### Derivation process for chroma intra prediction mode

Input to this process are:

* a luma location ( xCb, yCb ) specifying the top-left sample of the current chroma coding block relative to the top‑left luma sample of the current picture,
* a variable cbWidth specifying the width of the current coding block in luma samples,
* a variable cbHeight specifying the height of the current coding block in luma samples,
* a variable treeType specifying whether a single or a dual tree is used.

In this process, the chroma intra prediction mode IntraPredModeC[ xCb ][ yCb ] and the MIP chroma direct mode flag MipChromaDirectFlag[ xCb ][ yCb ] are derived.

The variable isSingleTreeAnd444 is dervied as follows:

The MIP chroma direct mode flag MipChromaDirectFlag[ xCb ][ yCb ] is derived as follows:

* If all of the following conditions are true, MipChromaDirectFlag[ xCb ][ yCb ] is set equal to 1:
  + treeType is equal to SINGLE\_TREE.
  + sps\_chroma\_format\_idc is equal to 3.
  + intra\_chroma\_pred\_mode is equal to 4 or cu\_act\_enabled\_flag[ xCb ][ yCb ] is equal to 1.
  + IntraMipFlag[ xCb ][ yCb ] is equal to 1.
* Otherwise, MipChromaDirectFlag[ xCb ][ yCb ] is set equal to 0.

The chroma intra prediction mode IntraPredModeC[ xCb ][ yCb ] is derived as follows:

* If MipChromaDirectFlag[ xCb ][ yCb ] is equal to 1, the chroma intra prediction mode IntraPredModeC[ xCb ][ yCb ] is set equal to IntraPredModeY[ xCb ][ yCb ].
* Otherwise, the following applies:
  + The corresponding luma intra prediction mode lumaIntraPredMode is derived as follows:
  + If IntraMipFlag[ xCb + cbWidth / 2 ][ yCb + cbHeight / 2 ] is equal to 1, the following applies:
  + If treeType is equal to SINGLE\_TREE and sps\_chroma\_format\_idc is equal to 3, lumaIntraPredMode is set equal to −1.
  + Otherwise, lumaIntraPredMode is set equal to INTRA\_PLANAR.
  + Otherwise, if CuPredMode[ 0 ][ xCb + cbWidth / 2 ][ yCb + cbHeight / 2 ] is equal to MODE\_IBC or MODE\_PLT, lumaIntraPredMode is set equal to INTRA\_DC.
  + Otherwise, lumaIntraPredMode is set equal to IntraPredModeY[ xCb + cbWidth / 2 ][ yCb + cbHeight / 2 ].
  + The chroma intra prediction mode IntraPredModeC[ xCb ][ yCb ] is derived as follows:
  + If cu\_act\_enabled\_flag[ xCb ][ yCb ] is equal to 1, the chroma intra prediction mode IntraPredModeC[ xCb ][ yCb ] is set equal to lumaIntraPredMode.
  + Otherwise, if BdpcmFlag[ xCb ][ yCb ][ 1 ] is equal to 1, IntraPredModeC[ xCb ][ yCb ] is set equal to BdpcmDir[ xCb ][ yCb ][ 1 ] ? INTRA\_ANGULAR50 : INTRA\_ANGULAR18.
  + Otherwise ( cu\_act\_enabled\_flag[ xCb ][ yCb ] is equal to 0 and BdpcmFlag[ xCb ][ yCb ][ 1 ] is equal to 0 ), the chroma intra prediction mode IntraPredModeC[ xCb ][ yCb ] is derived using cclm\_mode\_flag, cclm\_mode\_idx, intra\_chroma\_pred\_mode and lumaIntraPredMode as specified in Table 20.

Table 20 – Specification of IntraPredModeC[ xCb ][ yCb ] depending on cclm\_mode\_flag, cclm\_mode\_idx, intra\_chroma\_pred\_mode and lumaIntraPredMode

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| cclm\_mode\_flag | cclm\_mode\_idx | intra\_chroma\_pred\_mode | lumaIntraPredMode | | | | |
| 0 | 50 | 18 | 1 | X ( −1  <=  X  <=  66 ) |
| 0 | – | 0 | 66 | 0 | 0 | 0 | 0 |
| 0 | – | 1 | 50 | 66 | 50 | 50 | 50 |
| 0 | – | 2 | 18 | 18 | 66 | 18 | 18 |
| 0 | – | 3 | 1 | 1 | 1 | 66 | 1 |
| 0 | – | 4 | 0 | 50 | 18 | 1 | X |
| 1 | 0 | – | 81 | 81 | 81 | 81 | 81 |
| 1 | 1 | – | 82 | 82 | 82 | 82 | 82 |
| 1 | 2 | – | 83 | 83 | 83 | 83 | 83 |

* + When sps\_chroma\_format\_idc is equal to 2, the chroma intra prediction mode Y is derived using the chroma intra prediction mode X in Table 20 as specified in Table 21, and the chroma intra prediction mode X is set equal to the chroma intra prediction mode Y afterwards.

Table 21 – Specification of the 4:2:2 mapping process from chroma intra prediction mode X to mode Y when sps\_chroma\_format\_idc is equal to 2

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **mode X** | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| **mode Y** | 0 | 1 | 61 | 62 | 63 | 64 | 65 | 66 | 2 | 3 | 5 | 6 | 8 | 10 | 12 | 13 | 14 | 16 |
| **mode X** | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 |
| **mode Y** | 18 | 20 | 22 | 23 | 24 | 26 | 28 | 30 | 31 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 |
| **mode X** | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 |
| **mode Y** | 41 | 42 | 43 | 43 | 44 | 44 | 45 | 45 | 46 | 47 | 48 | 48 | 49 | 49 | 50 | 51 | 51 | 52 |
| **mode X** | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 |  |  |  |  |  |
| **mode Y** | 52 | 53 | 54 | 55 | 55 | 56 | 56 | 57 | 57 | 58 | 59 | 59 | 60 |  |  |  |  |  |