

Planar YUV formats

Planar formats split luma and chroma data in separate memory regions. They exist in two variants:

- Semi-planar formats use two planes. The first plane is the luma plane and stores the Y components. The second plane is the chroma plane and stores the Cb and Cr components interleaved.
- Fully planar formats use three planes to store the Y, Cb and Cr components separately.

Within a plane, components are stored in pixel order, which may be linear or tiled. Padding may be supported at the end of the lines, and the line stride of the chroma planes may be constrained by the line stride of the luma plane.

Some planar formats allow planes to be placed in independent memory locations. They are identified by an 'M' suffix in their name (such as in `V4L2_PIX_FMT_NV12M`). Those formats are intended to be used only in drivers and applications that support the multi-planar API, described in [ref`planar-apis`](#). Unless explicitly documented as supporting non-contiguous planes, formats require the planes to follow each other immediately in memory.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\userspace-api\media\v4l\linux-master [Documentation] [userspace-api] [media] [v4l]pixfmt-yuv-planar.rst, line 23); [backlink](#)

Unknown interpreted text role "ref".

Semi-Planar YUV Formats

These formats are commonly referred to as NV formats (NV12, NV16, ...). They use two planes, and store the luma components in the first plane and the chroma components in the second plane. The Cb and Cr components are interleaved in the chroma plane, with Cb and Cr always stored in pairs. The chroma order is exposed as different formats.

For memory contiguous formats, the number of padding pixels at the end of the chroma lines is identical to the padding of the luma lines. Without horizontal subsampling, the chroma line stride (in bytes) is thus equal to twice the luma line stride. With horizontal subsampling by 2, the chroma line stride is equal to the luma line stride. Vertical subsampling doesn't affect the line stride.

For non-contiguous formats, no constraints are enforced by the format on the relationship between the luma and chroma line padding and stride.

All components are stored with the same number of bits per component.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\userspace-api\media\v4l\linux-master [Documentation] [userspace-api] [media] [v4l]pixfmt-yuv-planar.rst, line 55)

Unknown directive type "tabularcolumns".

```
.. tabularcolumns:: |p{5.2cm}|p{1.0cm}|p{1.5cm}|p{1.9cm}|p{1.2cm}|p{1.8cm}|p{2.7cm}|
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\userspace-api\media\v4l\linux-master [Documentation] [userspace-api] [media] [v4l]pixfmt-yuv-planar.rst, line 57)

Unknown directive type "flat-table".

```
.. flat-table:: Overview of Semi-Planar YUV Formats
   :header-rows: 1
   :stub-columns: 0

   * - Identifier
     - Code
     - Bits per component
     - Subsampling
     - Chroma order [1]_
     - Contiguous [2]_
     - Tiling [3]_
   * - V4L2_PIX_FMT_NV12
     - 'NV12'
     - 8
     - 4:2:0
     - Cb, Cr
     - Yes
     - Linear
   * - V4L2_PIX_FMT_NV21
     - 'NV21'
```

- 8
- 4:2:0
- Cr, Cb
- Yes
- Linear
- * - V4L2_PIX_FMT_NV12M
- 'NM12'
- 8
- 4:2:0
- Cb, Cr
- No
- Linear
- * - V4L2_PIX_FMT_NV21M
- 'NM21'
- 8
- 4:2:0
- Cr, Cb
- No
- Linear
- * - V4L2_PIX_FMT_NV12MT
- 'TM12'
- 8
- 4:2:0
- Cb, Cr
- No
- 64x32 tiles
- Horizontal Z order
- * - V4L2_PIX_FMT_NV12MT_16X16
- 'VM12'
- 8
- 4:2:2
- Cb, Cr
- No
- 16x16 tiles
- * - V4L2_PIX_FMT_NV16
- 'NV16'
- 8
- 4:2:2
- Cb, Cr
- Yes
- Linear
- * - V4L2_PIX_FMT_NV61
- 'NV61'
- 8
- 4:2:2
- Cr, Cb
- Yes
- Linear
- * - V4L2_PIX_FMT_NV16M
- 'NM16'
- 8
- 4:2:2
- Cb, Cr
- No
- Linear
- * - V4L2_PIX_FMT_NV61M
- 'NM61'
- 8
- 4:2:2
- Cr, Cb
- No
- Linear
- * - V4L2_PIX_FMT_NV24
- 'NV24'
- 8
- 4:4:4
- Cb, Cr
- Yes
- Linear
- * - V4L2_PIX_FMT_NV42
- 'NV42'
- 8
- 4:4:4
- Cr, Cb
- Yes
- Linear

[1] Order of chroma samples in the second plane

- [2] Indicates if planes have to be contiguous in memory or can be disjoint
- [3] Macroblock size in pixels

Color Sample Location: Chroma samples are `ref` interstitially sited<yuv-chroma-centered>`` horizontally.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\userspace-api\media\v41\[linux-master] [Documentation] [userspace-api] [media] [v41]pixfmt-yuv-planar.rst, line 165); [backlink](#)

Unknown interpreted text role "ref".

NV12, NV21, NV12M and NV21M

Semi-planar YUV 4:2:0 formats. The chroma plane is subsampled by 2 in each direction. Chroma lines contain half the number of pixels and the same number of bytes as luma lines, and the chroma plane contains half the number of lines of the luma plane.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\userspace-api\media\v41\[linux-master] [Documentation] [userspace-api] [media] [v41]pixfmt-yuv-planar.rst, line 183)

Unknown directive type "flat-table".

```
.. flat-table:: Sample 4x4 NV12 Image
:header-rows: 0
:stub-columns: 0

* - start + 0:
  - Y'\ :sub:`00`
  - Y'\ :sub:`01`
  - Y'\ :sub:`02`
  - Y'\ :sub:`03`
* - start + 4:
  - Y'\ :sub:`10`
  - Y'\ :sub:`11`
  - Y'\ :sub:`12`
  - Y'\ :sub:`13`
* - start + 8:
  - Y'\ :sub:`20`
  - Y'\ :sub:`21`
  - Y'\ :sub:`22`
  - Y'\ :sub:`23`
* - start + 12:
  - Y'\ :sub:`30`
  - Y'\ :sub:`31`
  - Y'\ :sub:`32`
  - Y'\ :sub:`33`
* - start + 16:
  - Cb\ :sub:`00`
  - Cr\ :sub:`00`
  - Cb\ :sub:`01`
  - Cr\ :sub:`01`
* - start + 20:
  - Cb\ :sub:`10`
  - Cr\ :sub:`10`
  - Cb\ :sub:`11`
  - Cr\ :sub:`11`
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\userspace-api\media\v41\[linux-master] [Documentation] [userspace-api] [media] [v41]pixfmt-yuv-planar.rst, line 218)

Unknown directive type "flat-table".

```
.. flat-table:: Sample 4x4 NV12M Image
:header-rows: 0
:stub-columns: 0

* - start0 + 0:
  - Y'\ :sub:`00`
  - Y'\ :sub:`01`
  - Y'\ :sub:`02`
  - Y'\ :sub:`03`
* - start0 + 4:
  - Y'\ :sub:`10`
  - Y'\ :sub:`11`
```

```

- Y'\ :sub:`12`
- Y'\ :sub:`13`
* - start0 + 8:
- Y'\ :sub:`20`
- Y'\ :sub:`21`
- Y'\ :sub:`22`
- Y'\ :sub:`23`
* - start0 + 12:
- Y'\ :sub:`30`
- Y'\ :sub:`31`
- Y'\ :sub:`32`
- Y'\ :sub:`33`
* -
* - start1 + 0:
- Cb\ :sub:`00`
- Cr\ :sub:`00`
- Cb\ :sub:`01`
- Cr\ :sub:`01`
* - start1 + 4:
- Cb\ :sub:`10`
- Cr\ :sub:`10`
- Cb\ :sub:`11`
- Cr\ :sub:`11`

```

Tiled NV12

Semi-planar YUV 4:2:0 formats, using macroblock tiling. The chroma plane is subsampled by 2 in each direction. Chroma lines contain half the number of pixels and the same number of bytes as luma lines, and the chroma plane contains half the number of lines of the luma plane. Each tile follows the previous one linearly in memory (from left to right, top to bottom).

V4L2_PIX_FMT_NV12MT_16X16 is similar to V4L2_PIX_FMT_NV12M but stores pixels in 2D 16x16 tiles, and stores tiles linearly in memory. The line stride and image height must be aligned to a multiple of 16. The layouts of the luma and chroma planes are identical.

V4L2_PIX_FMT_NV12MT is similar to V4L2_PIX_FMT_NV12M but stores pixels in 2D 64x32 tiles, and stores 2x2 groups of tiles in Z-order in memory, alternating Z and mirrored Z shapes horizontally. The line stride must be a multiple of 128 pixels to ensure an integer number of Z shapes. The image height must be a multiple of 32 pixels. If the vertical resolution is an odd number of tiles, the last row of tiles is stored in linear order. The layouts of the luma and chroma planes are identical.

V4L2_PIX_FMT_NV12_4L4 stores pixels in 4x4 tiles, and stores tiles linearly in memory. The line stride and image height must be aligned to a multiple of 4. The layouts of the luma and chroma planes are identical.

V4L2_PIX_FMT_NV12_16L16 stores pixels in 16x16 tiles, and stores tiles linearly in memory. The line stride and image height must be aligned to a multiple of 16. The layouts of the luma and chroma planes are identical.

V4L2_PIX_FMT_NV12_32L32 stores pixels in 32x32 tiles, and stores tiles linearly in memory. The line stride and image height must be aligned to a multiple of 32. The layouts of the luma and chroma planes are identical.

V4L2_PIX_FMT_NV12M_8L128 is similar to V4L2_PIX_FMT_NV12M but stores pixels in 2D 8x128 tiles, and stores tiles linearly in memory. The image height must be aligned to a multiple of 128. The layouts of the luma and chroma planes are identical.

V4L2_PIX_FMT_NV12M_10BE_8L128 is similar to V4L2_PIX_FMT_NV12M but stores 10 bits pixels in 2D 8x128 tiles, and stores tiles linearly in memory. the data is arranged in big endian order. The image height must be aligned to a multiple of 128. The layouts of the luma and chroma planes are identical. Note the tile size is 8bytes multiplied by 128 bytes, it means that the low bits and high bits of one pixel may be in different tiles. The 10 bit pixels are packed, so 5 bytes contain 4 10-bit pixels layout like this (for luma): byte 0: Y0(bits 9-2) byte 1: Y0(bits 1-0) Y1(bits 9-4) byte 2: Y1(bits 3-0) Y2(bits 9-6) byte 3: Y2(bits 5-0) Y3(bits 9-8) byte 4: Y3(bits 7-0)

V4L2_PIX_FMT_MM21 store luma pixel in 16x32 tiles, and chroma pixels in 16x16 tiles. The line stride must be aligned to a multiple of 16 and the image height must be aligned to a multiple of 32. The number of luma and chroma tiles are identical, even though the tile size differ. The image is formed of two non-contiguous planes.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\userspace-api\media\v4l\[linux-master][Documentation][userspace-api][media][v4l]pixfmt-yuv-planar.rst, line 330)

Unknown directive type "kernel-figure".

```

.. kernel-figure:: nv12mt.svg
   :alt:      nv12mt.svg
   :align:    center

```

V4L2_PIX_FMT_NV12MT macroblock Z shape memory layout

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\userspace-api\media\v4l\[linux-master] [Documentation] [userspace-api] [media] [v4l]pixfmt-yuv-planar.rst, line 338)

Unknown directive type "kernel-figure".

```
.. kernel-figure:: nv12mt_example.svg
   :alt:      nv12mt_example.svg
   :align:    center

Example V4L2_PIX_FMT_NV12MT memory layout of tiles
```

NV16, NV61, NV16M and NV61M

Semi-planar YUV 4:2:2 formats. The chroma plane is subsampled by 2 in the horizontal direction. Chroma lines contain half the number of pixels and the same number of bytes as luma lines, and the chroma plane contains the same number of lines as the luma plane.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\userspace-api\media\v4l\[linux-master] [Documentation] [userspace-api] [media] [v4l]pixfmt-yuv-planar.rst, line 358)

Unknown directive type "flat-table".

```
.. flat-table:: Sample 4x4 NV16 Image
   :header-rows: 0
   :stub-columns: 0

   * - start + 0:
     - Y'\ :sub:`00`
     - Y'\ :sub:`01`
     - Y'\ :sub:`02`
     - Y'\ :sub:`03`
   * - start + 4:
     - Y'\ :sub:`10`
     - Y'\ :sub:`11`
     - Y'\ :sub:`12`
     - Y'\ :sub:`13`
   * - start + 8:
     - Y'\ :sub:`20`
     - Y'\ :sub:`21`
     - Y'\ :sub:`22`
     - Y'\ :sub:`23`
   * - start + 12:
     - Y'\ :sub:`30`
     - Y'\ :sub:`31`
     - Y'\ :sub:`32`
     - Y'\ :sub:`33`
   * - start + 16:
     - Cb\ :sub:`00`
     - Cr\ :sub:`00`
     - Cb\ :sub:`01`
     - Cr\ :sub:`01`
   * - start + 20:
     - Cb\ :sub:`10`
     - Cr\ :sub:`10`
     - Cb\ :sub:`11`
     - Cr\ :sub:`11`
   * - start + 24:
     - Cb\ :sub:`20`
     - Cr\ :sub:`20`
     - Cb\ :sub:`21`
     - Cr\ :sub:`21`
   * - start + 28:
     - Cb\ :sub:`30`
     - Cr\ :sub:`30`
     - Cb\ :sub:`31`
     - Cr\ :sub:`31`
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\userspace-api\media\v4l\[linux-master] [Documentation] [userspace-api] [media] [v4l]pixfmt-yuv-planar.rst, line 403)

Unknown directive type "flat-table".

```

.. flat-table:: Sample 4x4 NV16M Image
   :header-rows: 0
   :stub-columns: 0

   * - start0 + 0:
     - Y'\ :sub:`00`
     - Y'\ :sub:`01`
     - Y'\ :sub:`02`
     - Y'\ :sub:`03`
   * - start0 + 4:
     - Y'\ :sub:`10`
     - Y'\ :sub:`11`
     - Y'\ :sub:`12`
     - Y'\ :sub:`13`
   * - start0 + 8:
     - Y'\ :sub:`20`
     - Y'\ :sub:`21`
     - Y'\ :sub:`22`
     - Y'\ :sub:`23`
   * - start0 + 12:
     - Y'\ :sub:`30`
     - Y'\ :sub:`31`
     - Y'\ :sub:`32`
     - Y'\ :sub:`33`
   * -
   * - start1 + 0:
     - Cb\ :sub:`00`
     - Cr\ :sub:`00`
     - Cb\ :sub:`02`
     - Cr\ :sub:`02`
   * - start1 + 4:
     - Cb\ :sub:`10`
     - Cr\ :sub:`10`
     - Cb\ :sub:`12`
     - Cr\ :sub:`12`
   * - start1 + 8:
     - Cb\ :sub:`20`
     - Cr\ :sub:`20`
     - Cb\ :sub:`22`
     - Cr\ :sub:`22`
   * - start1 + 12:
     - Cb\ :sub:`30`
     - Cr\ :sub:`30`
     - Cb\ :sub:`32`
     - Cr\ :sub:`32`

```

NV24 and NV42

Semi-planar YUV 4:4:4 formats. The chroma plane is not subsampled. Chroma lines contain the same number of pixels and twice the number of bytes as luma lines, and the chroma plane contains the same number of lines as the luma plane.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\userspace-api\media\v41\[linux-master] [Documentation] [userspace-api] [media] [v41]pixfmt-yuv-planar.rst, line 461)

Unknown directive type "flat-table".

```

.. flat-table:: Sample 4x4 NV24 Image
   :header-rows: 0
   :stub-columns: 0

   * - start + 0:
     - Y'\ :sub:`00`
     - Y'\ :sub:`01`
     - Y'\ :sub:`02`
     - Y'\ :sub:`03`
   * - start + 4:
     - Y'\ :sub:`10`
     - Y'\ :sub:`11`
     - Y'\ :sub:`12`
     - Y'\ :sub:`13`
   * - start + 8:
     - Y'\ :sub:`20`
     - Y'\ :sub:`21`
     - Y'\ :sub:`22`
     - Y'\ :sub:`23`
   * - start + 12:

```

```

- Y'\ :sub:`30`
- Y'\ :sub:`31`
- Y'\ :sub:`32`
- Y'\ :sub:`33`
* - start + 16:
- Cb\ :sub:`00`
- Cr\ :sub:`00`
- Cb\ :sub:`01`
- Cr\ :sub:`01`
- Cb\ :sub:`02`
- Cr\ :sub:`02`
- Cb\ :sub:`03`
- Cr\ :sub:`03`
* - start + 24:
- Cb\ :sub:`10`
- Cr\ :sub:`10`
- Cb\ :sub:`11`
- Cr\ :sub:`11`
- Cb\ :sub:`12`
- Cr\ :sub:`12`
- Cb\ :sub:`13`
- Cr\ :sub:`13`
* - start + 32:
- Cb\ :sub:`20`
- Cr\ :sub:`20`
- Cb\ :sub:`21`
- Cr\ :sub:`21`
- Cb\ :sub:`22`
- Cr\ :sub:`22`
- Cb\ :sub:`23`
- Cr\ :sub:`23`
* - start + 40:
- Cb\ :sub:`30`
- Cr\ :sub:`30`
- Cb\ :sub:`31`
- Cr\ :sub:`31`
- Cb\ :sub:`32`
- Cr\ :sub:`32`
- Cb\ :sub:`33`
- Cr\ :sub:`33`

```

Fully Planar YUV Formats

These formats store the Y, Cb and Cr components in three separate planes. The luma plane comes first, and the order of the two chroma planes varies between formats. The two chroma planes always use the same subsampling.

For memory contiguous formats, the number of padding pixels at the end of the chroma lines is identical to the padding of the luma lines. The chroma line stride (in bytes) is thus equal to the luma line stride divided by the horizontal subsampling factor. Vertical subsampling doesn't affect the line stride.

For non-contiguous formats, no constraints are enforced by the format on the relationship between the luma and chroma line padding and stride.

All components are stored with the same number of bits per component.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\userspace-api\media\v4l\[linux-master] [Documentation] [userspace-api] [media] [v4l]pixfmt-yuv-planar.rst, line 545)

Unknown directive type "tabularcolumns".

```
.. tabularcolumns:: |p{5.0cm}|p{1.1cm}|p{1.5cm}|p{2.2cm}|p{1.2cm}|p{3.7cm}|
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\userspace-api\media\v4l\[linux-master] [Documentation] [userspace-api] [media] [v4l]pixfmt-yuv-planar.rst, line 547)

Unknown directive type "flat-table".

```
.. flat-table:: Overview of Fully Planar YUV Formats
   :header-rows: 1
   :stub-columns: 0

   * - Identifier
```

- Code
- Bits per component
- Subsampling
- Planes order [4]_
- Contiguous [5]_
- * - V4L2_PIX_FMT_YUV410
 - 'YUV9'
 - 8
 - 4:1:0
 - Y, Cb, Cr
 - Yes
- * - V4L2_PIX_FMT_YVU410
 - 'YVU9'
 - 8
 - 4:1:0
 - Y, Cr, Cb
 - Yes
- * - V4L2_PIX_FMT_YUV411P
 - '411P'
 - 8
 - 4:1:1
 - Y, Cb, Cr
 - Yes
- * - V4L2_PIX_FMT_YUV420M
 - 'YM12'
 - 8
 - 4:2:0
 - Y, Cb, Cr
 - No
- * - V4L2_PIX_FMT_YVU420M
 - 'YM21'
 - 8
 - 4:2:0
 - Y, Cr, Cb
 - No
- * - V4L2_PIX_FMT_YUV420
 - 'YU12'
 - 8
 - 4:2:0
 - Y, Cb, Cr
 - Yes
- * - V4L2_PIX_FMT_YVU420
 - 'YV12'
 - 8
 - 4:2:0
 - Y, Cr, Cb
 - Yes
- * - V4L2_PIX_FMT_YUV422P
 - '422P'
 - 8
 - 4:2:2
 - Y, Cb, Cr
 - Yes
- * - V4L2_PIX_FMT_YUV422M
 - 'YM16'
 - 8
 - 4:2:2
 - Y, Cb, Cr
 - No
- * - V4L2_PIX_FMT_YVU422M
 - 'YM61'
 - 8
 - 4:2:2
 - Y, Cr, Cb
 - No
- * - V4L2_PIX_FMT_YUV444M
 - 'YM24'
 - 8
 - 4:4:4
 - Y, Cb, Cr
 - No
- * - V4L2_PIX_FMT_YVU444M
 - 'YM42'
 - 8
 - 4:4:4
 - Y, Cr, Cb
 - No

[5] Indicates if planes have to be contiguous in memory or can be disjoint

Color Sample Location: Chroma samples are `ref`interstitially sited<yuv-chroma-centered>`` horizontally.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\userspace-api\media\v4l\[linux-master] [Documentation] [userspace-api] [media] [v4l]pixfmt-yuv-planar.rst, line 640); [backlink](#)

Unknown interpreted text role "ref".

YUV410 and YVU410

Planar YUV 4:1:0 formats. The chroma planes are subsampled by 4 in each direction. Chroma lines contain a quarter of the number of pixels and bytes of the luma lines, and the chroma planes contain a quarter of the number of lines of the luma plane.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\userspace-api\media\v4l\[linux-master] [Documentation] [userspace-api] [media] [v4l]pixfmt-yuv-planar.rst, line 655)

Unknown directive type "flat-table".

```
.. flat-table:: Sample 4x4 YUV410 Image
   :header-rows: 0
   :stub-columns: 0

   * - start + 0:
     - Y'\ :sub:`00`
     - Y'\ :sub:`01`
     - Y'\ :sub:`02`
     - Y'\ :sub:`03`
   * - start + 4:
     - Y'\ :sub:`10`
     - Y'\ :sub:`11`
     - Y'\ :sub:`12`
     - Y'\ :sub:`13`
   * - start + 8:
     - Y'\ :sub:`20`
     - Y'\ :sub:`21`
     - Y'\ :sub:`22`
     - Y'\ :sub:`23`
   * - start + 12:
     - Y'\ :sub:`30`
     - Y'\ :sub:`31`
     - Y'\ :sub:`32`
     - Y'\ :sub:`33`
   * - start + 16:
     - Cr\ :sub:`00`
   * - start + 17:
     - Cb\ :sub:`00`
```

YUV411P

Planar YUV 4:1:1 formats. The chroma planes are subsampled by 4 in the horizontal direction. Chroma lines contain a quarter of the number of pixels and bytes of the luma lines, and the chroma planes contain the same number of lines as the luma plane.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\userspace-api\media\v4l\[linux-master] [Documentation] [userspace-api] [media] [v4l]pixfmt-yuv-planar.rst, line 695)

Unknown directive type "flat-table".

```
.. flat-table:: Sample 4x4 YUV411P Image
   :header-rows: 0
   :stub-columns: 0

   * - start + 0:
     - Y'\ :sub:`00`
     - Y'\ :sub:`01`
     - Y'\ :sub:`02`
     - Y'\ :sub:`03`
   * - start + 4:
     - Y'\ :sub:`10`
     - Y'\ :sub:`11`
     - Y'\ :sub:`12`
```

```

- Y'\ :sub:`13`
* - start + 8:
- Y'\ :sub:`20`
- Y'\ :sub:`21`
- Y'\ :sub:`22`
- Y'\ :sub:`23`
* - start + 12:
- Y'\ :sub:`30`
- Y'\ :sub:`31`
- Y'\ :sub:`32`
- Y'\ :sub:`33`
* - start + 16:
- Cb\ :sub:`00`
* - start + 17:
- Cb\ :sub:`10`
* - start + 18:
- Cb\ :sub:`20`
* - start + 19:
- Cb\ :sub:`30`
* - start + 20:
- Cr\ :sub:`00`
* - start + 21:
- Cr\ :sub:`10`
* - start + 22:
- Cr\ :sub:`20`
* - start + 23:
- Cr\ :sub:`30`

```

YUV420, YVU420, YUV420M and YVU420M

Planar YUV 4:2:0 formats. The chroma planes are subsampled by 2 in each direction. Chroma lines contain half of the number of pixels and bytes of the luma lines, and the chroma planes contain half of the number of lines of the luma plane.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\userspace-api\media\v4l\[linux-master] [Documentation] [userspace-api] [media] [v4l]pixfmt-yuv-planar.rst, line 750)

Unknown directive type "flat-table".

```

.. flat-table:: Sample 4x4 YUV420 Image
   :header-rows: 0
   :stub-columns: 0

   * - start + 0:
     - Y'\ :sub:`00`
     - Y'\ :sub:`01`
     - Y'\ :sub:`02`
     - Y'\ :sub:`03`
   * - start + 4:
     - Y'\ :sub:`10`
     - Y'\ :sub:`11`
     - Y'\ :sub:`12`
     - Y'\ :sub:`13`
   * - start + 8:
     - Y'\ :sub:`20`
     - Y'\ :sub:`21`
     - Y'\ :sub:`22`
     - Y'\ :sub:`23`
   * - start + 12:
     - Y'\ :sub:`30`
     - Y'\ :sub:`31`
     - Y'\ :sub:`32`
     - Y'\ :sub:`33`
   * - start + 16:
     - Cr\ :sub:`00`
     - Cr\ :sub:`01`
   * - start + 18:
     - Cr\ :sub:`10`
     - Cr\ :sub:`11`
   * - start + 20:
     - Cb\ :sub:`00`
     - Cb\ :sub:`01`
   * - start + 22:
     - Cb\ :sub:`10`
     - Cb\ :sub:`11`

```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\userspace-api\media\v41\[linux-master] [Documentation] [userspace-api] [media] [v41]pixfmt-yuv-planar.rst, line 787)

Unknown directive type "flat-table".

```
.. flat-table:: Sample 4x4 YUV420M Image
:header-rows: 0
:stub-columns: 0

* - start0 + 0:
  - Y'\ :sub:`00`
  - Y'\ :sub:`01`
  - Y'\ :sub:`02`
  - Y'\ :sub:`03`
* - start0 + 4:
  - Y'\ :sub:`10`
  - Y'\ :sub:`11`
  - Y'\ :sub:`12`
  - Y'\ :sub:`13`
* - start0 + 8:
  - Y'\ :sub:`20`
  - Y'\ :sub:`21`
  - Y'\ :sub:`22`
  - Y'\ :sub:`23`
* - start0 + 12:
  - Y'\ :sub:`30`
  - Y'\ :sub:`31`
  - Y'\ :sub:`32`
  - Y'\ :sub:`33`
* -
* - start1 + 0:
  - Cb\ :sub:`00`
  - Cb\ :sub:`01`
* - start1 + 2:
  - Cb\ :sub:`10`
  - Cb\ :sub:`11`
* -
* - start2 + 0:
  - Cr\ :sub:`00`
  - Cr\ :sub:`01`
* - start2 + 2:
  - Cr\ :sub:`10`
  - Cr\ :sub:`11`
```

YUV422P, YUV422M and YVU422M

Planar YUV 4:2:2 formats. The chroma planes are subsampled by 2 in the horizontal direction. Chroma lines contain half of the number of pixels and bytes of the luma lines, and the chroma planes contain the same number of lines as the luma plane.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\userspace-api\media\v41\[linux-master] [Documentation] [userspace-api] [media] [v41]pixfmt-yuv-planar.rst, line 839)

Unknown directive type "flat-table".

```
.. flat-table:: Sample 4x4 YUV422P Image
:header-rows: 0
:stub-columns: 0

* - start + 0:
  - Y'\ :sub:`00`
  - Y'\ :sub:`01`
  - Y'\ :sub:`02`
  - Y'\ :sub:`03`
* - start + 4:
  - Y'\ :sub:`10`
  - Y'\ :sub:`11`
  - Y'\ :sub:`12`
  - Y'\ :sub:`13`
* - start + 8:
  - Y'\ :sub:`20`
  - Y'\ :sub:`21`
  - Y'\ :sub:`22`
  - Y'\ :sub:`23`
* - start + 12:
  - Y'\ :sub:`30`
```

```

- Y'\ :sub:`31`
- Y'\ :sub:`32`
- Y'\ :sub:`33`
* - start + 16:
- Cb\ :sub:`00`
- Cb\ :sub:`01`
* - start + 18:
- Cb\ :sub:`10`
- Cb\ :sub:`11`
* - start + 20:
- Cb\ :sub:`20`
- Cb\ :sub:`21`
* - start + 22:
- Cb\ :sub:`30`
- Cb\ :sub:`31`
* - start + 24:
- Cr\ :sub:`00`
- Cr\ :sub:`01`
* - start + 26:
- Cr\ :sub:`10`
- Cr\ :sub:`11`
* - start + 28:
- Cr\ :sub:`20`
- Cr\ :sub:`21`
* - start + 30:
- Cr\ :sub:`30`
- Cr\ :sub:`31`

```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\userspace-api\media\v4l\[linux-master][Documentation][userspace-api][media][v4l]pixfmt-yuv-planar.rst, line 888)

Unknown directive type "flat-table".

```

.. flat-table:: Sample 4x4 YUV422M Image
:header-rows: 0
:stub-columns: 0

```

```

* - start0 + 0:
- Y'\ :sub:`00`
- Y'\ :sub:`01`
- Y'\ :sub:`02`
- Y'\ :sub:`03`
* - start0 + 4:
- Y'\ :sub:`10`
- Y'\ :sub:`11`
- Y'\ :sub:`12`
- Y'\ :sub:`13`
* - start0 + 8:
- Y'\ :sub:`20`
- Y'\ :sub:`21`
- Y'\ :sub:`22`
- Y'\ :sub:`23`
* - start0 + 12:
- Y'\ :sub:`30`
- Y'\ :sub:`31`
- Y'\ :sub:`32`
- Y'\ :sub:`33`
* -
* - start1 + 0:
- Cb\ :sub:`00`
- Cb\ :sub:`01`
* - start1 + 2:
- Cb\ :sub:`10`
- Cb\ :sub:`11`
* - start1 + 4:
- Cb\ :sub:`20`
- Cb\ :sub:`21`
* - start1 + 6:
- Cb\ :sub:`30`
- Cb\ :sub:`31`
* -
* - start2 + 0:
- Cr\ :sub:`00`
- Cr\ :sub:`01`
* - start2 + 2:
- Cr\ :sub:`10`
- Cr\ :sub:`11`
* - start2 + 4:

```

```

- Cr\ :sub:`20`
- Cr\ :sub:`21`
* - start2 + 6:
- Cr\ :sub:`30`
- Cr\ :sub:`31`

```

YUV444M and YVU444M

Planar YUV 4:4:4 formats. The chroma planes are not subsampled. Chroma lines contain the same number of pixels and bytes of the luma lines, and the chroma planes contain the same number of lines as the luma plane.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\userspace-api\media\v4l\linux-master [Documentation] [userspace-api] [media] [v4l]pixfmt-yuv-planar.rst, line 950)

Unknown directive type "flat-table".

```

.. flat-table:: Sample 4x4 YUV444M Image
   :header-rows: 0
   :stub-columns: 0

   * - start0 + 0:
     - Y'\ :sub:`00`
     - Y'\ :sub:`01`
     - Y'\ :sub:`02`
     - Y'\ :sub:`03`
   * - start0 + 4:
     - Y'\ :sub:`10`
     - Y'\ :sub:`11`
     - Y'\ :sub:`12`
     - Y'\ :sub:`13`
   * - start0 + 8:
     - Y'\ :sub:`20`
     - Y'\ :sub:`21`
     - Y'\ :sub:`22`
     - Y'\ :sub:`23`
   * - start0 + 12:
     - Y'\ :sub:`30`
     - Y'\ :sub:`31`
     - Y'\ :sub:`32`
     - Y'\ :sub:`33`
   * -
   * - start1 + 0:
     - Cb\ :sub:`00`
     - Cb\ :sub:`01`
     - Cb\ :sub:`02`
     - Cb\ :sub:`03`
   * - start1 + 4:
     - Cb\ :sub:`10`
     - Cb\ :sub:`11`
     - Cb\ :sub:`12`
     - Cb\ :sub:`13`
   * - start1 + 8:
     - Cb\ :sub:`20`
     - Cb\ :sub:`21`
     - Cb\ :sub:`22`
     - Cb\ :sub:`23`
   * - start1 + 12:
     - Cb\ :sub:`20`
     - Cb\ :sub:`21`
     - Cb\ :sub:`32`
     - Cb\ :sub:`33`
   * -
   * - start2 + 0:
     - Cr\ :sub:`00`
     - Cr\ :sub:`01`
     - Cr\ :sub:`02`
     - Cr\ :sub:`03`
   * - start2 + 4:
     - Cr\ :sub:`10`
     - Cr\ :sub:`11`
     - Cr\ :sub:`12`
     - Cr\ :sub:`13`
   * - start2 + 8:
     - Cr\ :sub:`20`
     - Cr\ :sub:`21`
     - Cr\ :sub:`22`

```

```
- Cr\ :sub:`23`  
* - start2 + 12:  
- Cr\ :sub:`30`  
- Cr\ :sub:`31`  
- Cr\ :sub:`32`  
- Cr\ :sub:`33`
```