Data Formats

> **System Message: ERROR/3** (`D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\userspace-api\media\v4l\[linux-master][Documentation][userspace-api][media][v4l]format.rst`, line 2)
>
> Unknown directive type "c:namespace".
>
> ```
> .. c:namespace:: V4L
> ```

Data Format Negotiation

Different devices exchange different kinds of data with applications, for example video images, raw or sliced VBI data, RDS datagrams. Even within one kind many different formats are possible, in particular there is an abundance of image formats. Although drivers must provide a default and the selection persists across closing and reopening a device, applications should always negotiate a data format before engaging in data exchange. Negotiation means the application asks for a particular format and the driver selects and reports the best the hardware can do to satisfy the request. Of course applications can also just query the current selection.

A single mechanism exists to negotiate all data formats using the aggregate struct :c:type:`v4l2_format` and the :ref:`VIDIOC_G_FMT <VIDIOC_G_FMT>` and :ref:`VIDIOC_S_FMT <VIDIOC_G_FMT>` ioctls. Additionally the :ref:`VIDIOC_TRY_FMT <VIDIOC_G_FMT>` ioctl can be used to examine what the hardware *could* do, without actually selecting a new data format. The data formats supported by the V4L2 API are covered in the respective device section in :ref:`devices`. For a closer look at image formats see :ref:`pixfmt`.

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>
> Unknown interpreted text role "c:type".

> **System Message: ERROR/3** (`D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\userspace-api\media\v4l\[linux-master][Documentation][userspace-api][media][v4l]format.rst`, line 24); *backlink*
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> **System Message: ERROR/3** (`D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\userspace-api\media\v4l\[linux-master][Documentation][userspace-api][media][v4l]format.rst`, line 24); *backlink*
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> **System Message: ERROR/3** (`D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\userspace-api\media\v4l\[linux-master][Documentation][userspace-api][media][v4l]format.rst`, line 24); *backlink*
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> **System Message: ERROR/3** (`D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\userspace-api\media\v4l\[linux-master][Documentation][userspace-api][media][v4l]format.rst`, line 24); *backlink*
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> **System Message: ERROR/3** (`D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\userspace-api\media\v4l\[linux-master][Documentation][userspace-api][media][v4l]format.rst`, line 24); *backlink*
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The :ref:`VIDIOC_S_FMT <VIDIOC_G_FMT>` ioctl is a major turning-point in the initialization sequence. Prior to this point multiple panel applications can access the same device concurrently to select the current input, change controls or modify other properties. The first :ref:`VIDIOC_S_FMT <VIDIOC_G_FMT>` assigns a logical stream (video data, VBI data etc.) exclusively to

one file descriptor.

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Exclusive means no other application, more precisely no other file descriptor, can grab this stream or change device properties inconsistent with the negotiated parameters. A video standard change for example, when the new standard uses a different number of scan lines, can invalidate the selected image format. Therefore only the file descriptor owning the stream can make invalidating changes. Accordingly multiple file descriptors which grabbed different logical streams prevent each other from interfering with their settings. When for example video overlay is about to start or already in progress, simultaneous video capturing may be restricted to the same cropping and image size.

When applications omit the :ref:`VIDIOC_S_FMT <VIDIOC_G_FMT>` ioctl its locking side effects are implied by the next step, the selection of an I/O method with the :ref:`VIDIOC_REQBUFS` ioctl or implicit with the first :c:func:`read()` or :c:func:`write()` call.

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Generally only one logical stream can be assigned to a file descriptor, the exception being drivers permitting simultaneous video capturing and overlay using the same file descriptor for compatibility with V4L and earlier versions of V4L2. Switching the logical stream or returning into "panel mode" is possible by closing and reopening the device. Drivers *may* support a switch using :ref:`VIDIOC_S_FMT <VIDIOC_G_FMT>`.

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All drivers exchanging data with applications must support the :ref:`VIDIOC_G_FMT <VIDIOC_G_FMT>` and :ref:`VIDIOC_S_FMT <VIDIOC_G_FMT>` ioctl. Implementation of the :ref:`VIDIOC_TRY_FMT <VIDIOC_G_FMT>` is highly recommended but optional.

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System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\userspace-api\media\v4l\[linux-master][Documentation][userspace-api][media][v4l]format.rst, line 66); *backlink*

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Image Format Enumeration

Apart of the generic format negotiation functions a special ioctl to enumerate all image formats supported by video capture, overlay or output devices is available. [1]

The :ref:`VIDIOC_ENUM_FMT` ioctl must be supported by all drivers exchanging image data with applications.

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Important

Drivers are not supposed to convert image formats in kernel space. They must enumerate only formats directly supported by the hardware. If necessary driver writers should publish an example conversion routine or library for integration into applications.

[1] Enumerating formats an application has no a-priori knowledge of (otherwise it could explicitly ask for them and need not enumerate) seems useless, but there are applications serving as proxy between drivers and the actual video applications for which this is useful.