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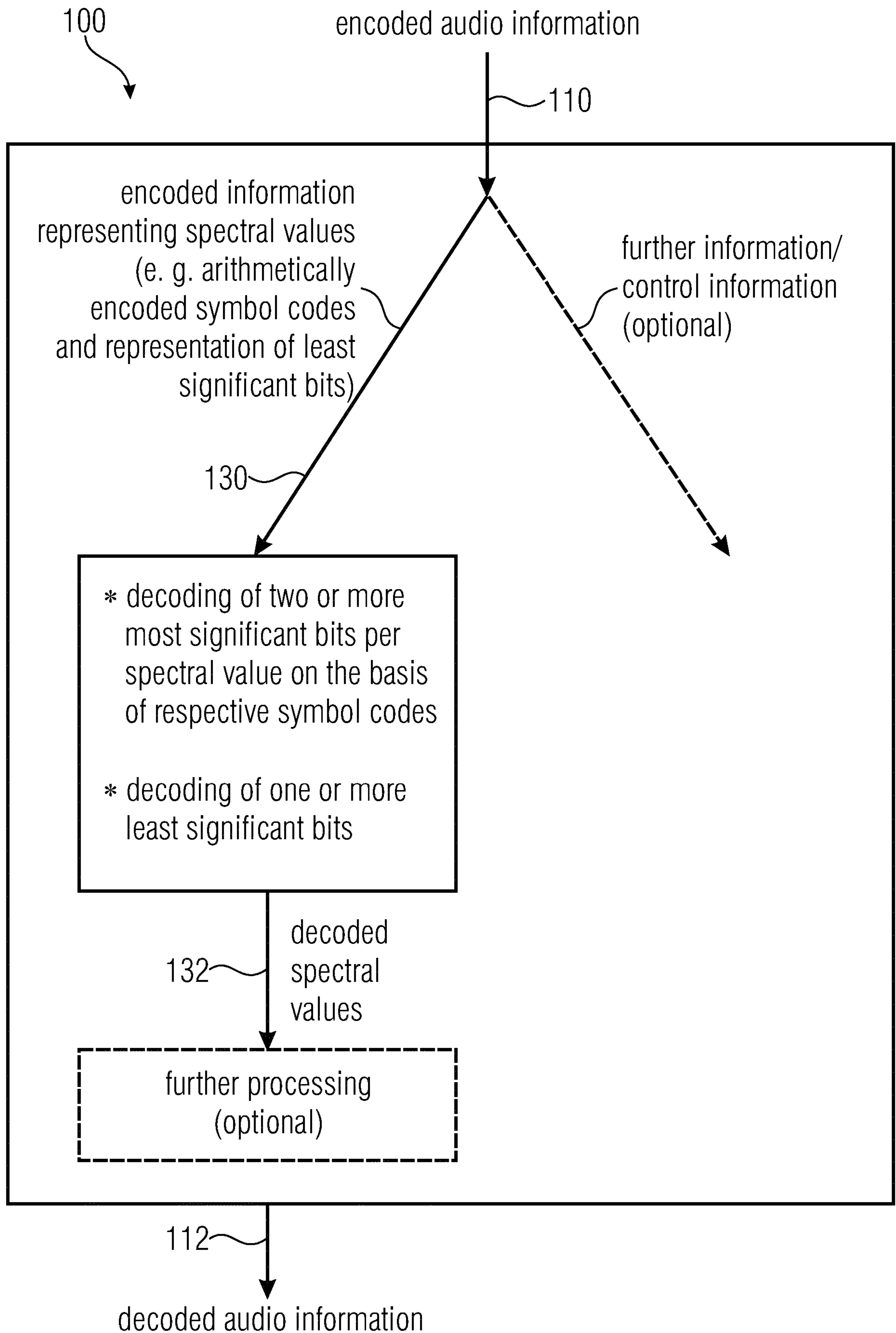


Fig. 1

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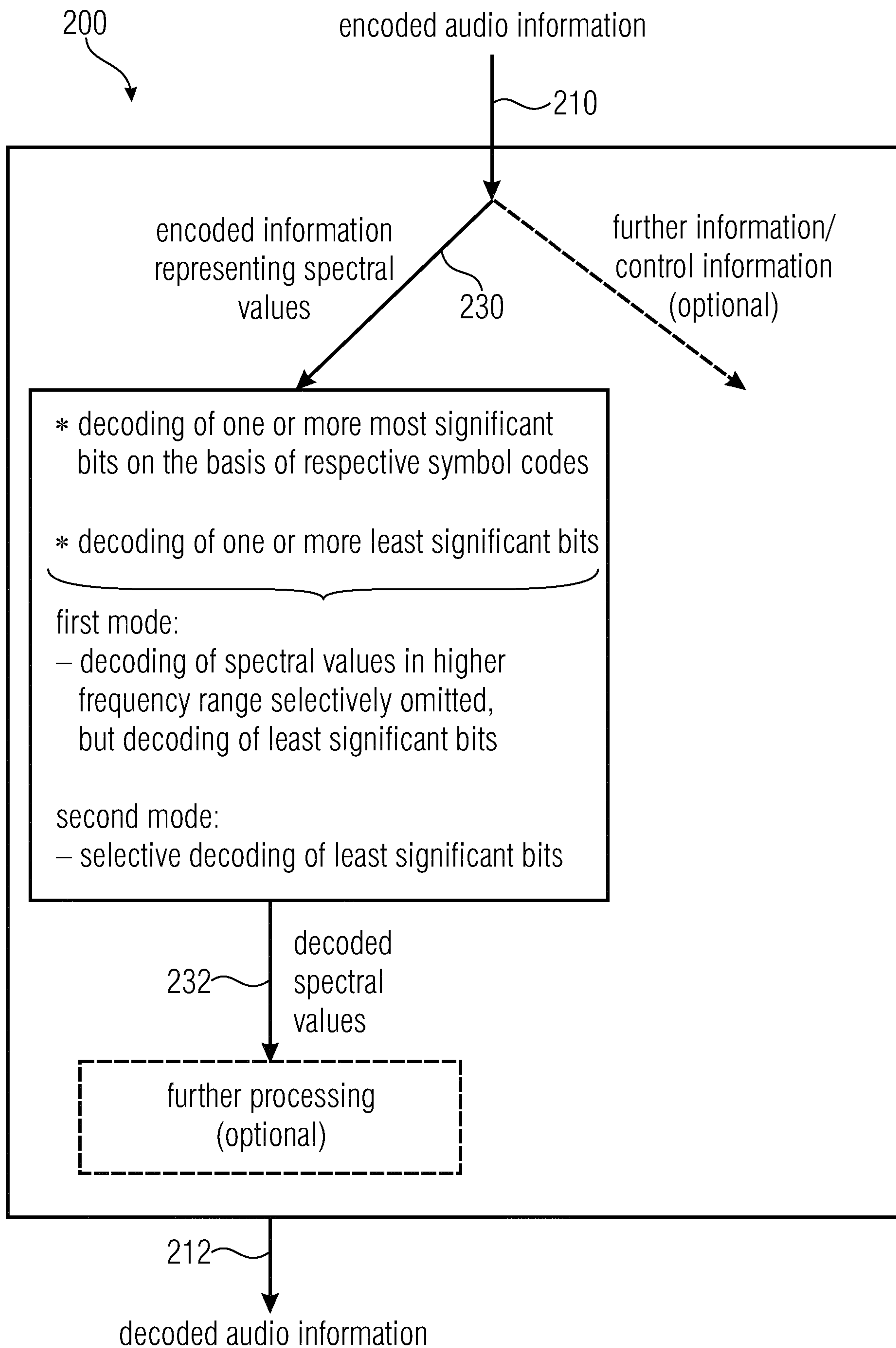


Fig. 2

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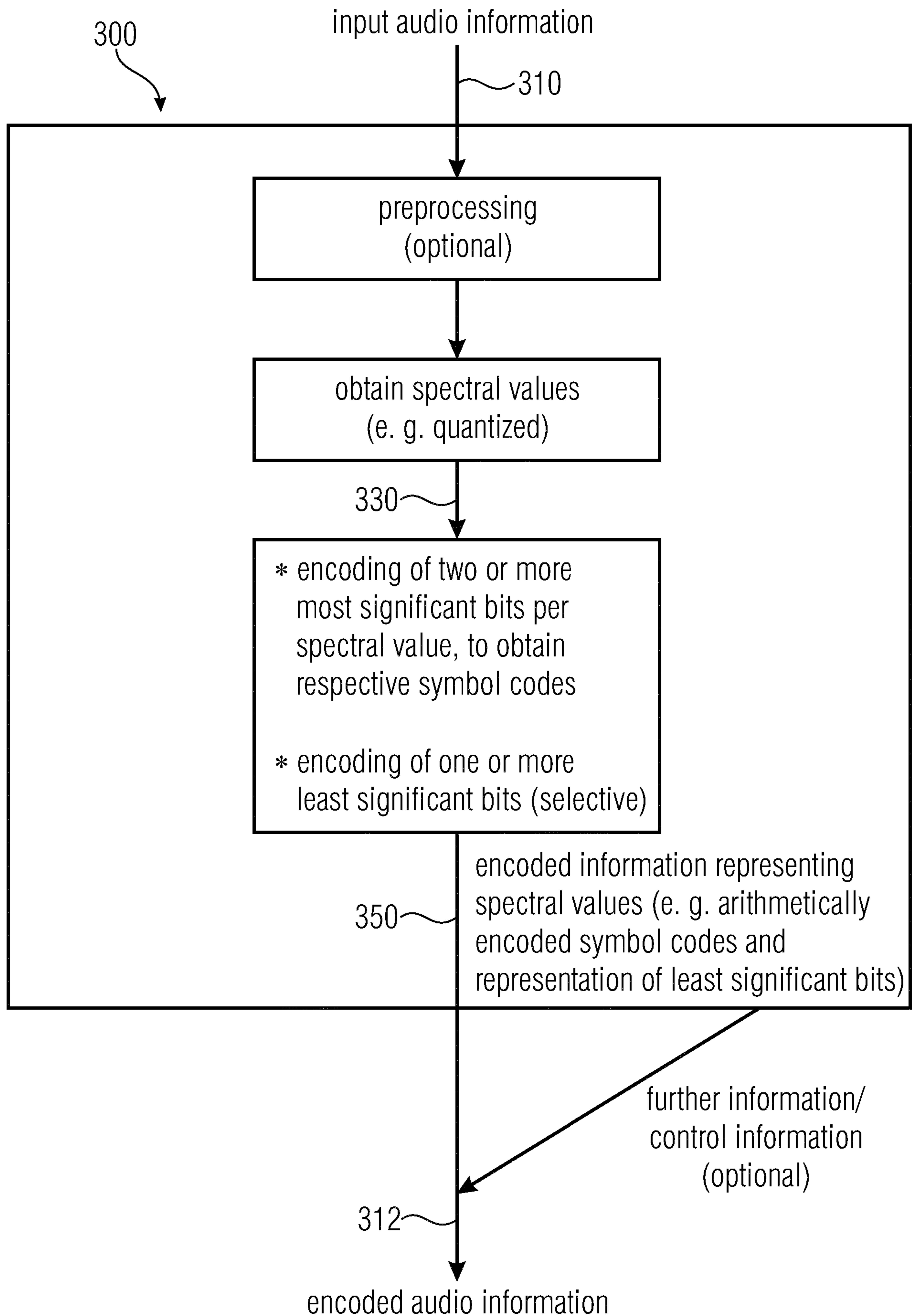


Fig. 3

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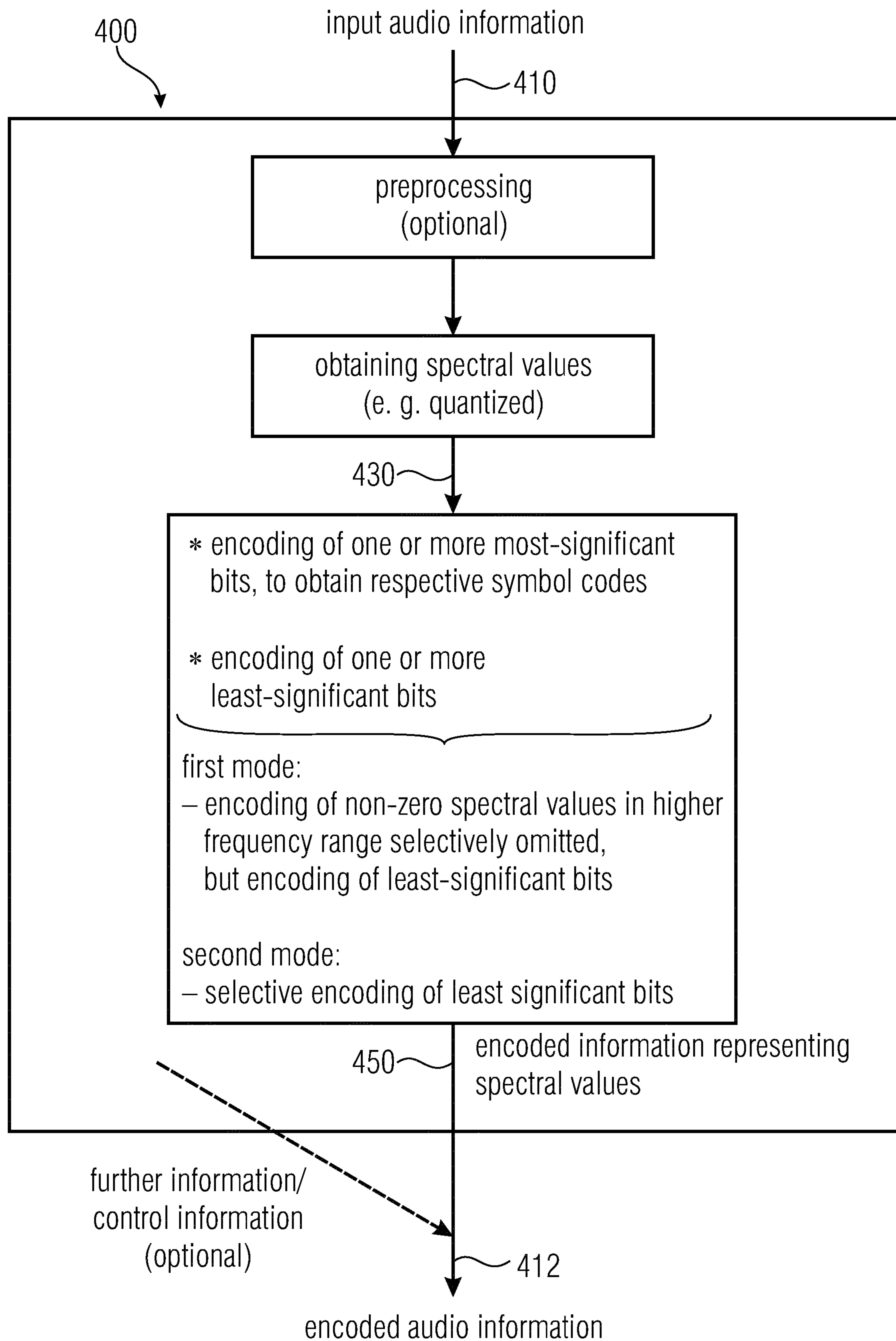


Fig. 4

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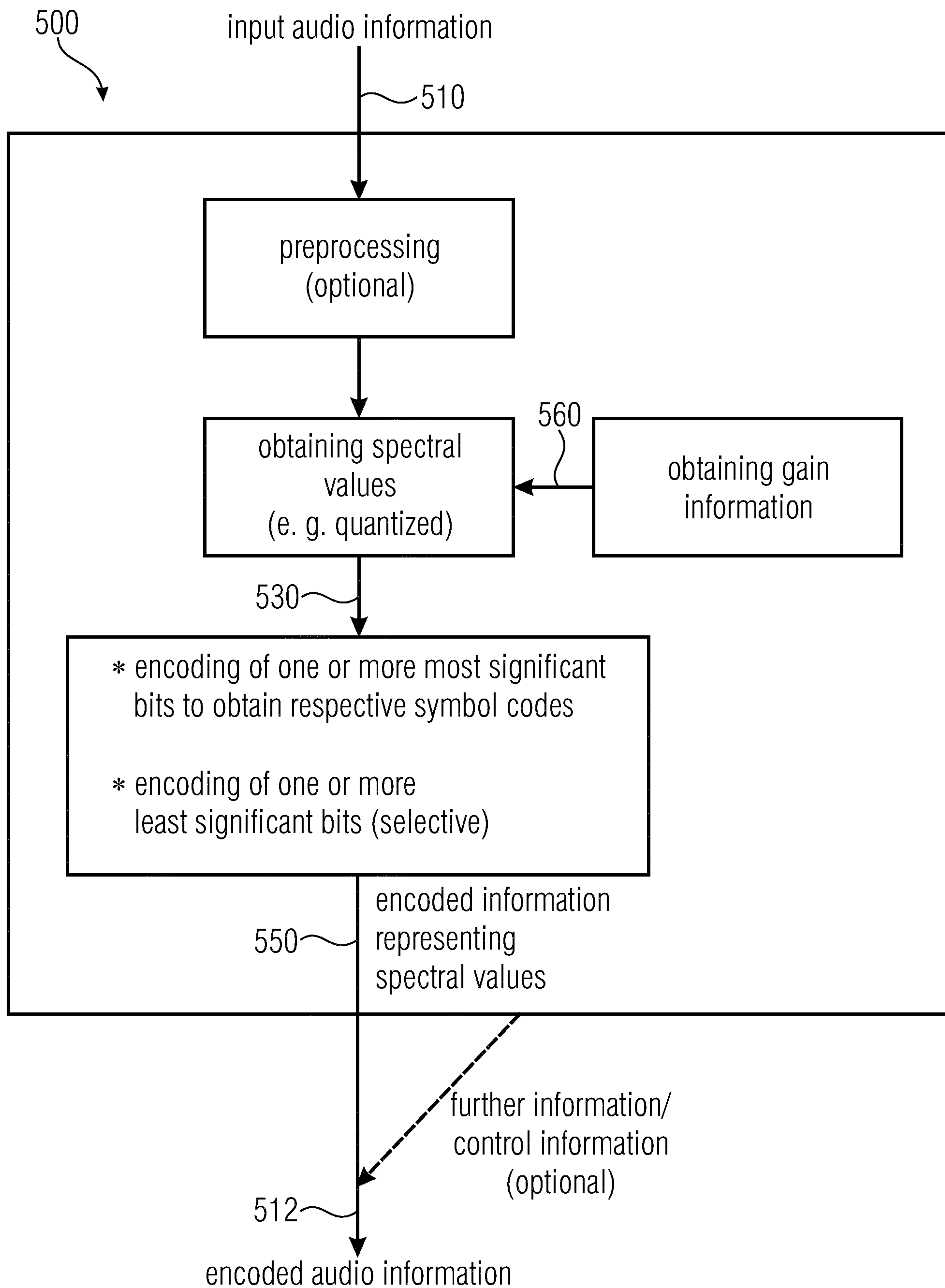


Fig. 5

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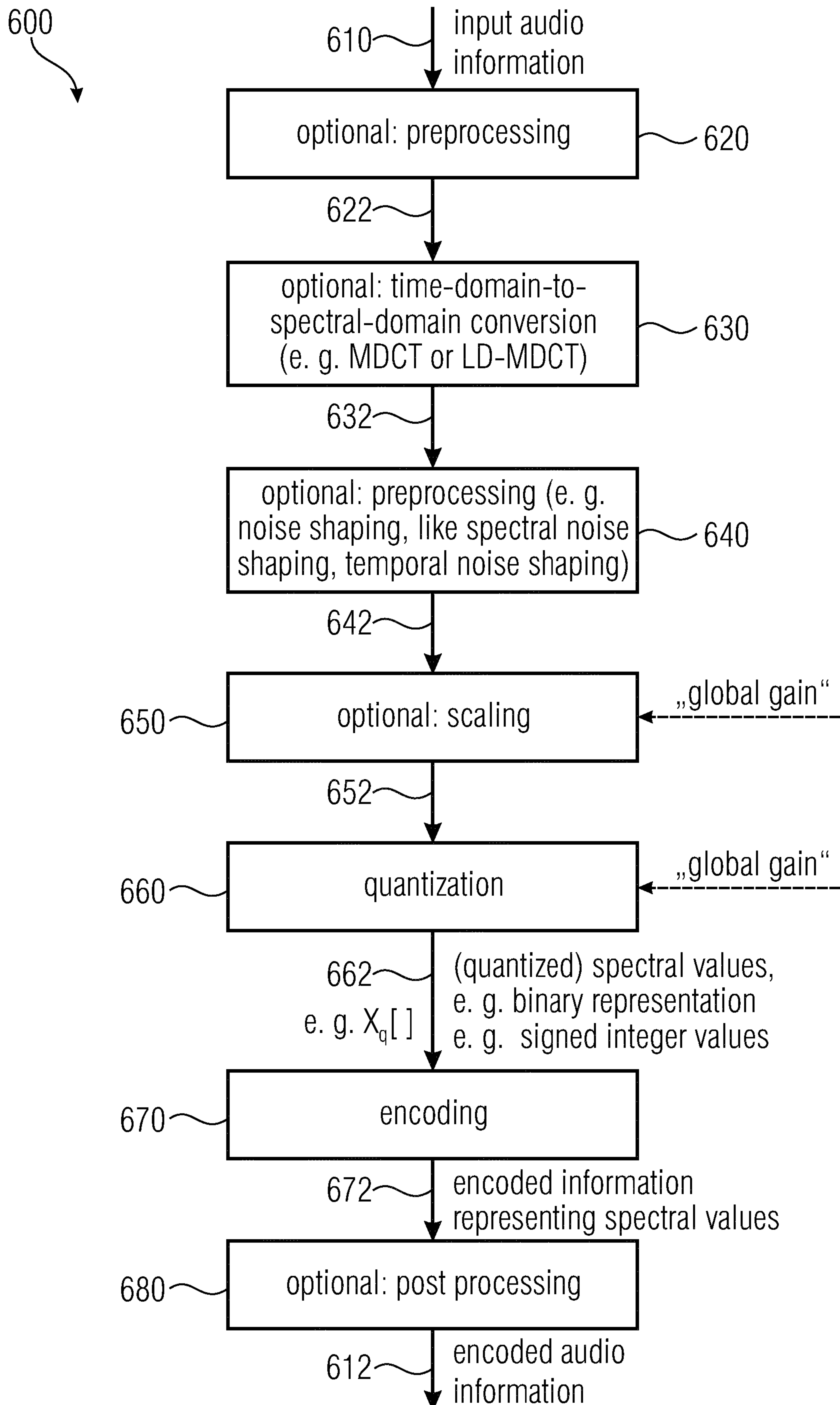


Fig. 6

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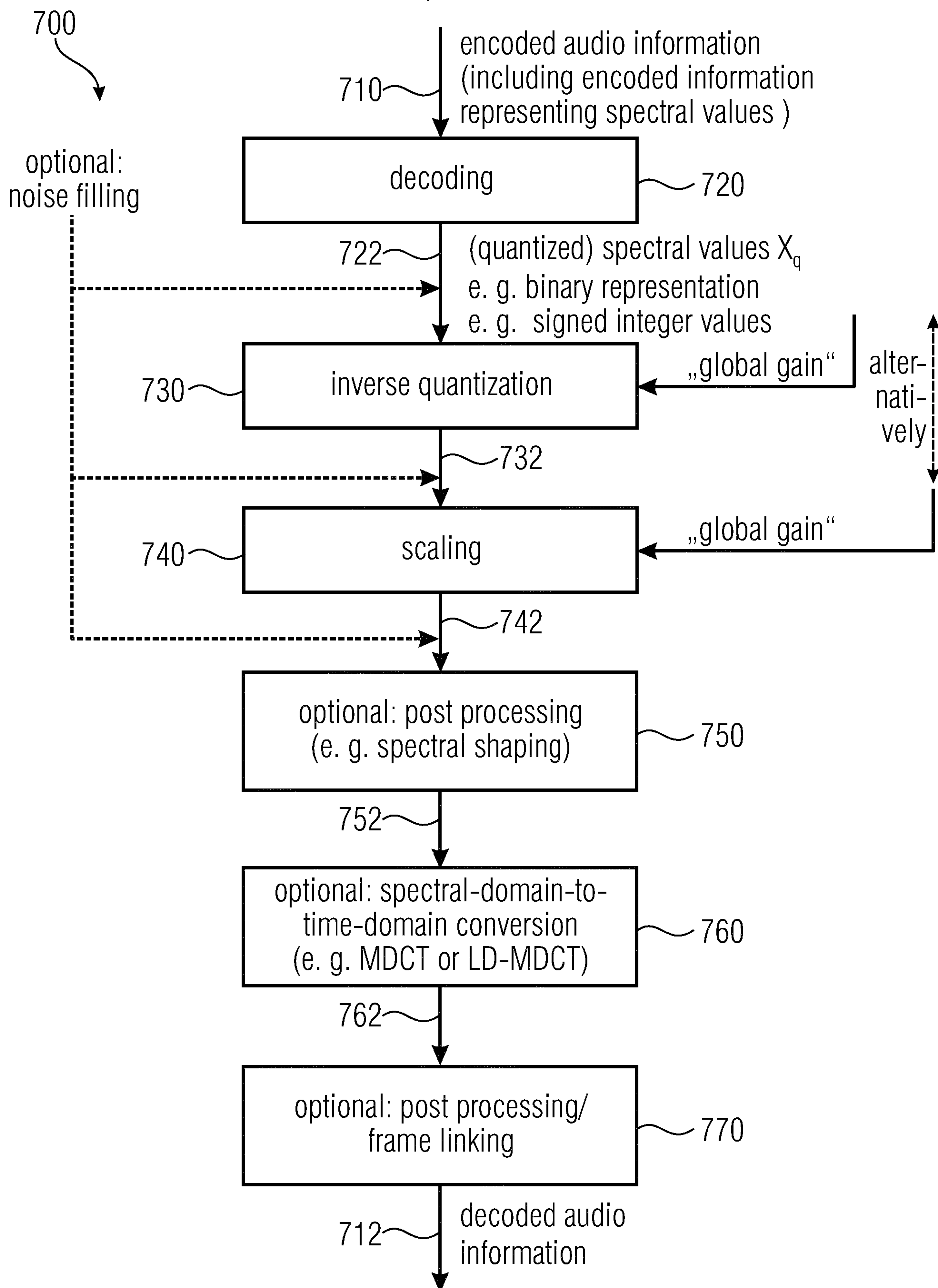


Fig. 7

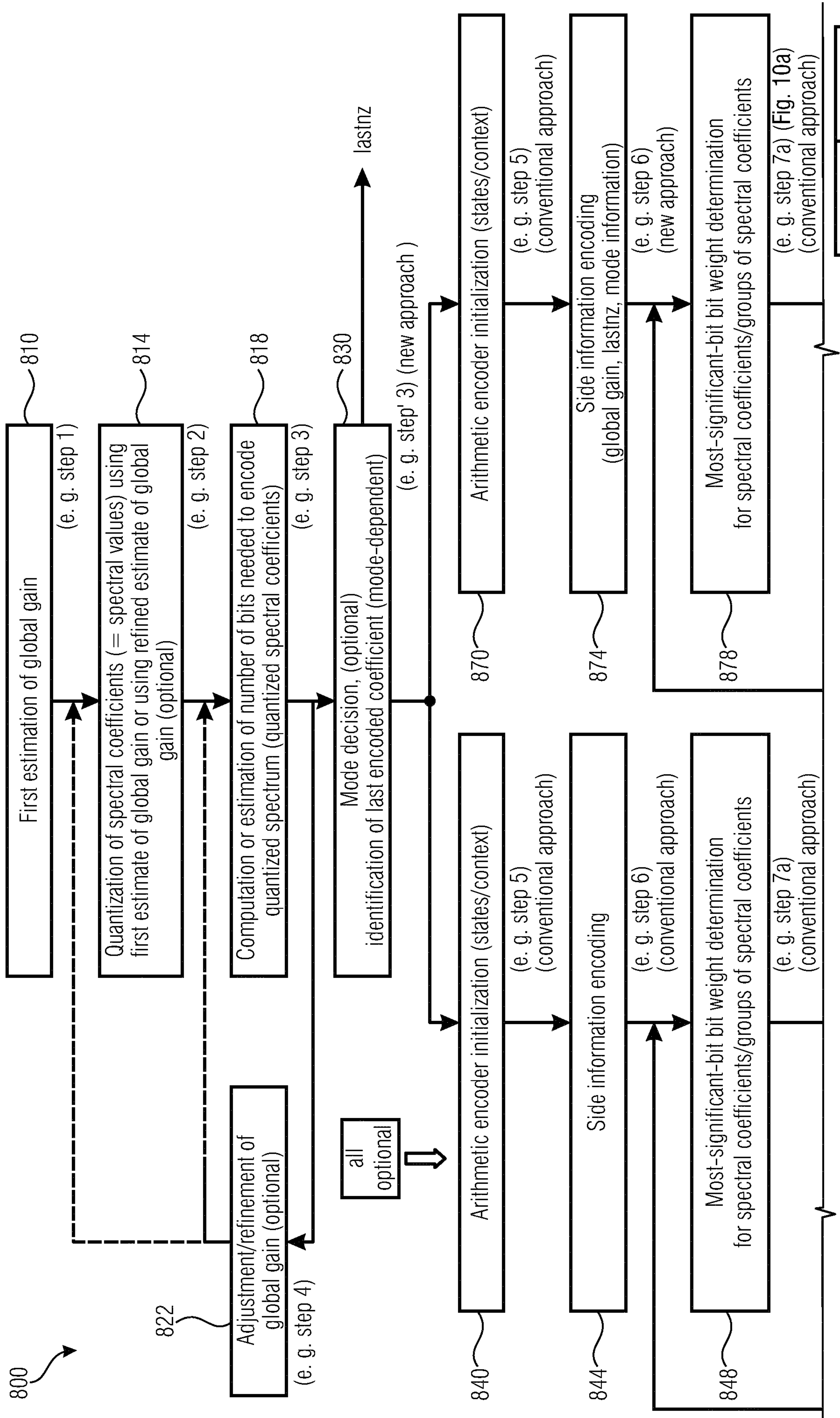


FIG 8A

FIG 8	FIG 8A
	FIG 8B

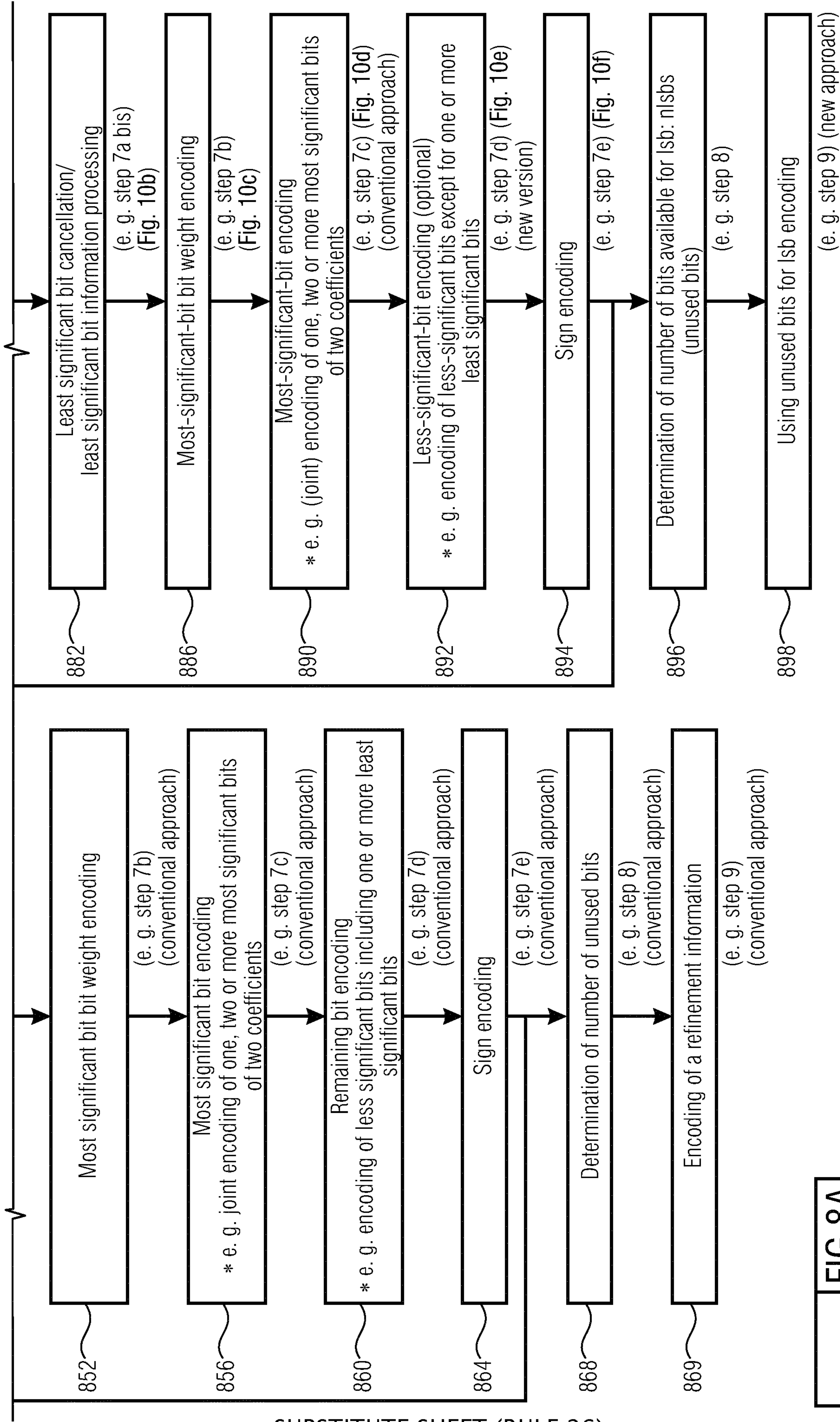
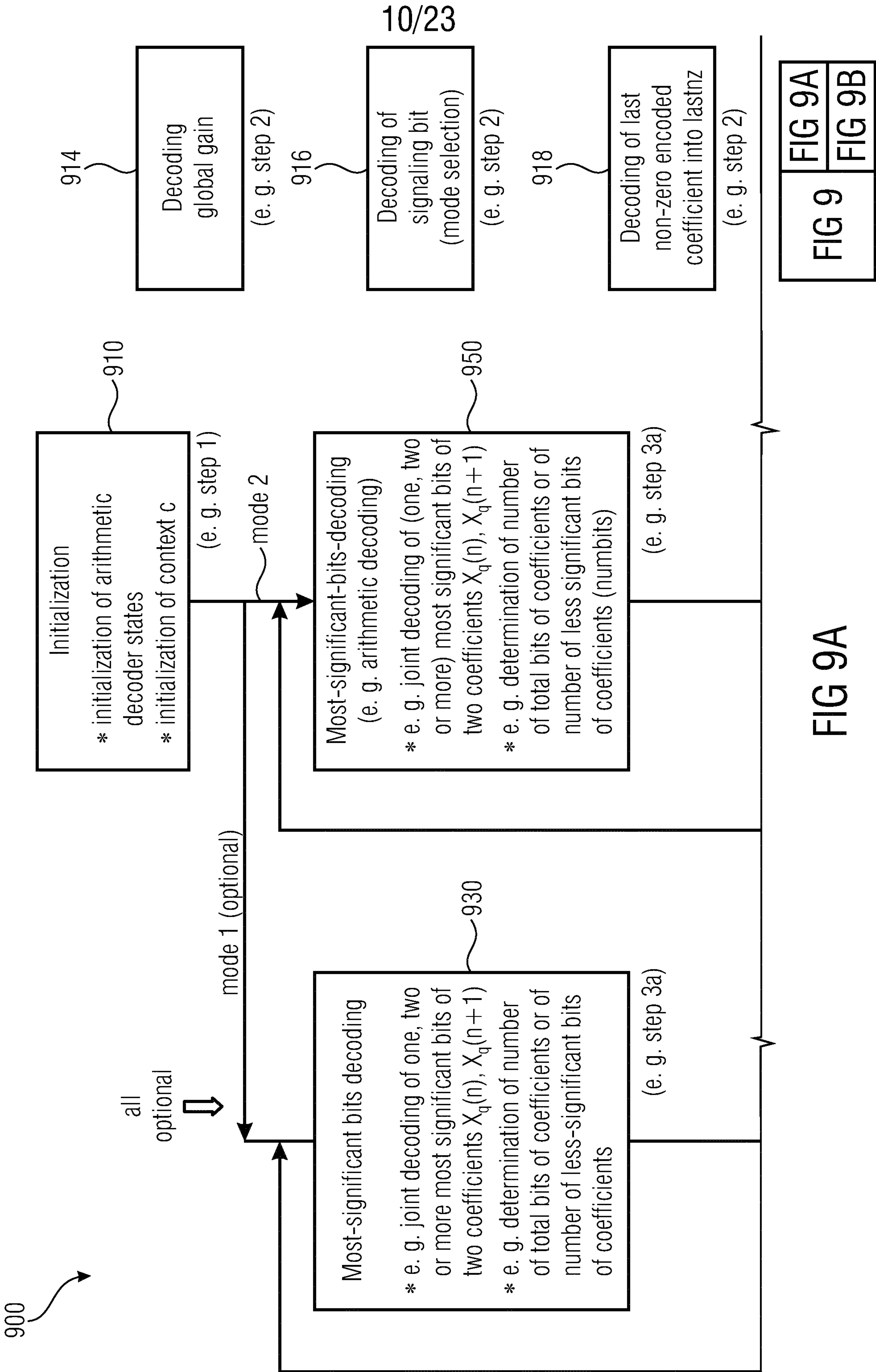


FIG 8B

FIG 8	FIG 8A
	FIG 8B



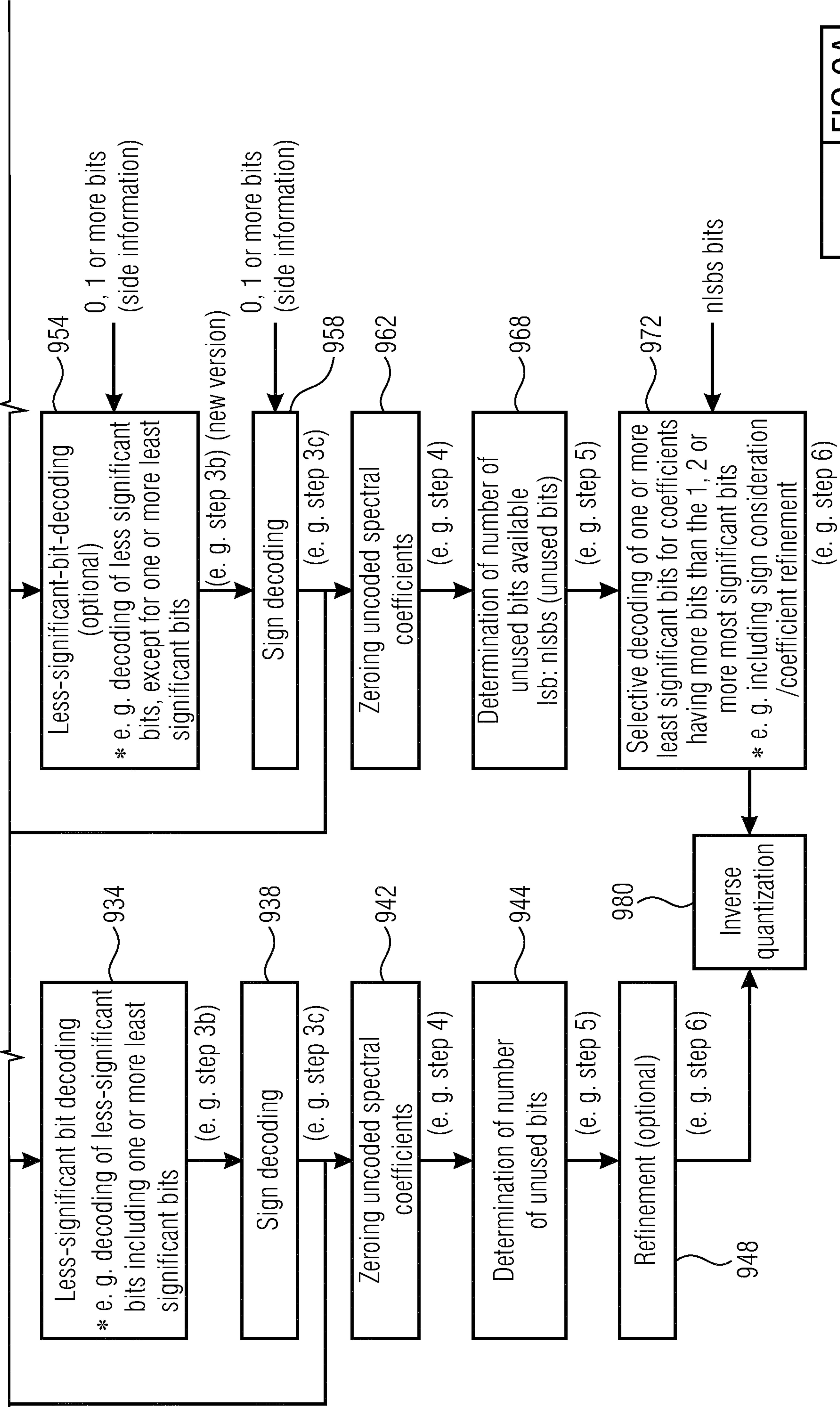


FIG 9	FIG 9A
	FIG 9B

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- Step 7a: compute the minimum number of bits needed to represent the amplitude of the two coefficients $X_q(n)$ and $X_q(n+1)$

numbits = ceil(log2(max(abs($X_q[n]$), abs($X_q[n+1]$)) + 1)); ↖ 1000a

Fig. 10a

- Step 7a-bis: this is an additional step just after Step 7a, which is performed if *numbits* > 2. The least significant bit of each coefficient is saved, and the coefficient is then modified such that its LSB is now zero. The sign of the coefficient is also saved in case the coefficient was originally non-zero and becomes zero after setting its LSB to zero.

```

if (numbits > 2)
{
    bit = abs( $X_q[n]$ ) & 1;                                ↖ 1010a
    lsbs[nlsbs++] = bit;                                   ↖ 1010b
    if (bit != 0 && (abs( $X_q[n]$ ) & FFFE) == 0)             ↖ 1010c
    {
        bit = 0;                                          } ↖ 1010d
        if ( $X_q[n]$  < 0) {
            bit = 1;
        }
        lsbs[nlsbs++] = bit;                               ↖ 1010e
    }
     $X_q[n] = (X_q[n]/2)*2$ ;                                ↖ 1010f
    bit = abs( $X_q[n+1]$ ) & 1;                                ↖ 1011a
    lsbs[nlsbs++] = bit;                                   ↖ 1011b
    if (bit != 0 && (abs( $X_q[n+1]$ ) & FFFE) == 0)           ↖ 1011c
    {
        bit = 0;                                          } ↖ 1011d
        if ( $X_q[n+1]$  < 0) {
            bit = 1;
        }
        lsbs[nlsbs++] = bit;                               ↖ 1011e
    }
     $X_q[n+1] = (X_q[n+1]/2)*2$ ;                             ↖ 1011f
}

```

Fig. 10b

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- Step 7b: encode $numbits-2$ escape values ($VAL_ESC=16$) if $numbits > 2$

```

for (b = 0; b < numbits-2; b++) {
    Get probabilities p from context c
    Encode escape symbol VAL_ESC with ari. enc. and probabilities p
    Update context c
}

```

1020a

Fig. 10c

- Step 7c: encode the 2 most significant bits of both coefficients $X_q(n)$ and $X_q(n+1)$ as a single symbol sym (whose value lies between 0 and 15)

```

s = max(0, numbits-2);
a = abs( $X_q[n]$ ) >> s;
b = abs( $X_q[n+1]$ ) >> s;
sym = a + 4*b;
Get probabilities p from context c
Encode symbol sym with ari. enc. and probabilities p
Update context c

```

1040a

1040b

1040c

1040d

Fig. 10d

- Step 7d: encode the remaining bits except the least significant bit

```

for (b = 1; b < numbits-2; b++) {
    bit0 = (abs( $X_q[n]$ ) >> b) & 1;
    Encode bit0 as side-information
    bit1 = (abs( $X_q[n+1]$ ) >> b) & 1;
    Encode bit1 as side-information
}

```

1050a

1050b

1050c

Fig. 10e

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- Step 7e: encode the sign of each coefficient, except if the coefficient is zero

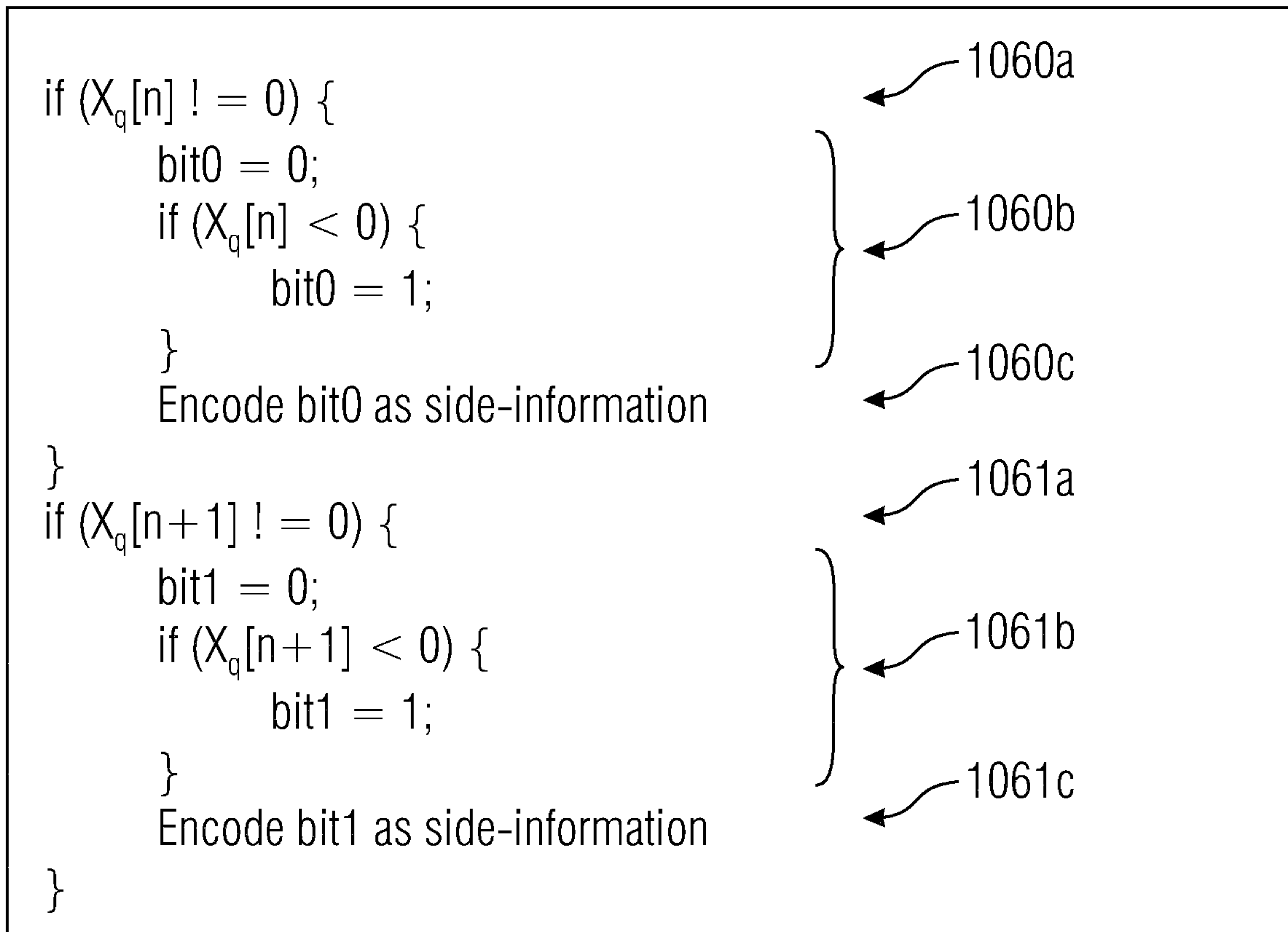


Fig. 10f

- Step 3a: decode the 2 most significant bits of both coefficients $X_q(n)$ and $X_q(n+1)$

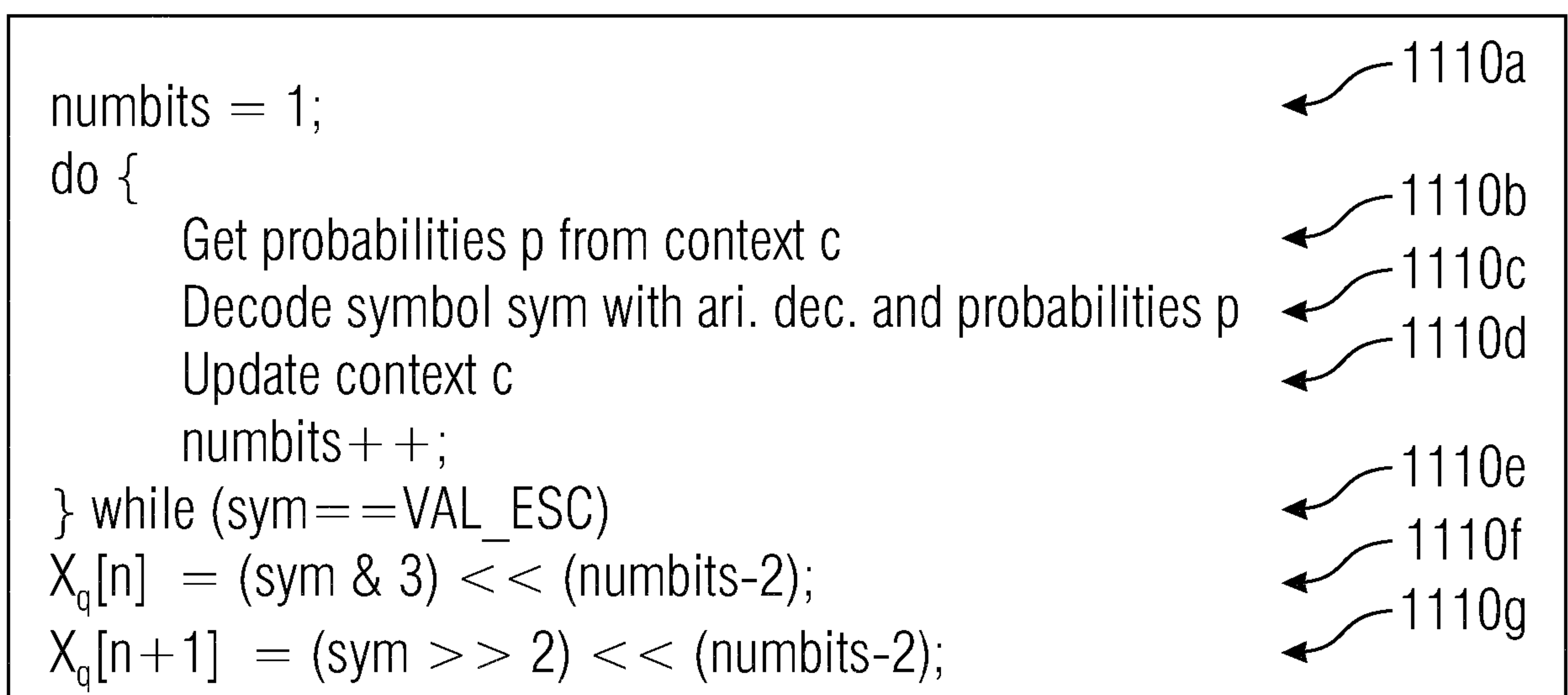


Fig. 11a

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- Step 3b: decode the remaining bits except the least significant bit

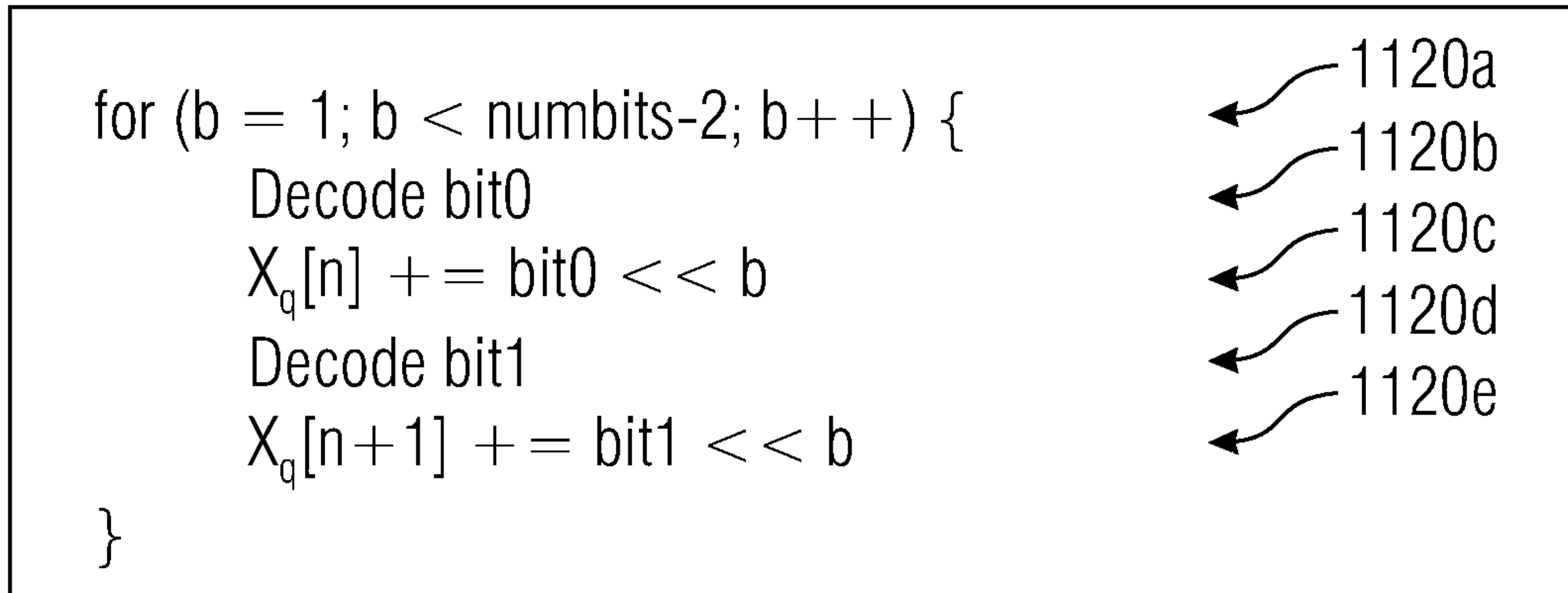


Fig. 11b

- Step 3c: decode the sign of each coefficient, except if the coefficient is zero

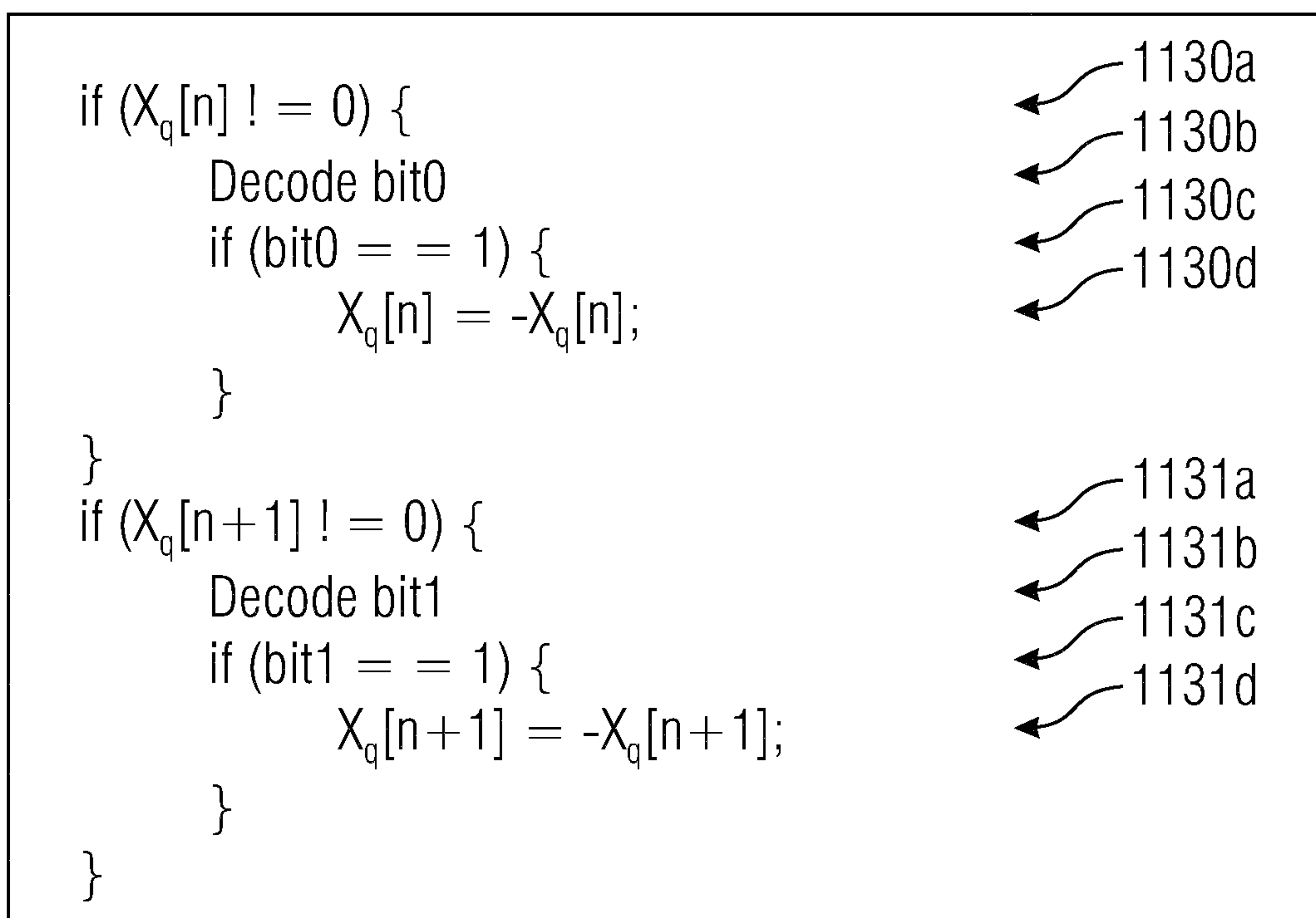


Fig. 11c

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- Step 6: if there are unused bits, decode n/sbs bits and store them in $/sbs/$. Then refine the coefficients $(n, n+1)$ if $numbits[n] > 2$ using the decoded LSB bits

```

k = 0;
for (n = 0; n < lastnz; n += 2) {
    if (numbits[n] > 2) {
        if (k == nlsbs) {
            break;
        }
        bit0 = lsbs[k++];
        if (bit0 == 1) {
            if (Xq[n] > 0) {
                Xq[n] += 1;
            } else if (Xq[n] < 0) {
                Xq[n] -= 1;
            } else {
                if (k == nlsbs) {
                    break;
                }
                bit1 = lsbs[k++];
                Xq[n] = 1 - 2*bit1;
            }
        }
        if (k == nlsbs) {
            break;
        }
        bit0 = lsbs[k++];
        if (bit0 == 1) {
            if (Xq[n+1] > 0) {
                Xq[n+1] += 1;
            } else if (Xq[n+1] < 0) {
                Xq[n+1] -= 1;
            } else {
                if (k == nlsbs) {
                    break;
                }
                bit1 = lsbs[k++];
                Xq[n+1] = 1 - 2*bit1;
            }
        }
    }
}

```

Fig. 11d

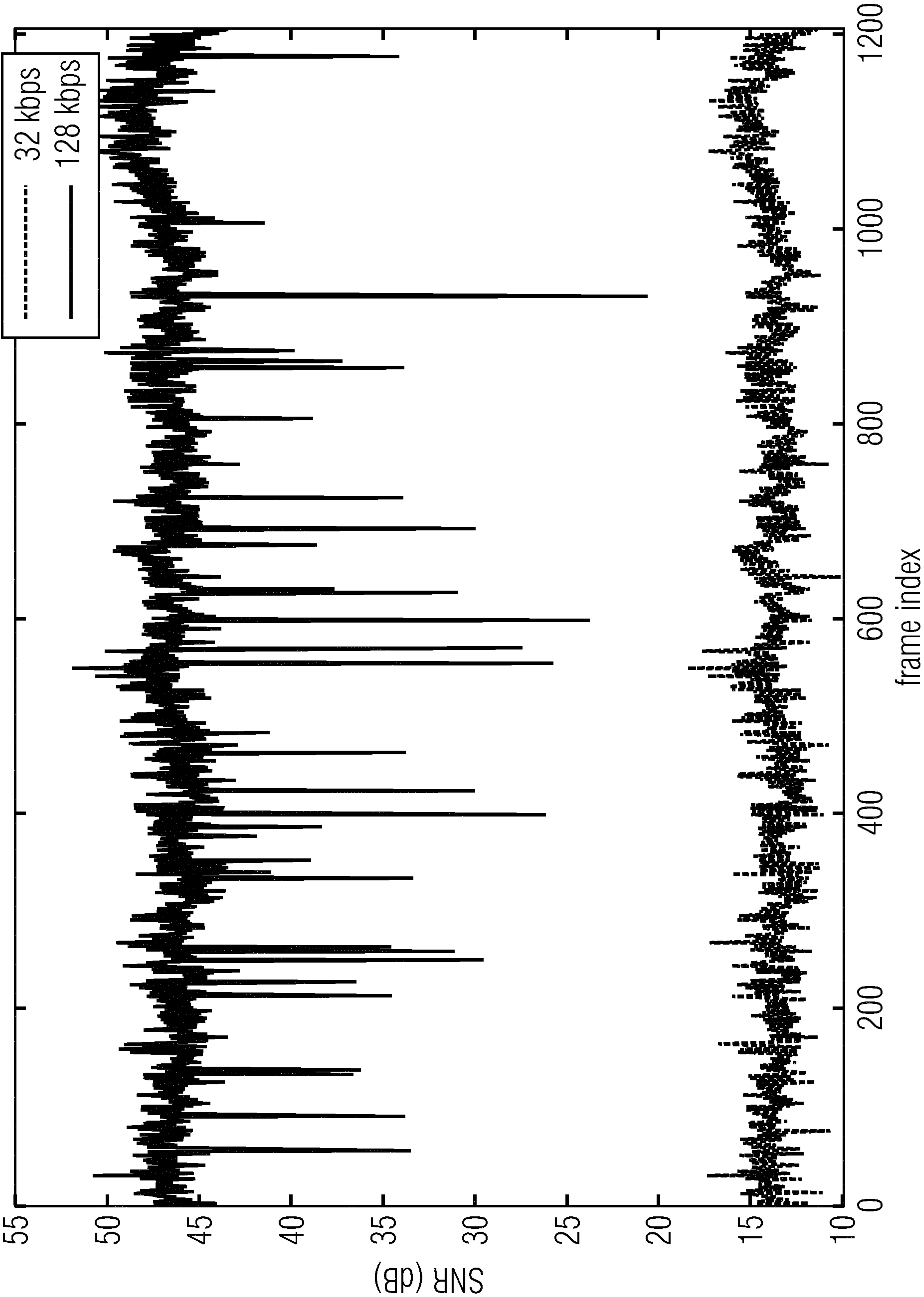


Fig. 12

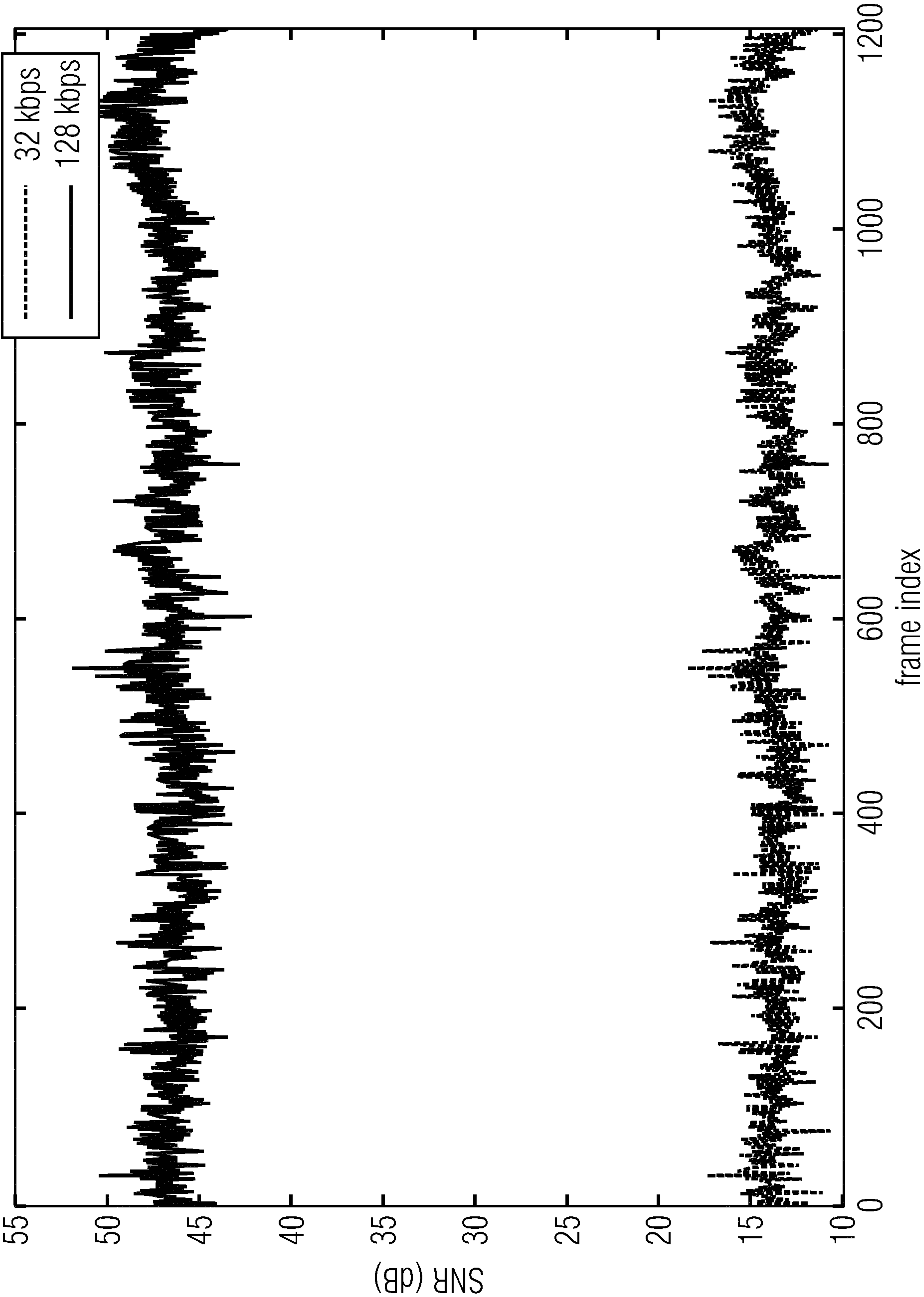


Fig. 13

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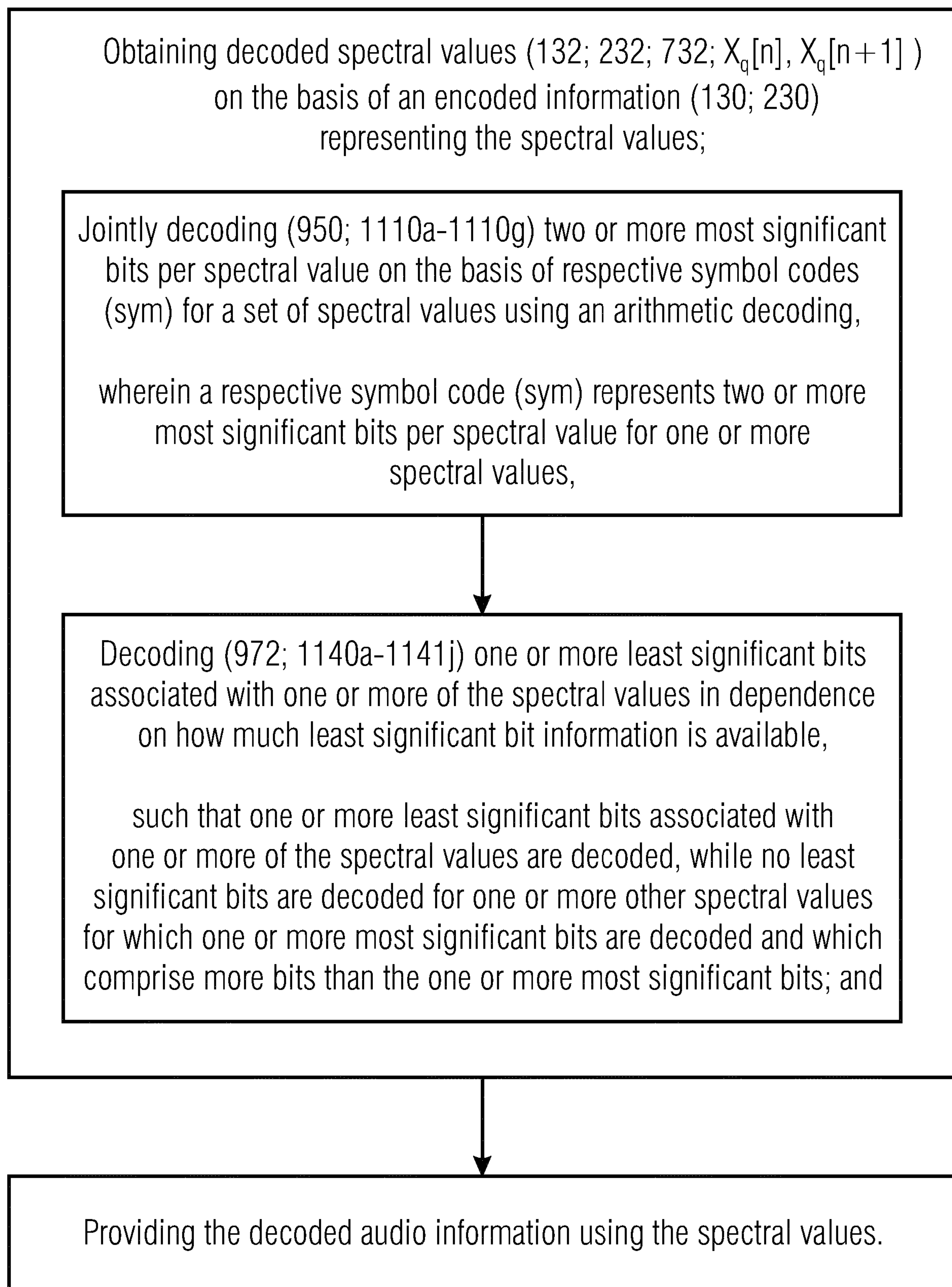


Fig. 14

Obtaining decoded spectral values (132; 232; 732; $X_q[n]$, $X_q[n+1]$) on the basis of an encoded information (130; 230) representing the spectral values,

Selecting between

- a first mode (930, 934, 938, 942, 944, 948) in which a decoding of spectral values in a higher frequency range is omitted in response to a signaling from the encoder and in which least significant bits are decoded (934) for all spectral values for which one or more most significant bits are decoded and which comprise more bits than the most significant bits, and
- a second mode (950, 954, 958, 962, 968, 972) in which one or more least significant bits associated with one or more of the spectral values are decoded, while no least significant bits are decoded for one or more other spectral values for which one or more most significant bits have been decoded and which comprise more bits than the most significant bits; and

Decoding (950; 1110a-1110g) one or more most significant bits on the basis of respective symbol codes (sym) for a plurality of spectral values ($X_q[0] \dots X_q[\text{lastnz}-1]$),

Decoding one or more least significant bits for one or more of the spectral values

Providing the decoded audio information using the spectral values.

Fig. 15

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Obtaining (620, 630, 640, 650, 660) spectral values (330; 662; $X_q[n]$) representing an audio content of the input audio information

Encoding (670; 800) at least a plurality of the spectral values, in order to obtain an encoded information (350, 450, 550, 672; sym, lsbs[]) representing the spectral values;

Wherein the method comprises jointly encoding (878, 886, 890; 1000a, 1020a, 1040a-1040d) two or more most significant bits per spectral value, to obtain respective symbol codes (sym) for a set of spectral values ($X_q[0] \dots X_q[\text{lastnz}-1]$), using an arithmetic encoding, wherein a respective symbol code (sym) represents two or more most significant bits per spectral value for one or more spectral values,

Encoding (882; 898; 1010a-1010e, 1011a-1011e) one or more least significant bits associated with one or more of the spectral values in dependence on a bit budget available,

such that one or more least significant bits associated with one or more of the spectral values are encoded, while no least significant bits are encoded for one or more other spectral values for which two or more most significant bits are encoded and which comprise more bits than the two or more most significant bits; and

Providing the encoded audio information using the encoded information representing the spectral values.

Fig. 16

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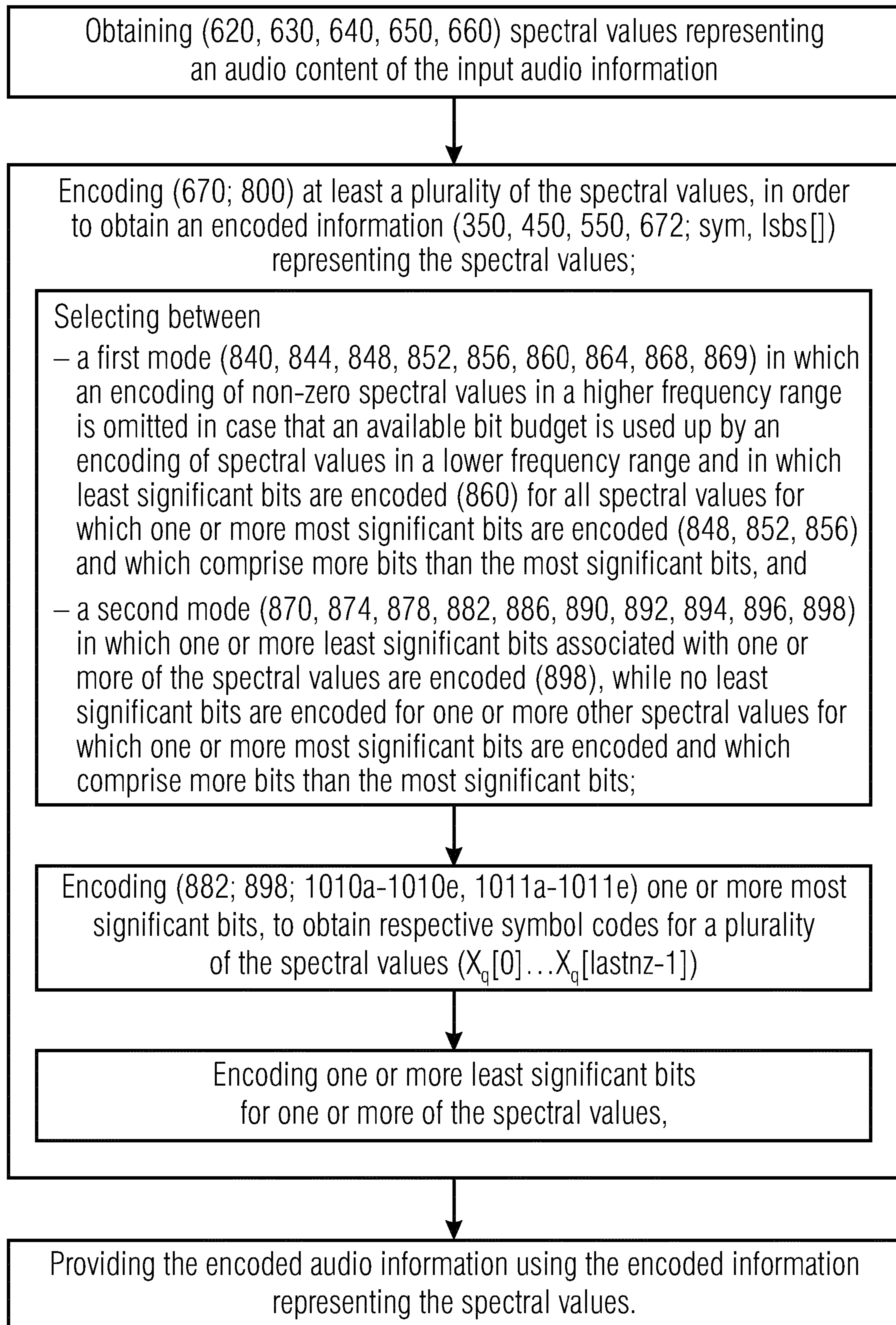


Fig. 17

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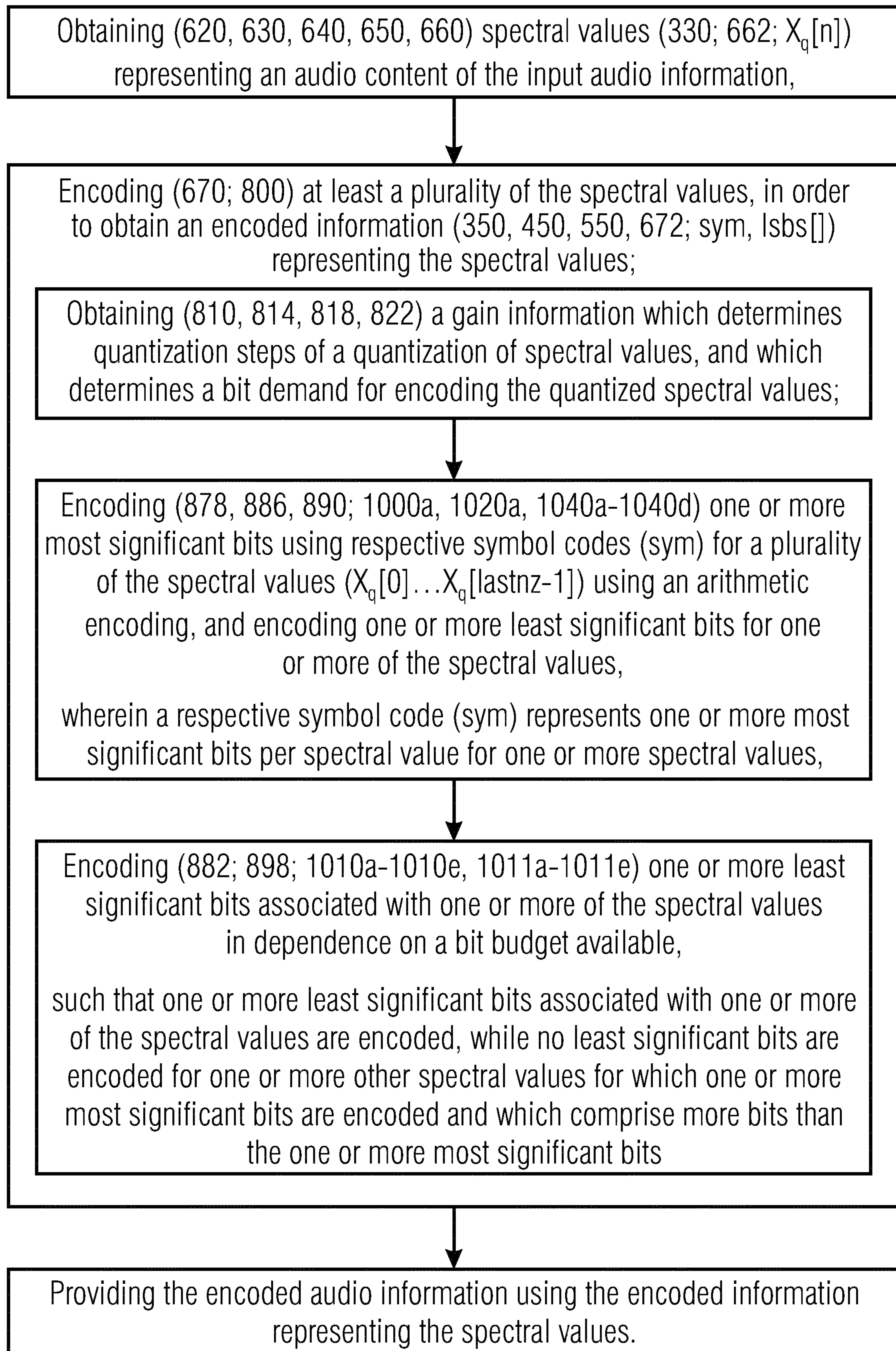


Fig. 18