

FIGURES

FIG. 1

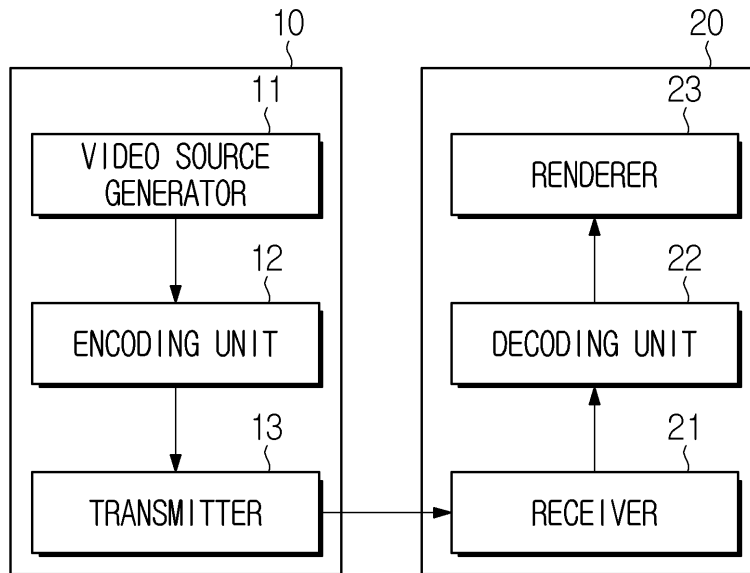


FIG. 2

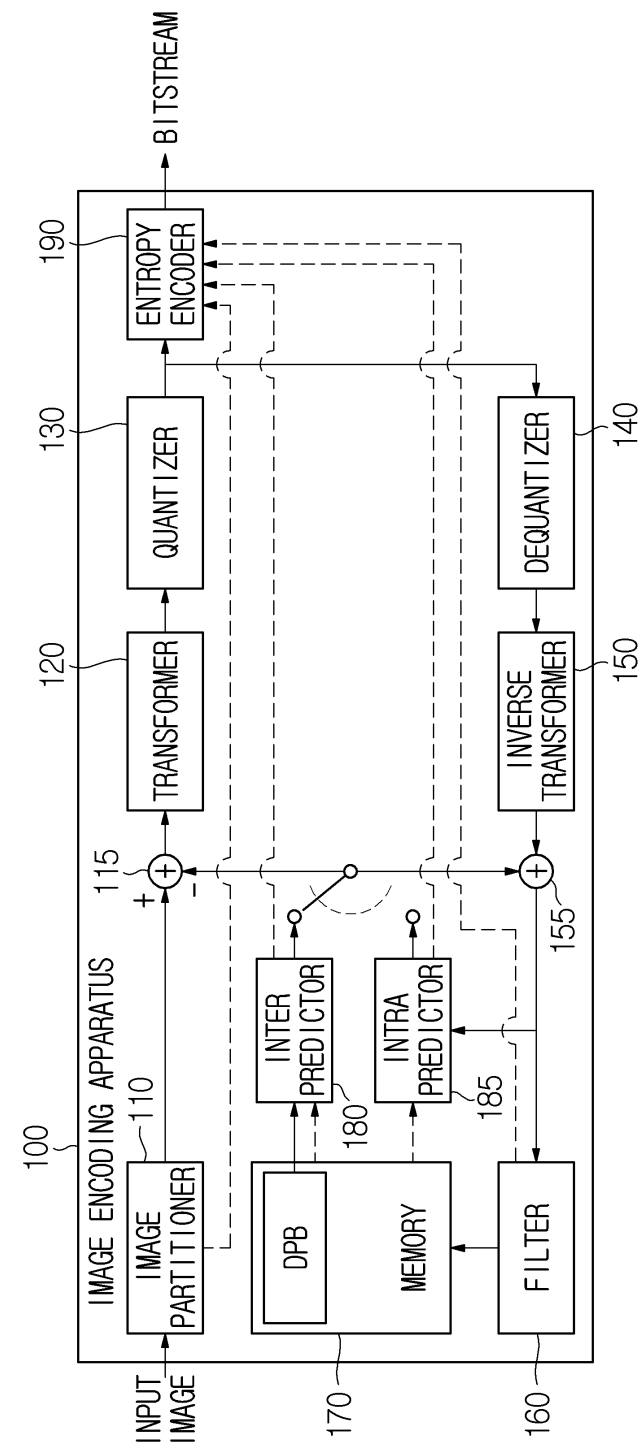
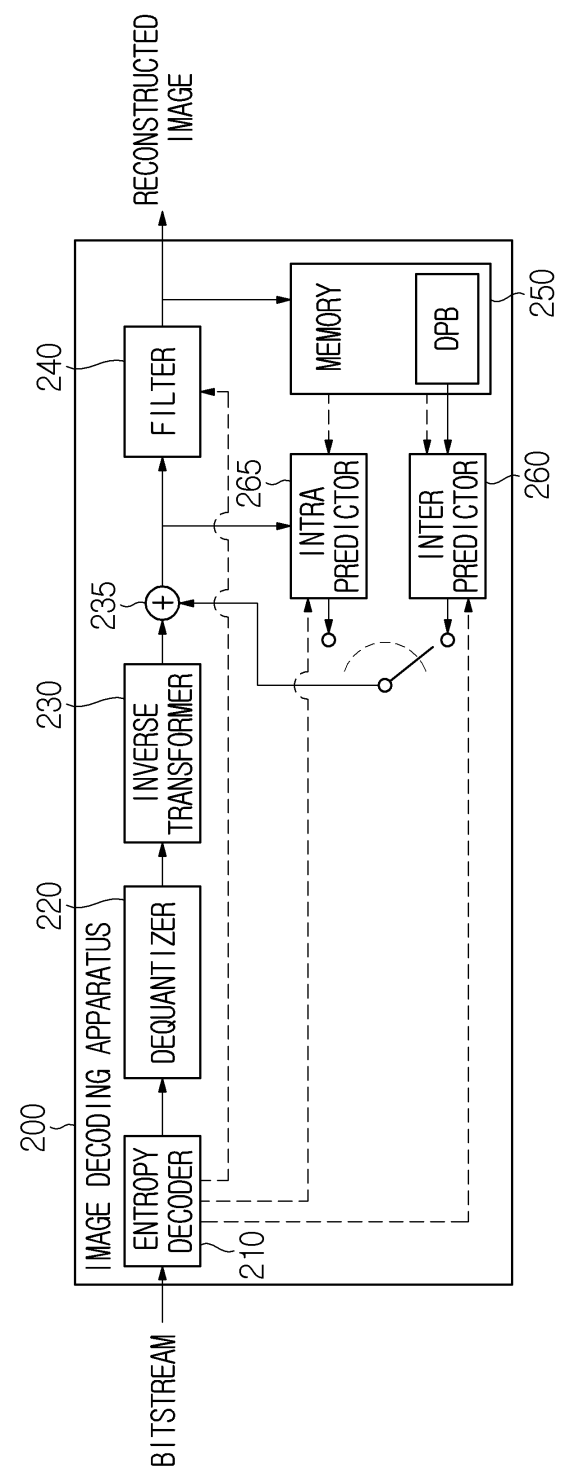
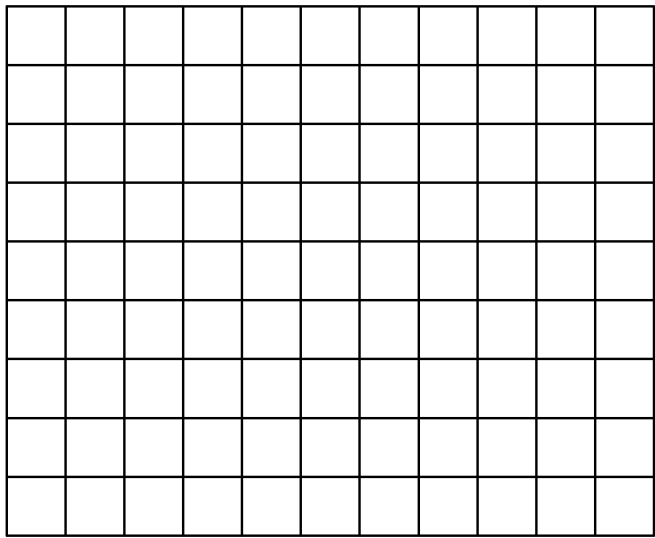


FIG. 3



**FIG. 4**



**FIG. 5**

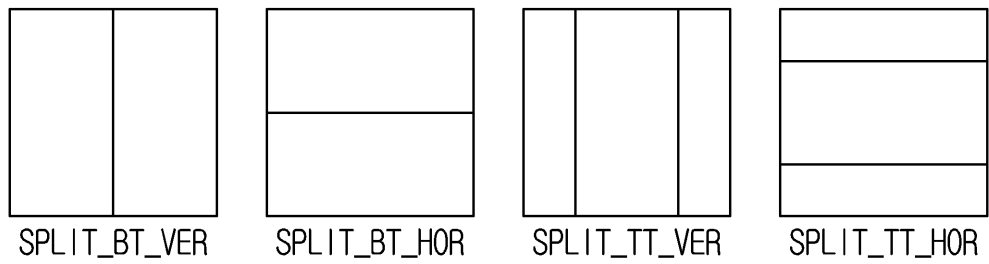


FIG. 6

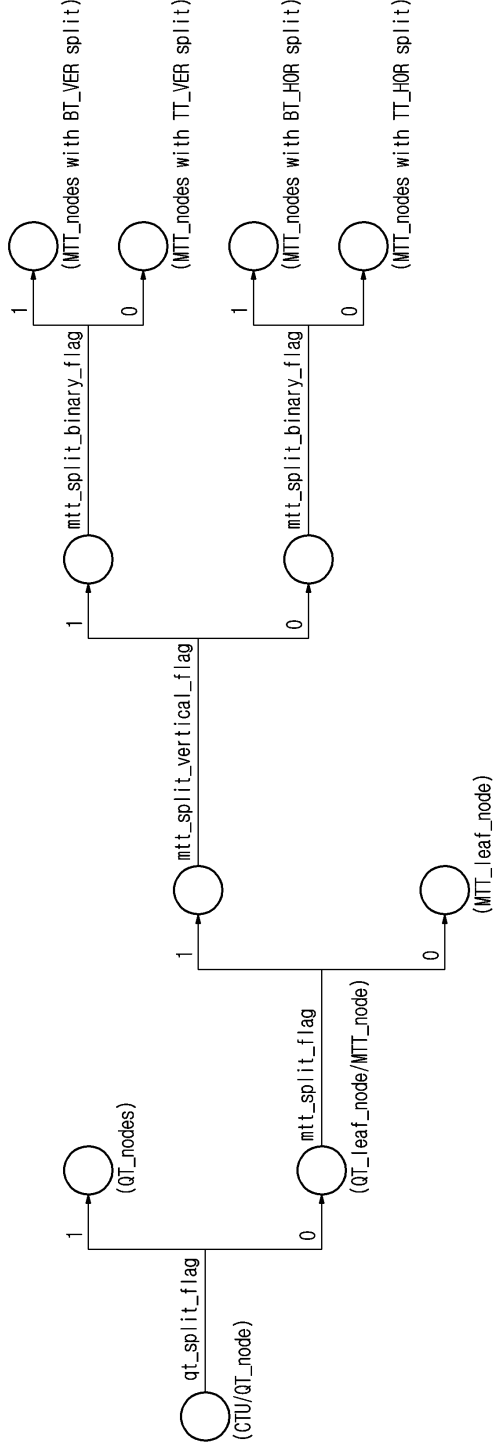


FIG. 7

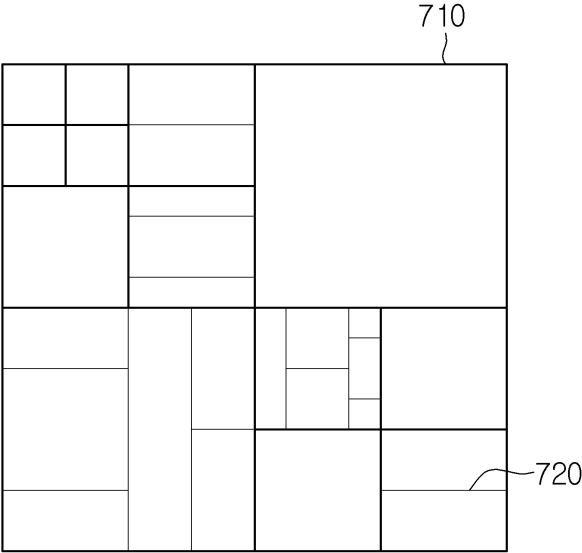
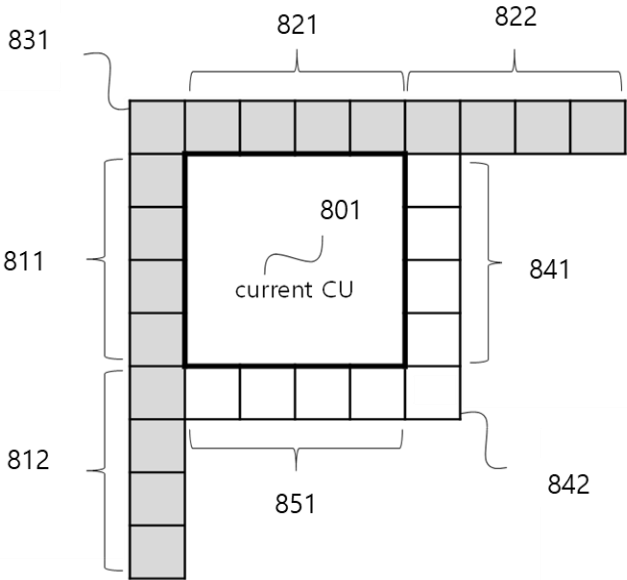
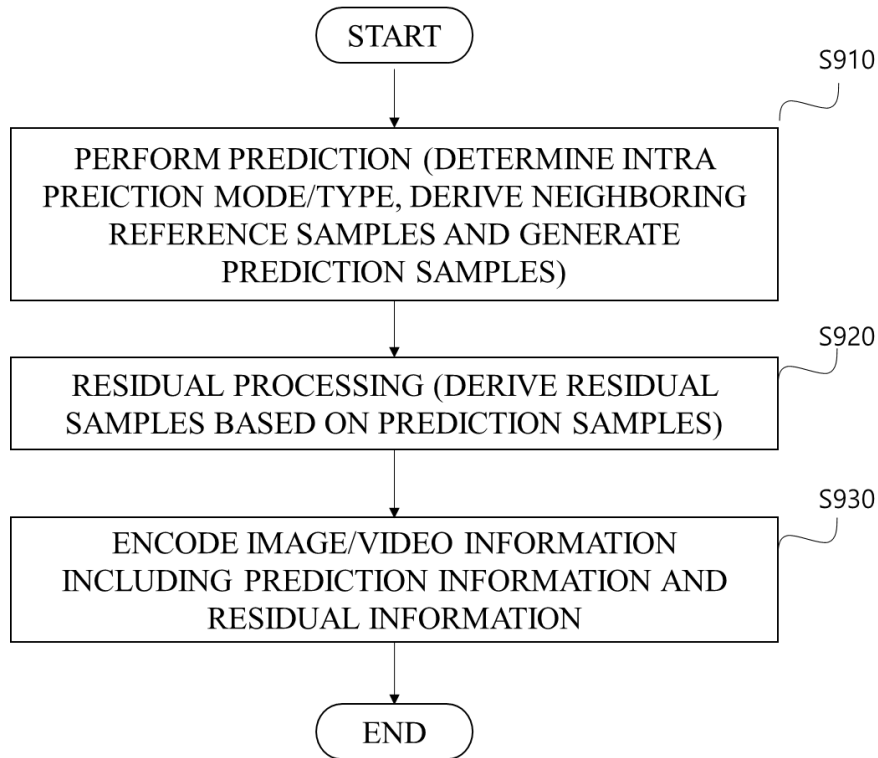


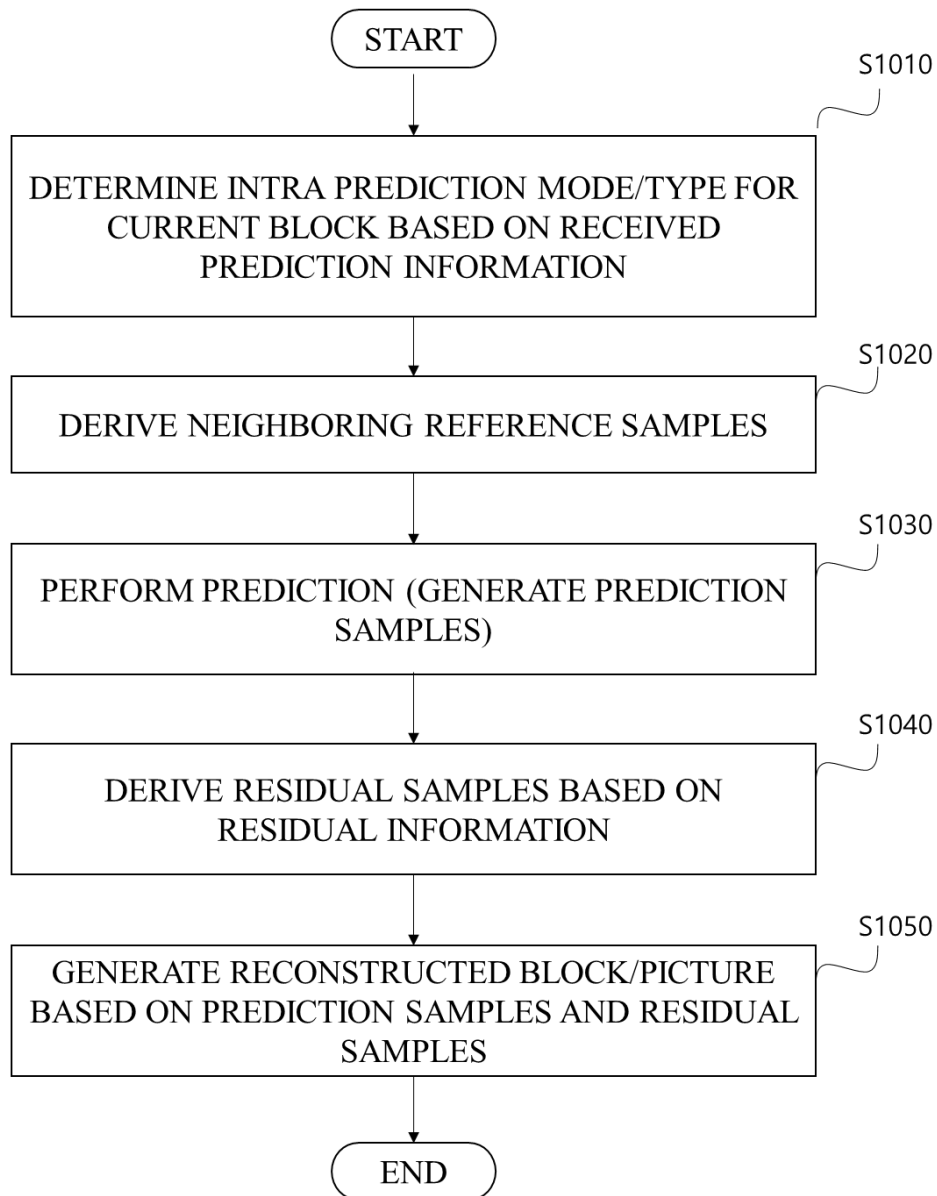
FIG. 8



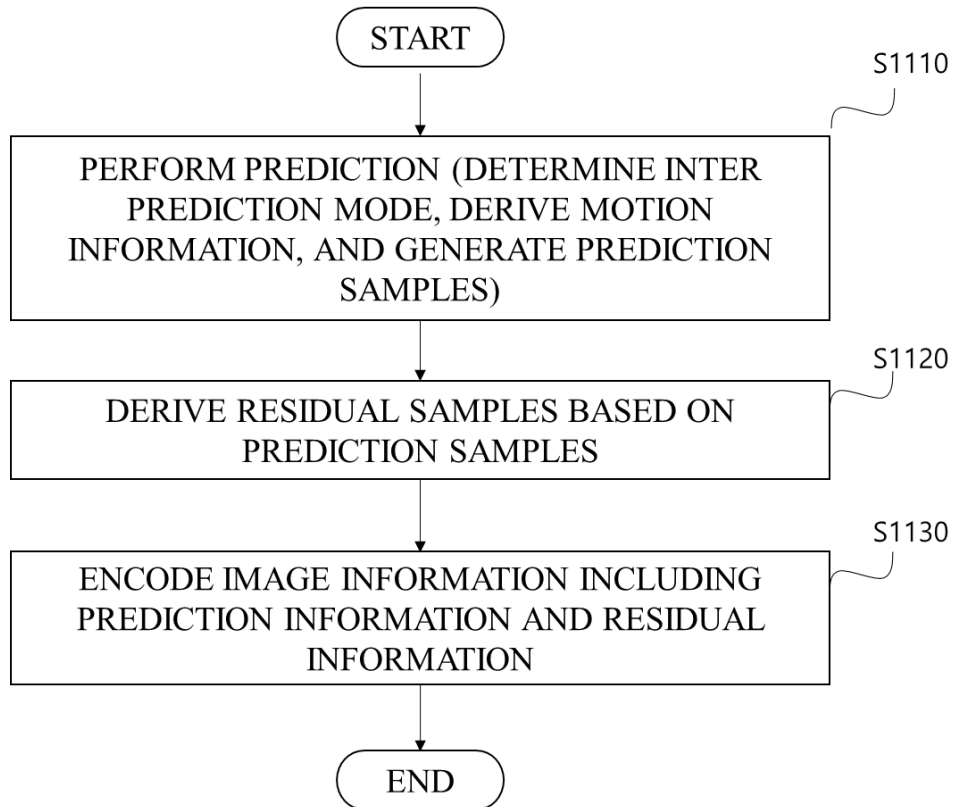
**FIG. 9**



**FIG. 10**



**FIG. 11**



**FIG. 12**

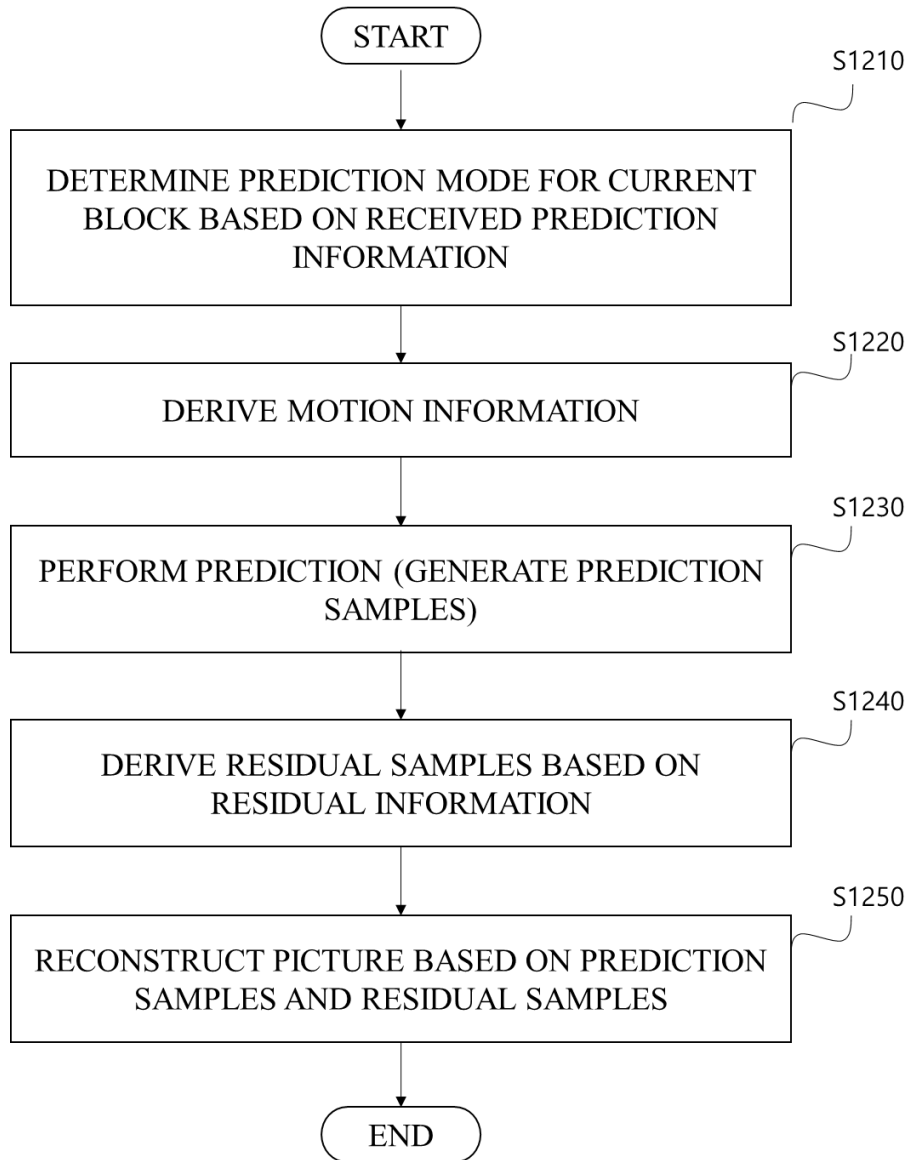


FIG. 13

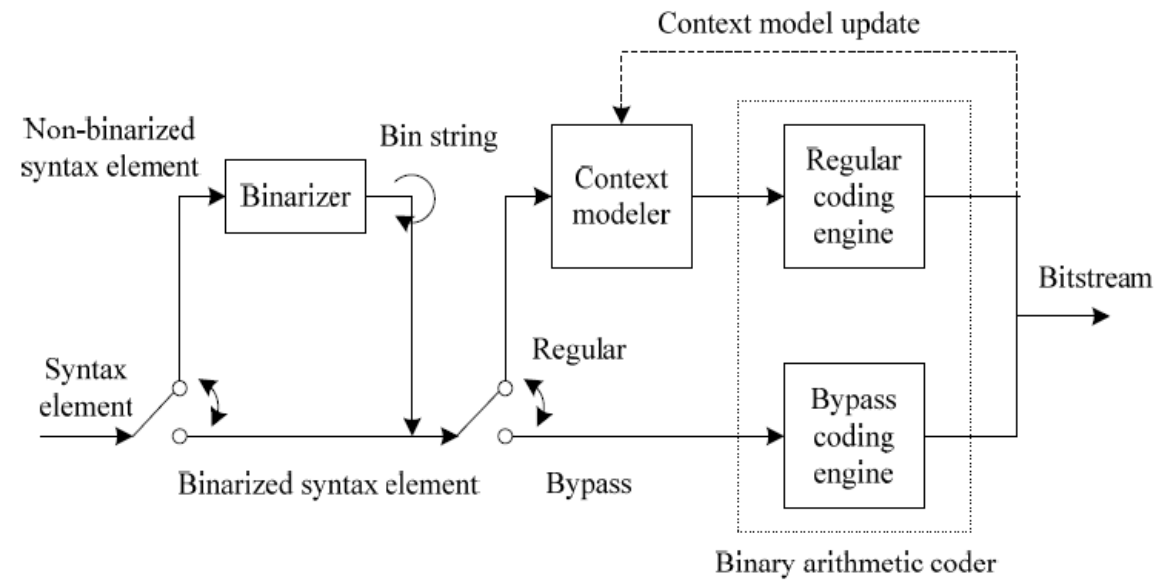


FIG. 14

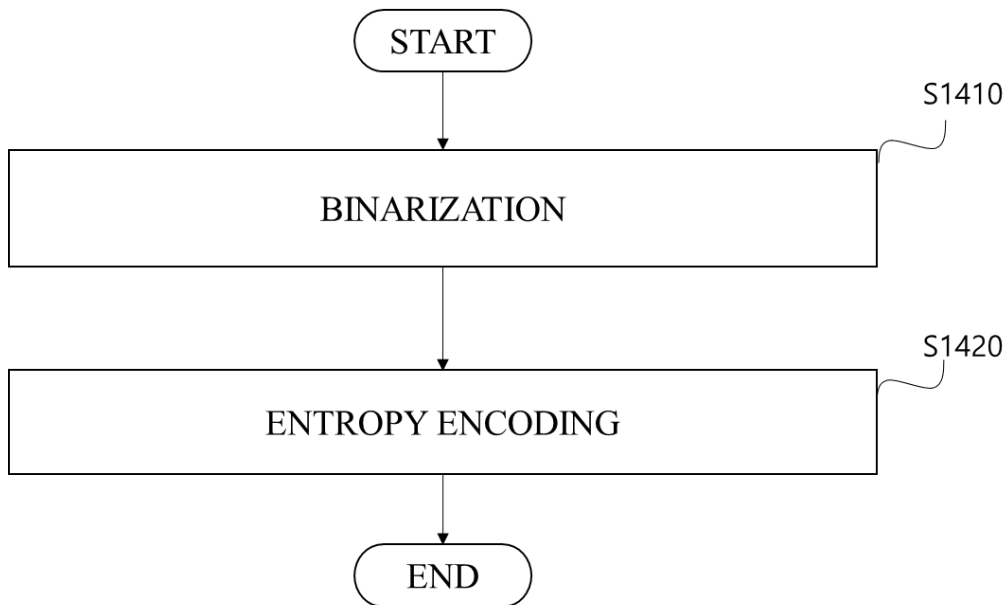


FIG. 15

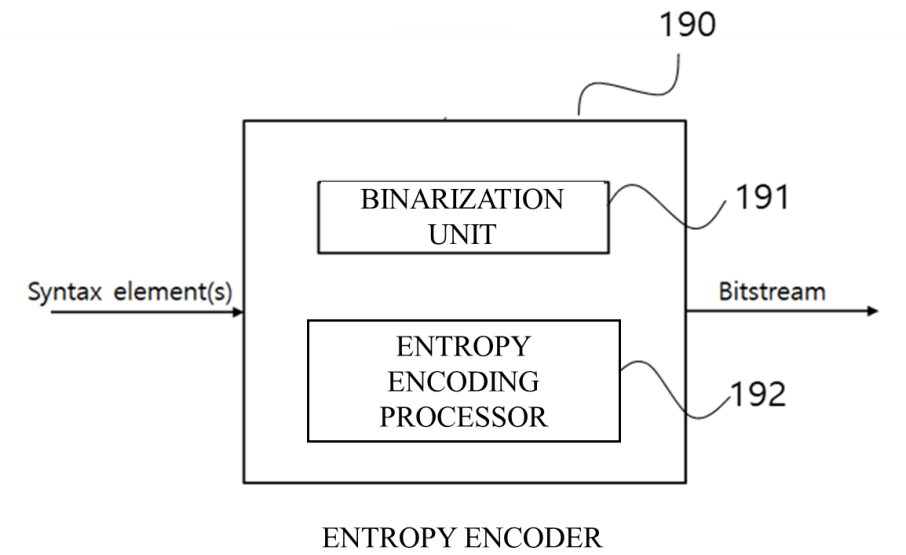


FIG. 16

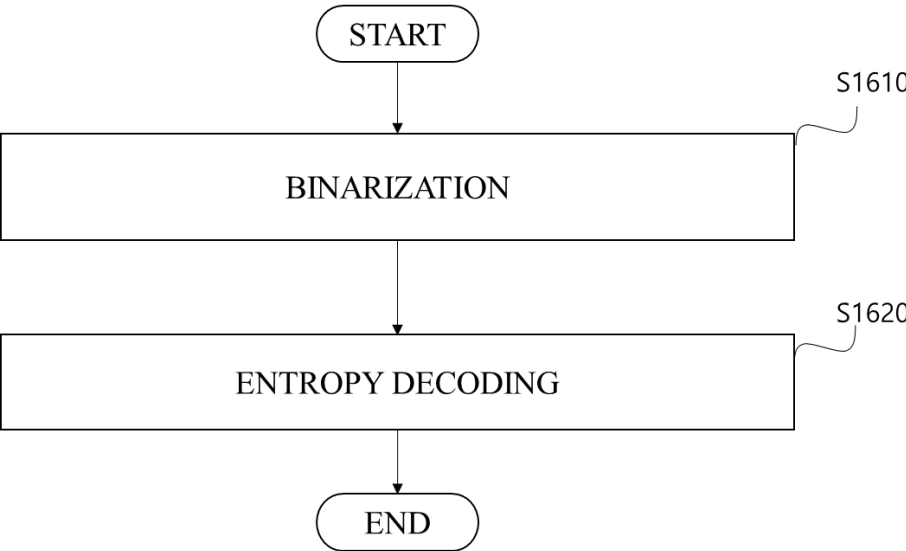
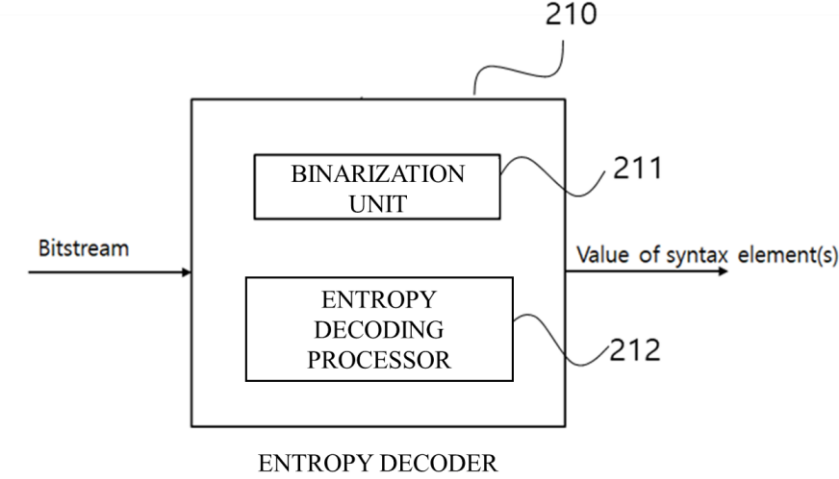


FIG. 17



**FIG. 18**

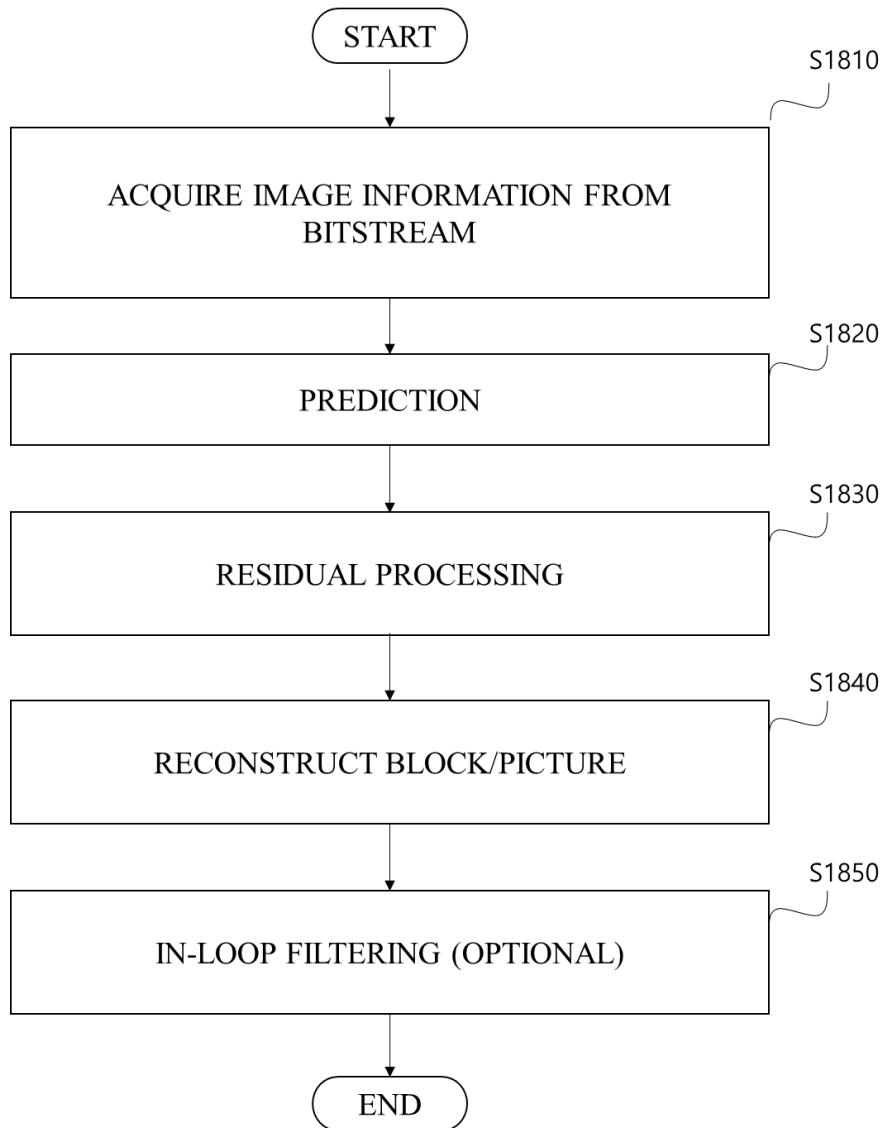


FIG. 19

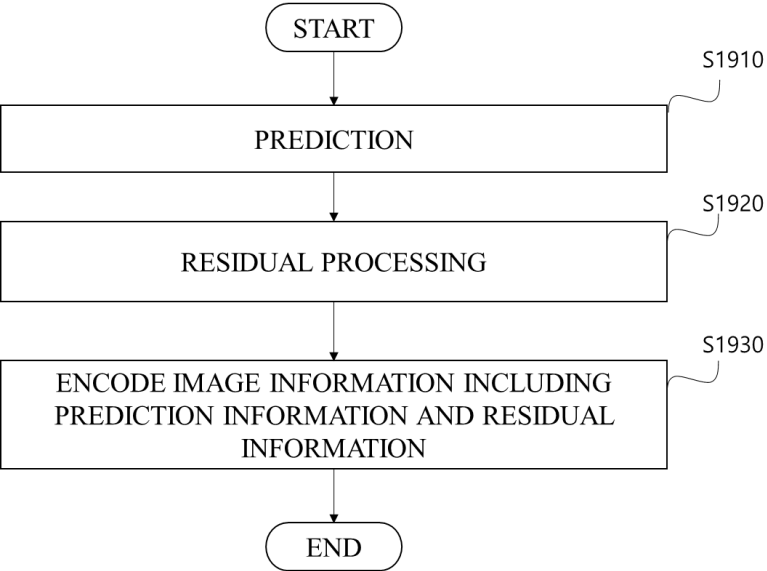


FIG. 20

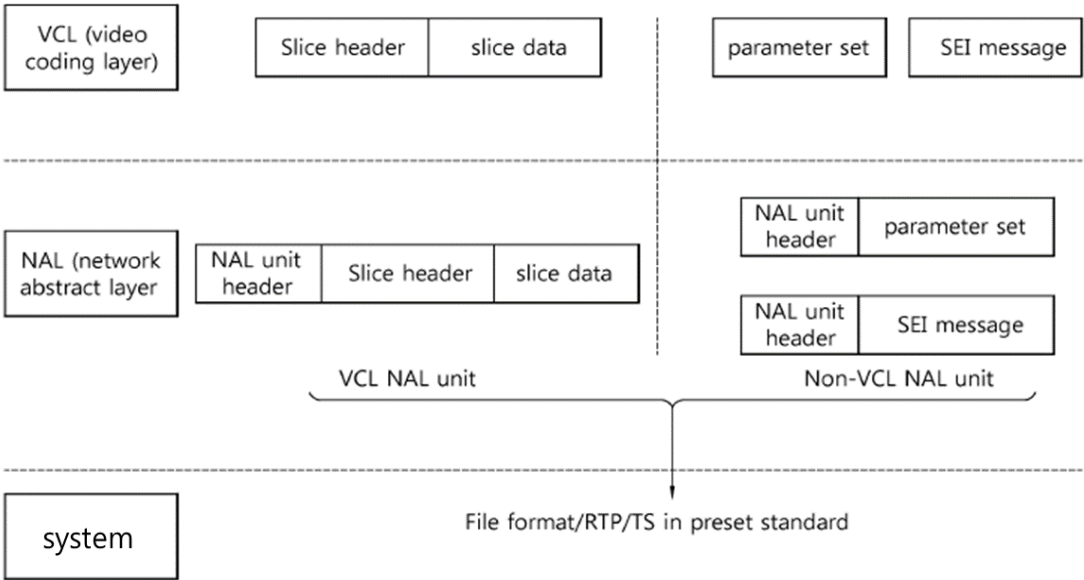


FIG. 21

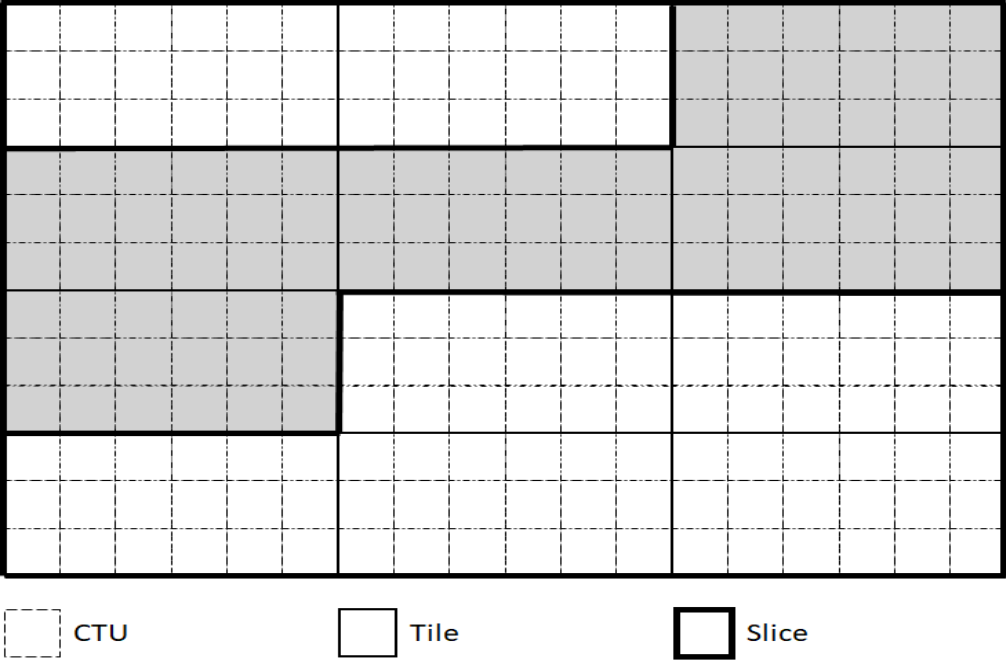


FIG. 22

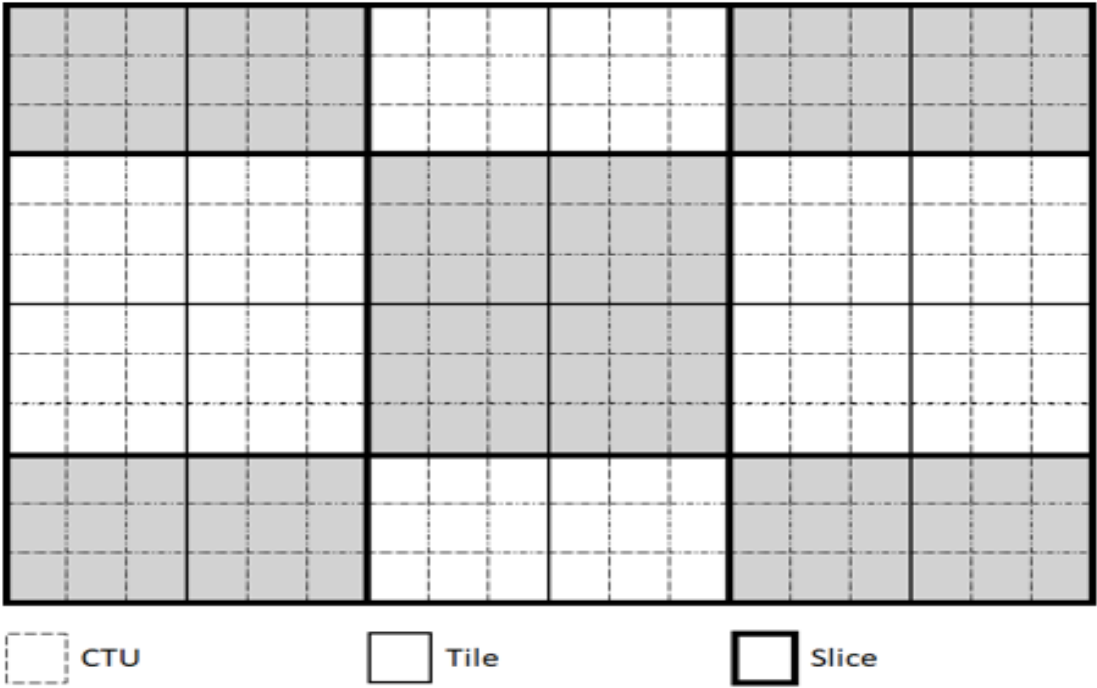


FIG. 23

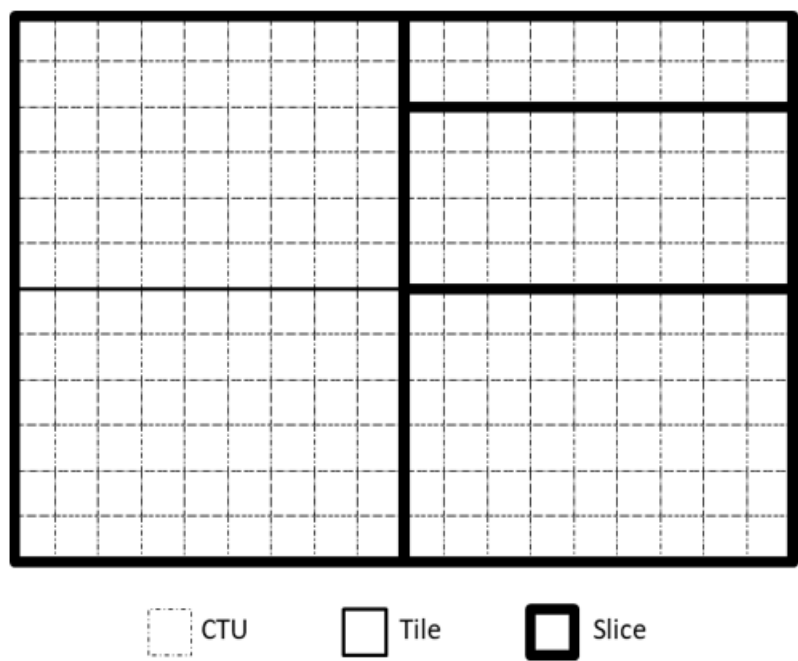
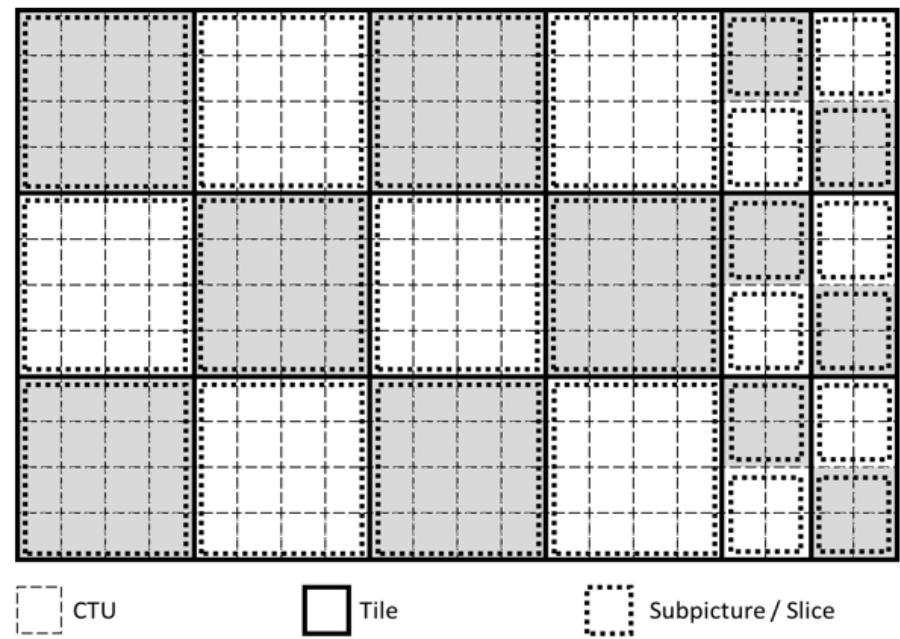


FIG. 24



**FIG. 25**

| seq_parameter_set_rbsp() {                                                     | Descriptor |
|--------------------------------------------------------------------------------|------------|
| ...                                                                            |            |
| <b>subpic_info_present_flag</b>                                                | u(1)       |
| if( subpic_info_present_flag ) {                                               |            |
| <b>sps_num_subpics_minus1</b>                                                  | ue(v)      |
| <b>sps_independent_subpics_flag</b>                                            | u(1)       |
| for( i = 0; sps_num_subpics_minus1 > 0 && i <= sps_num_subpics_minus1; i++ ) { |            |
| if( i > 0 && pic_width_max_in_luma_samples > CtbSizeY )                        |            |
| <b>subpic_ctu_top_left_x[i]</b>                                                | u(v)       |
| if( i > 0 && pic_height_max_in_luma_samples > CtbSizeY ) {                     |            |
| <b>subpic_ctu_top_left_y[i]</b>                                                | u(v)       |
| if( i < sps_num_subpics_minus1 && pic_width_max_in_luma_samples > CtbSizeY )   |            |
| <b>subpic_width_minus1[i]</b>                                                  | u(v)       |
| if( i < sps_num_subpics_minus1 && pic_height_max_in_luma_samples > CtbSizeY )  |            |
| <b>subpic_height_minus1[i]</b>                                                 | u(v)       |
| if( !sps_independent_subpics_flag ) {                                          |            |
| <b>subpic_treated_as_pic_flag[i]</b>                                           | u(1)       |
| <b>loop_filter_across_subpic_enabled_flag[i]</b>                               | u(1)       |
| }                                                                              |            |
| }                                                                              |            |
| }                                                                              |            |
| ...                                                                            |            |
| }                                                                              |            |

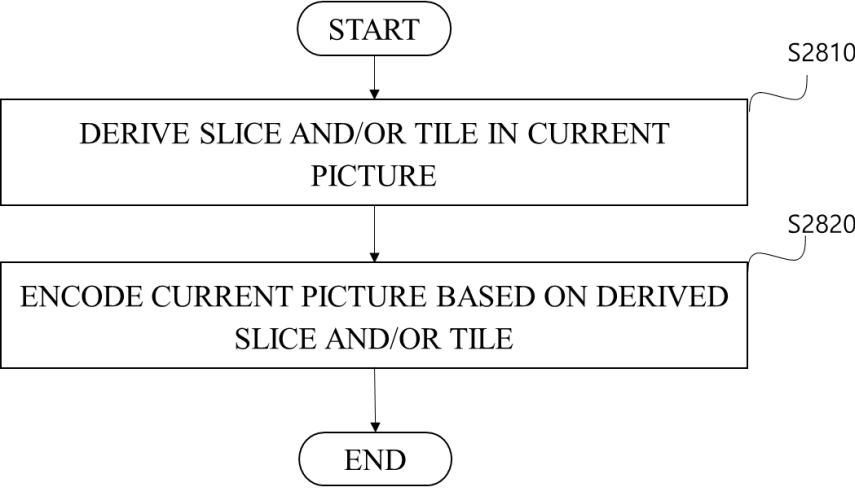
FIG. 26

|                                                                                                                                                             | Descriptor |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| pic_parameter_set_rbsp() {                                                                                                                                  |            |
| ...                                                                                                                                                         |            |
| <b>no_pic_partition_flag</b>                                                                                                                                | u(1)       |
| if( !no_pic_partition_flag ) {                                                                                                                              |            |
| <b>pps_log2_ctu_size_minus5</b>                                                                                                                             | u(2)       |
| <b>num_exp_tile_columns_minus1</b>                                                                                                                          | ue(v)      |
| <b>num_exp_tile_rows_minus1</b>                                                                                                                             | ue(v)      |
| for( i=0; i <= num_exp_tile_columns_minus1; i++ )                                                                                                           |            |
| <b>tile_column_width_minus1[i]</b>                                                                                                                          | ue(v)      |
| for( i=0; i <= num_exp_tile_rows_minus1; i++ )                                                                                                              |            |
| <b>tile_row_height_minus1[i]</b>                                                                                                                            | ue(v)      |
| if( NumTilesInPic > 1 )                                                                                                                                     |            |
| <b>rect_slice_flag</b>                                                                                                                                      | u(1)       |
| if( rect_slice_flag )                                                                                                                                       |            |
| <b>single_slice_per_subpic_flag</b>                                                                                                                         | u(1)       |
| if( rect_slice_flag && !single_slice_per_subpic_flag ) {                                                                                                    |            |
| <b>num_slices_in_pic_minus1</b>                                                                                                                             | ue(v)      |
| if( num_slices_in_pic_minus1 > 0 )                                                                                                                          |            |
| <b>tile_idx_delta_present_flag</b>                                                                                                                          | u(1)       |
| for( i=0; i < num_slices_in_pic_minus1; i++ ) {                                                                                                             |            |
| if( NumTileColumns > 1 )                                                                                                                                    |            |
| <b>slice_width_in_tiles_minus1[i]</b>                                                                                                                       | ue(v)      |
| if( NumTileRows > 1 && ( tile_idx_delta_present_flag   <br>SliceTopLeftTileIdx[ i ] % NumTileColumns == 0 ) )                                               |            |
| <b>slice_height_in_tiles_minus1[i]</b>                                                                                                                      | ue(v)      |
| if( slice_width_in_tiles_minus1[ i ] == 0 &&<br>slice_height_in_tiles_minus1[ i ] == 0 &&<br>RowHeight[ SliceTopLeftTileIdx[ i ] / NumTileColumns ] > 1 ) { |            |
| <b>num_exp_slices_in_tile[i]</b>                                                                                                                            | ue(v)      |
| for( j=0; j < num_exp_slices_in_tile[i]; j++ )                                                                                                              |            |
| <b>exp_slice_height_in_ctus_minus1[i][j]</b>                                                                                                                | ue(v)      |
| i += NumSlicesInTile[ i ] - 1                                                                                                                               |            |
| }                                                                                                                                                           |            |
| if( tile_idx_delta_present_flag && i < num_slices_in_pic_minus1 )                                                                                           |            |
| <b>tile_idx_delta[i]</b>                                                                                                                                    | se(v)      |
| }                                                                                                                                                           |            |
| }                                                                                                                                                           |            |
| }                                                                                                                                                           |            |
| <b>loop_filter_across_tiles_enabled_flag</b>                                                                                                                | u(1)       |
| <b>loop_filter_across_slices_enabled_flag</b>                                                                                                               | u(1)       |
| }                                                                                                                                                           |            |
| ...                                                                                                                                                         |            |
| }                                                                                                                                                           |            |

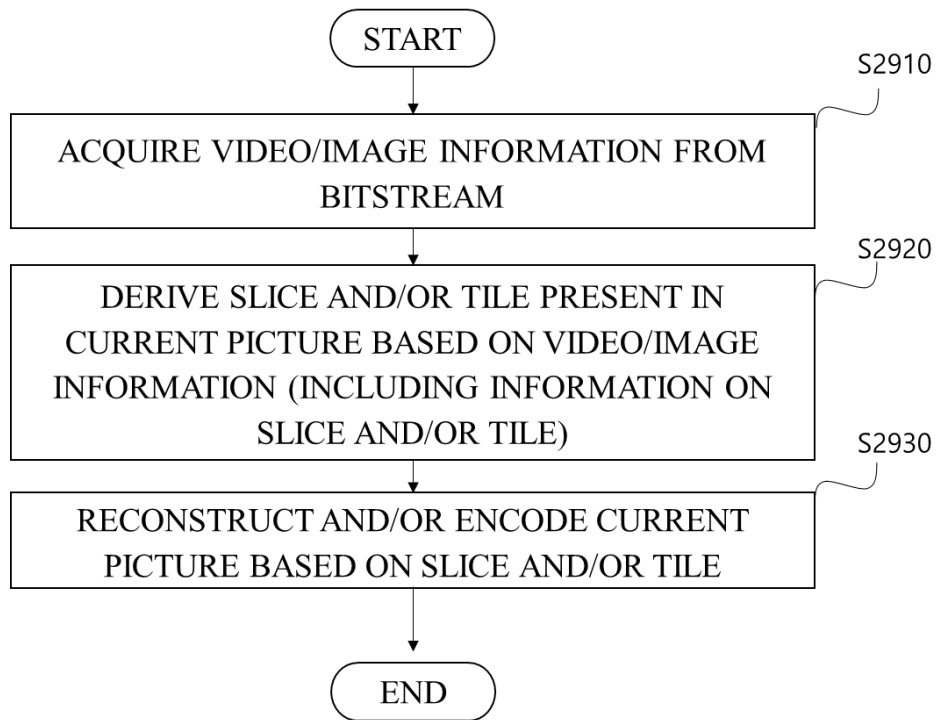
FIG. 27

|                                                                                                                     |                   |
|---------------------------------------------------------------------------------------------------------------------|-------------------|
| slice_header( ) {                                                                                                   | <b>Descriptor</b> |
| ...                                                                                                                 |                   |
| if( subpic_info_present_flag )                                                                                      |                   |
| <b>slice_subpic_id</b>                                                                                              | u(v)              |
| if( ( rect_slice_flag && NumSlicesInSubpic[ CurrSubpicIdx ] > 1 )   <br>( !rect_slice_flag && NumTilesInPic > 1 ) ) |                   |
| <b>slice_address</b>                                                                                                | u(v)              |
| for( i = 0; i < NumExtraShBits; i++ )                                                                               |                   |
| <b>sh_extra_bit[ i ]</b>                                                                                            | u(1)              |
| if( !rect_slice_flag && NumTilesInPic > 1 )                                                                         |                   |
| <b>num_tiles_in_slice_minus1</b>                                                                                    | ue(v)             |
| ...                                                                                                                 |                   |
| }                                                                                                                   |                   |

FIG. 28



**FIG. 29**



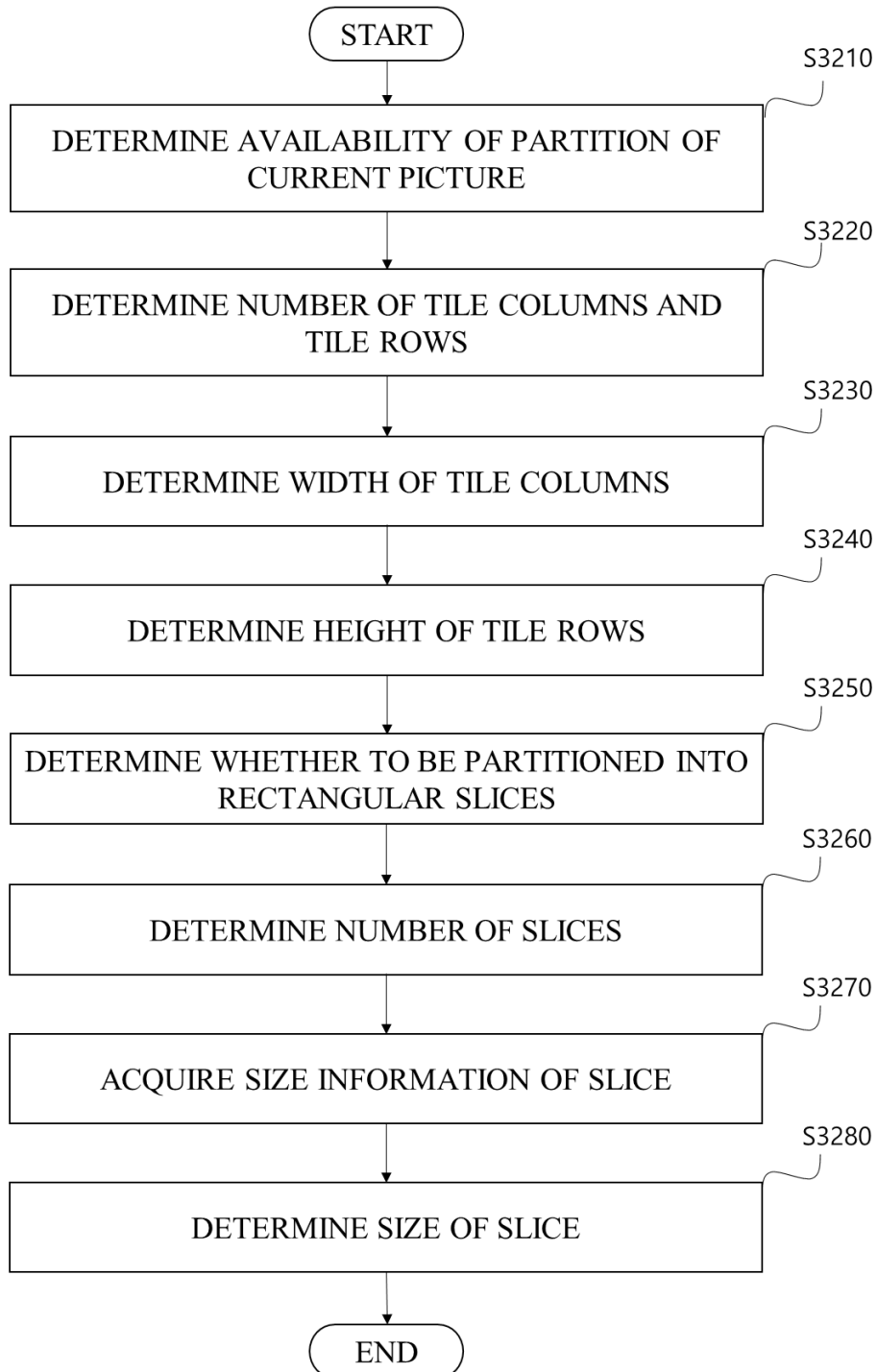
**FIG. 30**

|                                                                                                                                                                                     |                   |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| pic_parameter_set_rbsp() {                                                                                                                                                          | <b>Descriptor</b> |
| ...                                                                                                                                                                                 |                   |
| <b>no_pic_partition_flag</b>                                                                                                                                                        | u(1)              |
| if( !no_pic_partition_flag ) {                                                                                                                                                      |                   |
| ...                                                                                                                                                                                 |                   |
| if( rect_slice_flag && !single_slice_per_subpic_flag ) {                                                                                                                            |                   |
| <b>num_slices_in_pic_minus1</b>                                                                                                                                                     | ue(v)             |
| if( num_slices_in_pic_minus1 > 0 )                                                                                                                                                  |                   |
| <b>tile_idx_delta_present_flag</b>                                                                                                                                                  | u(1)              |
| for( i = 0; i < num_slices_in_pic_minus1; i++ ) {                                                                                                                                   |                   |
| if( NumTileColumns > 1 &&<br>( SliceTopLeftTileIdx[ i ] % NumTileColumns != NumTileColumns -<br>1 ) )                                                                               |                   |
| <b>slice_width_in_tiles_minus1[ i ]</b>                                                                                                                                             | ue(v)             |
| if( NumTileRows > 1 &&( tile_idx_delta_present_flag   <br>SliceTopLeftTileIdx[ i ] % NumTileColumns == 0 ) &&<br>( SliceTopLeftTileIdx[ i ] / NumTileColumns != NumTileRows - 1 ) ) |                   |
| <b>slice_height_in_tiles_minus1[ i ]</b>                                                                                                                                            | ue(v)             |
| ...                                                                                                                                                                                 |                   |
| }                                                                                                                                                                                   |                   |
| }                                                                                                                                                                                   |                   |
| ...                                                                                                                                                                                 |                   |
| }                                                                                                                                                                                   |                   |
| ...                                                                                                                                                                                 |                   |
| }                                                                                                                                                                                   |                   |

**FIG. 31**

|                                                                                                                                                                  |                        |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| pic_parameter_set_rbsp() {                                                                                                                                       | <b>Descript<br/>or</b> |
| ...                                                                                                                                                              |                        |
| <b>no_pic_partition_flag</b>                                                                                                                                     | u(1)                   |
| if( !no_pic_partition_flag ) {                                                                                                                                   |                        |
| ...                                                                                                                                                              |                        |
| if( rect_slice_flag && !single_slice_per_subpic_flag ) {                                                                                                         |                        |
| <b>num_slices_in_pic_minus1</b>                                                                                                                                  | ue(v)                  |
| if( num_slices_in_pic_minus1 > 0 )                                                                                                                               |                        |
| <b>tile_idx_delta_present_flag</b>                                                                                                                               | u(1)                   |
| for( i = 0; i < num_slices_in_pic_minus1; i++ ) {                                                                                                                |                        |
| if( SliceTopLeftTileIdx[ i ] % NumTileColumns != NumTileColumns - 1 )                                                                                            |                        |
| <b>slice_width_in_tiles_minus1[ i ]</b>                                                                                                                          | ue(v)                  |
| if( ( SliceTopLeftTileIdx[ i ] / NumTileColumns != NumTileRows - 1 )<br>&&( tile_idx_delta_present_flag   <br>SliceTopLeftTileIdx[ i ] % NumTileColumns == 0 ) ) |                        |
| <b>slice_height_in_tiles_minus1[ i ]</b>                                                                                                                         | ue(v)                  |
| ...                                                                                                                                                              |                        |
| }                                                                                                                                                                |                        |
| }                                                                                                                                                                |                        |
| ...                                                                                                                                                              |                        |
| }                                                                                                                                                                |                        |
| ...                                                                                                                                                              |                        |
| }                                                                                                                                                                |                        |

FIG. 32



**FIG. 33**

```
tileIdx = 0
for( i = 0; i <= pps_num_slices_in_pic_minus1; i++ )
    NumCtusInSlice[ i ] = 0
for( i = 0; i <= pps_num_slices_in_pic_minus1; i++ ) {
    SliceTopLeftTileIdx[ i ] = tileIdx
    tileX = tileIdx % NumTileColumns
    tileY = tileIdx / NumTileColumns
    if( i < pps_num_slices_in_pic_minus1 ) {
        sliceWidthInTiles[ i ] = pps_slice_width_in_tiles_minus1[ i ] + 1
        sliceHeightInTiles[ i ] = pps_slice_height_in_tiles_minus1[ i ] + 1
    } else {
        sliceWidthInTiles[ i ] = NumTileColumns - tileX
        sliceHeightInTiles[ i ] = NumTileRows - tileY
        NumSlicesInTile[ i ] = 1
    }
    if( sliceWidthInTiles[ i ] == 1 && sliceHeightInTiles[ i ] == 1 ) {
        if( pps_num_exp_slices_in_tile[ i ] == 0 ) {
            NumSlicesInTile[ i ] = 1
            sliceHeightInCtus[ i ] = RowHeightVal[ SliceTopLeftTileIdx[ i ] / NumTileColumns ]
        } else {
            remainingHeightInCtbsY = RowHeightVal[ SliceTopLeftTileIdx[ i ] / NumTileColumns ]
            for( j = 0; j < pps_num_exp_slices_in_tile[ i ]; j++ ) {
                sliceHeightInCtus[ i + j ] = pps_exp_slice_height_in_ctus_minus1[ i ][ j ] + 1
                remainingHeightInCtbsY -= sliceHeightInCtus[ i + j ]
            }
            uniformSliceHeight = sliceHeightInCtus[ i + j - 1 ]
            while( remainingHeightInCtbsY >= uniformSliceHeight ) {
                sliceHeightInCtus[ i + j ] = uniformSliceHeight
                remainingHeightInCtbsY -= uniformSliceHeight
                j++
            }
        }
        if( remainingHeightInCtbsY > 0 ) {
            sliceHeightInCtus[ i + j ] = remainingHeightInCtbsY
            j++
        }
    }
}
```

**FIG. 34**

```
        NumSlicesInTile[ i ] = j
    }
    ctbY = TileRowBdVal[ tileY ]
    for( j = 0; j < NumSlicesInTile[ i ]; j++ ) {
        AddCtbsToSlice( i + j, TileColBdVal[ tileX ], TileColBdVal[ tileX + 1 ],
            ctbY, ctbY + sliceHeightInCtus[ i + j ] )
        ctbY += sliceHeightInCtus[ i + j ]
        sliceWidthInTiles[ i + j ] = 1
        sliceHeightInTiles[ i + j ] = 1
    }
    i += NumSlicesInTile[ i ] - 1
} else
    for( j = 0; j < sliceHeightInTiles[ i ]; j++ )
        for( k = 0; k < sliceWidthInTiles[ i ]; k++ )
            AddCtbsToSlice( i, TileColBdVal[ tileX + k ], TileColBdVal[ tileX + k + 1 ],
                TileRowBdVal[ tileY + j ], TileRowBdVal[ tileY + j + 1 ] )
if( i < pps_num_slices_in_pic_minus1 ) {
    if( pps_tile_idx_delta_present_flag )
        tileIdx += pps_tile_idx_delta_val[ i ]
    else {
        tileIdx += sliceWidthInTiles[ i ]
        if( tileIdx % NumTileColumns == 0 )
            tileIdx += ( sliceHeightInTiles[ i ] - 1 ) * NumTileColumns
    }
}
}
```

FIG. 35

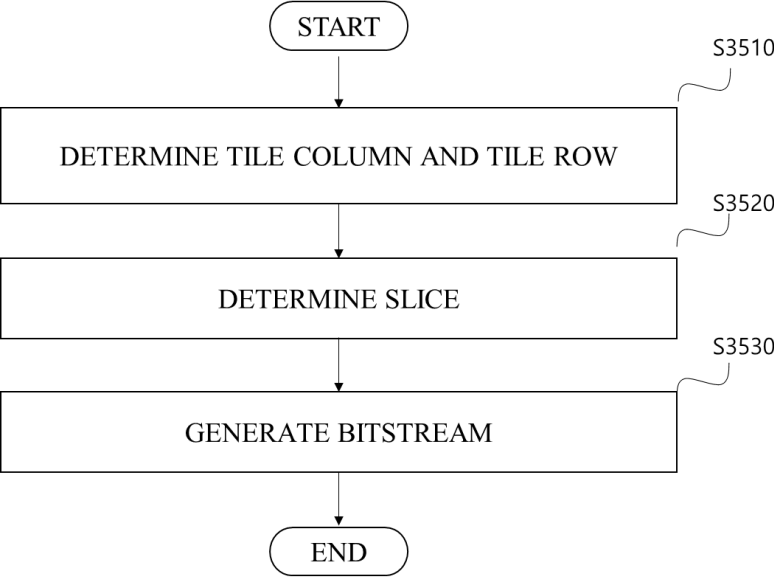


FIG. 36

