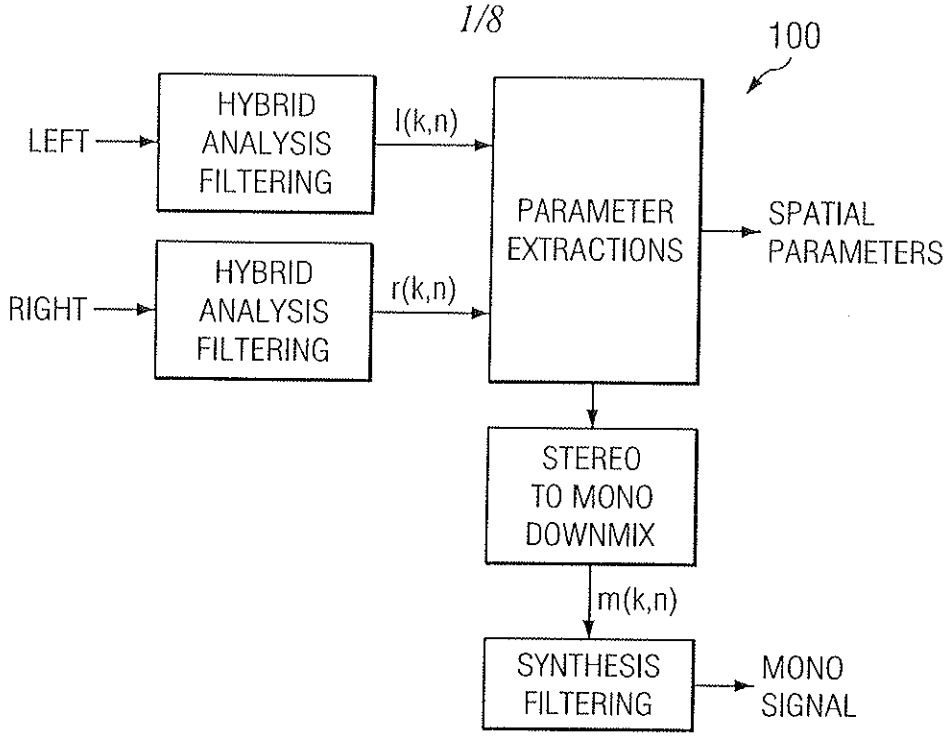

100
LEFT
HYBRID ANALYSIS FILTERING
l(k,n)
RIGHT
HYBRID ANALYSIS FILTERING
r(k,n)
PARAMETER EXTRACTIONS
SPATIAL PARAMETERS
STEREO TO MONO DOWNMIX
m(k,n)
SYNTHESIS FILTERING
MONO SIGNAL

FIG. 1

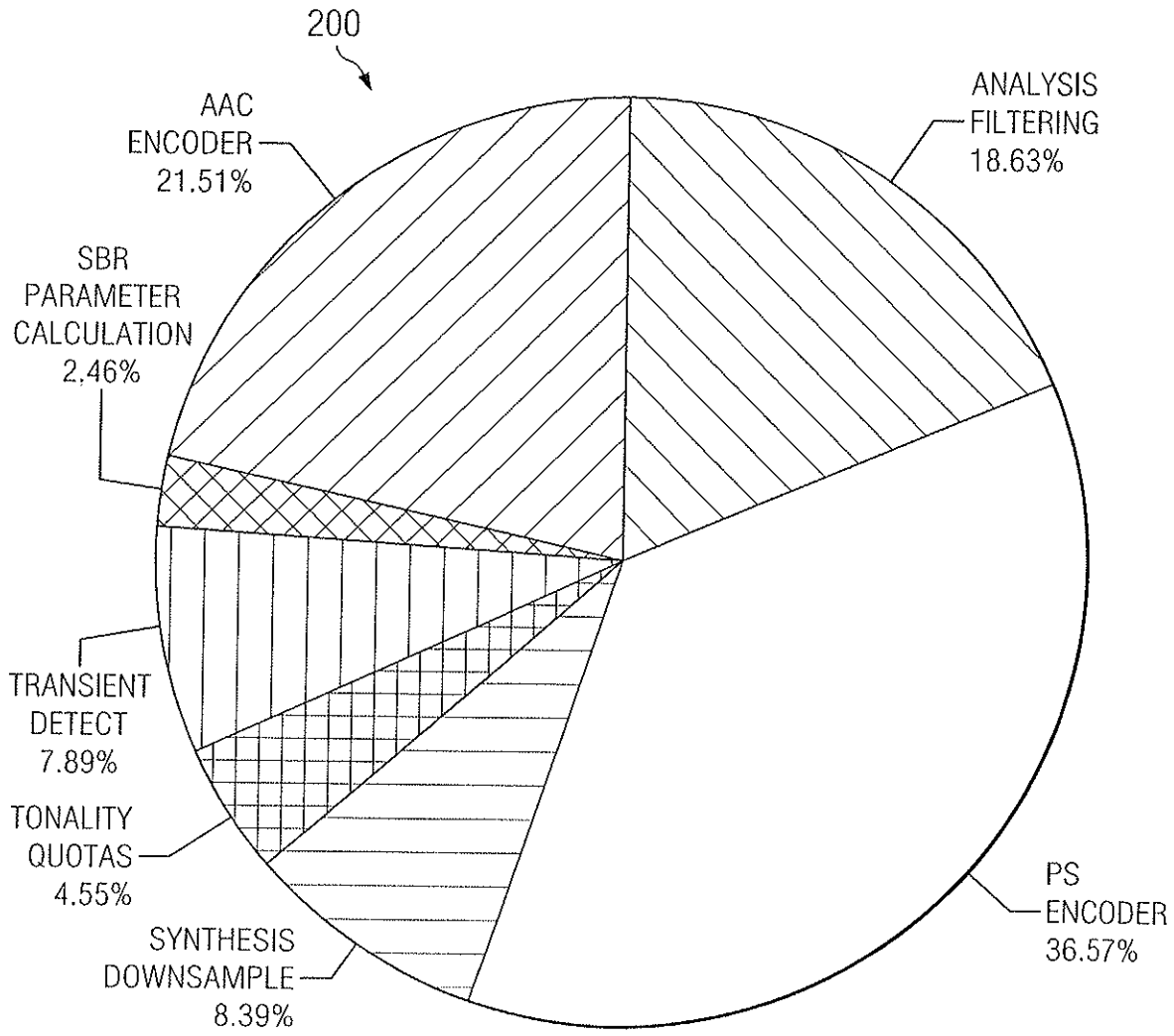

200
AAC ENCODER 21.51%
ANALYSIS FILTERING 18.63%
SBR PARAMETER CALCULATION 2.46%
TRANSIENT DETECT 7.89%
TONALITY QUOTAS 4.55%
SYNTHESIS DOWNSAMPLE 8.39%
PS ENCODER 36.57%

FIG. 2

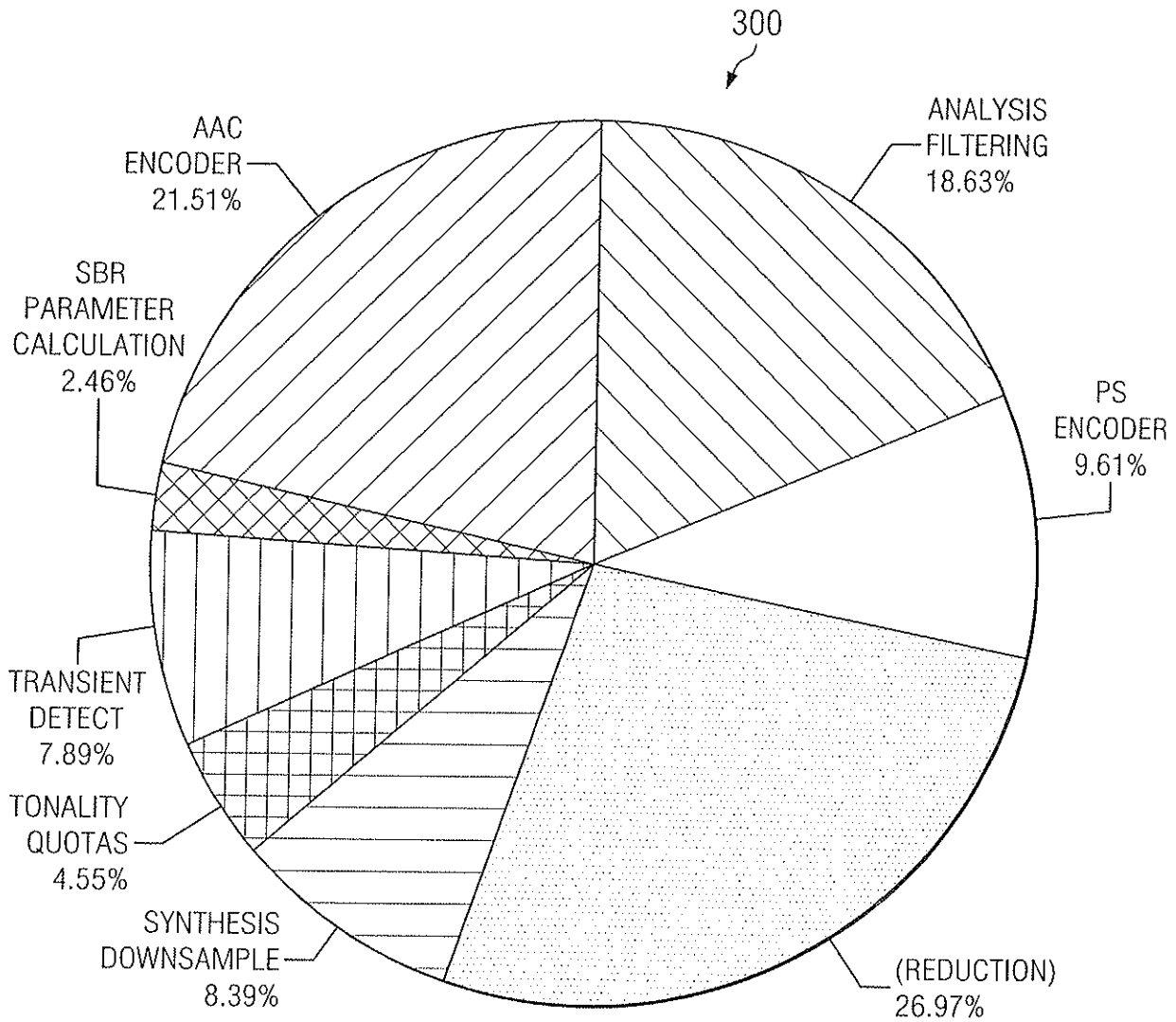

300
AAC
ENCODER
21.51%
ANALYSIS
FILTERING
18.63%
SBR
PARAMETER
CALCULATION
2.46%
PS
ENCODER
9.61%
TRANSIENT
DETECT
7.89%
TONALITY
QUOTAS
4.55%
SYNTHESIS
DOWNSAMPLE
8.39%
(REDUCTION)
26.97%

FIG. 3

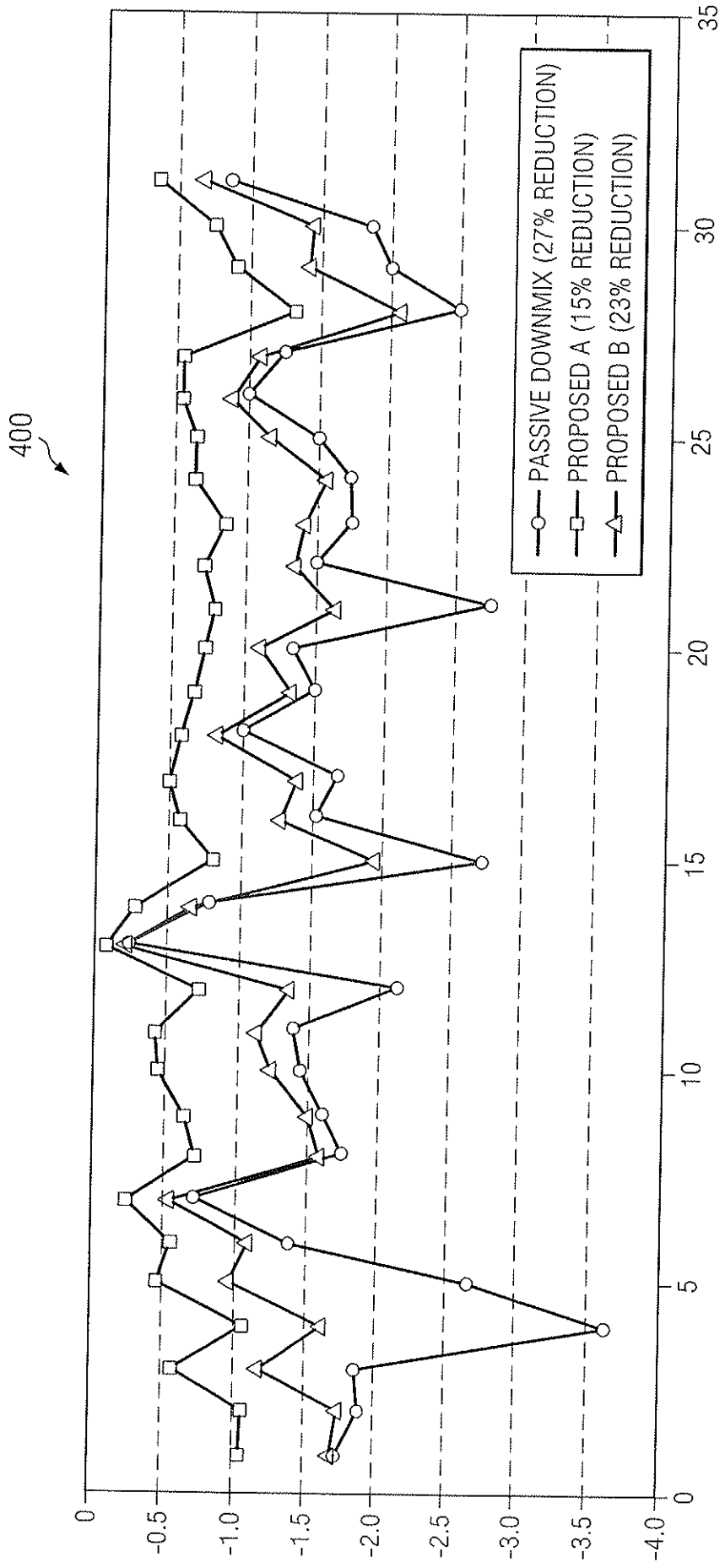

400
PASSIVE DOWNMIX (27% REDUCTION)
PROPOSED A (15% REDUCTION)
PROPOSED B (23% REDUCTION)
0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
-3.5
-4.0
0
5
10
15
20
25
30
35

FIG. 4

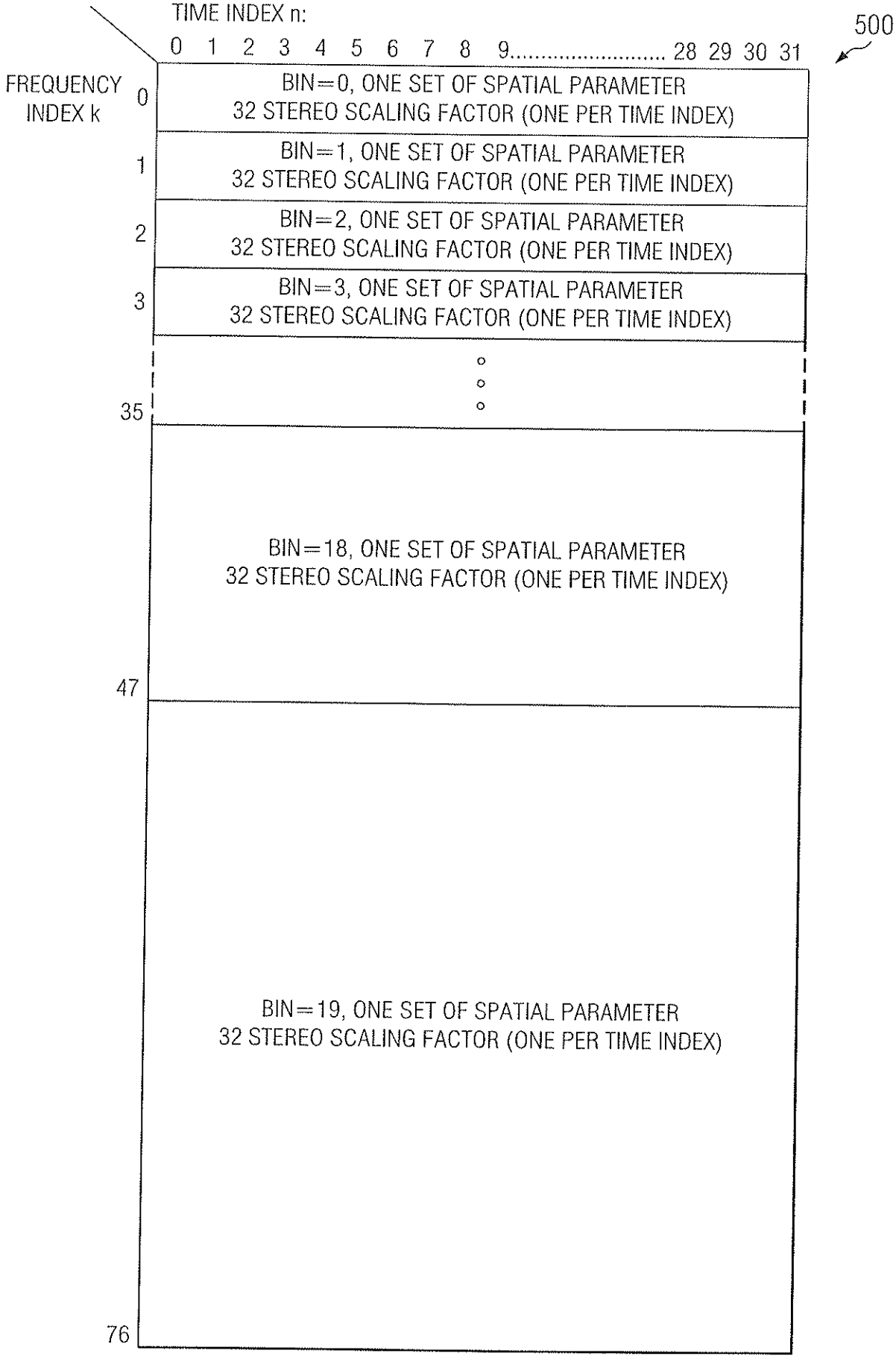

TIME INDEX n:
0 1 2 3 4 5 6 7 8 9..... 28 29 30 31
500
FREQUENCY INDEX k
0
BIN=0, ONE SET OF SPATIAL PARAMETER
32 STEREO SCALING FACTOR (ONE PER TIME INDEX)
1
BIN=1, ONE SET OF SPATIAL PARAMETER
32 STEREO SCALING FACTOR (ONE PER TIME INDEX)
2
BIN=2, ONE SET OF SPATIAL PARAMETER
32 STEREO SCALING FACTOR (ONE PER TIME INDEX)
3
BIN=3, ONE SET OF SPATIAL PARAMETER
32 STEREO SCALING FACTOR (ONE PER TIME INDEX)
35
BIN=18, ONE SET OF SPATIAL PARAMETER
32 STEREO SCALING FACTOR (ONE PER TIME INDEX)
47
BIN=19, ONE SET OF SPATIAL PARAMETER
32 STEREO SCALING FACTOR (ONE PER TIME INDEX)
76

FIG. 5

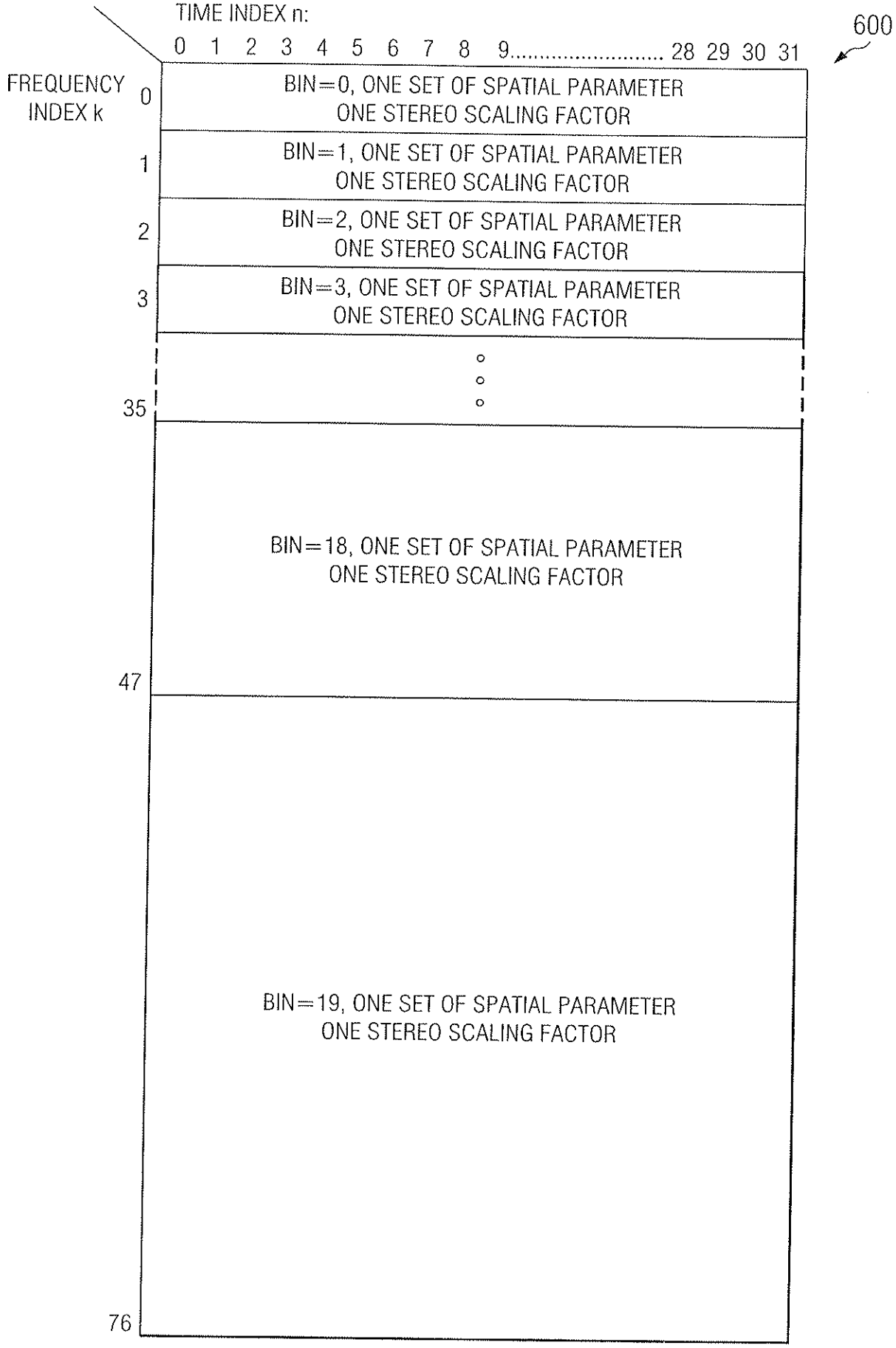

TIME INDEX n:
0 1 2 3 4 5 6 7 8 9..... 28 29 30 31
600
FREQUENCY INDEX k
0
BIN=0, ONE SET OF SPATIAL PARAMETER
ONE STEREO SCALING FACTOR
1
BIN=1, ONE SET OF SPATIAL PARAMETER
ONE STEREO SCALING FACTOR
2
BIN=2, ONE SET OF SPATIAL PARAMETER
ONE STEREO SCALING FACTOR
3
BIN=3, ONE SET OF SPATIAL PARAMETER
ONE STEREO SCALING FACTOR
35
BIN=18, ONE SET OF SPATIAL PARAMETER
ONE STEREO SCALING FACTOR
47
BIN=19, ONE SET OF SPATIAL PARAMETER
ONE STEREO SCALING FACTOR
76

FIG. 6

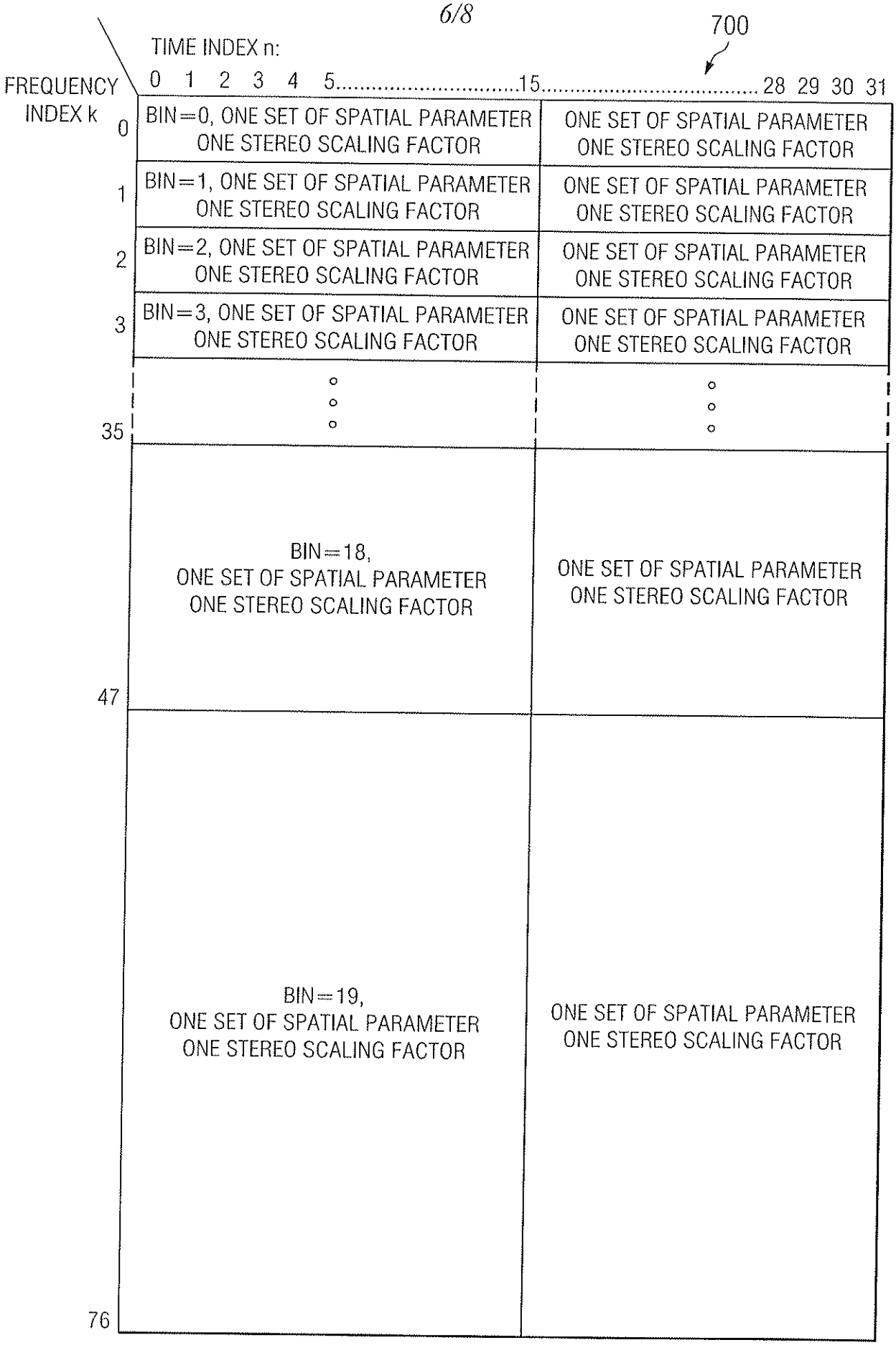

700
TIME INDEX n:
0 1 2 3 4 5.....15..... 28 29 30 31
FREQUENCY INDEX k
0
BIN=0, ONE SET OF SPATIAL PARAMETER ONE STEREO SCALING FACTOR
ONE SET OF SPATIAL PARAMETER ONE STEREO SCALING FACTOR
1
BIN=1, ONE SET OF SPATIAL PARAMETER ONE STEREO SCALING FACTOR
ONE SET OF SPATIAL PARAMETER ONE STEREO SCALING FACTOR
2
BIN=2, ONE SET OF SPATIAL PARAMETER ONE STEREO SCALING FACTOR
ONE SET OF SPATIAL PARAMETER ONE STEREO SCALING FACTOR
3
BIN=3, ONE SET OF SPATIAL PARAMETER ONE STEREO SCALING FACTOR
ONE SET OF SPATIAL PARAMETER ONE STEREO SCALING FACTOR
35
BIN=18, ONE SET OF SPATIAL PARAMETER ONE STEREO SCALING FACTOR
ONE SET OF SPATIAL PARAMETER ONE STEREO SCALING FACTOR
47
BIN=19, ONE SET OF SPATIAL PARAMETER ONE STEREO SCALING FACTOR
ONE SET OF SPATIAL PARAMETER ONE STEREO SCALING FACTOR
76

FIG. 7

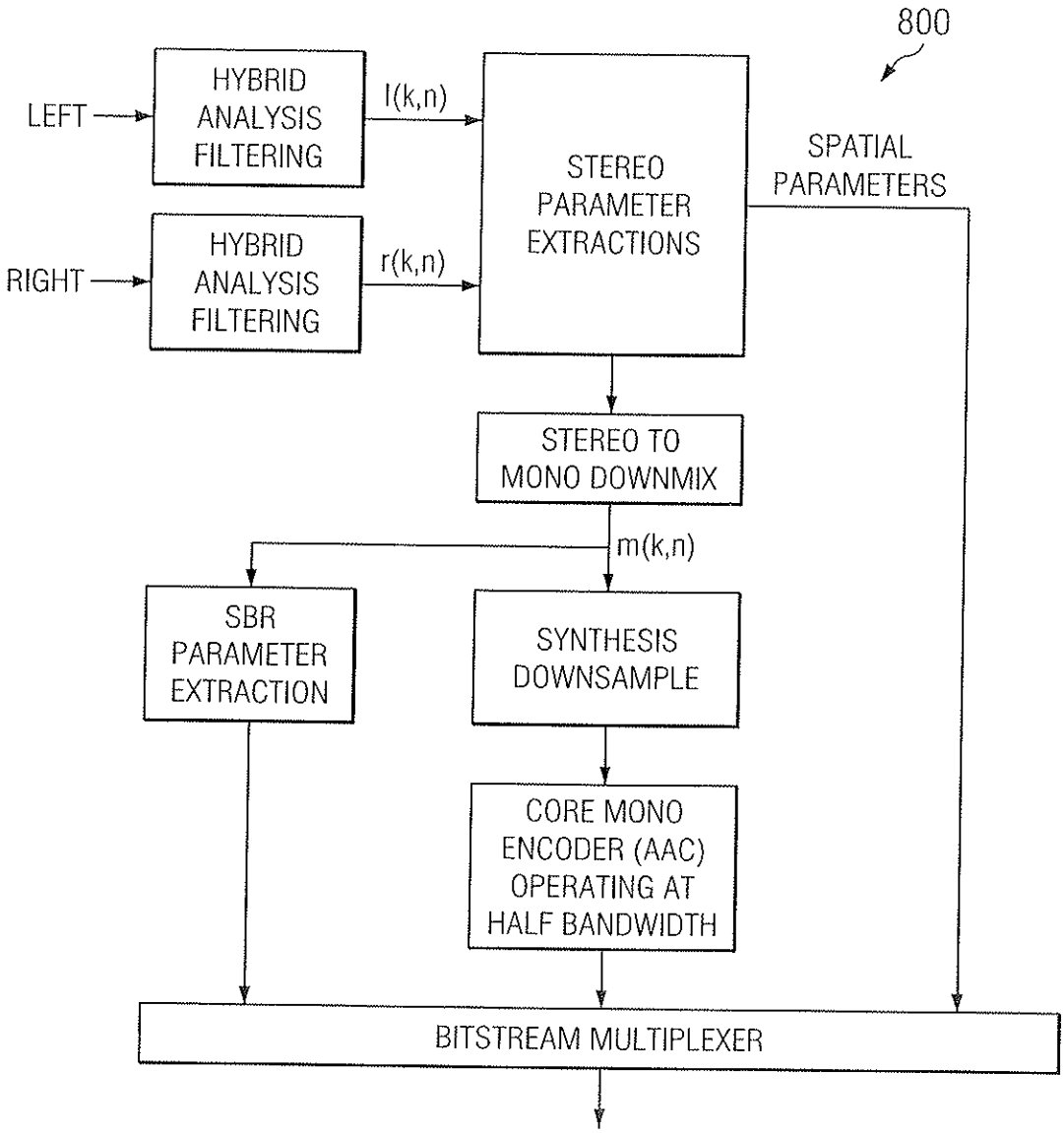

800
LEFT
HYBRID ANALYSIS FILTERING
l(k,n)
RIGHT
HYBRID ANALYSIS FILTERING
r(k,n)
STEREO PARAMETER EXTRACTIONS
SPATIAL PARAMETERS
STEREO TO MONO DOWNMIX
m(k,n)
SBR PARAMETER EXTRACTION
SYNTHESIS DOWNSAMPLE
CORE MONO ENCODER (AAC) OPERATING AT HALF BANDWIDTH
BITSTREAM MULTIPLEXER

FIG. 8

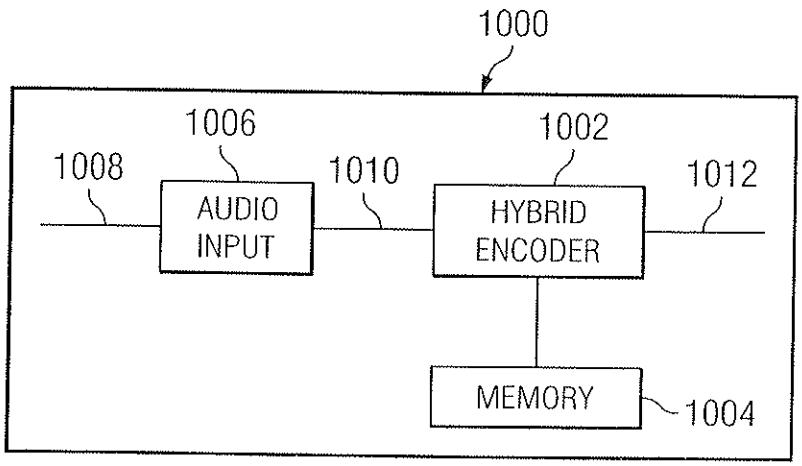

1000
1006
1002
1008
1010
1012
AUDIO INPUT
HYBRID ENCODER
MEMORY
1004

FIG. 10

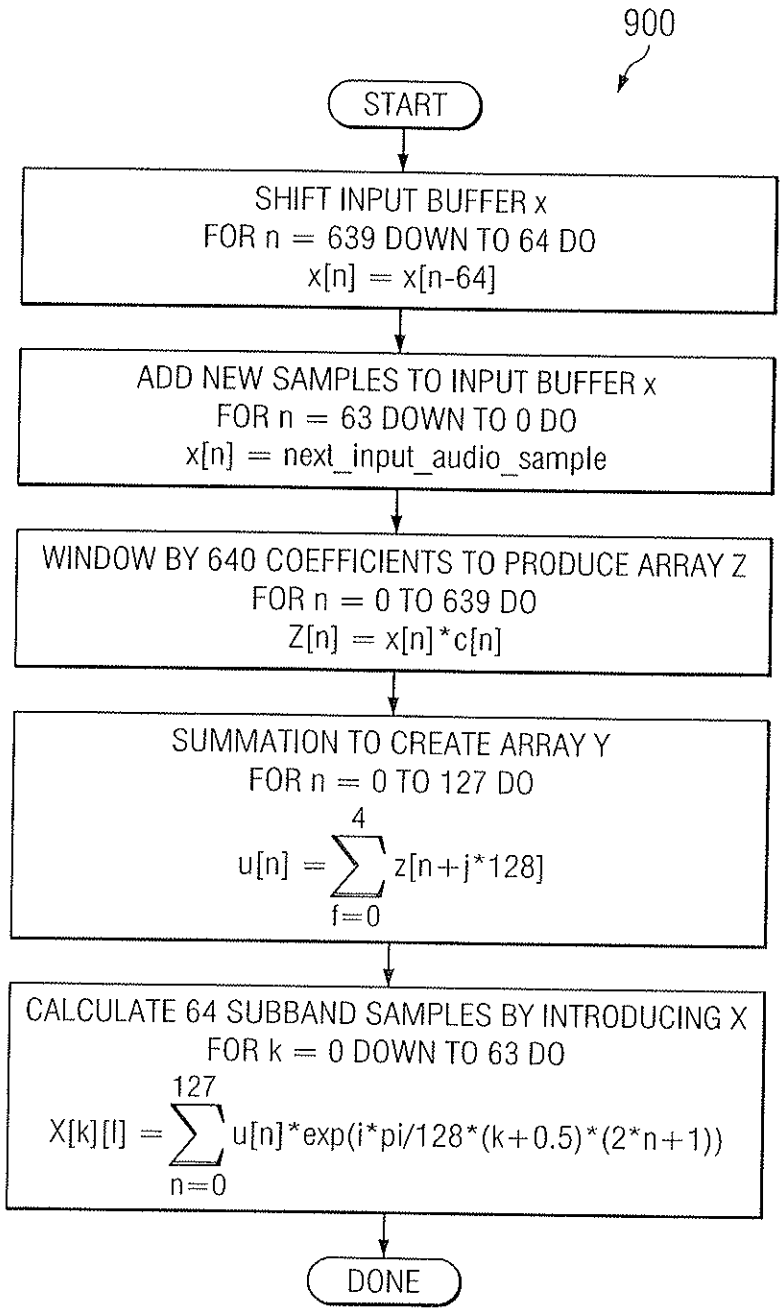

900
START
SHIFT INPUT BUFFER x
FOR n = 639 DOWN TO 64 DO
x[n] = x[n-64]
ADD NEW SAMPLES TO INPUT BUFFER x
FOR n = 63 DOWN TO 0 DO
x[n] = next_input_audio_sample
WINDOW BY 640 COEFFICIENTS TO PRODUCE ARRAY Z
FOR n = 0 TO 639 DO
Z[n] = x[n]*c[n]
SUMMATION TO CREATE ARRAY Y
FOR n = 0 TO 127 DO
u[n] = Σ z[n+j*128] (f=0 to 4)
CALCULATE 64 SUBBAND SAMPLES BY INTRODUCING X
FOR k = 0 DOWN TO 63 DO
X[k][l] = Σ u[n]*exp(i*pi/128*(k+0.5)*(2*n+1)) (n=0 to 127)
DONE

FIG. 9