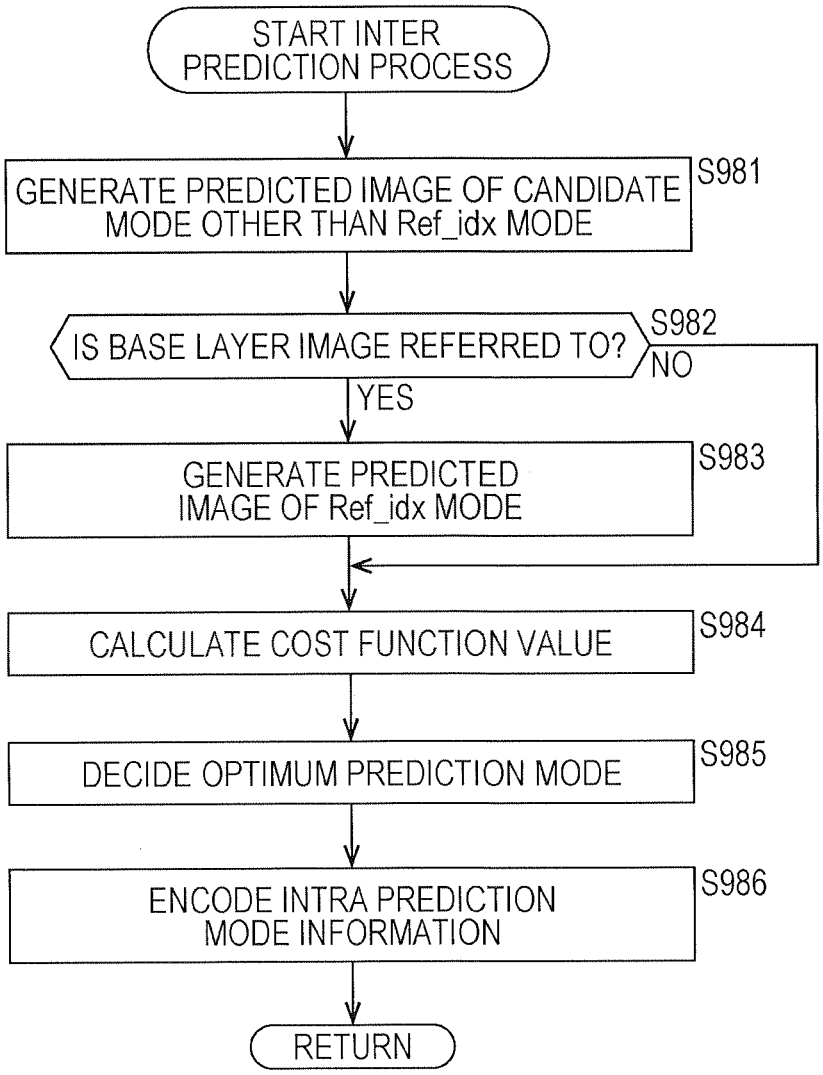

START INTER PREDICTION PROCESS
GENERATE PREDICTED IMAGE OF CANDIDATE MODE OTHER THAN Ref_idx MODE
S981
IS BASE LAYER IMAGE REFERRED TO?
S982
NO
YES
GENERATE PREDICTED IMAGE OF Ref_idx MODE
S983
CALCULATE COST FUNCTION VALUE
S984
DECIDE OPTIMUM PREDICTION MODE
S985
ENCODE INTRA PREDICTION MODE INFORMATION
S986
RETURN

FIG. 71

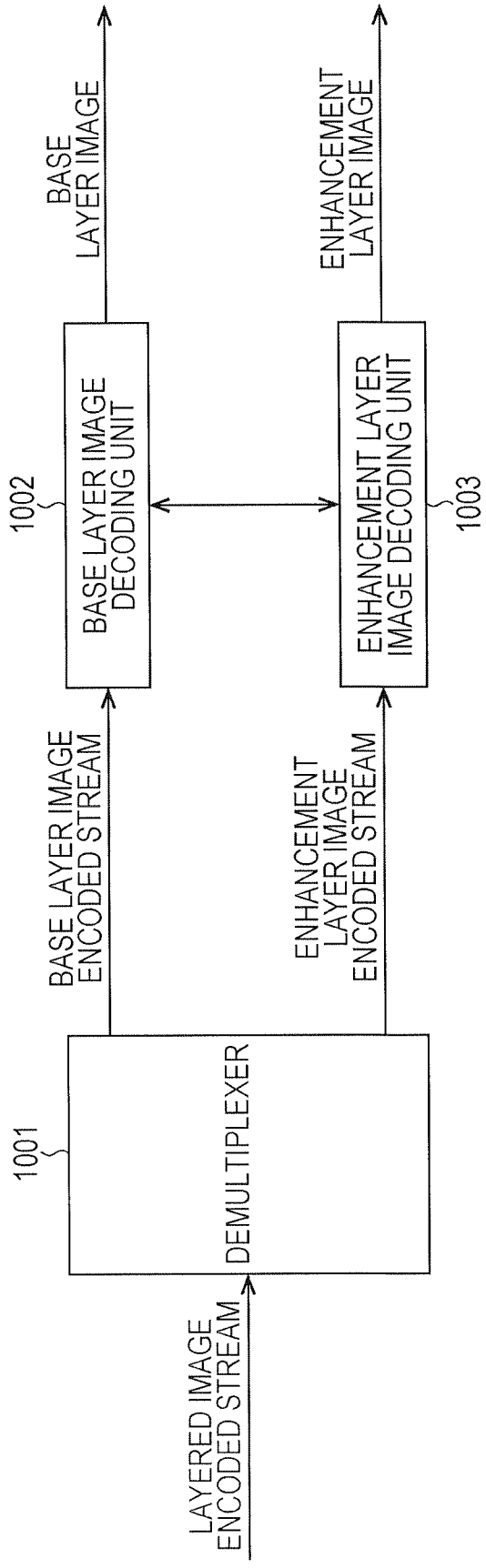

LAYERED IMAGE ENCODED STREAM
1001
DEMULTIPLEXER
BASE LAYER IMAGE ENCODED STREAM
ENHANCEMENT LAYER IMAGE ENCODED STREAM
1002
BASE LAYER IMAGE DECODING UNIT
1003
ENHANCEMENT LAYER IMAGE DECODING UNIT
BASE LAYER IMAGE
ENHANCEMENT LAYER IMAGE
1000

FIG. 72

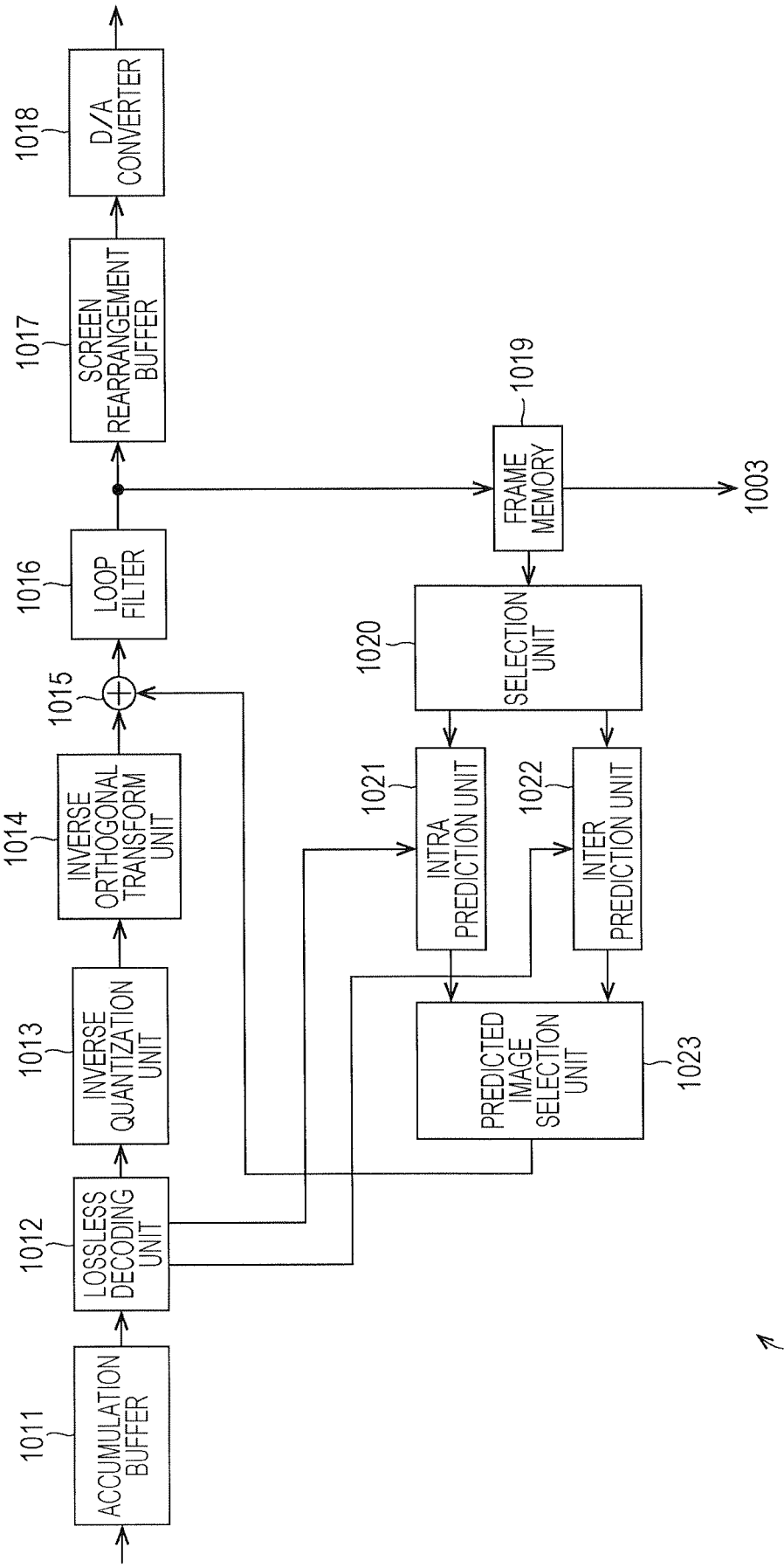

1002
1011
ACCUMULATION BUFFER
1012
LOSSLESS DECODING UNIT
1013
INVERSE QUANTIZATION UNIT
1014
INVERSE ORTHOGONAL TRANSFORM UNIT
1015
1016
LOOP FILTER
1017
SCREEN REARRANGEMENT BUFFER
1018
D/A CONVERTER
1019
FRAME MEMORY
1003
1020
SELECTION UNIT
1021
INTRA PREDICTION UNIT
1022
INTER PREDICTION UNIT
1023
PREDICTED IMAGE SELECTION UNIT

FIG. 73

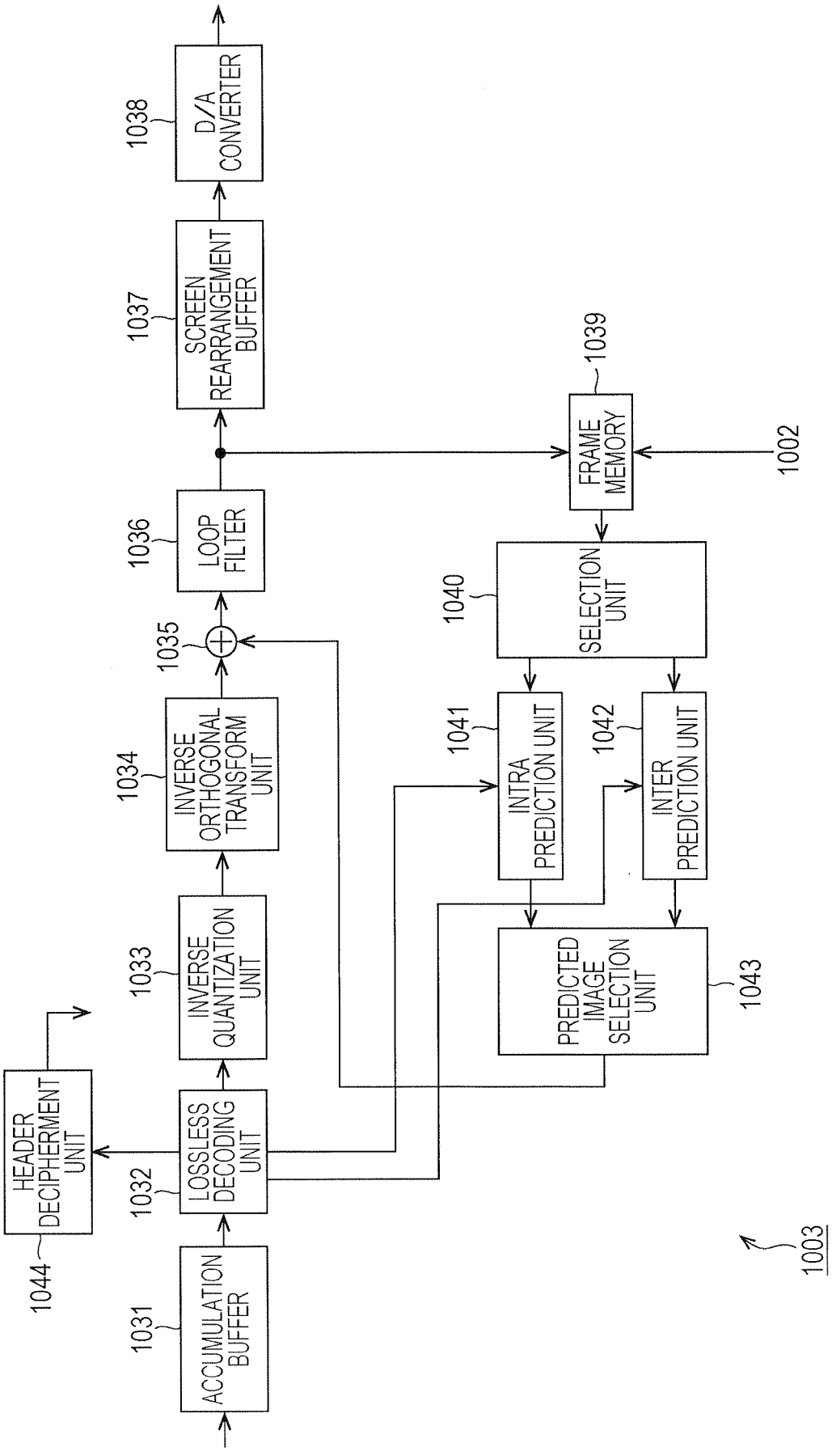

ACCUMULATION BUFFER
1031
LOSSLESS DECODING UNIT
1032
INVERSE QUANTIZATION UNIT
1033
INVERSE ORTHOGONAL TRANSFORM UNIT
1034
1035
LOOP FILTER
1036
SCREEN REARRANGEMENT BUFFER
1037
D/A CONVERTER
1038
FRAME MEMORY
1039
1002
SELECTION UNIT
1040
INTRA PREDICTION UNIT
1041
INTER PREDICTION UNIT
1042
PREDICTED IMAGE SELECTION UNIT
1043
HEADER DECIPHERMENT UNIT
1044
1003

FIG. 74

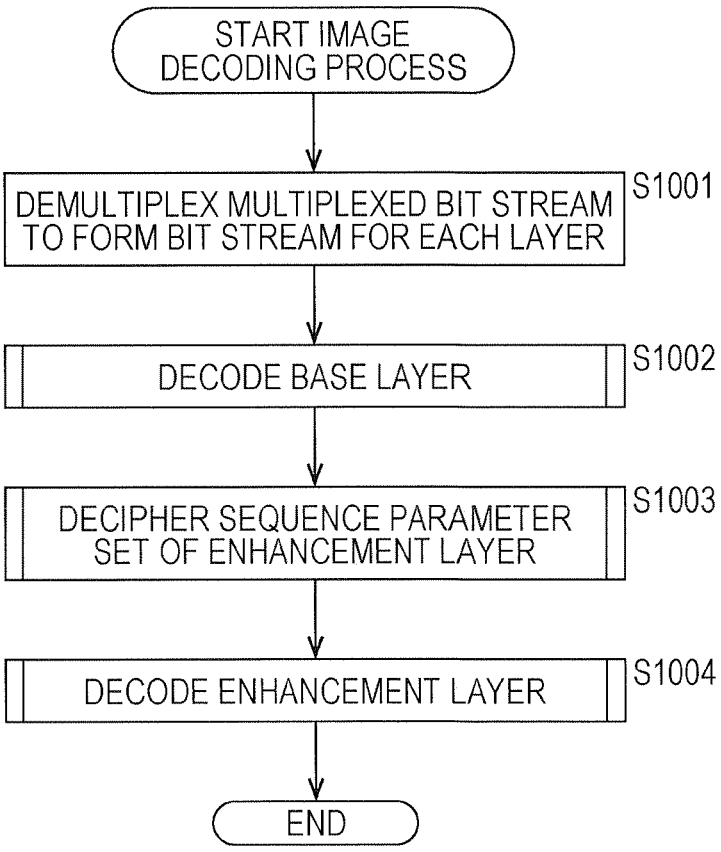

START IMAGE DECODING PROCESS
DEMULTIPLEX MULTIPLEXED BIT STREAM TO FORM BIT STREAM FOR EACH LAYER
S1001
DECODE BASE LAYER
S1002
DECIPHER SEQUENCE PARAMETER SET OF ENHANCEMENT LAYER
S1003
DECODE ENHANCEMENT LAYER
S1004
END

FIG. 75

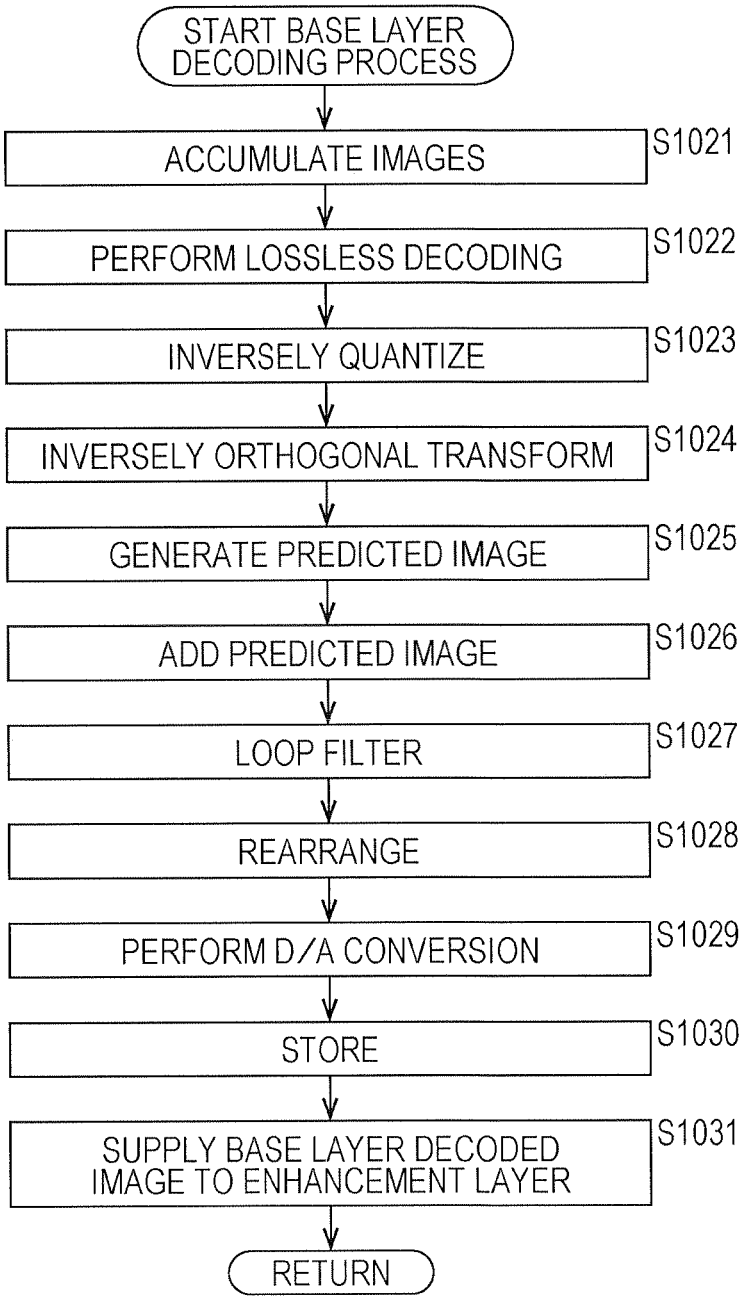

START BASE LAYER DECODING PROCESS
ACCUMULATE IMAGES
S1021
PERFORM LOSSLESS DECODING
S1022
INVERSELY QUANTIZE
S1023
INVERSELY ORTHOGONAL TRANSFORM
S1024
GENERATE PREDICTED IMAGE
S1025
ADD PREDICTED IMAGE
S1026
LOOP FILTER
S1027
REARRANGE
S1028
PERFORM D/A CONVERSION
S1029
STORE
S1030
SUPPLY BASE LAYER DECODED IMAGE TO ENHANCEMENT LAYER
S1031
RETURN

FIG. 76

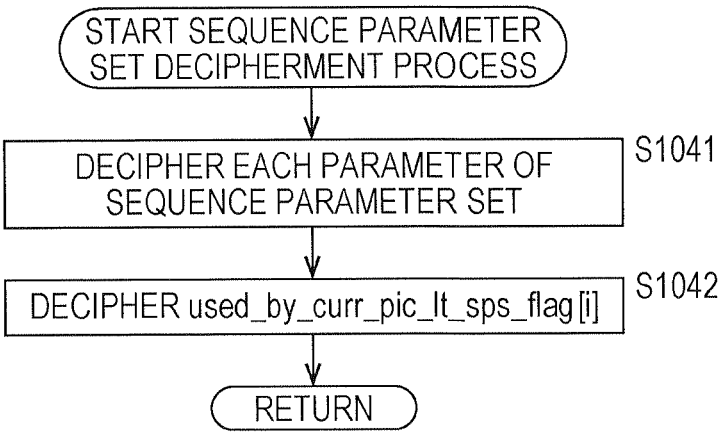

START SEQUENCE PARAMETER SET DECIPHERMENT PROCESS
DECIPHER EACH PARAMETER OF SEQUENCE PARAMETER SET
S1041
DECIPHER used_by_curr_pic_lt_sps_flag[i]
S1042
RETURN

FIG. 77

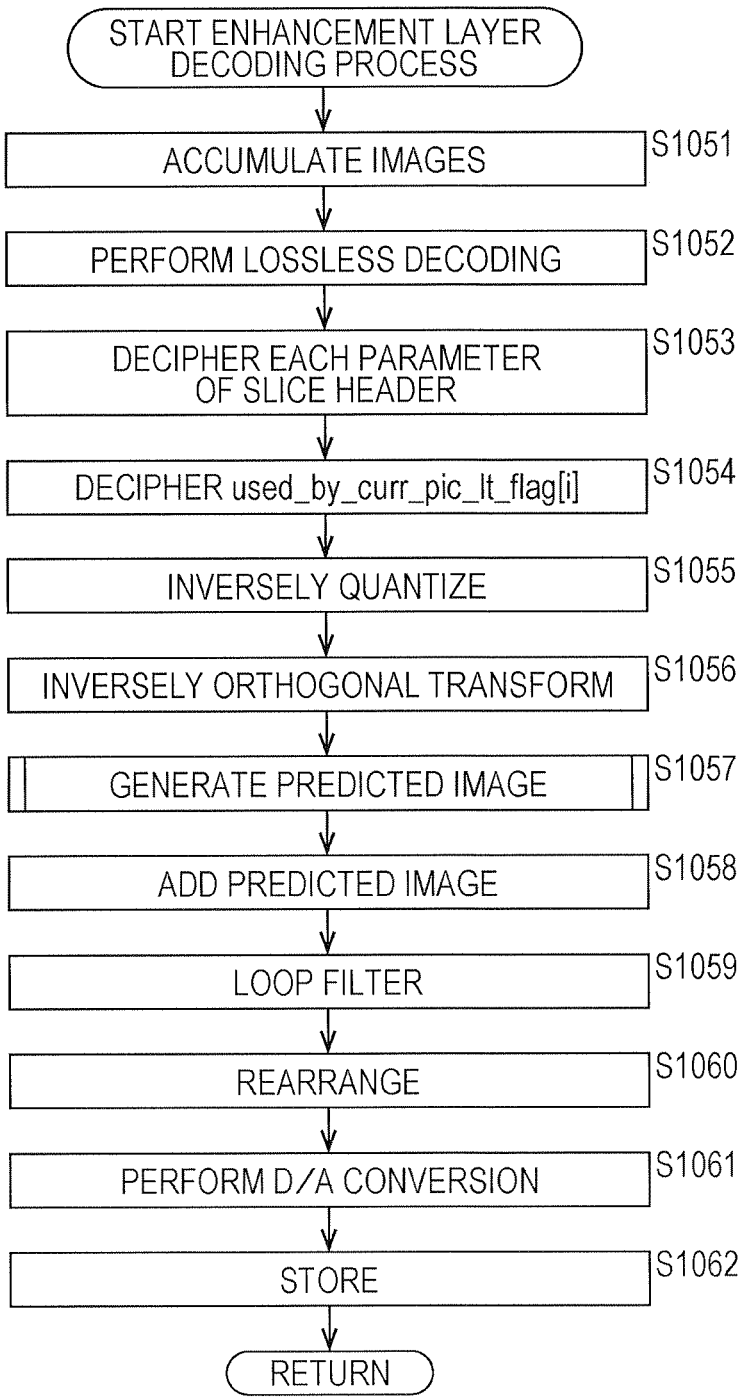

START ENHANCEMENT LAYER DECODING PROCESS
ACCUMULATE IMAGES
S1051
PERFORM LOSSLESS DECODING
S1052
DECIPHER EACH PARAMETER OF SLICE HEADER
S1053
DECIPHER used_by_curr_pic_lt_flag[i]
S1054
INVERSELY QUANTIZE
S1055
INVERSELY ORTHOGONAL TRANSFORM
S1056
GENERATE PREDICTED IMAGE
S1057
ADD PREDICTED IMAGE
S1058
LOOP FILTER
S1059
REARRANGE
S1060
PERFORM D/A CONVERSION
S1061
STORE
S1062
RETURN

FIG. 78

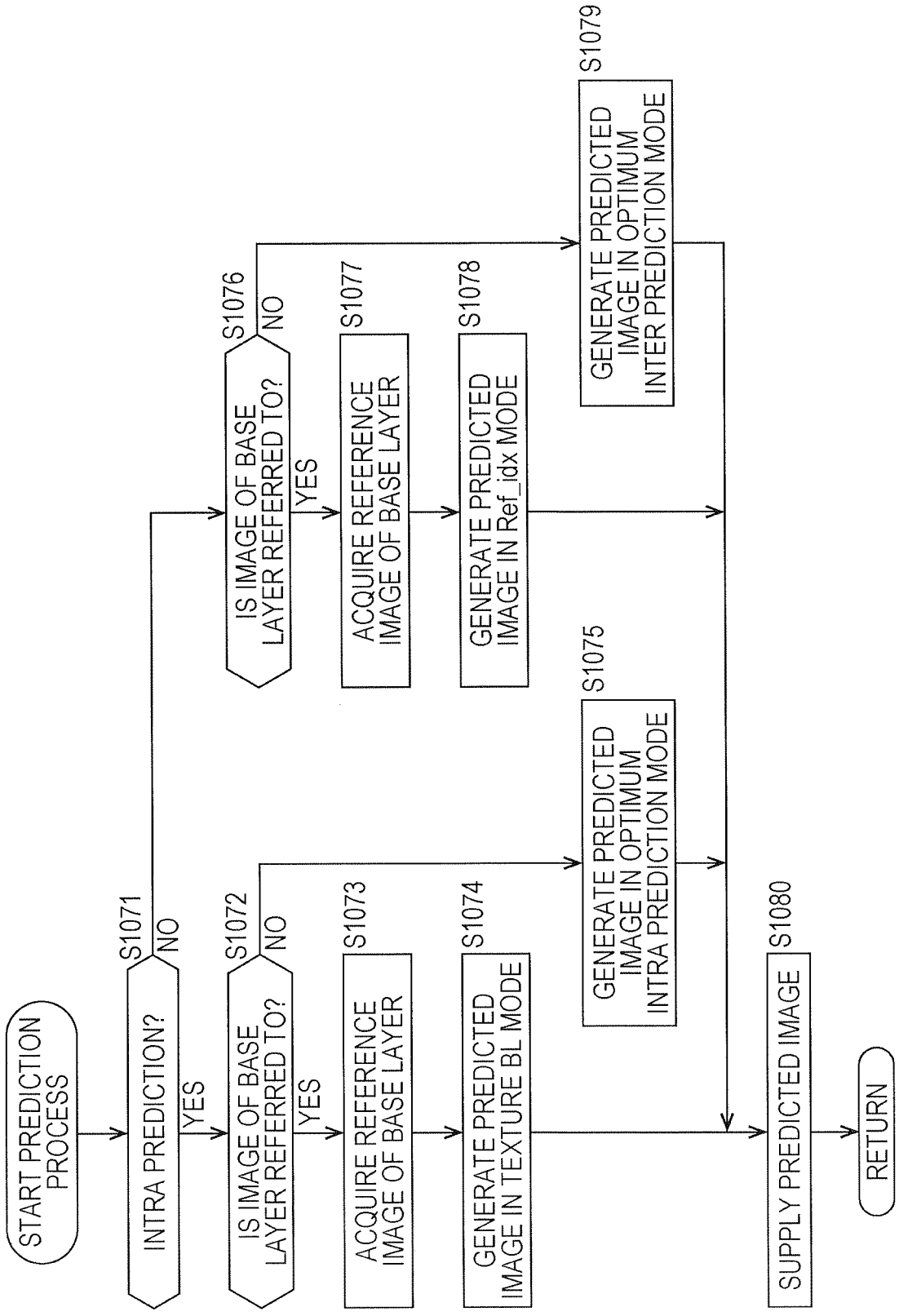

START PREDICTION PROCESS
INTRA PREDICTION?
S1071
NO
YES
IS IMAGE OF BASE LAYER REFERRED TO?
S1072
NO
YES
ACQUIRE REFERENCE IMAGE OF BASE LAYER
S1073
GENERATE PREDICTED IMAGE IN TEXTURE BL MODE
S1074
IS IMAGE OF BASE LAYER REFERRED TO?
S1076
NO
YES
ACQUIRE REFERENCE IMAGE OF BASE LAYER
S1077
GENERATE PREDICTED IMAGE IN Ref_idx MODE
S1078
GENERATE PREDICTED IMAGE IN OPTIMUM INTRA PREDICTION MODE
S1075
GENERATE PREDICTED IMAGE IN OPTIMUM INTER PREDICTION MODE
S1079
SUPPLY PREDICTED IMAGE
S1080
RETURN

FIG. 79

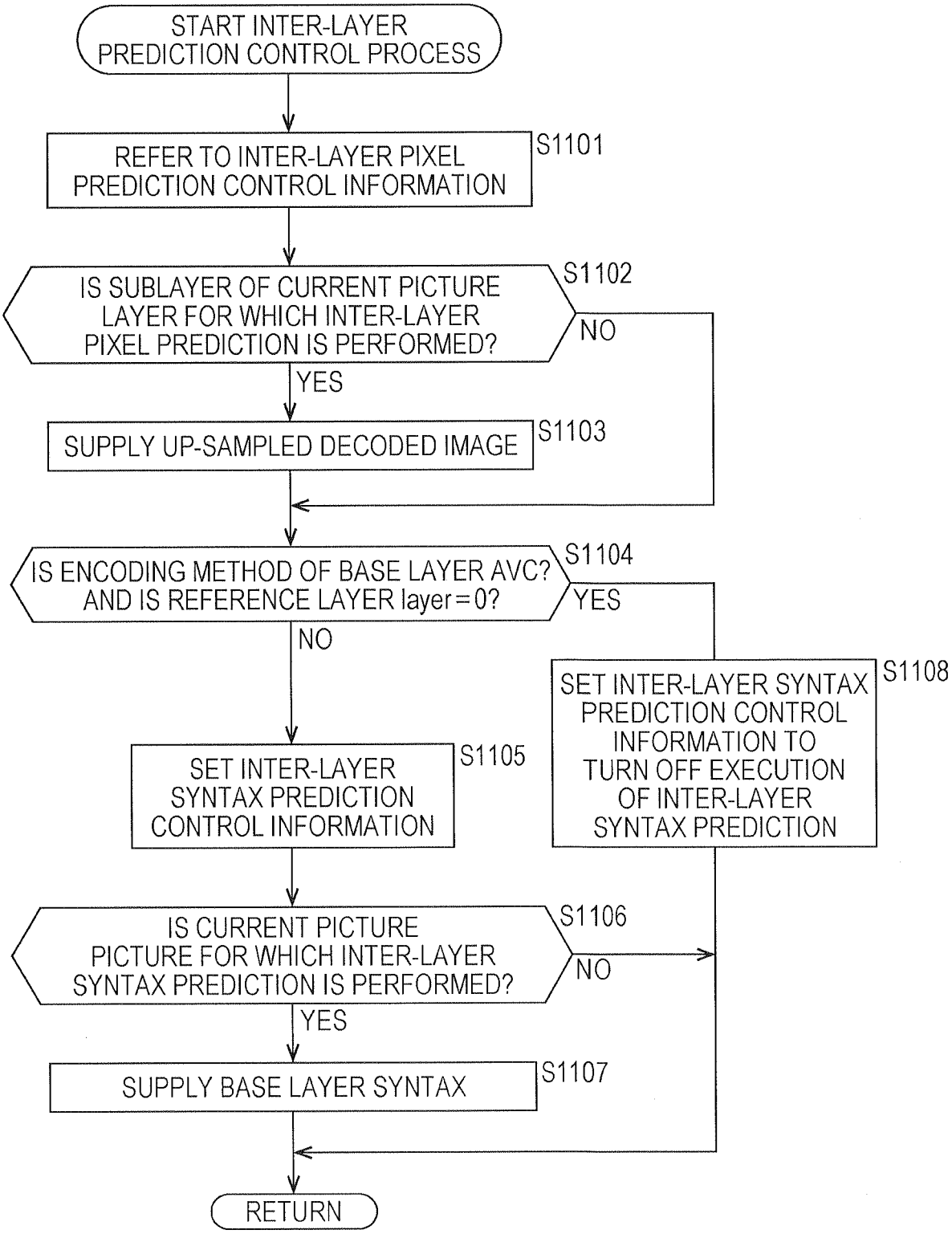

START INTER-LAYER PREDICTION CONTROL PROCESS
REFER TO INTER-LAYER PIXEL PREDICTION CONTROL INFORMATION
S1101
IS SUBLAYER OF CURRENT PICTURE LAYER FOR WHICH INTER-LAYER PIXEL PREDICTION IS PERFORMED?
S1102
NO
YES
SUPPLY UP-SAMPLED DECODED IMAGE
S1103
IS ENCODING METHOD OF BASE LAYER AVC? AND IS REFERENCE LAYER layer = 0?
S1104
YES
NO
SET INTER-LAYER SYNTAX PREDICTION CONTROL INFORMATION TO TURN OFF EXECUTION OF INTER-LAYER SYNTAX PREDICTION
S1108
SET INTER-LAYER SYNTAX PREDICTION CONTROL INFORMATION
S1105
IS CURRENT PICTURE PICTURE FOR WHICH INTER-LAYER SYNTAX PREDICTION IS PERFORMED?
S1106
NO
YES
SUPPLY BASE LAYER SYNTAX
S1107
RETURN

FIG. 80

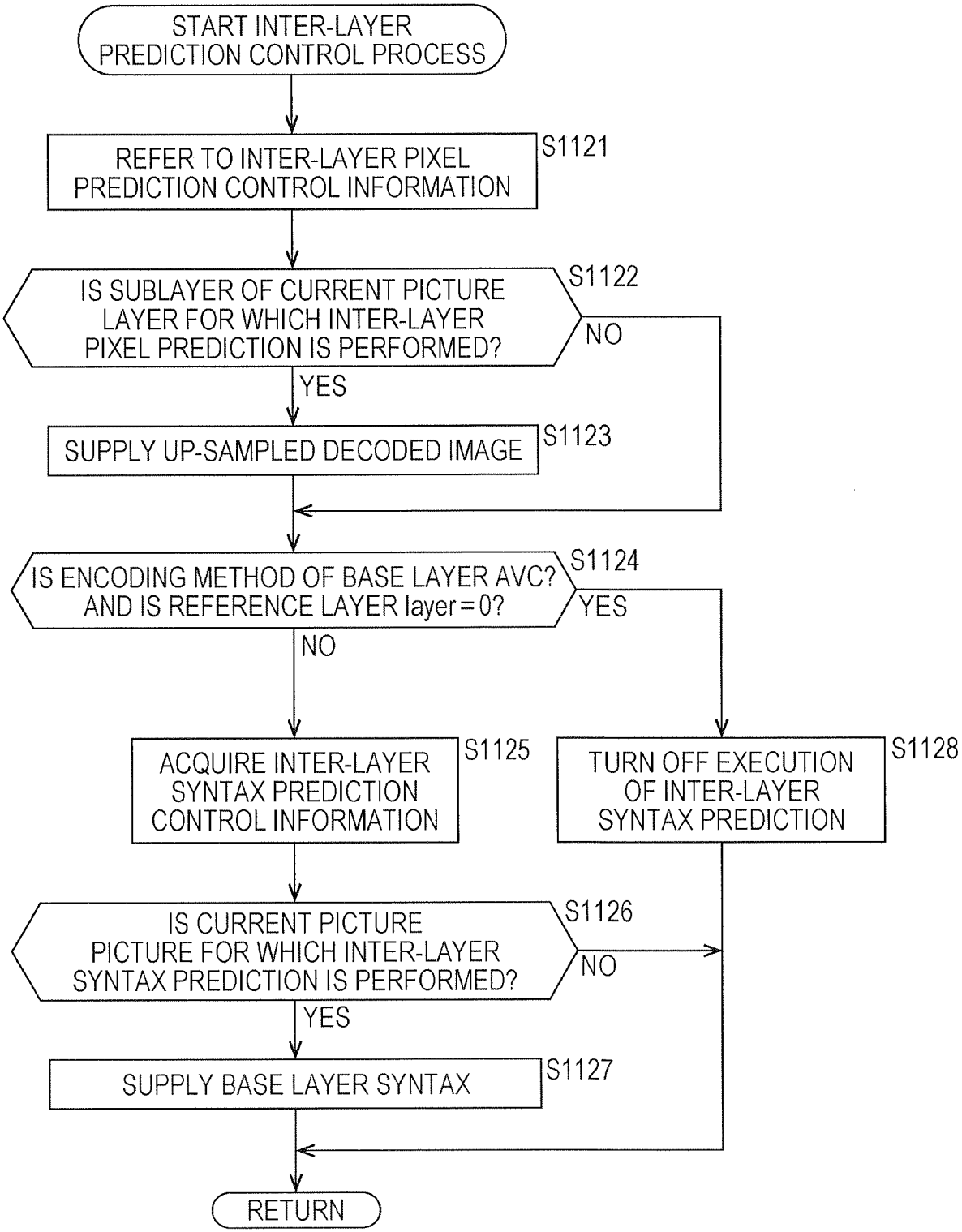

START INTER-LAYER PREDICTION CONTROL PROCESS
REFER TO INTER-LAYER PIXEL PREDICTION CONTROL INFORMATION
S1121
IS SUBLAYER OF CURRENT PICTURE LAYER FOR WHICH INTER-LAYER PIXEL PREDICTION IS PERFORMED?
S1122
NO
YES
SUPPLY UP-SAMPLED DECODED IMAGE
S1123
IS ENCODING METHOD OF BASE LAYER AVC? AND IS REFERENCE LAYER layer = 0?
S1124
YES
NO
ACQUIRE INTER-LAYER SYNTAX PREDICTION CONTROL INFORMATION
S1125
TURN OFF EXECUTION OF INTER-LAYER SYNTAX PREDICTION
S1128
IS CURRENT PICTURE PICTURE FOR WHICH INTER-LAYER SYNTAX PREDICTION IS PERFORMED?
S1126
NO
YES
SUPPLY BASE LAYER SYNTAX
S1127
RETURN

FIG. 81

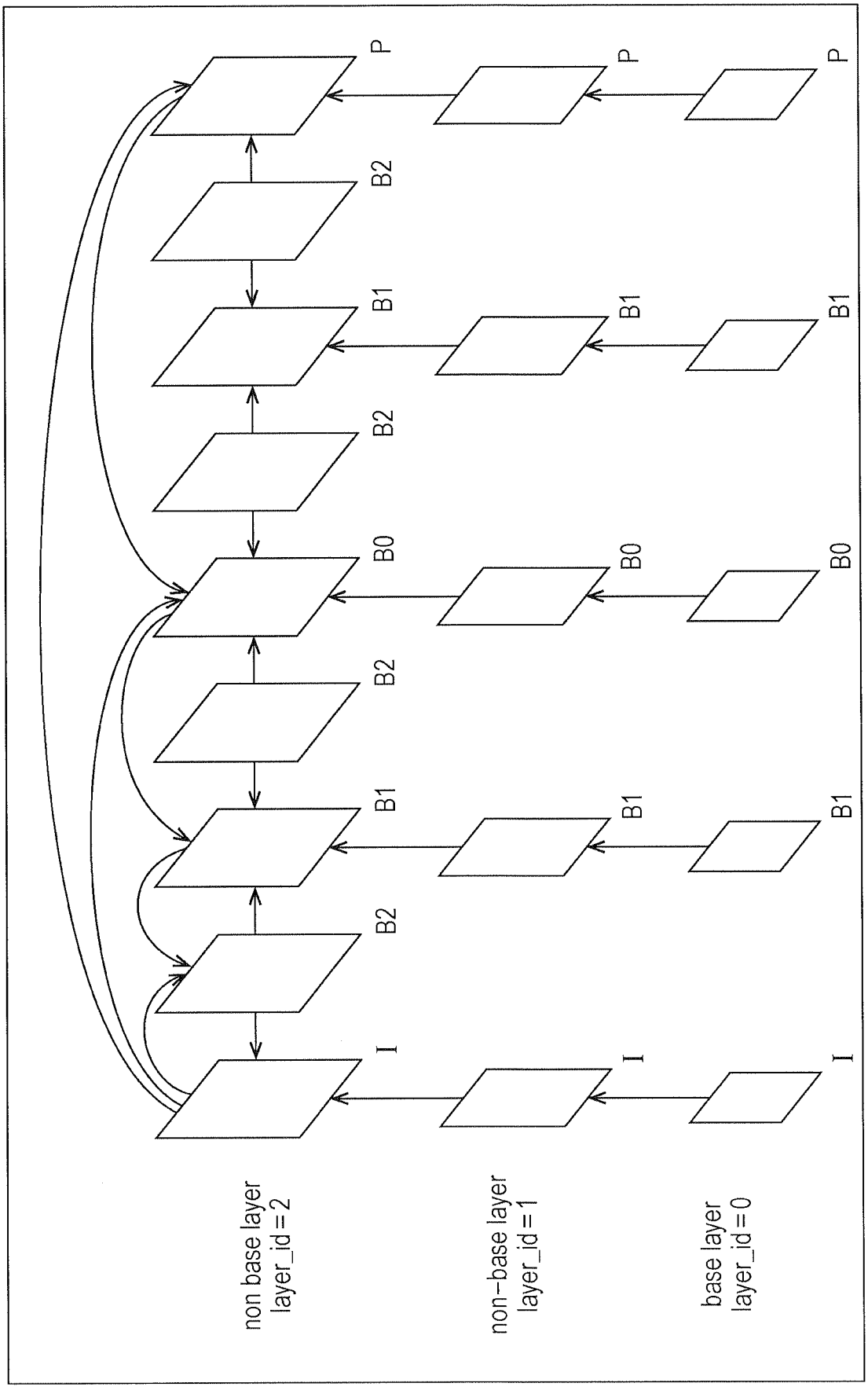

P
B2
B1
B2
B0
B2
B1
B2
I
non base layer
layer_id = 2
non-base layer
layer_id = 1
base layer
layer_id = 0

FIG. 82

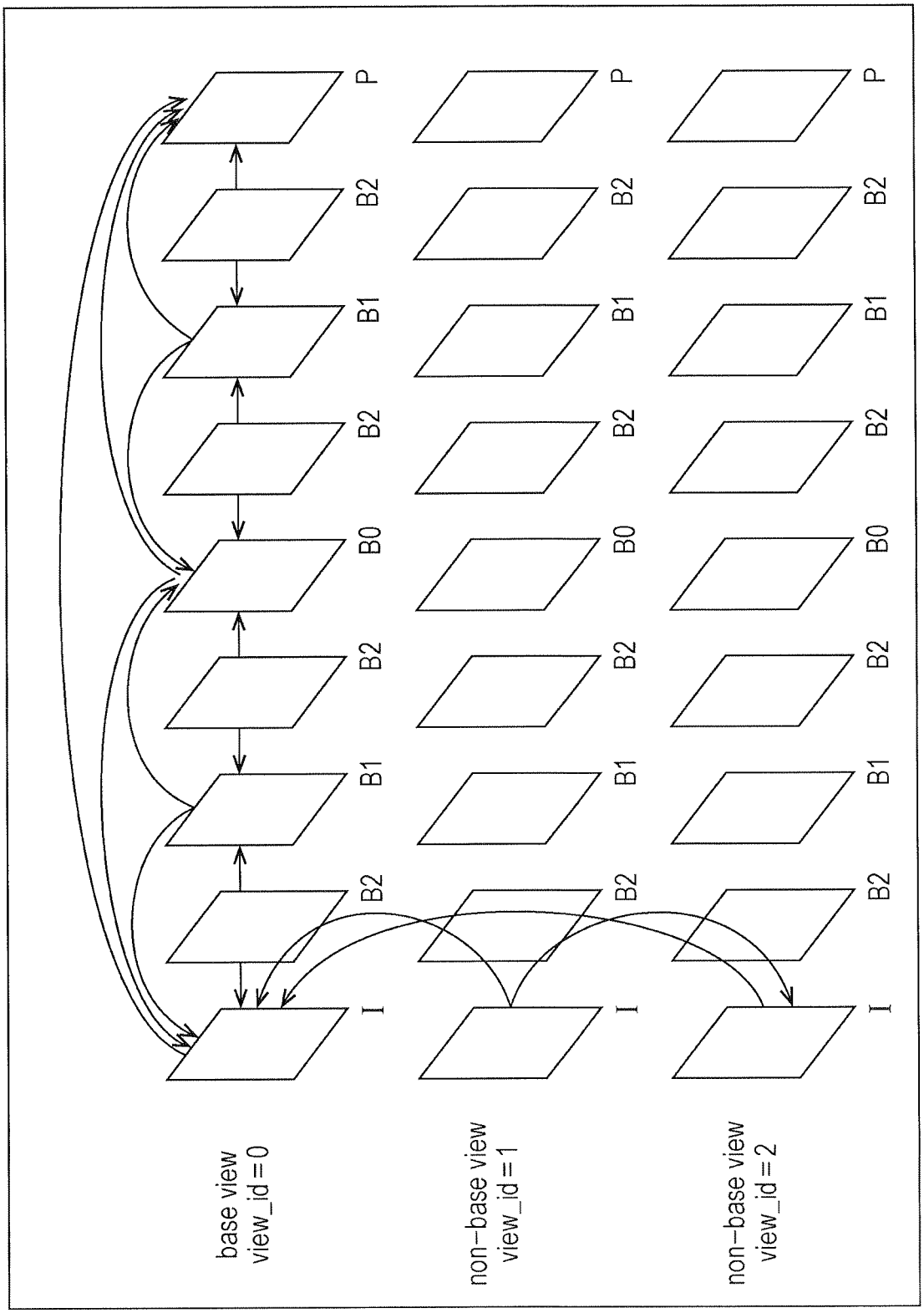

base view
view_id = 0
non−base view
view_id = 1
non−base view
view_id = 2
I
B2
B1
B2
B0
B2
B1
B2
P

FIG. 83

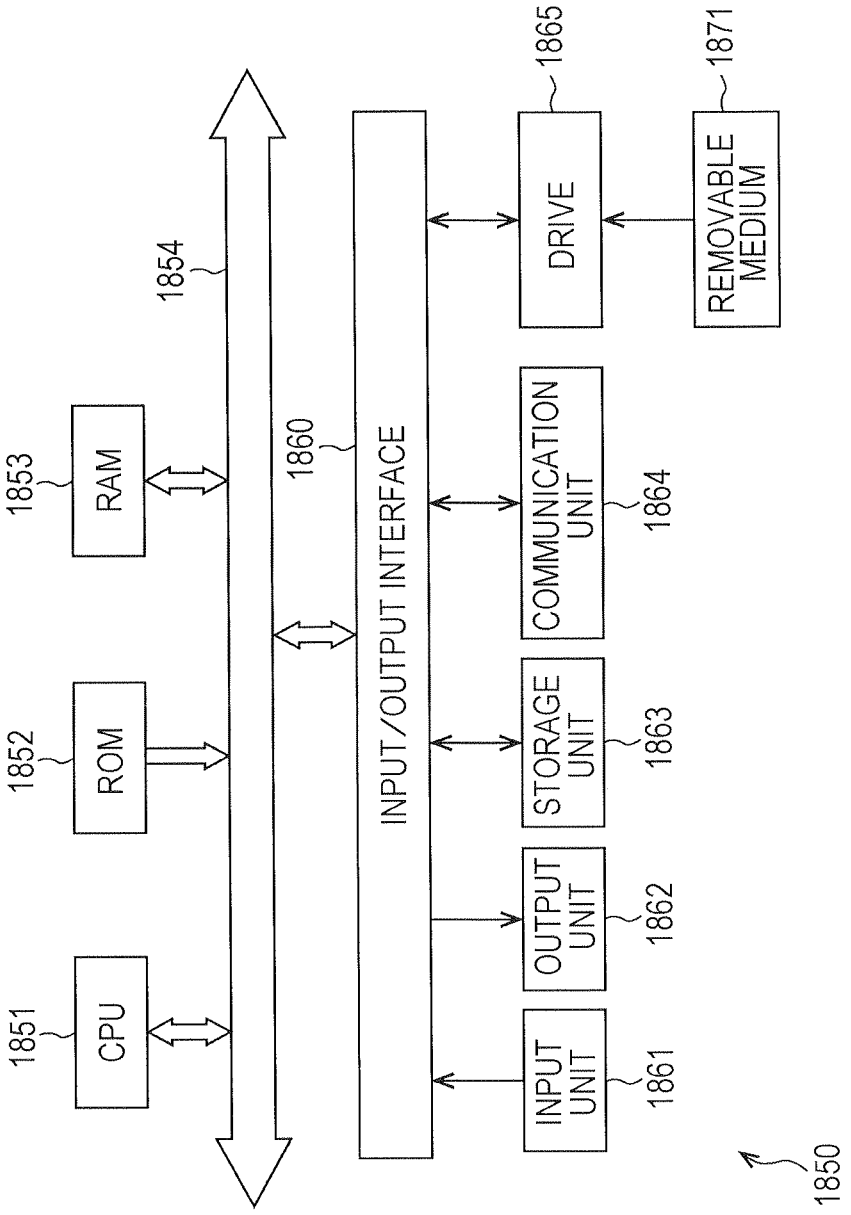

1850
1851
CPU
1852
ROM
1853
RAM
1854
1860
INPUT/OUTPUT INTERFACE
1861
INPUT UNIT
1862
OUTPUT UNIT
1863
STORAGE UNIT
1864
COMMUNICATION UNIT
1865
DRIVE
1871
REMOVABLE MEDIUM

FIG. 84

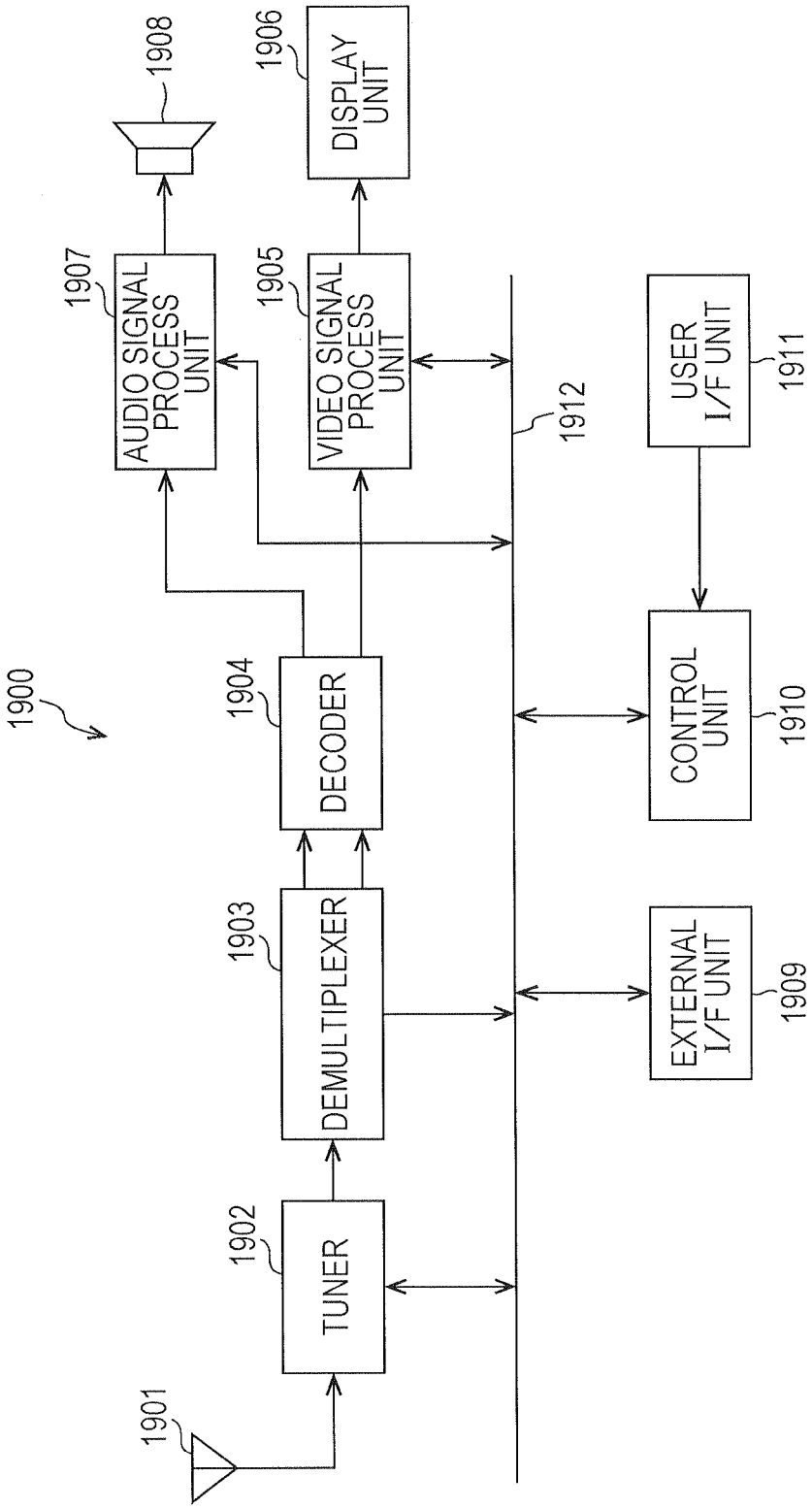

1900
1901
ANTENNA
1902
TUNER
1903
DEMULTIPLEXER
1904
DECODER
1905
VIDEO SIGNAL PROCESS UNIT
1906
DISPLAY UNIT
1907
AUDIO SIGNAL PROCESS UNIT
1908
1909
EXTERNAL I/F UNIT
1910
CONTROL UNIT
1911
USER I/F UNIT
1912

FIG. 85

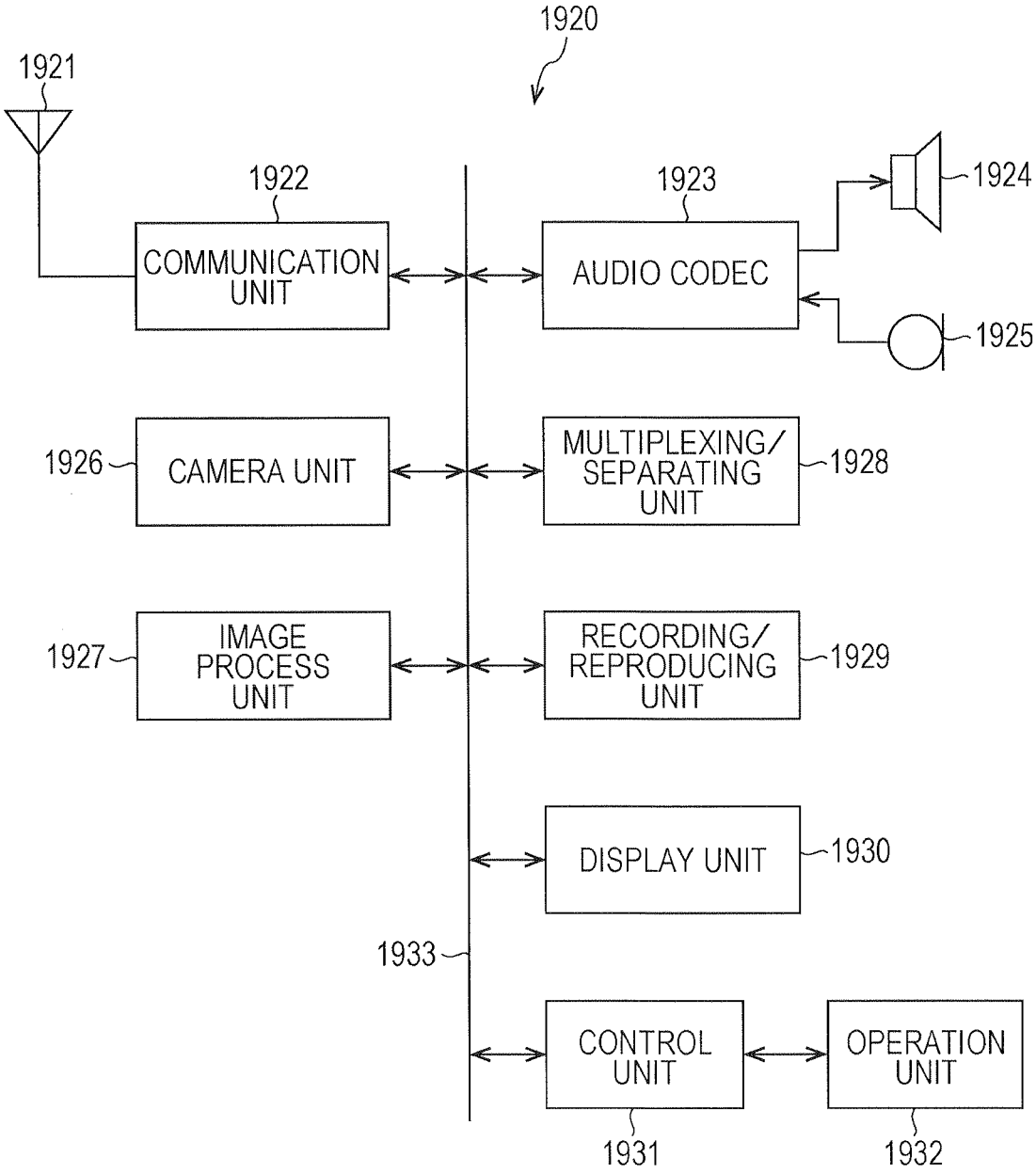

1920
1921
1922
1923
1924
1925
COMMUNICATION UNIT
AUDIO CODEC
1926
CAMERA UNIT
MULTIPLEXING/ SEPARATING UNIT
1928
1927
IMAGE PROCESS UNIT
RECORDING/ REPRODUCING UNIT
1929
DISPLAY UNIT
1930
1933
CONTROL UNIT
OPERATION UNIT
1931
1932

FIG. 86

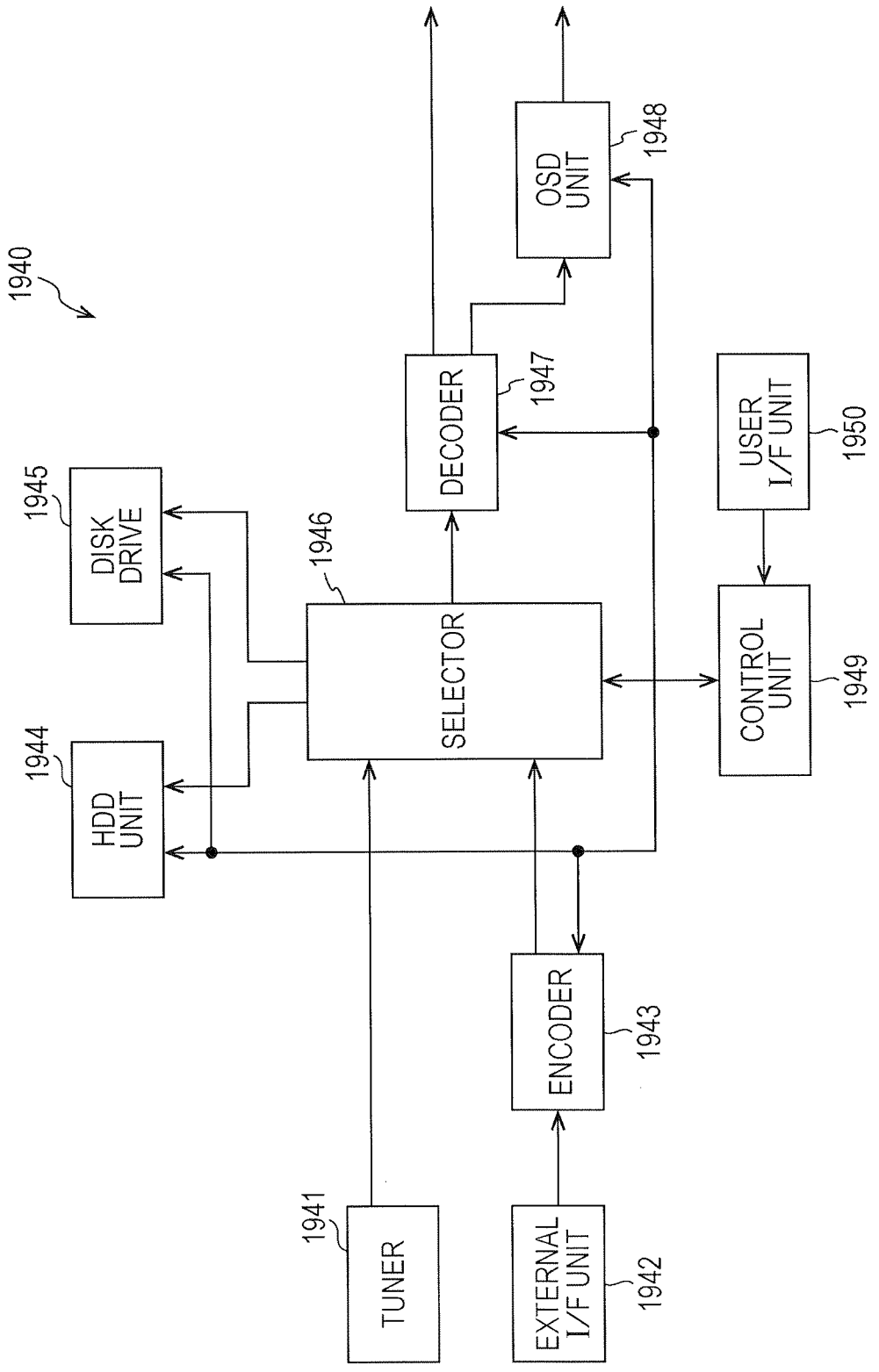

1940
1941
TUNER
1942
EXTERNAL I/F UNIT
1943
ENCODER
1944
HDD UNIT
1945
DISK DRIVE
1946
SELECTOR
1947
DECODER
1948
OSD UNIT
1949
CONTROL UNIT
1950
USER I/F UNIT

FIG. 87

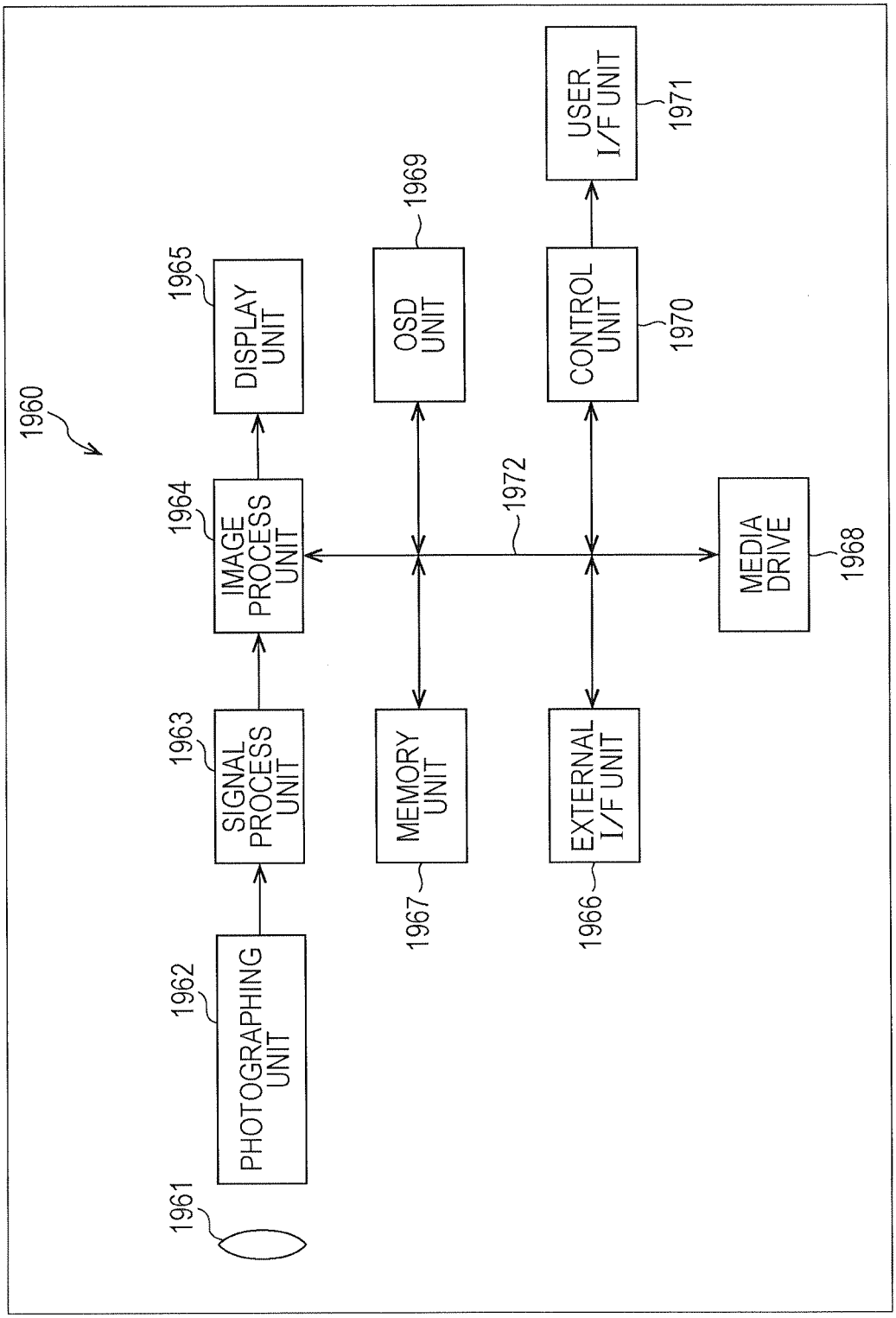

1960
1961
PHOTOGRAPHING UNIT
1962
SIGNAL PROCESS UNIT
1963
IMAGE PROCESS UNIT
1964
DISPLAY UNIT
1965
MEMORY UNIT
1967
EXTERNAL I/F UNIT
1966
OSD UNIT
1969
CONTROL UNIT
1970
USER I/F UNIT
1971
1972
MEDIA DRIVE
1968

FIG. 88

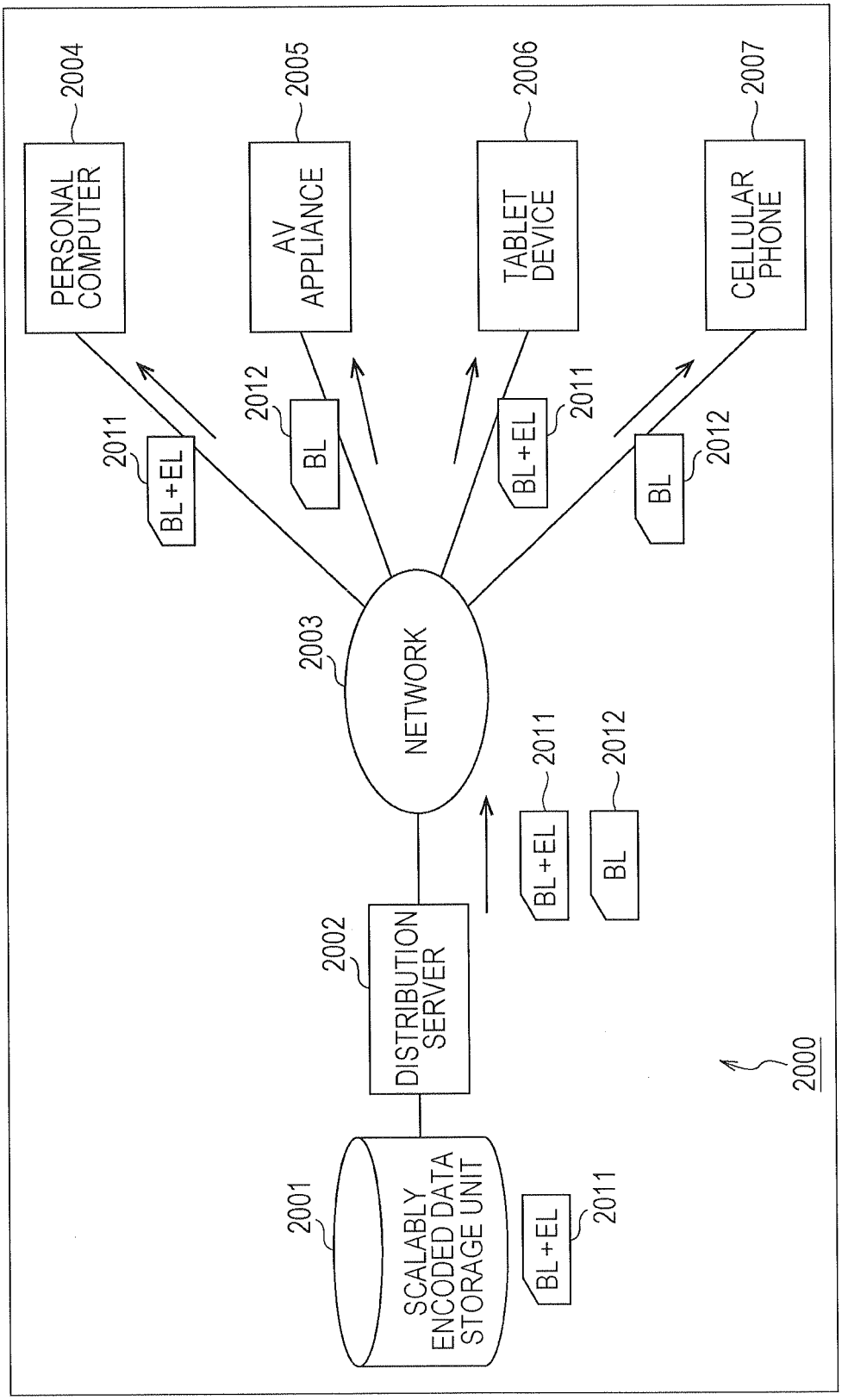

2000
2001
SCALABLY ENCODED DATA STORAGE UNIT
BL+EL
2011
2002
DISTRIBUTION SERVER
2003
NETWORK
BL+EL
2011
BL
2012
2004
PERSONAL COMPUTER
2005
AV APPLIANCE
2006
TABLET DEVICE
2007
CELLULAR PHONE
BL+EL
2011
BL
2012
BL+EL
2011
BL
2012

FIG. 89

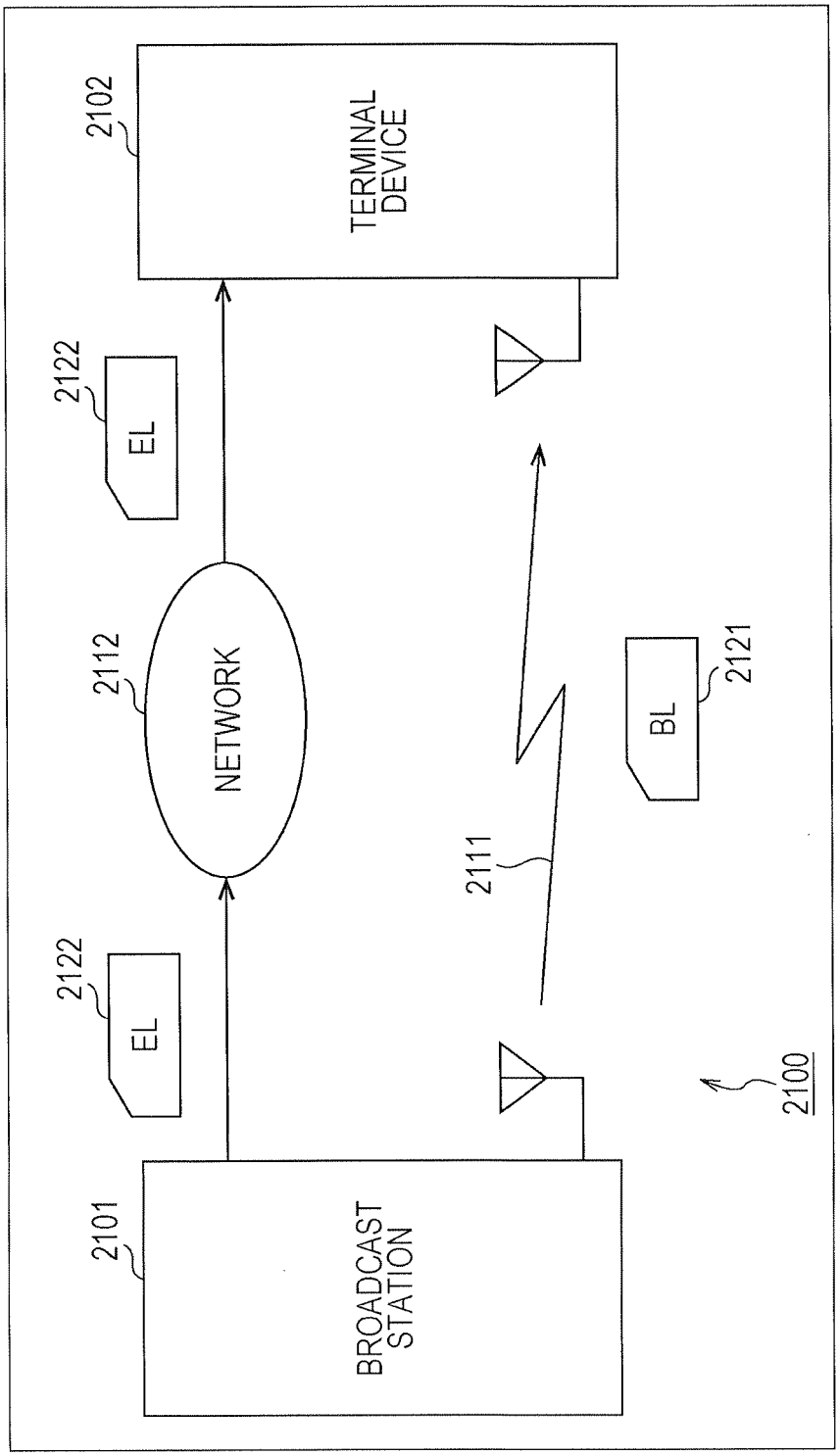

2102
TERMINAL DEVICE
2122
EL
2112
NETWORK
2111
2121
BL
2122
EL
2101
BROADCAST STATION
2100

FIG. 90

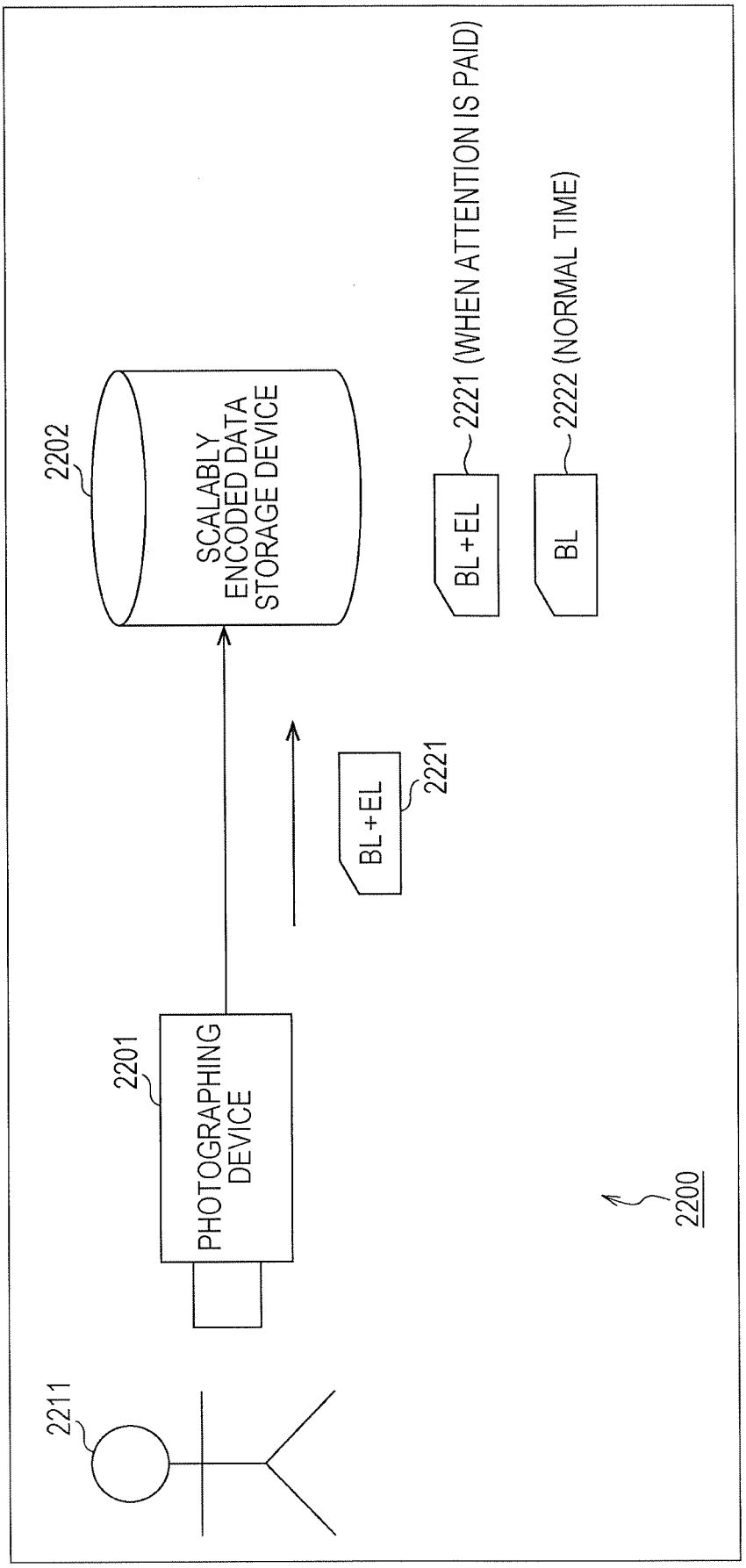

2200
2211
PHOTOGRAPHING DEVICE
2201
BL+EL
2221
SCALABLY ENCODED DATA STORAGE DEVICE
2202
BL+EL
2221 (WHEN ATTENTION IS PAID)
BL
2222 (NORMAL TIME)

FIG. 91

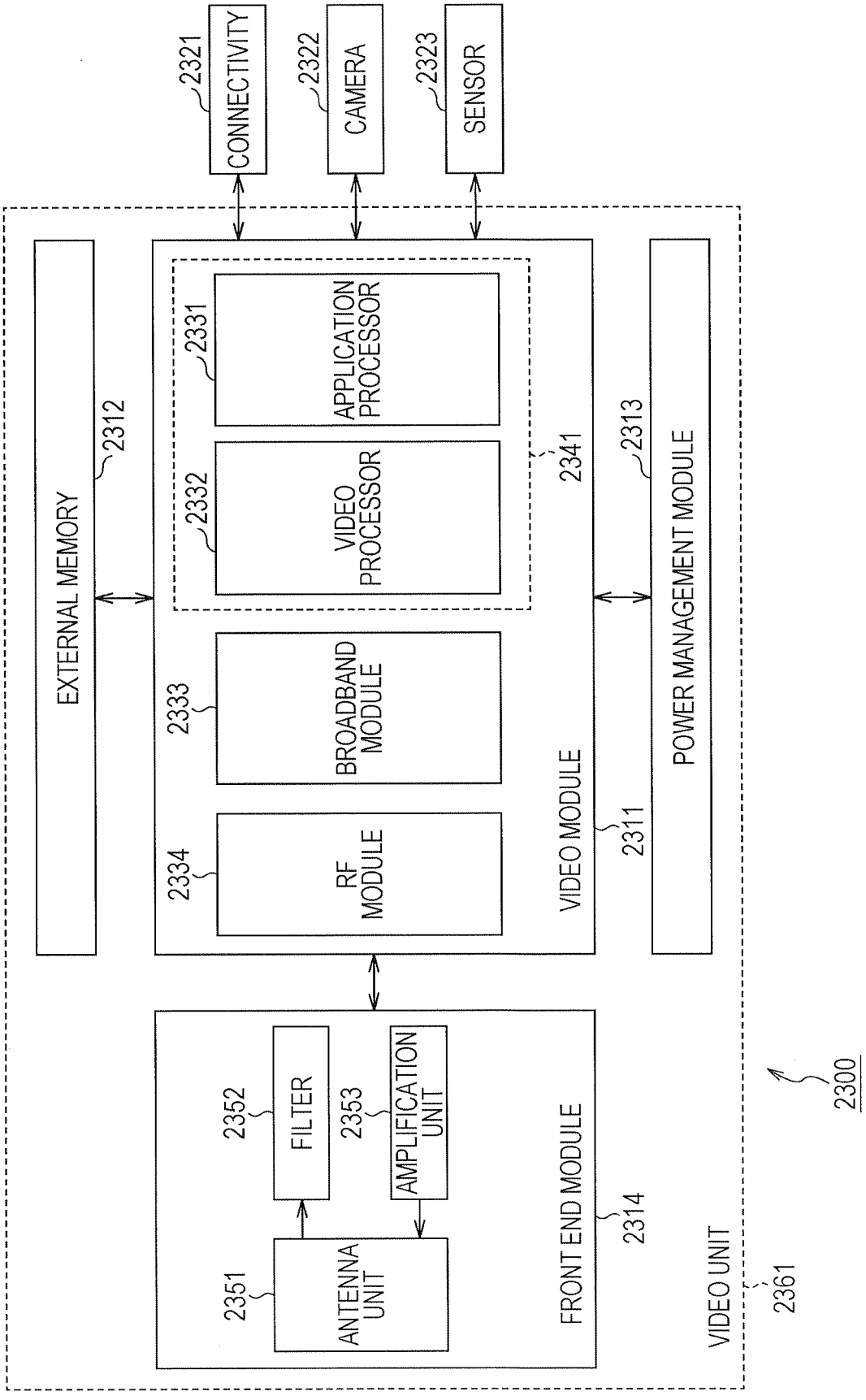

2321
CONNECTIVITY
2322
CAMERA
2323
SENSOR
EXTERNAL MEMORY
2312
2331
APPLICATION PROCESSOR
2332
VIDEO PROCESSOR
2341
2333
BROADBAND MODULE
2334
RF MODULE
VIDEO MODULE
2311
2313
POWER MANAGEMENT MODULE
2352
FILTER
2353
AMPLIFICATION UNIT
2351
ANTENNA UNIT
FRONT END MODULE
2314
VIDEO UNIT
2361
2300

FIG. 92

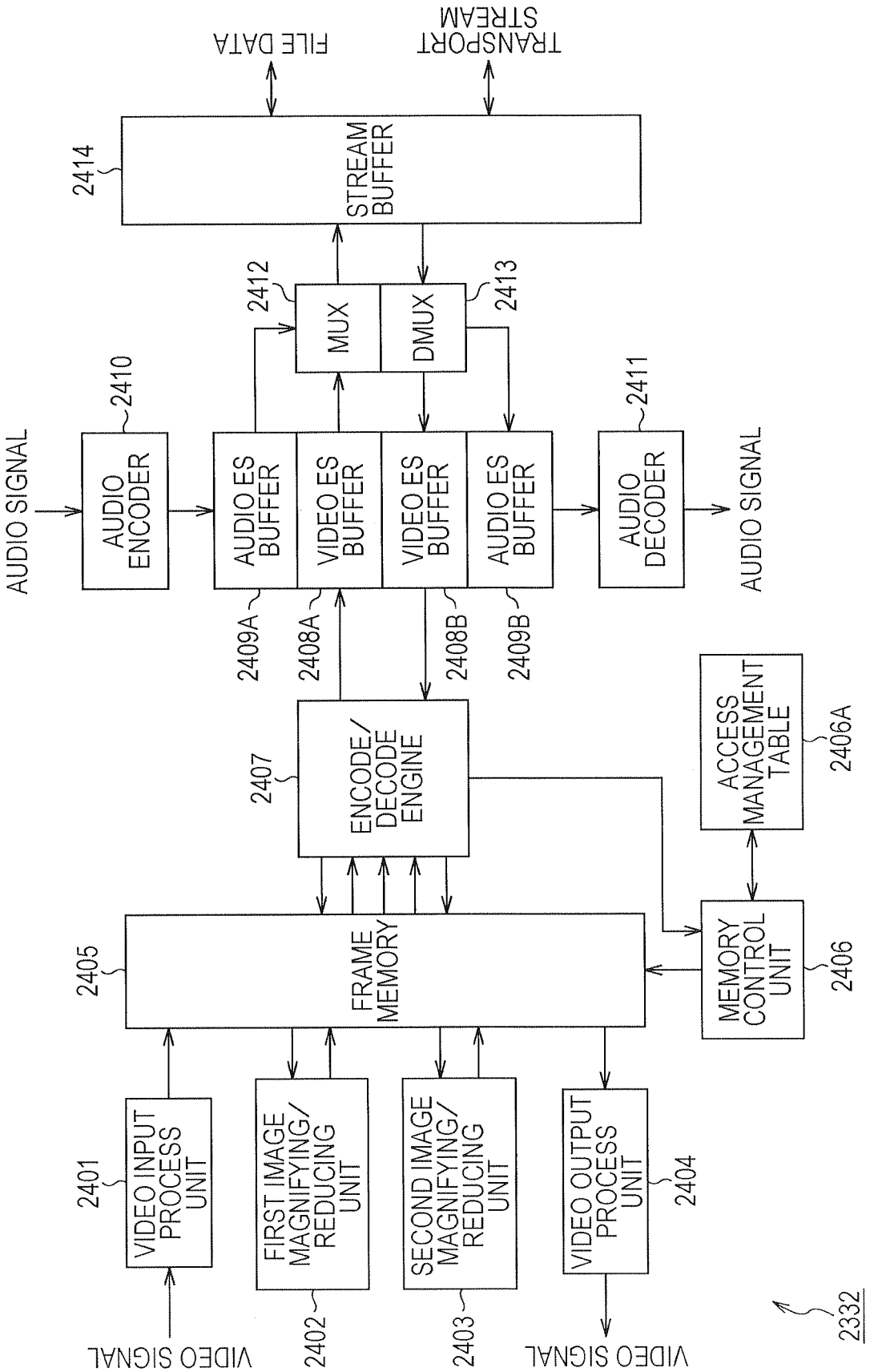

TRANSPORT STREAM
FILE DATA
2414
STREAM BUFFER
2412
MUX
DMUX
2413
2410
AUDIO ENCODER
AUDIO SIGNAL
AUDIO ES BUFFER
VIDEO ES BUFFER
VIDEO ES BUFFER
AUDIO ES BUFFER
2411
AUDIO DECODER
AUDIO SIGNAL
2409A
2408A
2408B
2409B
2407
ENCODE/ DECODE ENGINE
ACCESS MANAGEMENT TABLE
2406A
2405
FRAME MEMORY
MEMORY CONTROL UNIT
2406
2401
VIDEO INPUT PROCESS UNIT
FIRST IMAGE MAGNIFYING/ REDUCING UNIT
SECOND IMAGE MAGNIFYING/ REDUCING UNIT
VIDEO OUTPUT PROCESS UNIT
2404
VIDEO SIGNAL
2402
2403
VIDEO SIGNAL
2332

FIG. 93

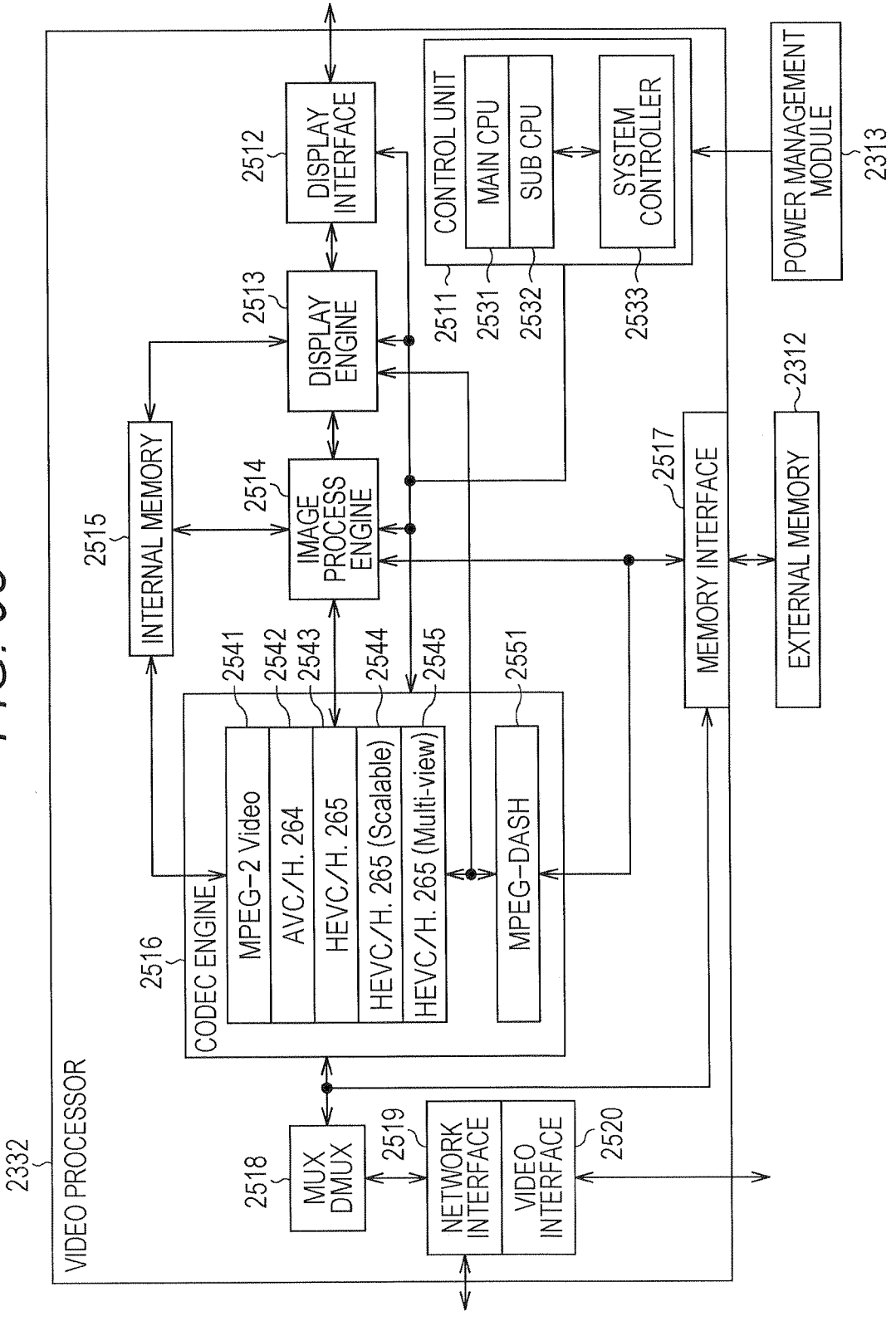

2332
VIDEO PROCESSOR
2518
MUX DMUX
2519
NETWORK INTERFACE
2520
VIDEO INTERFACE
2516
CODEC ENGINE
2541
MPEG-2 Video
2542
AVC/H. 264
2543
HEVC/H. 265
2544
HEVC/H. 265 (Scalable)
2545
HEVC/H. 265 (Multi-view)
2551
MPEG-DASH
2515
INTERNAL MEMORY
2514
IMAGE PROCESS ENGINE
2513
DISPLAY ENGINE
2512
DISPLAY INTERFACE
2511
CONTROL UNIT
2531
MAIN CPU
2532
SUB CPU
2533
SYSTEM CONTROLLER
2517
MEMORY INTERFACE
2312
EXTERNAL MEMORY
2313
POWER MANAGEMENT MODULE

FIG. 94

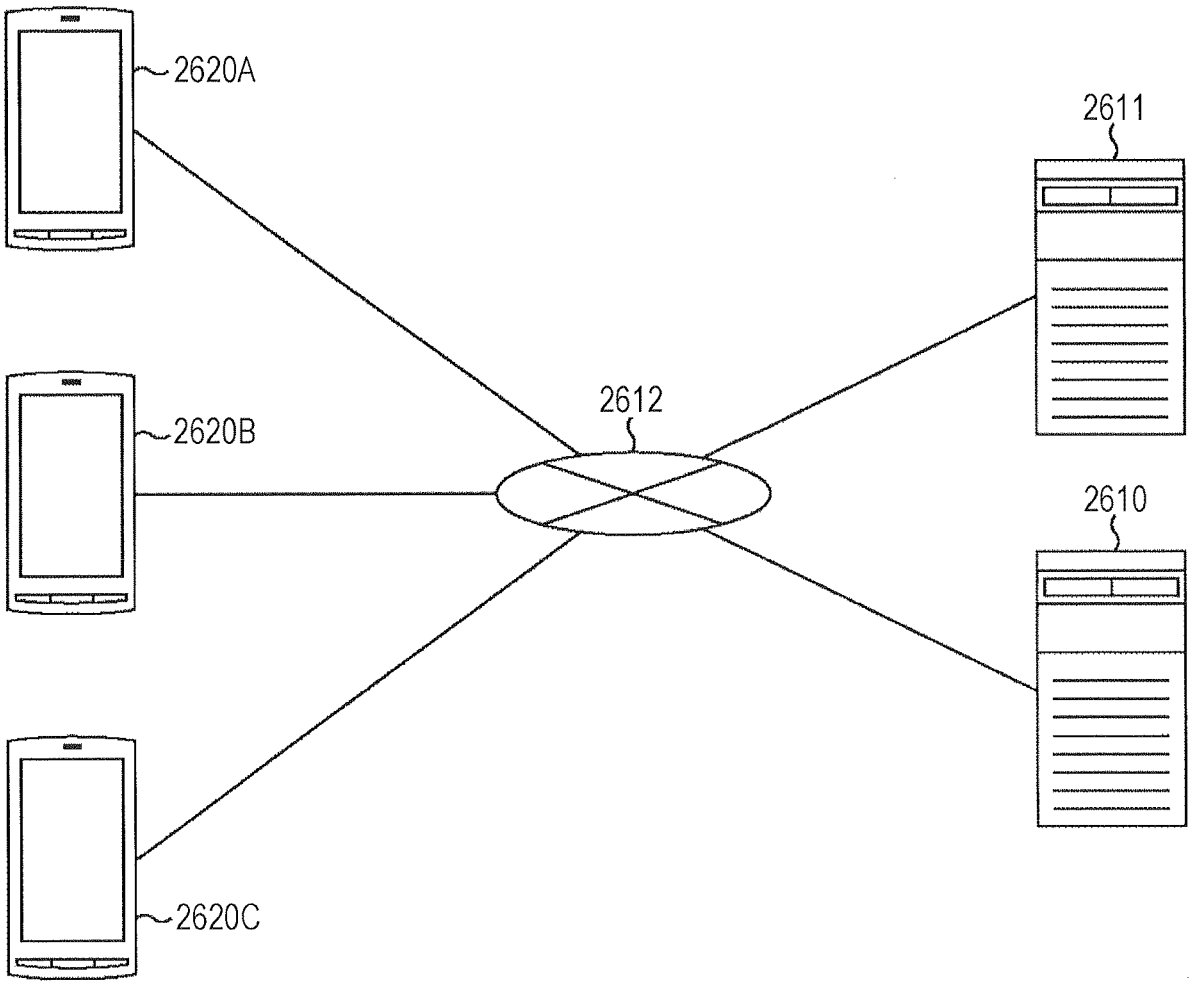


FIG. 95

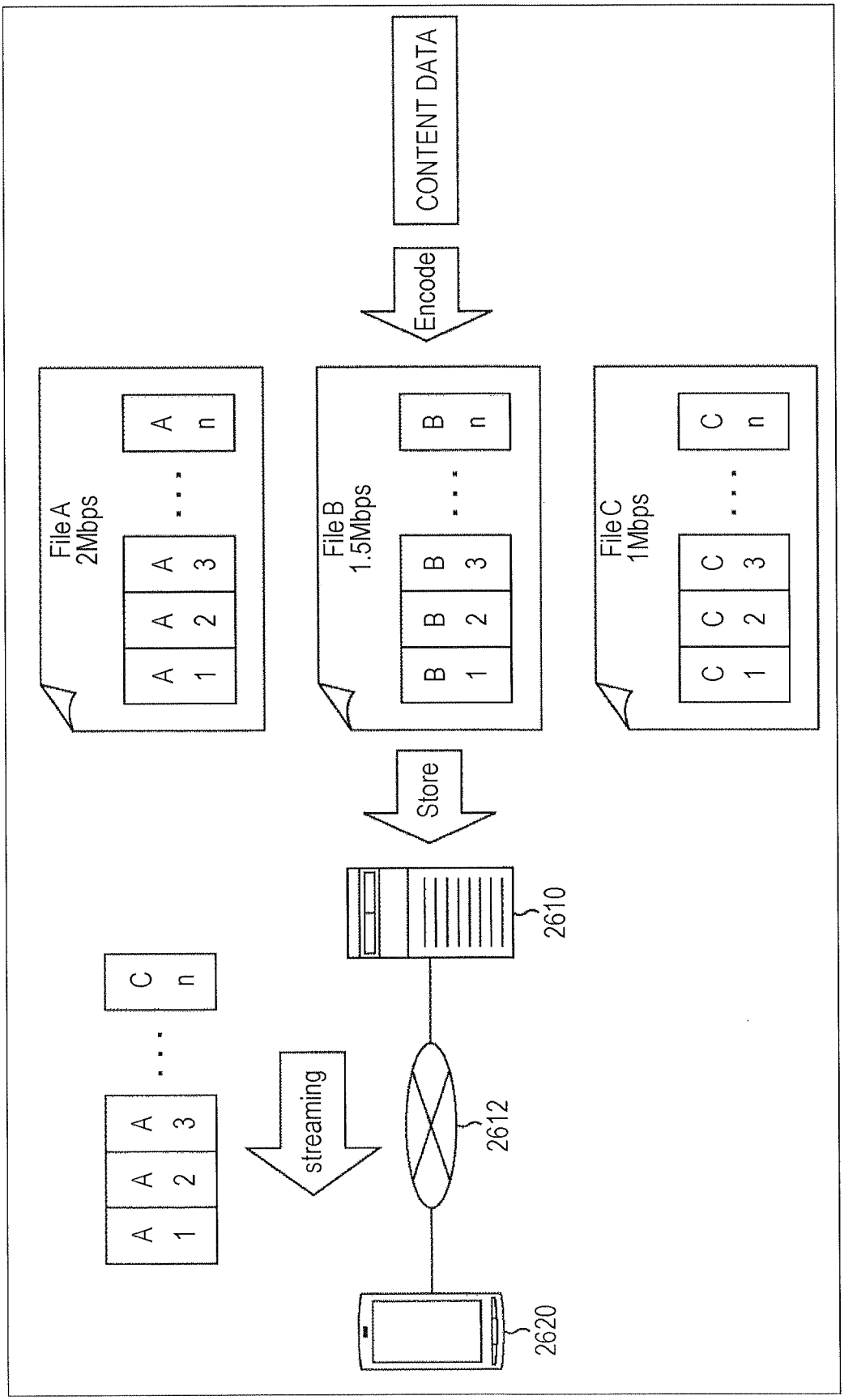

CONTENT DATA
Encode
File A
2Mbps
A 1
A 2
A 3
A n
File B
1.5Mbps
B 1
B 2
B 3
B n
File C
1Mbps
C 1
C 2
C 3
C n
Store
2610
streaming
2612
2620

FIG. 96

```
<?xml version="1.0"?>
<MPD
 xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
 xmlns="urn:mpeg:DASH:schema:MPD:2011"
 xsi:schemaLocation="urn:mpeg:DASH:schema:MPD:2011 DASH-MPD.xsd"
 type="static"
 mediaPresentationDuration="PT3256S"
 minBufferTime="PT1.2S"
 profiles="urn:mpeg:dash:profile:isoff-on-demand:2011">

 <BaseURL>http://cdn1.example.com/</BaseURL>
 <BaseURL>http://cdn2.example.com/</BaseURL>

 <Period>
  <!--English Audio-->
  <AdaptationSet mimeType="audio/mp4" codecs="mp4a.0x40" lang="en" subsegmentAlignment="true" subsegmentStartsWithSAP="1">
   <ContentProtection schemeIdUri="urn:uuid:706D6953-656C-5244-4D48-656164657221" />
   <Representation id "1" bandwidth="64000">
    <BaseURL>7657412348.mp4</BaseURL>
   </Representation>
   <Representation id="2" bandwidth="32000">
    <BaseURL>3463646346.mp4</BaseURL>
   </Representation>
  </AdaptationSet>
<!--Video-->
  <AdaptationSet mimeType="video/mp4" codecs="avc1.4d0228" subsegmentAlignment="true" subsegmentStartsWithSAP="2">
   <ContentProtection schemeIdUri="urn:uuid:706D6953-656C-5244-4D48-656164657221" />
   <Representation id="6" bandwidth="256000" width="320" height="240">
    <BaseURL>8563456473.mp4</BaseURL>
   </Representation>
   <Representation id="7" bandwidth="512000" width="320" height="240">
    <BaseURL>56363634.mp4</BaseURL>
   </Representation>
   <Representation id="8" bandwidth="1024000" width="640" height="480">
    <BaseURL>562465736.mp4</BaseURL>
   </Representation>
   <Representation id="9" bandwidth="1384000" width="640" height="480">
    <BaseURL>41325645.mp4</BaseURL>
   </Representation>
   <Representation id="A" bandwidth="1536000" width="1280" height="720">
    <BaseURL>89045625.mp4</BaseURL>
   </Representation>
   <Representation id="B" bandwidth="2048000" width="1280" height="720">
    <BaseURL>23536745734.mp4</BaseURL>
   </Representation>
  </AdaptationSet>
 </Period>
</MPD>
```

FIG. 97

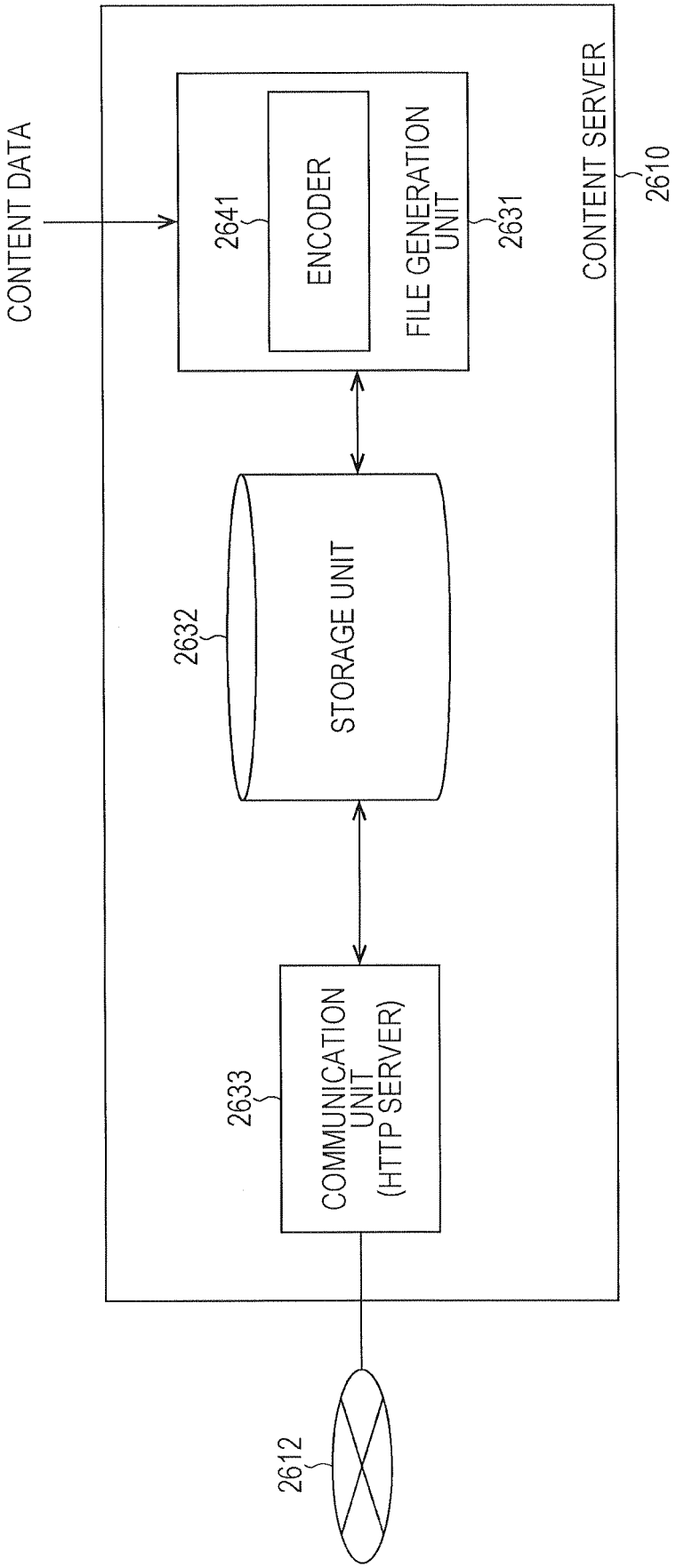

CONTENT DATA
CONTENT SERVER
2610
FILE GENERATION UNIT
2631
ENCODER
2641
STORAGE UNIT
2632
COMMUNICATION UNIT (HTTP SERVER)
2633
2612

FIG. 98

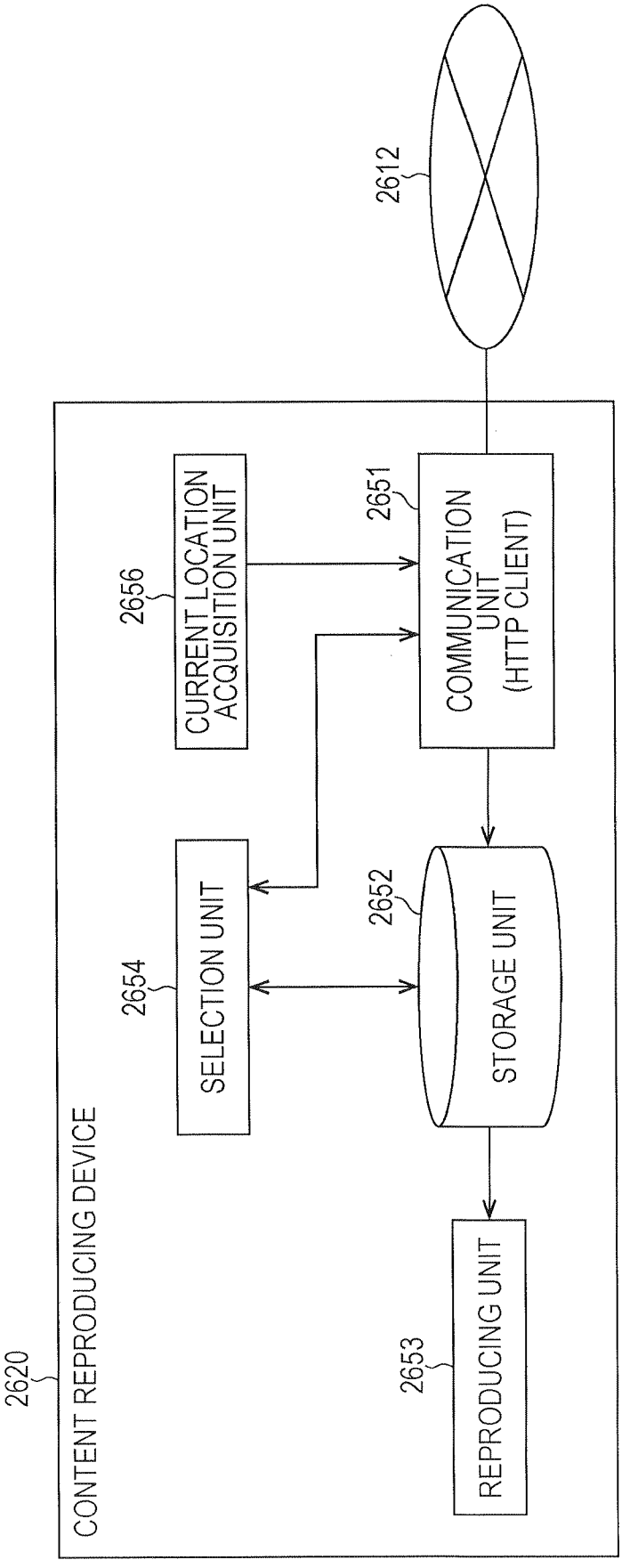

2612
2620
CONTENT REPRODUCING DEVICE
2656
CURRENT LOCATION ACQUISITION UNIT
2651
COMMUNICATION UNIT (HTTP CLIENT)
2654
SELECTION UNIT
2652
STORAGE UNIT
2653
REPRODUCING UNIT

FIG. 99

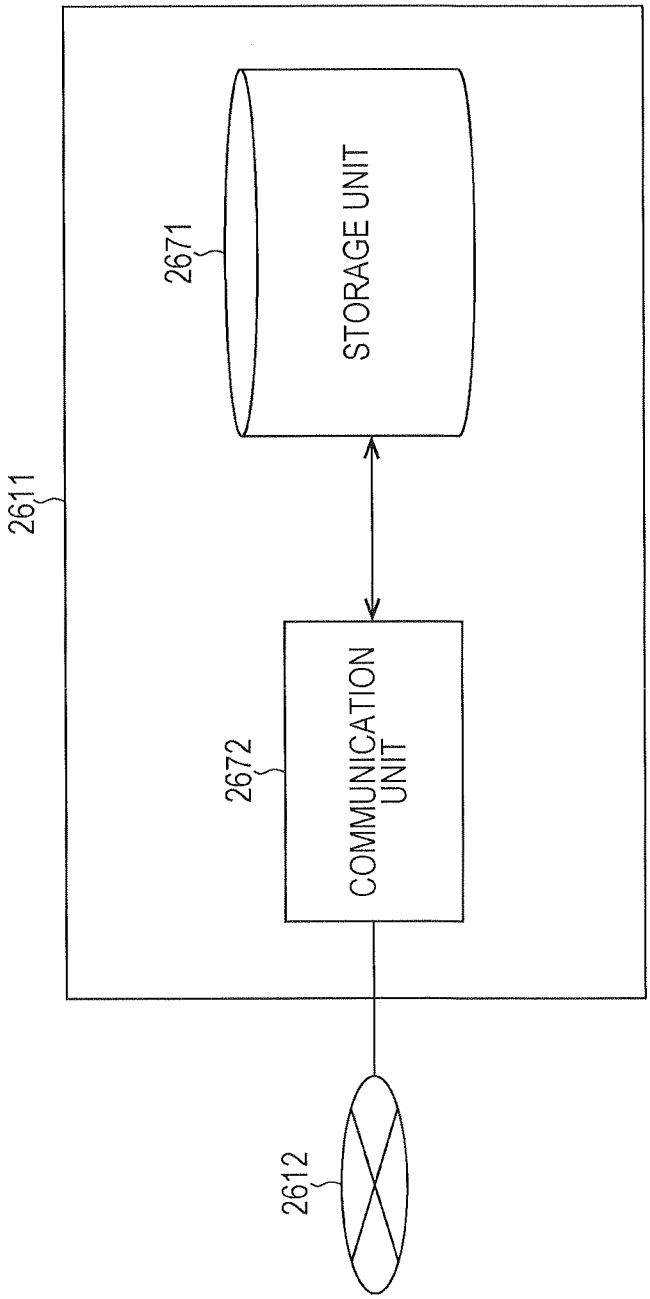


FIG. 100

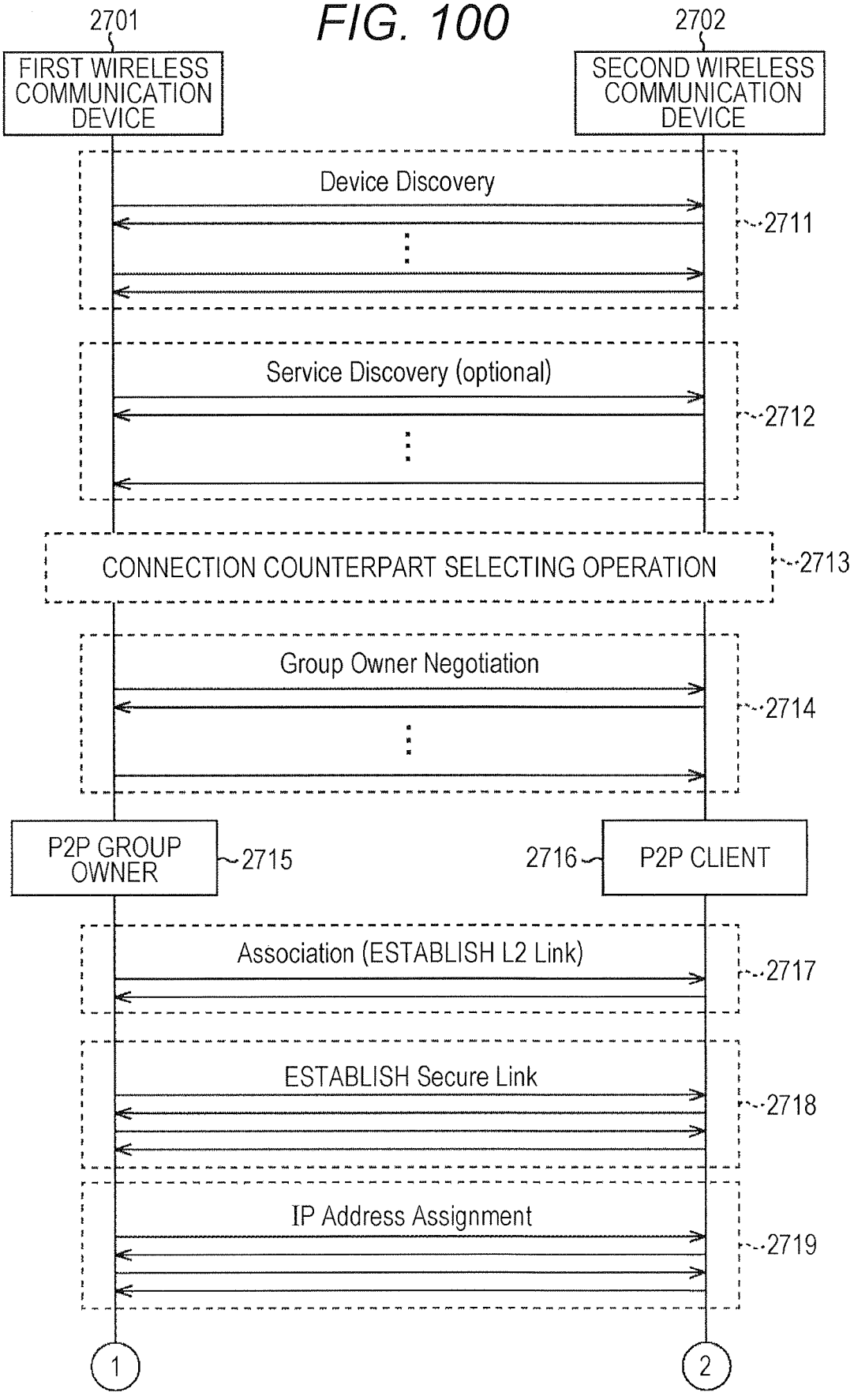

2701
FIRST WIRELESS COMMUNICATION DEVICE
2702
SECOND WIRELESS COMMUNICATION DEVICE
Device Discovery
2711
Service Discovery (optional)
2712
CONNECTION COUNTERPART SELECTING OPERATION
2713
Group Owner Negotiation
2714
P2P GROUP OWNER
2715
2716
P2P CLIENT
Association (ESTABLISH L2 Link)
2717
ESTABLISH Secure Link
2718
IP Address Assignment
2719
1
2

FIG. 101

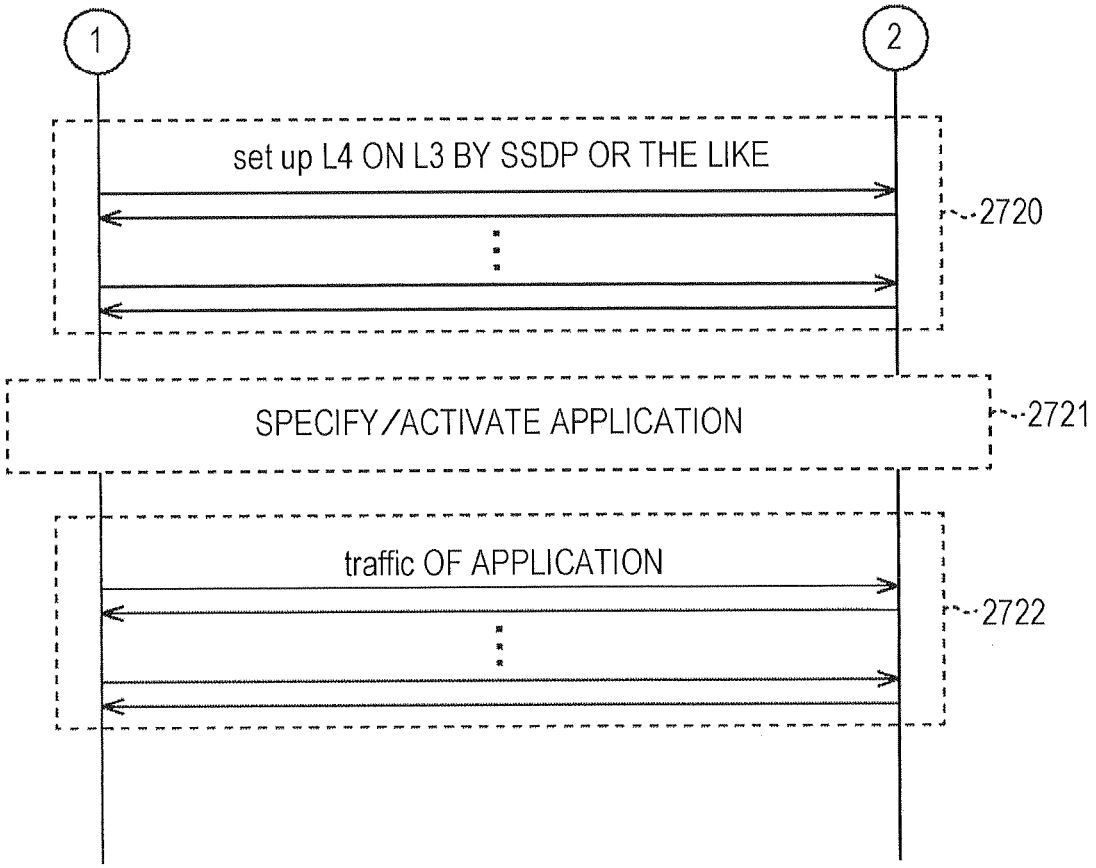

1
2
set up L4 ON L3 BY SSDP OR THE LIKE
2720
SPECIFY/ACTIVATE APPLICATION
2721
traffic OF APPLICATION
2722

FIG. 102

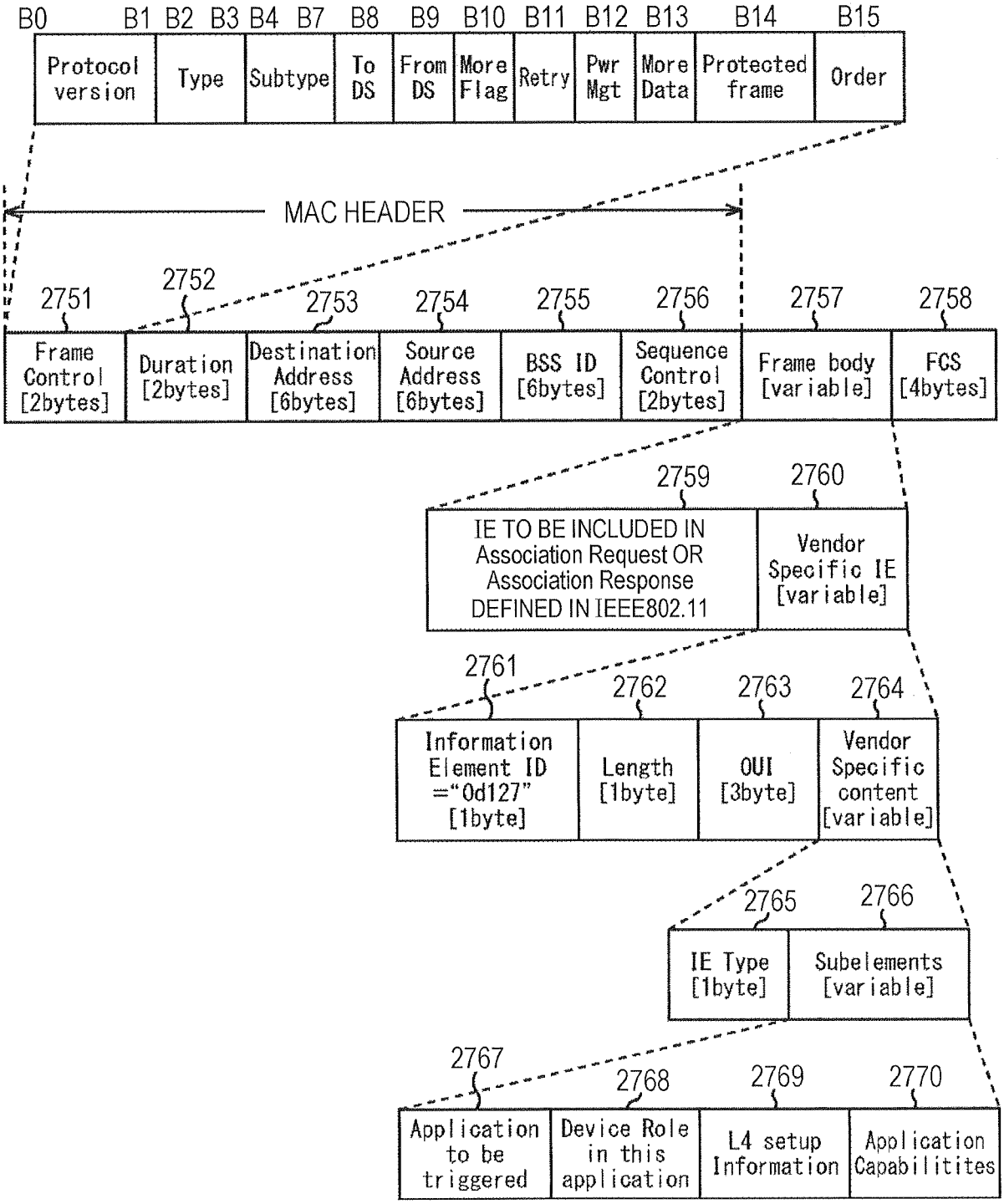
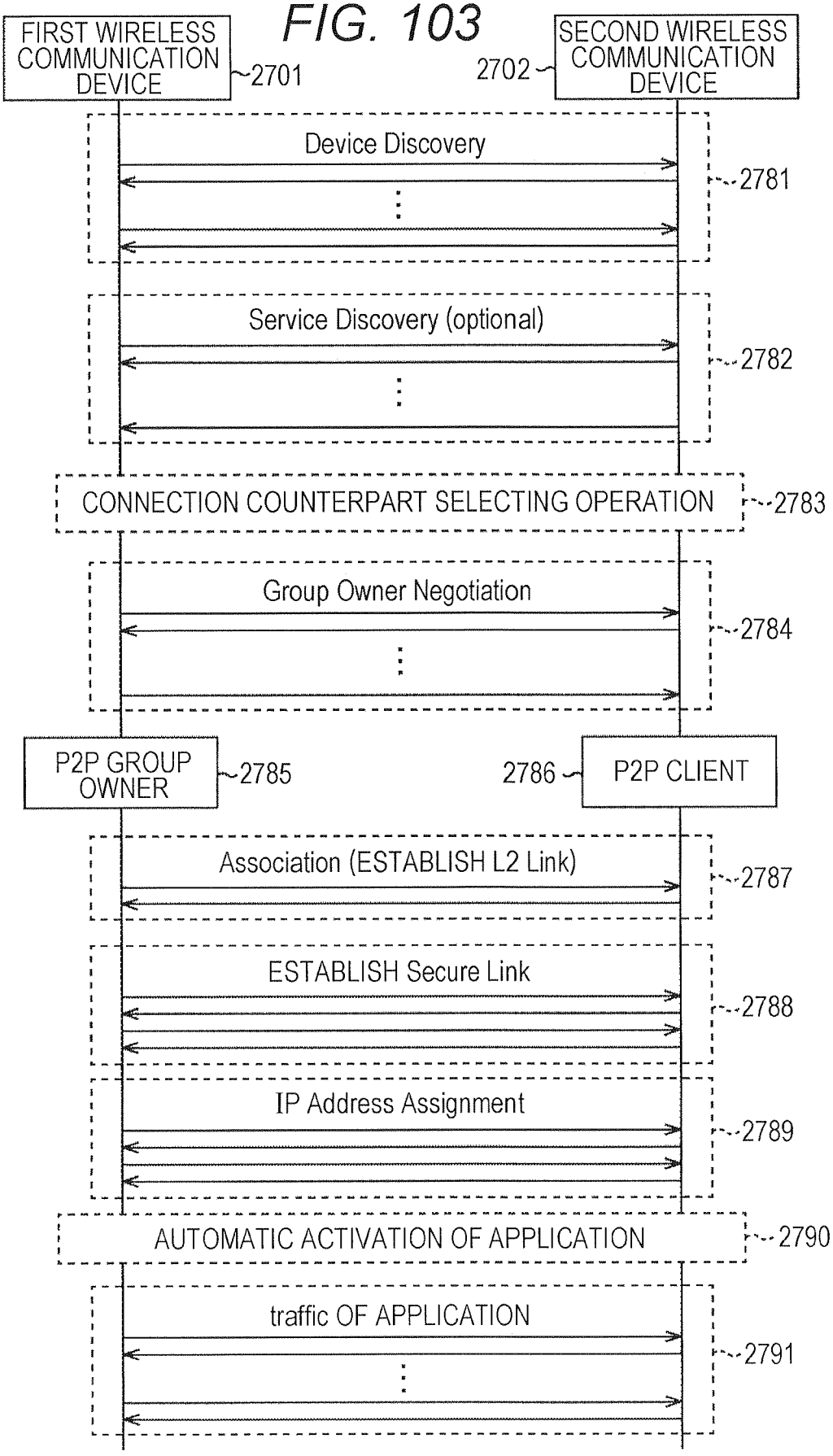

B0
B1
B2
B3
B4
B7
B8
B9
B10
B11
B12
B13
B14
B15
Protocol version
Type
Subtype
To DS
From DS
More Flag
Retry
Pwr Mgt
More Data
Protected frame
Order
MAC HEADER
2751
2752
2753
2754
2755
2756
2757
2758
Frame Control [2bytes]
Duration [2bytes]
Destination Address [6bytes]
Source Address [6bytes]
BSS ID [6bytes]
Sequence Control [2bytes]
Frame body [variable]
FCS [4bytes]
2759
2760
IE TO BE INCLUDED IN Association Request OR Association Response DEFINED IN IEEE802.11
Vendor Specific IE [variable]
2761
2762
2763
2764
Information Element ID ="0d127" [1byte]
Length [1byte]
OUI [3byte]
Vendor Specific content [variable]
2765
2766
IE Type [1byte]
Subelements [variable]
2767
2768
2769
2770
Application to be triggered
Device Role in this application
L4 setup Information
Application Capabilitites

FIG. 103


FIRST WIRELESS COMMUNICATION DEVICE
2701
2702
SECOND WIRELESS COMMUNICATION DEVICE
Device Discovery
2781
Service Discovery (optional)
2782
CONNECTION COUNTERPART SELECTING OPERATION
2783
Group Owner Negotiation
2784
P2P GROUP OWNER
2785
2786
P2P CLIENT
Association (ESTABLISH L2 Link)
2787
ESTABLISH Secure Link
2788
IP Address Assignment
2789
AUTOMATIC ACTIVATION OF APPLICATION
2790
traffic OF APPLICATION
2791