FIG.1

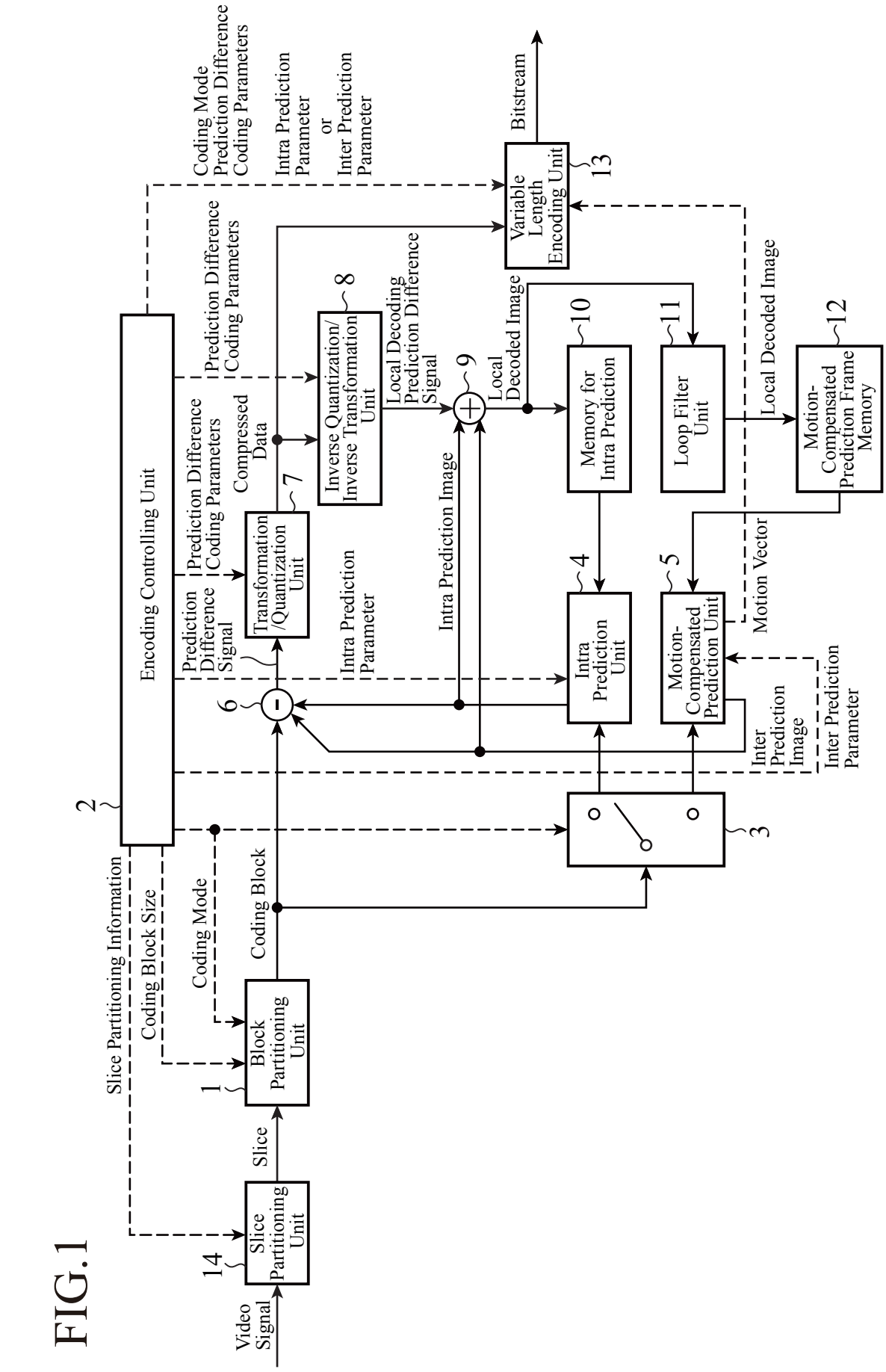

Video Signal
Slice
Slice Partitioning Unit
14
Slice Partitioning Information
Coding Block Size
Coding Mode
Block Partitioning Unit
1
Coding Block
2
Encoding Controlling Unit
Prediction Difference Signal
Prediction Difference Coding Parameters
Transformation /Quantization Unit
7
Compressed Data
Inverse Quantization/ Inverse Transformation Unit
8
Local Decoding Prediction Difference Signal
9
Local Decoded Image
Memory for Intra Prediction
10
Loop Filter Unit
11
Local Decoded Image
Motion-Compensated Prediction Frame Memory
12
Intra Prediction Parameter
Intra Prediction Image
Intra Prediction Unit
4
Motion-Compensated Prediction Unit
5
Motion Vector
Inter Prediction Image
Inter Prediction Parameter
3
6
Coding Mode
Prediction Difference Coding Parameters
Intra Prediction Parameter or Inter Prediction Parameter
Variable Length Encoding Unit
13
Bitstream

FIG.2

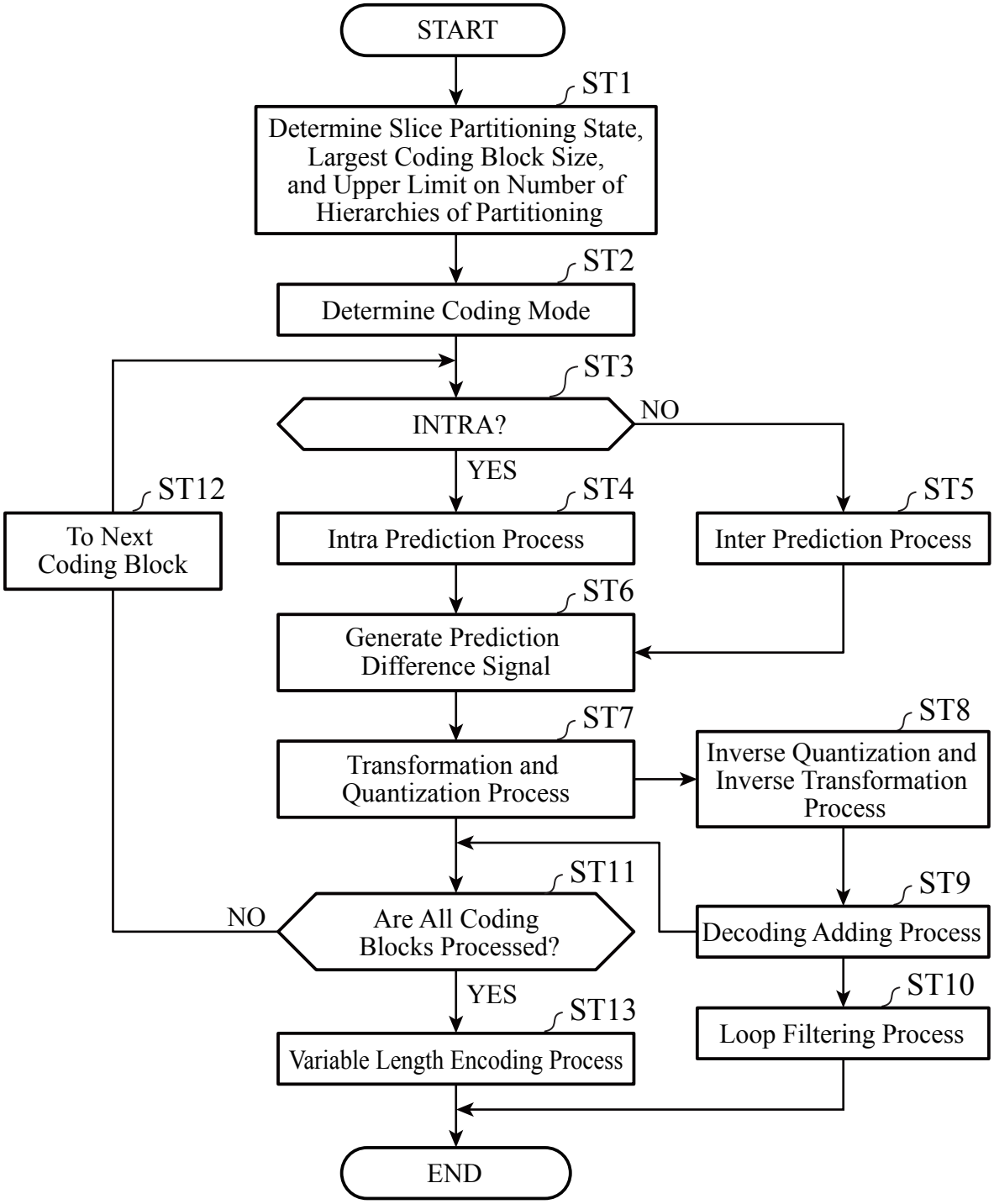

START
ST1
Determine Slice Partitioning State, Largest Coding Block Size, and Upper Limit on Number of Hierarchies of Partitioning
ST2
Determine Coding Mode
ST3
INTRA?
NO
YES
ST12
To Next Coding Block
ST4
Intra Prediction Process
ST5
Inter Prediction Process
ST6
Generate Prediction Difference Signal
ST7
Transformation and Quantization Process
ST8
Inverse Quantization and Inverse Transformation Process
ST11
NO
Are All Coding Blocks Processed?
ST9
Decoding Adding Process
YES
ST13
Variable Length Encoding Process
ST10
Loop Filtering Process
END

FIG.3

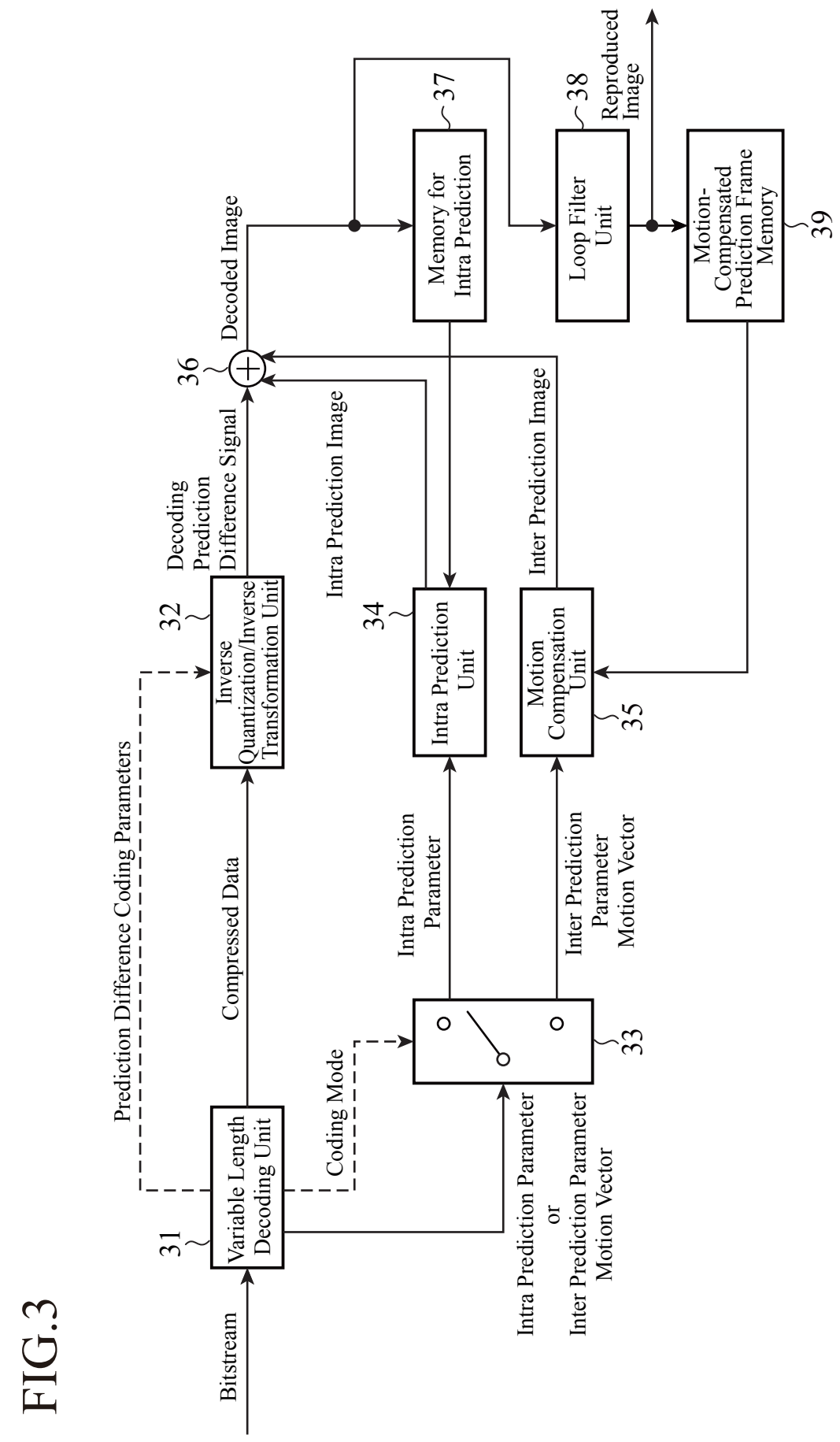

Bitstream
31
Variable Length Decoding Unit
Prediction Difference Coding Parameters
Coding Mode
Compressed Data
32
Inverse Quantization/Inverse Transformation Unit
Decoding Prediction Difference Signal
36
Decoded Image
Memory for Intra Prediction
37
Loop Filter Unit
38
Reproduced Image
Motion-Compensated Prediction Frame Memory
39
Intra Prediction Image
34
Intra Prediction Unit
Inter Prediction Image
Motion Compensation Unit
35
33
Intra Prediction Parameter
Inter Prediction Parameter
Motion Vector
Intra Prediction Parameter or Inter Prediction Parameter Motion Vector

FIG.4

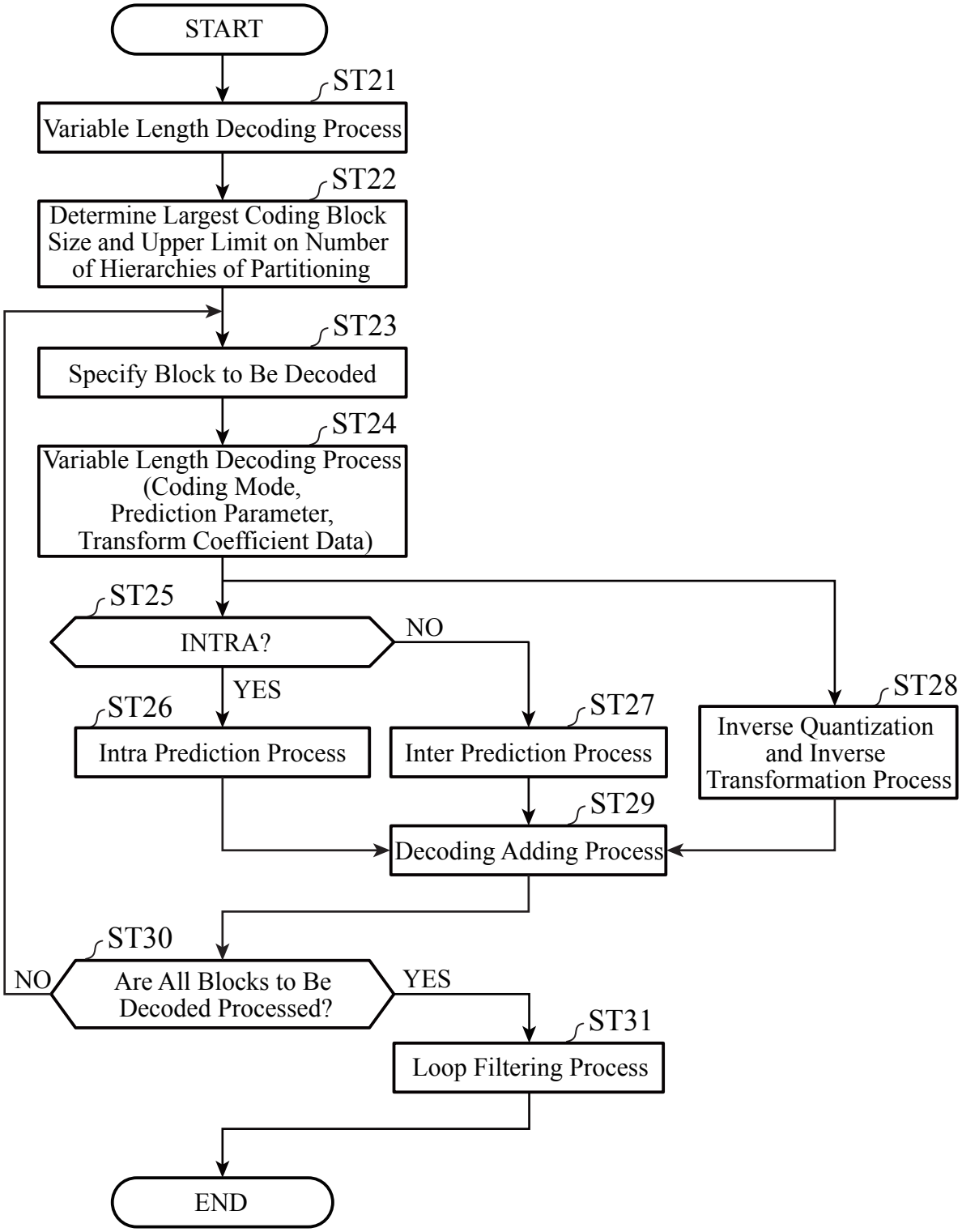

START
ST21
Variable Length Decoding Process
ST22
Determine Largest Coding Block Size and Upper Limit on Number of Hierarchies of Partitioning
ST23
Specify Block to Be Decoded
ST24
Variable Length Decoding Process (Coding Mode, Prediction Parameter, Transform Coefficient Data)
ST25
INTRA?
NO
YES
ST26
Intra Prediction Process
ST27
Inter Prediction Process
ST28
Inverse Quantization and Inverse Transformation Process
ST29
Decoding Adding Process
ST30
Are All Blocks to Be Decoded Processed?
NO
YES
ST31
Loop Filtering Process
END

FIG.5

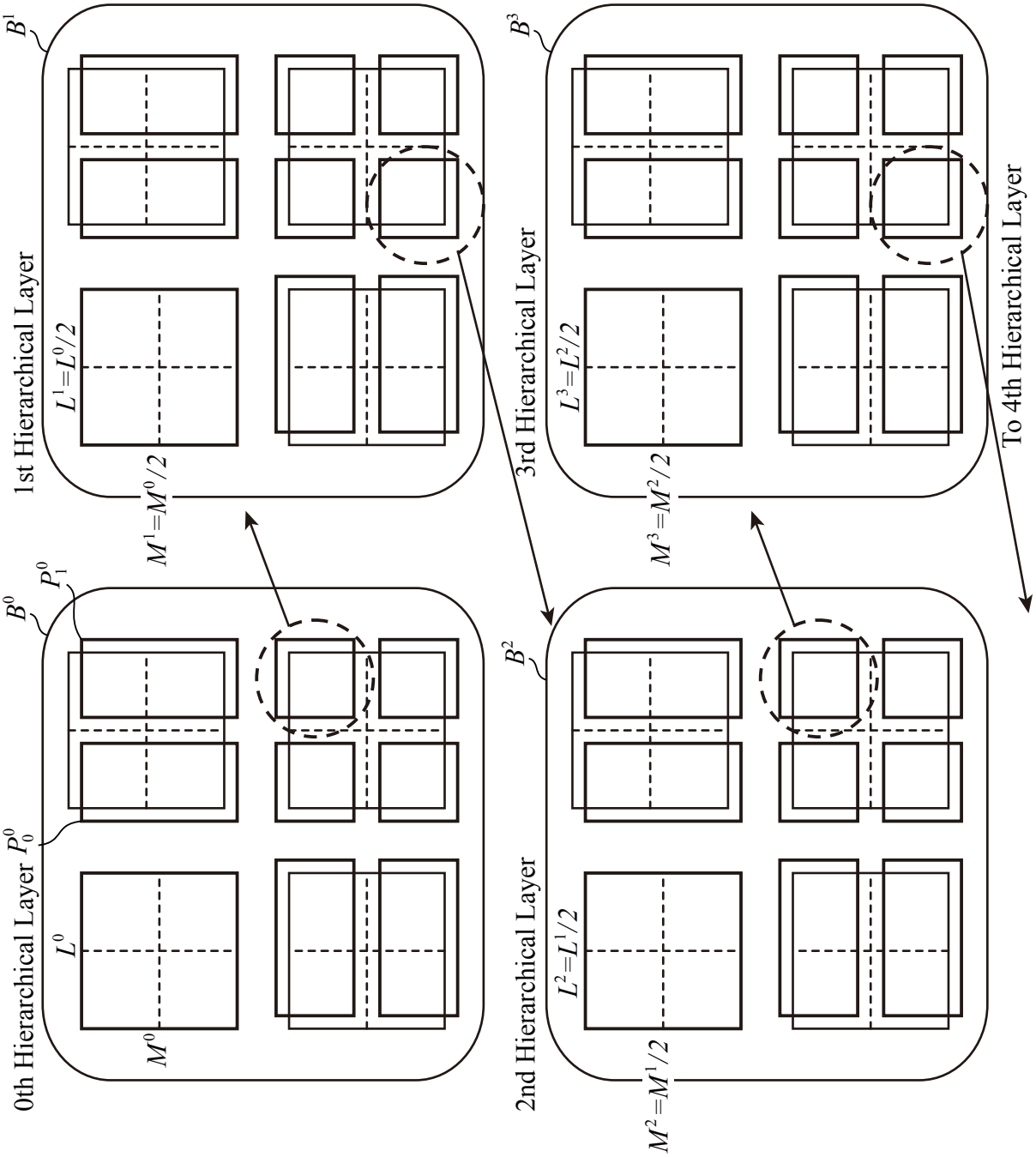

0th Hierarchical Layer
1st Hierarchical Layer
2nd Hierarchical Layer
3rd Hierarchical Layer
To 4th Hierarchical Layer
B^0
B^1
B^2
B^3
P_0^0
P_1^0
L^0
M^0
$L^1=L^0/2$
$M^1=M^0/2$
$L^2=L^1/2$
$M^2=M^1/2$
$L^3=L^2/2$
$M^3=M^2/2$

FIG.6

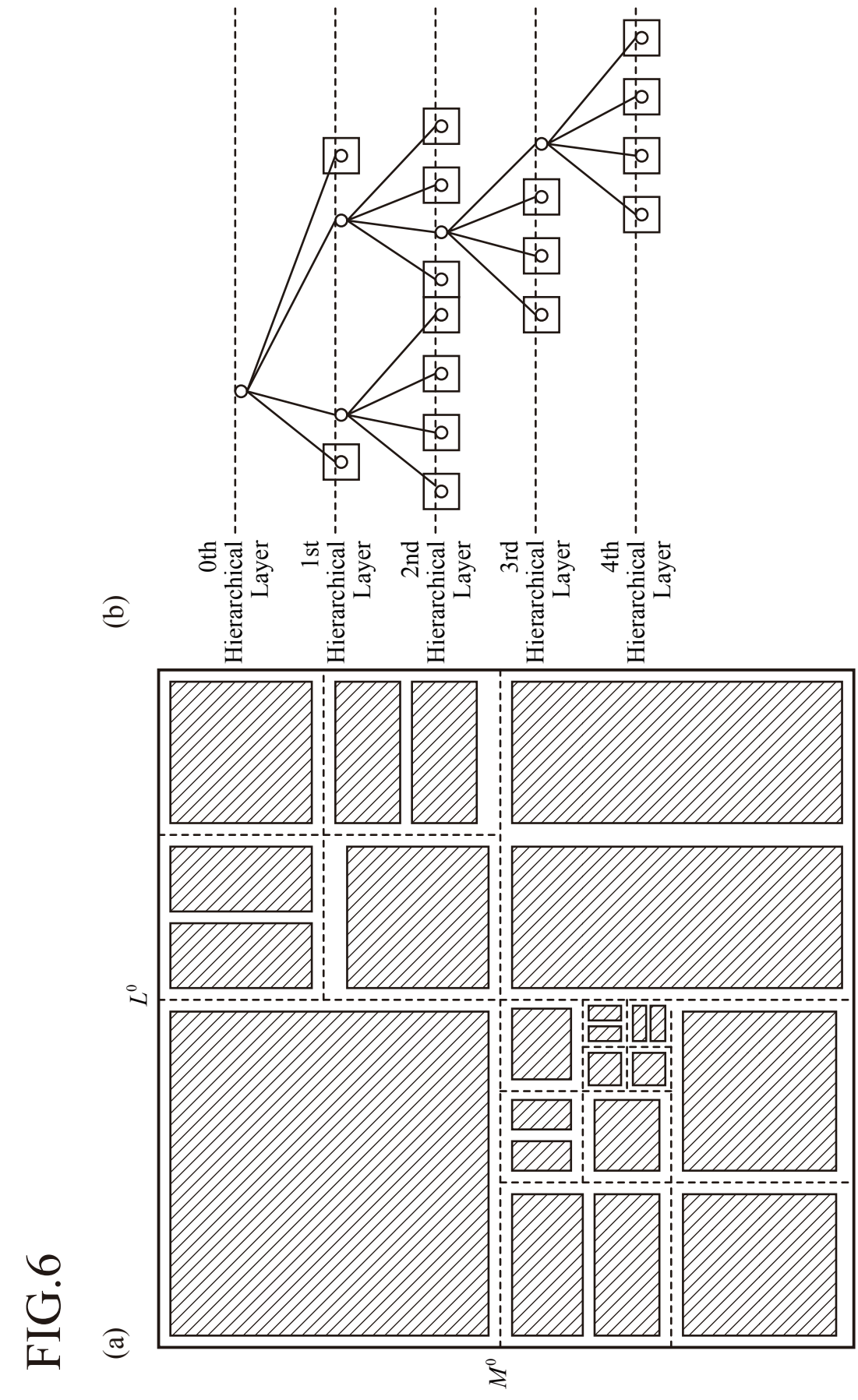

(a)
(b)
L^0
M^0
0th Hierarchical Layer
1st Hierarchical Layer
2nd Hierarchical Layer
3rd Hierarchical Layer
4th Hierarchical Layer

FIG.7

Intra Prediction Mode Index	Intra Prediction Mode
0	Planar Prediction
1	Vertical Prediction
2	Horizontal Prediction
3	Average (DC) Prediction
4 ~ N_I-1	Diagonal Prediction

N_I:Number of Intra Prediction Modes

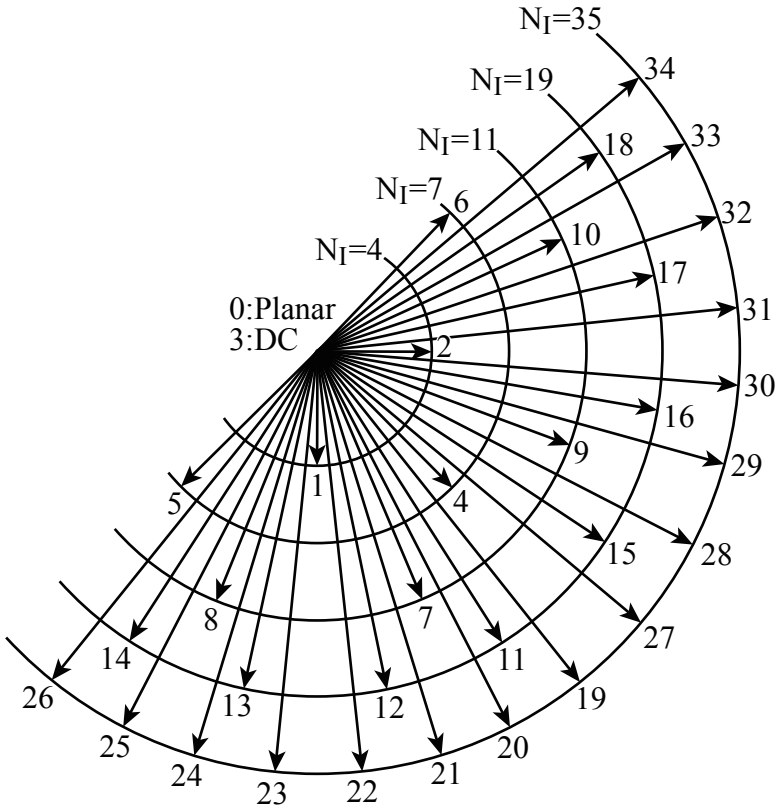


FIG.8

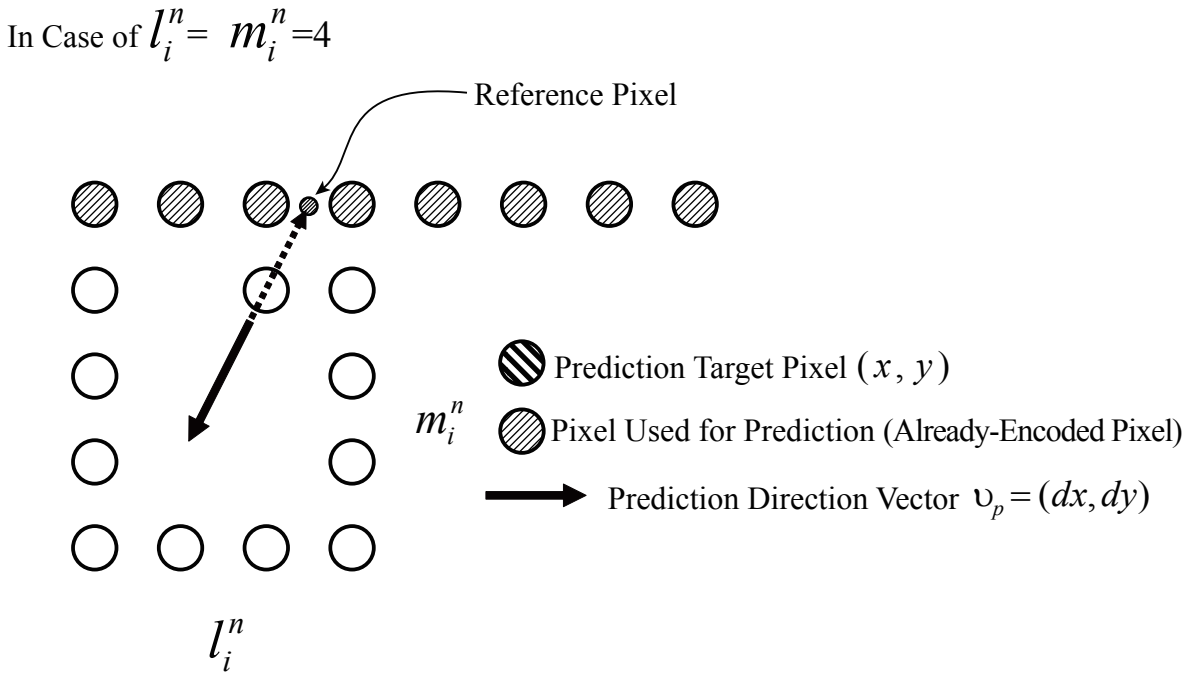

In Case of $l_i^n = m_i^n = 4$
Reference Pixel
m_i^n
Prediction Target Pixel (x, y)
Pixel Used for Prediction (Already-Encoded Pixel)
Prediction Direction Vector $\upsilon_p = (dx, dy)$
l_i^n

FIG.9

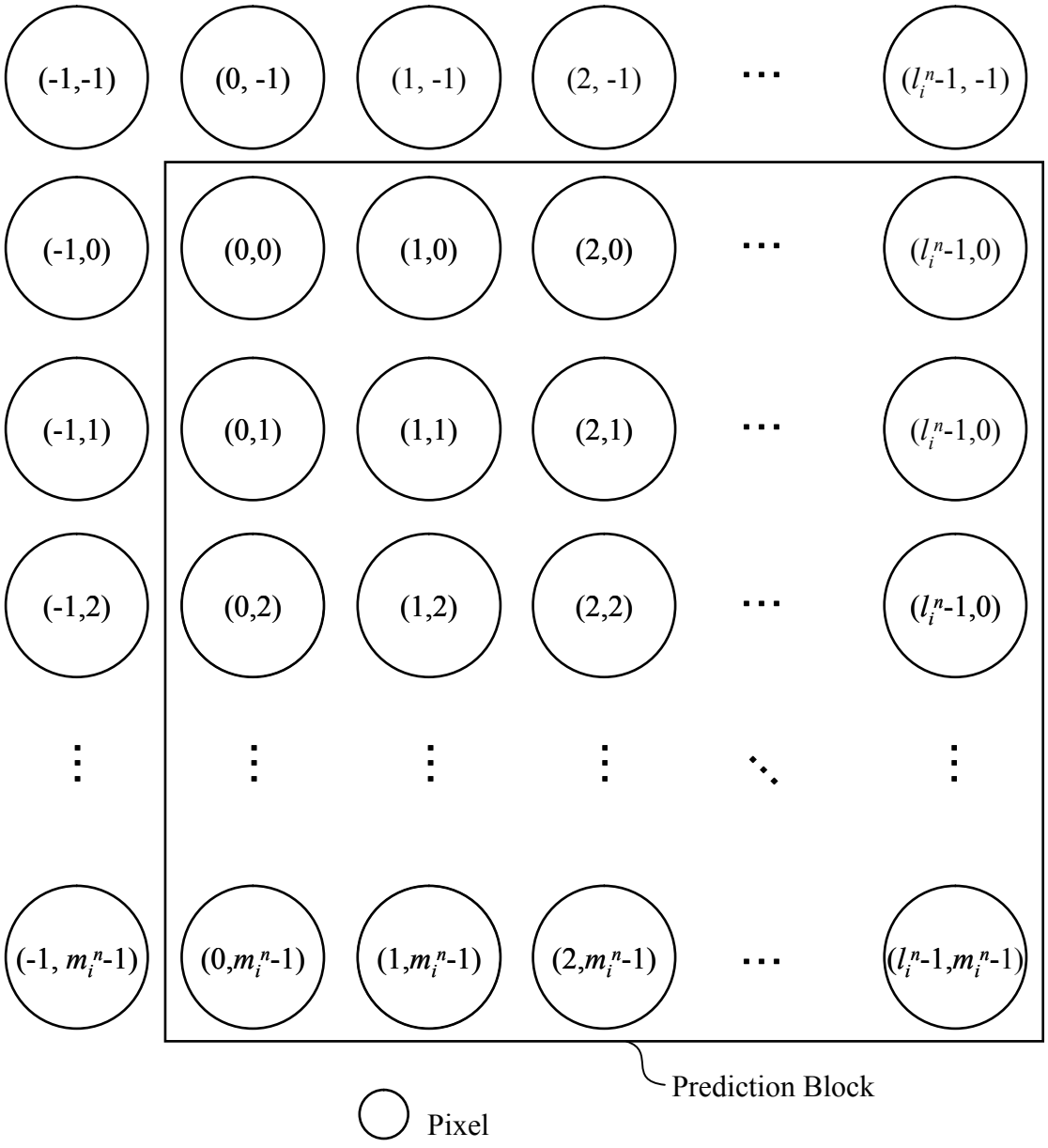

(-1,-1)
(0, -1)
(1, -1)
(2, -1)
$(l_i^n$-1, -1)
(-1,0)
(0,0)
(1,0)
(2,0)
$(l_i^n$-1,0)
(-1,1)
(0,1)
(1,1)
(2,1)
$(l_i^n$-1,0)
(-1,2)
(0,2)
(1,2)
(2,2)
$(l_i^n$-1,0)
(-1, m_i^n-1)
(0,m_i^n-1)
(1,m_i^n-1)
(2,m_i^n-1)
$(l_i^n$-1,m_i^n-1)
Prediction Block
Pixel

FIG.10

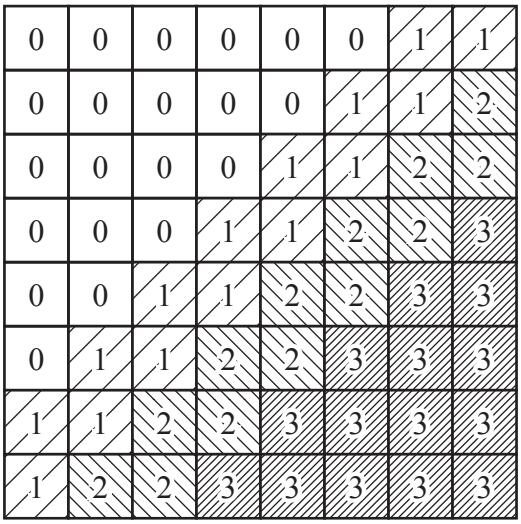

0 0 0 0 0 0 1 1
0 0 0 0 0 1 1 2
0 0 0 0 1 1 2 2
0 0 0 1 1 2 2 3
0 0 1 1 2 2 3 3
0 1 1 2 2 3 3 3
1 1 2 2 3 3 3 3
1 2 2 3 3 3 3 3

FIG.11

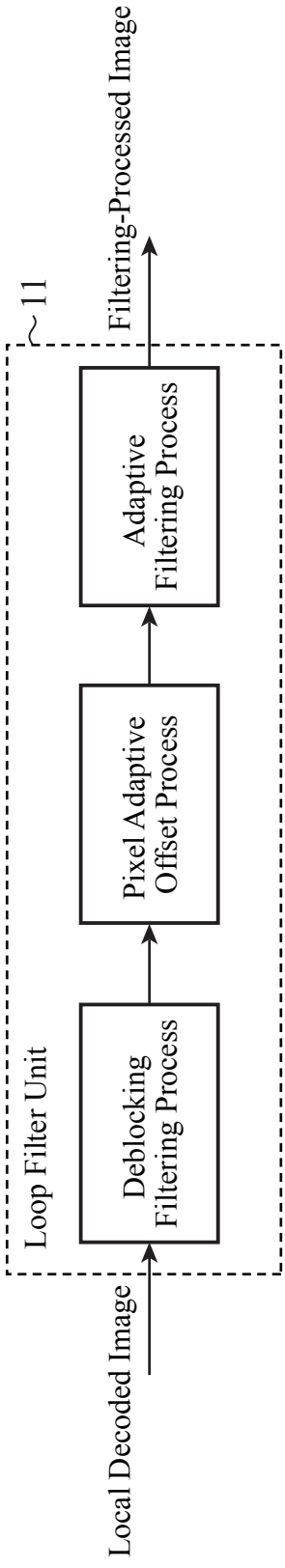

Local Decoded Image
Loop Filter Unit
11
Deblocking Filtering Process
Pixel Adaptive Offset Process
Adaptive Filtering Process
Filtering-Processed Image

FIG.12

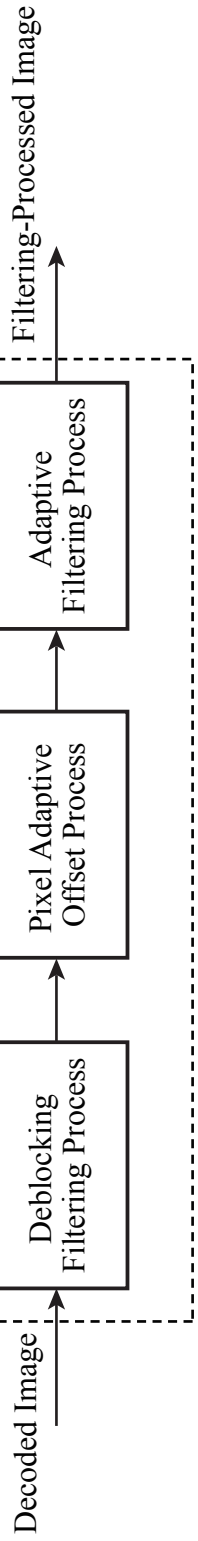

Decoded Image
Loop Filter Unit
38
Deblocking Filtering Process
Pixel Adaptive Offset Process
Adaptive Filtering Process
Filtering-Processed Image

FIG.13

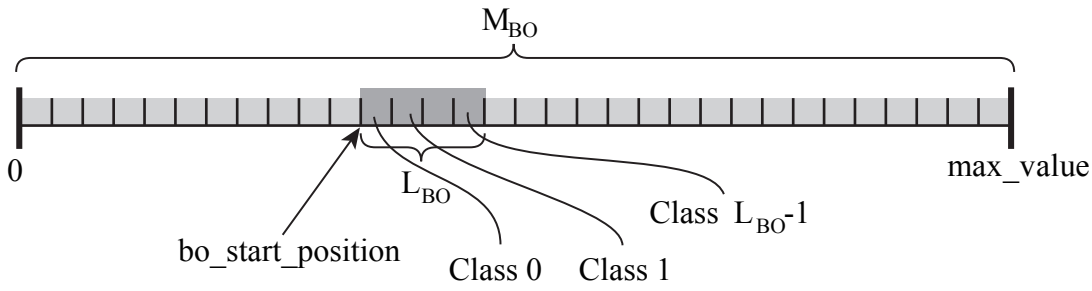
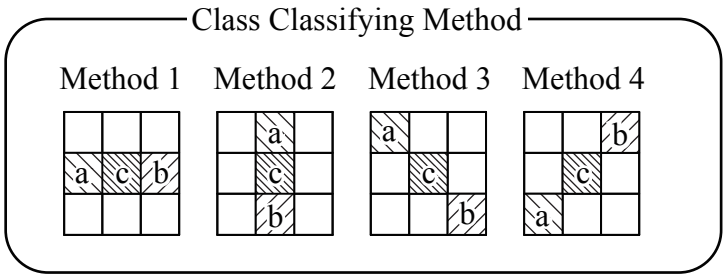


FIG.14



Classification Criteria in Each Class Classifying Method

Class	Criterion
1	c< a && c < b
2	(c < a&& c = b) || (c < b&& c = a)
3	(c > a&& c = b) || (c > b&& c = a)
4	c>a && c > b
0	Other than Classes 1 to 4

a, b, c: Brightness Value of Each Pixel

FIG.15

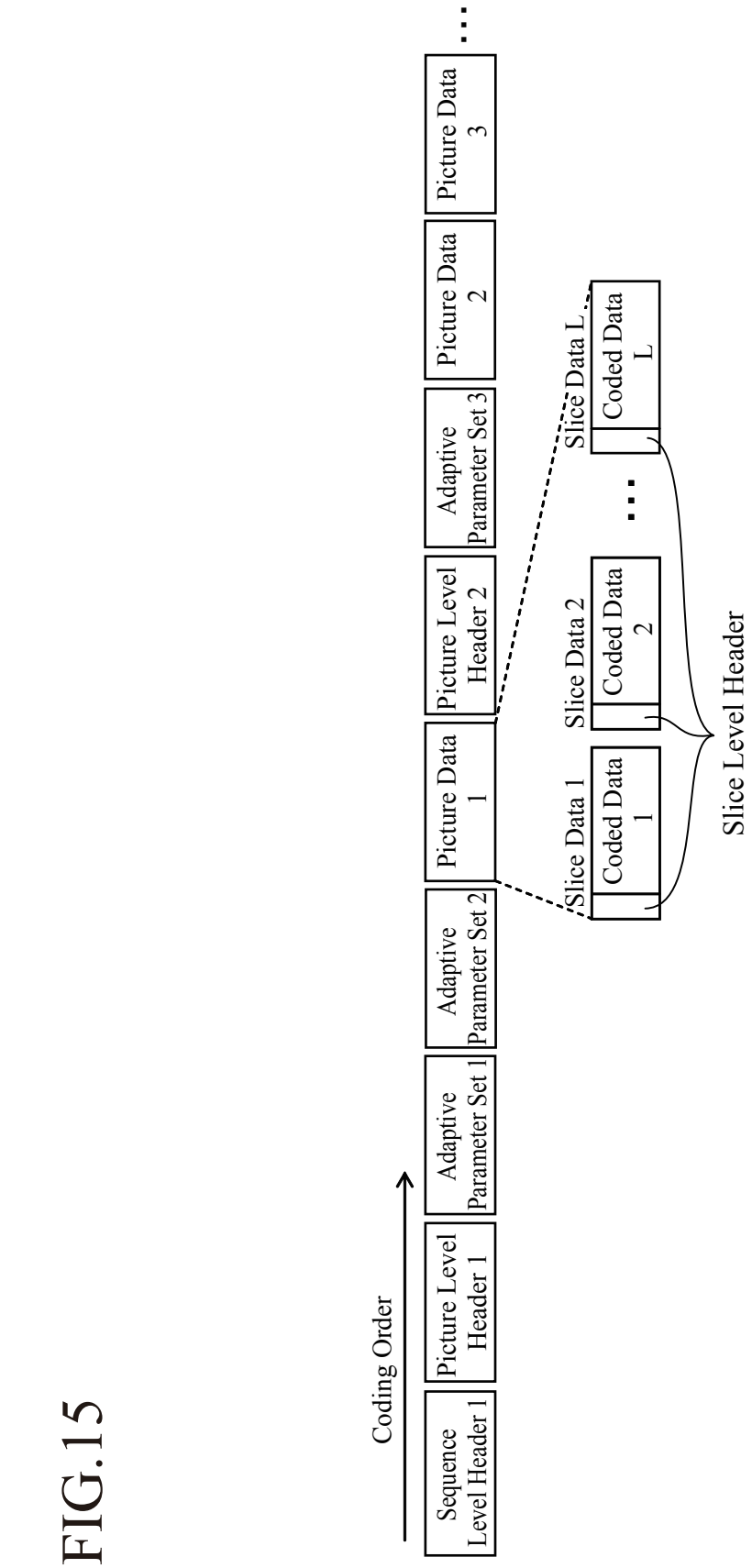

Coding Order
Sequence Level Header 1
Picture Level Header 1
Adaptive Parameter Set 1
Adaptive Parameter Set 2
Picture Data 1
Picture Level Header 2
Adaptive Parameter Set 3
Picture Data 2
Picture Data 3
...
Slice Data 1
Coded Data 1
Slice Data 2
Coded Data 2
...
Slice Data L
Coded Data L
Slice Level Header

FIG.16

Index	Class Classifying Method
0	No Offset Process
1	EO Method 1
2	EO Method 2
3	EO Method 3
4	EO Method 4
5	BO Method

FIG.17

Index	Offset Value				
	Class 0	Class 1	Class 2	Class 3	Class 4
0	0	1	0	0	-1
1	0	2	1	-1	-2
2	0	3	1	-1	-3
3	0	4	2	-2	-4

FIG.18

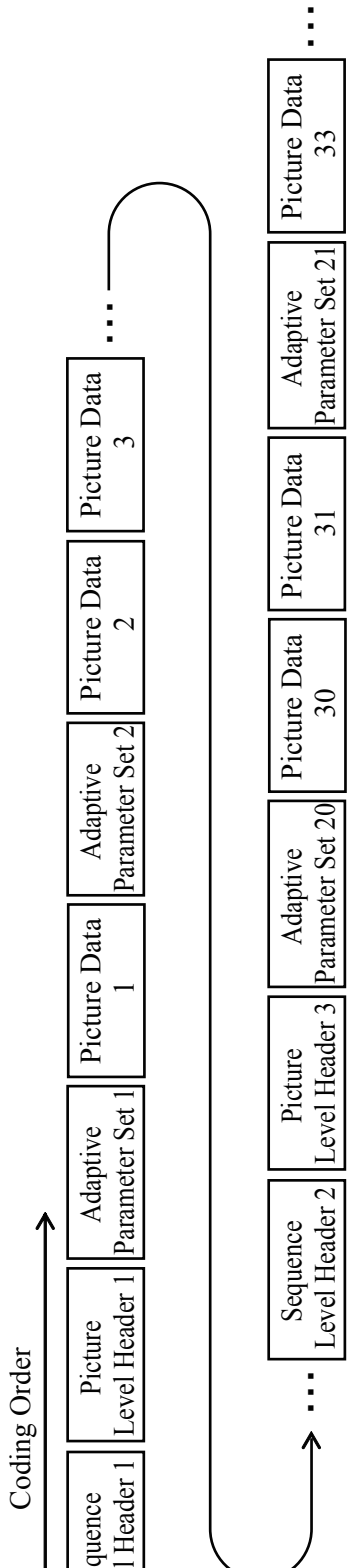

Coding Order
Sequence Level Header 1
Picture Level Header 1
Adaptive Parameter Set 1
Picture Data 1
Adaptive Parameter Set 2
Picture Data 2
Picture Data 3
Sequence Level Header 2
Picture Level Header 3
Adaptive Parameter Set 20
Picture Data 30
Picture Data 31
Adaptive Parameter Set 21
Picture Data 33

FIG.19

Bit Depth : 8

Index	Offset Value				
	Class 0	Class 1	Class 2	Class 3	Class 4
0	0	1	0	0	-1

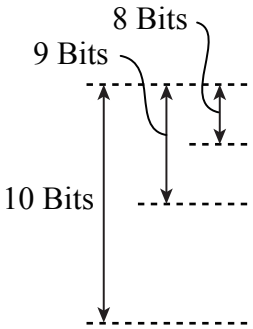
Bit Depth : 9

Index	Offset Value				
	Class 0	Class 1	Class 2	Class 3	Class 4
0	0	1	0	0	-1
1	0	2	1	-1	-2

Bit Depth : 10

Index	Offset Value				
	Class 0	Class 1	Class 2	Class 3	Class 4
0	0	1	0	0	-1
1	0	2	1	-1	-2
2	0	3	1	-1	-3
3	0	4	2	-2	-4

FIG.20



Index	Offset Value				
	Class 0	Class 1	Class 2	Class 3	Class 4
0	0	1	0	0	-1
1	0	2	1	-1	-2
2	0	3	1	-1	-3
3	0	4	2	-2	-4

FIG.21

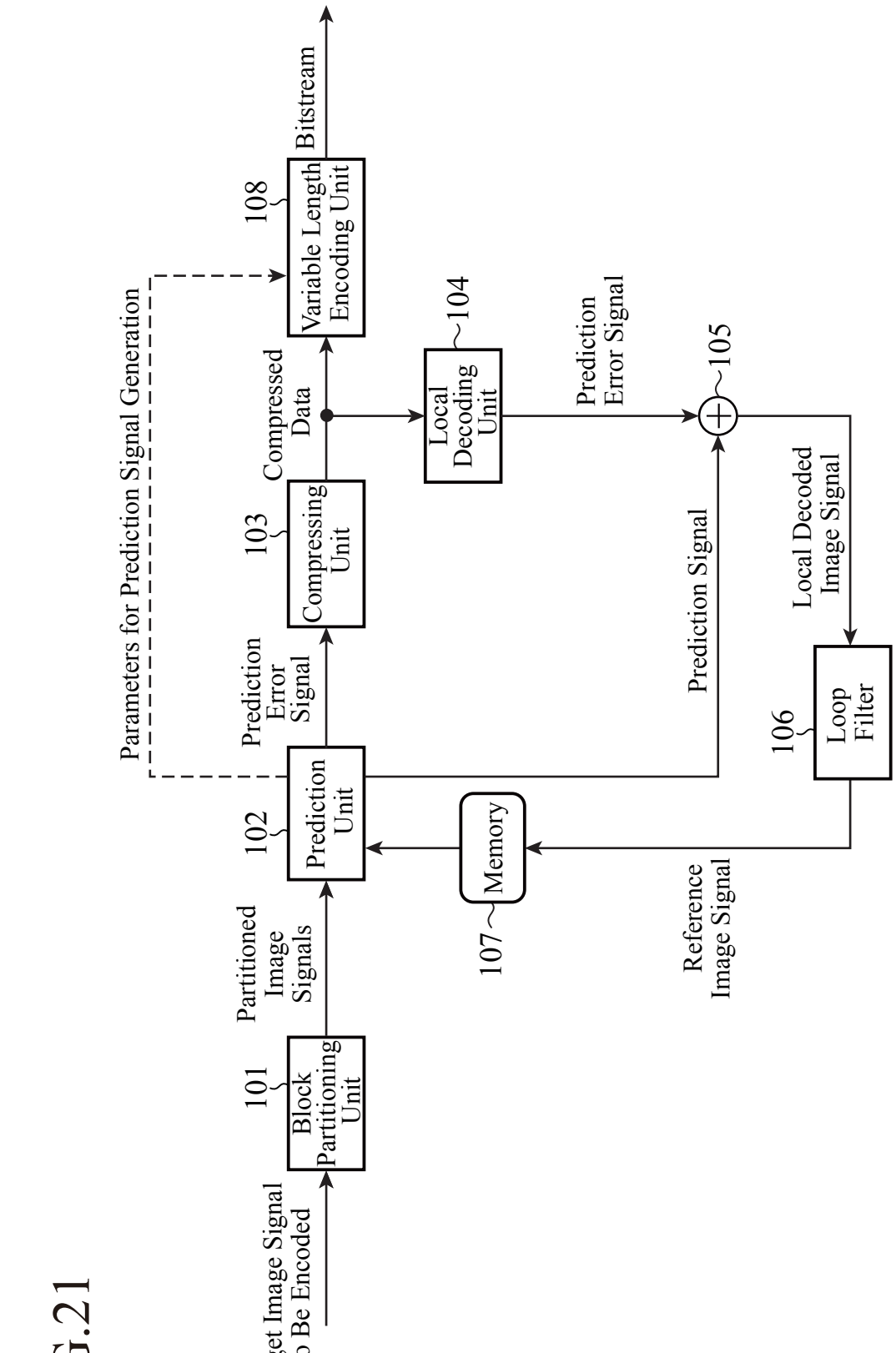

Target Image Signal to Be Encoded
101
Block Partitioning Unit
Partitioned Image Signals
102
Prediction Unit
Parameters for Prediction Signal Generation
Prediction Error Signal
103
Compressing Unit
Compressed Data
108
Variable Length Encoding Unit
Bitstream
104
Local Decoding Unit
Prediction Error Signal
105
Prediction Signal
Local Decoded Image Signal
106
Loop Filter
107
Memory
Reference Image Signal

FIG.22

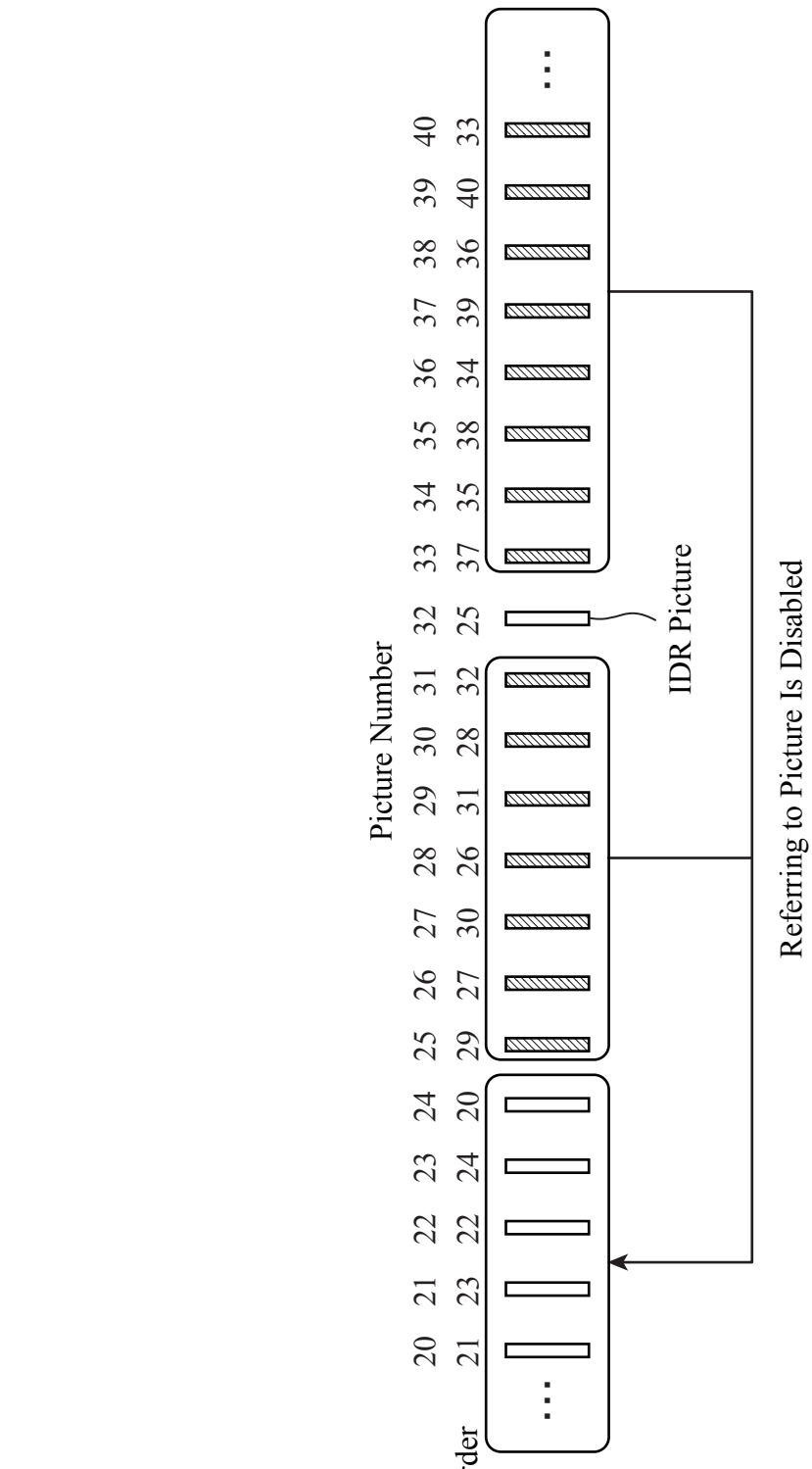

Picture Number
Display Order
Coding (Decoding) Order
20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
21 23 22 24 20 29 27 30 26 31 28 32 25 37 35 38 34 39 36 40 33
IDR Picture
Referring to Picture Is Disabled

FIG.23

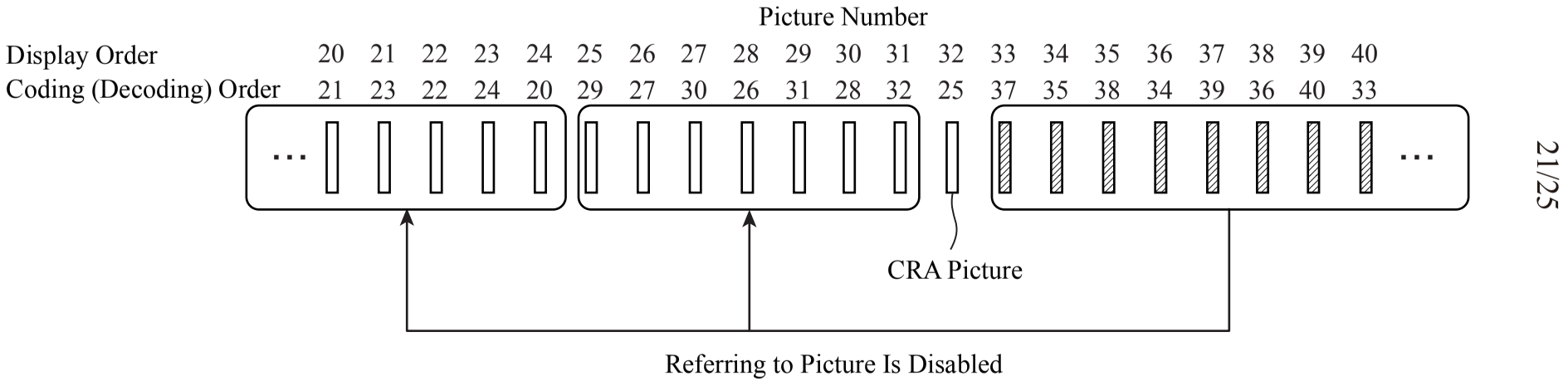

Picture Number
Display Order 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
Coding (Decoding) Order 21 23 22 24 20 29 27 30 26 31 28 32 25 37 35 38 34 39 36 40 33
CRA Picture
Referring to Picture Is Disabled

FIG.24

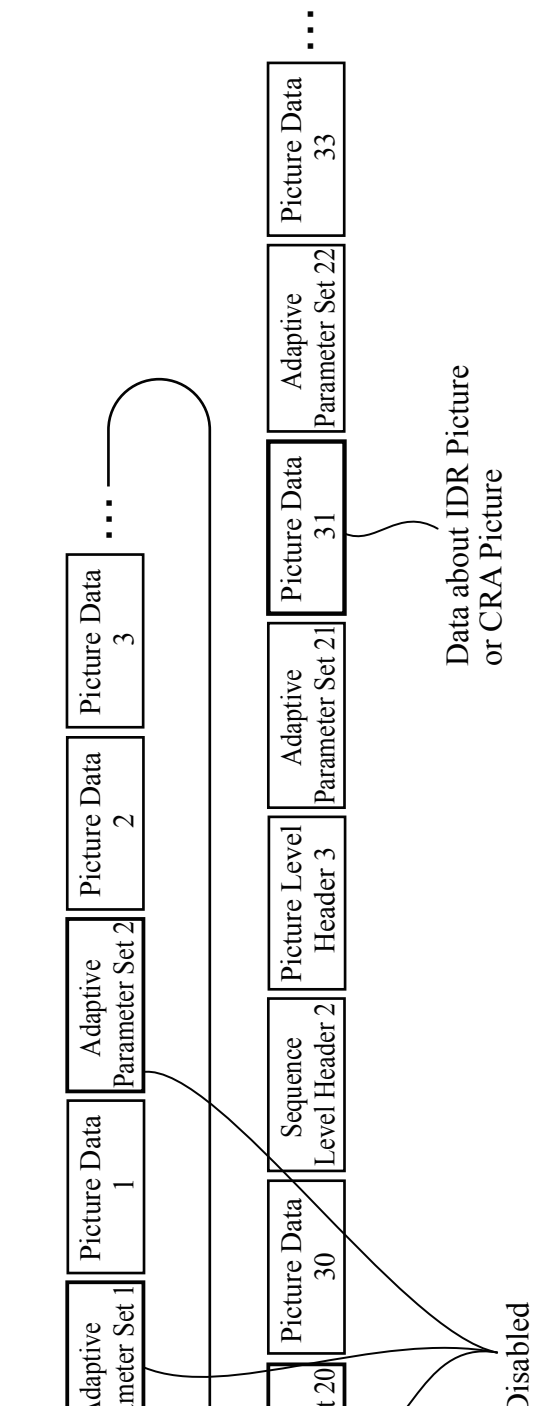

Coding Order
Sequence Level Header 1
Picture Level Header 1
Adaptive Parameter Set 1
Picture Data 1
Adaptive Parameter Set 2
Picture Data 2
Picture Data 3
...
Adaptive Parameter Set 20
Picture Data 30
Sequence Level Header 2
Picture Level Header 3
Adaptive Parameter Set 21
Picture Data 31
Adaptive Parameter Set 22
Picture Data 33
...
Data about IDR Picture or CRA Picture
Disabled

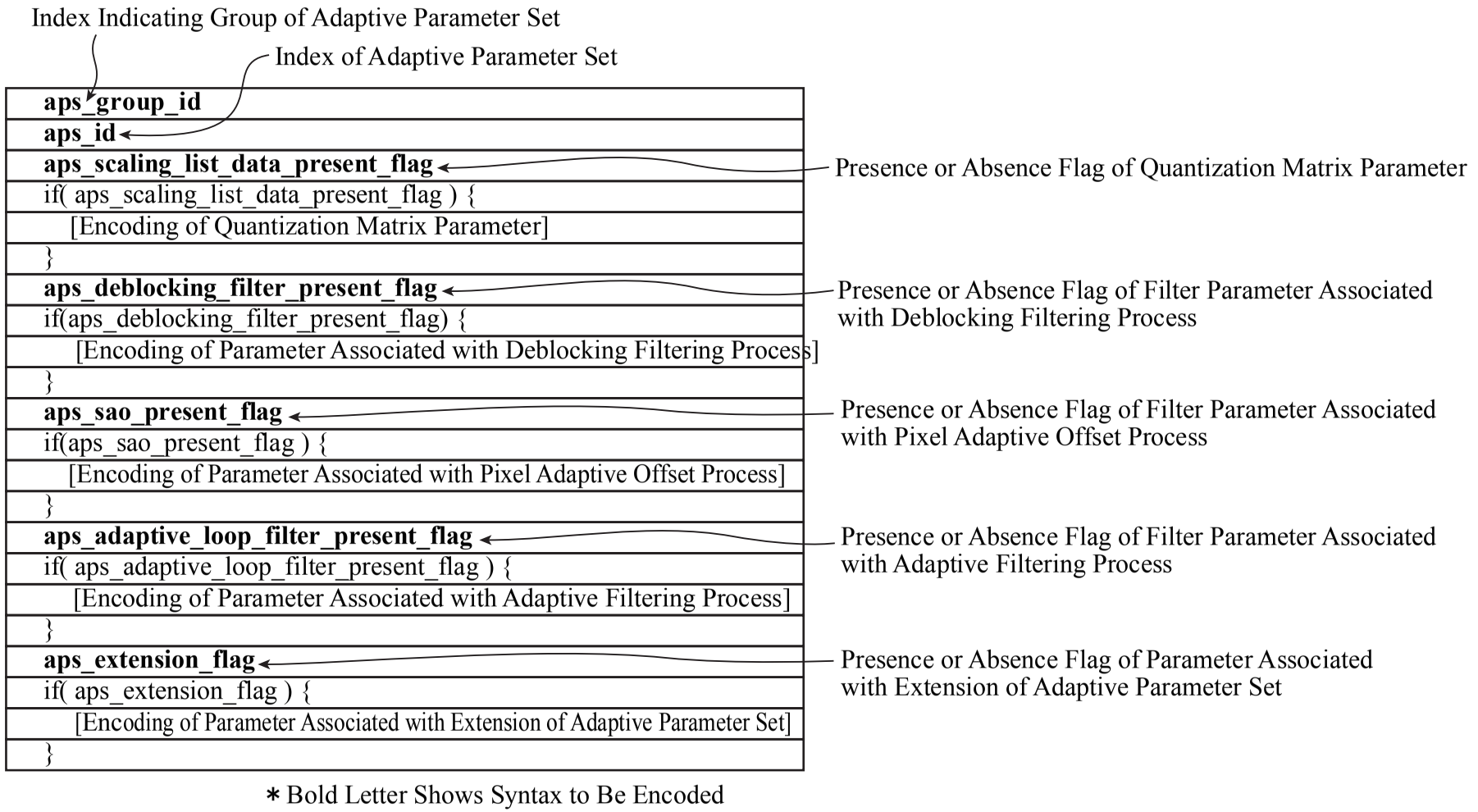
FIG.25

Target Symbol to Be Encoded	Output Code Word				
0	0				
1	1	0			
2	1	1	0		
3	1	1	1	0	
4	1	1	1	1	0
5	1	1	1	1	1

FIG.26

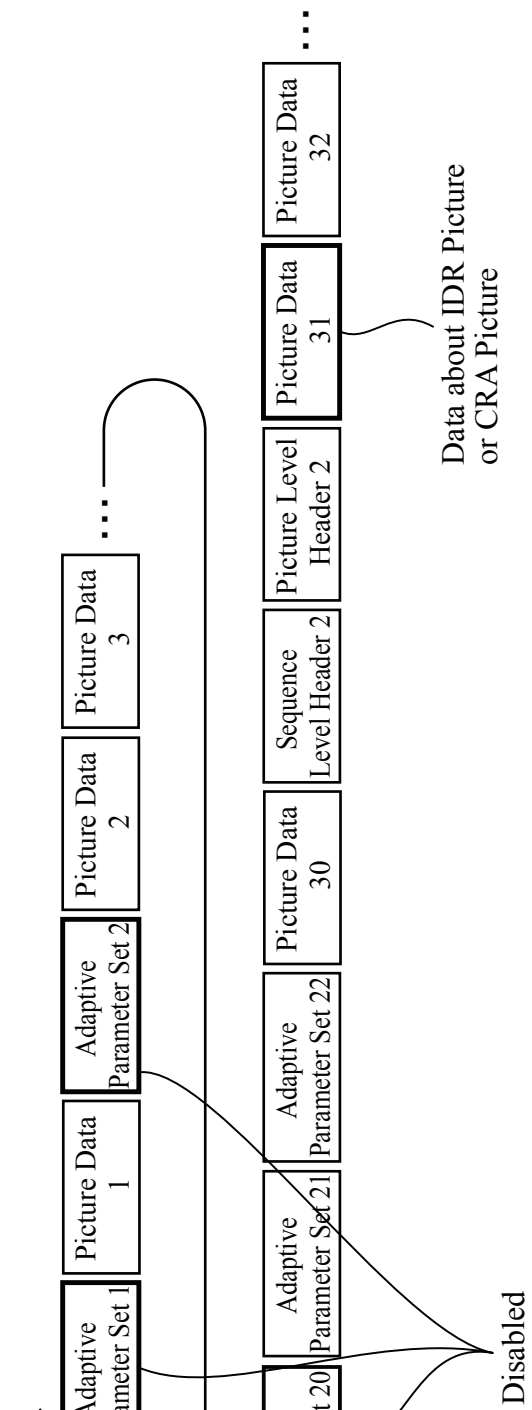
Target Symbol to Be Encoded	Output Code Word					
0	0					
1	1	0				
2	1	1	0			
3	1	1	1	0		
4	1	1	1	1	0	
5	1	1	1	1	1	0
⋮	⋮					

FIG.27



* Bold Letter Shows Syntax to Be Encoded

FIG.28


Decoding Order
Sequence Level Header 1
Picture Level Header 1
Adaptive Parameter Set 1
Picture Data 1
Adaptive Parameter Set 2
Picture Data 2
Picture Data 3
...
Adaptive Parameter Set 20
Adaptive Parameter Set 21
Adaptive Parameter Set 22
Picture Data 30
Sequence Level Header 2
Picture Level Header 2
Picture Data 31
Picture Data 32
...
Data about IDR Picture or CRA Picture
Disabled