

Digital TV property parameters

There are several different Digital TV parameters that can be used by `ref FE_SET_PROPERTY` and `FE_GET_PROPERTY ioctl<FE_GET_PROPERTY>`. This section describes each of them. Please notice, however, that only a subset of them are needed to setup a frontend.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\userspace-api\media\dvb\linux-master [Documentation] [userspace-api] [media] [dvb] fe_property_parameters.rst, line 9); [backlink](#)

Unknown interpreted text role "ref".

DTV_UNDEFINED

Used internally. A GET/SET operation for it won't change or return anything.

DTV_TUNE

Interpret the cache of data, build either a traditional frontend tunerequest so we can pass validation in the `FE_SET_FRONTEND ioctl`.

DTV_CLEAR

Reset a cache of data specific to the frontend here. This does not effect hardware.

DTV_FREQUENCY

Frequency of the digital TV transponder/channel.

Note

1. For satellite delivery systems, the frequency is in kHz.
2. For cable and terrestrial delivery systems, the frequency is in Hz.
3. On most delivery systems, the frequency is the center frequency of the transponder/channel. The exception is for ISDB-T, where the main carrier has a 1/7 offset from the center.
4. For ISDB-T, the channels are usually transmitted with an offset of about 143kHz. E.g. a valid frequency could be 474,143 kHz. The stepping is bound to the bandwidth of the channel which is typically 6MHz.
5. In ISDB-Tsb, the channel consists of only one or three segments the frequency step is 429kHz, 3*429 respectively.

DTV_MODULATION

Specifies the frontend modulation type for delivery systems that supports more multiple modulations.

The modulation can be one of the types defined by enum `c:type:'fe_modulation'`.

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Unknown interpreted text role "c:type".

Most of the digital TV standards offers more than one possible modulation type.

The table below presents a summary of the types of modulation types supported by each delivery system, as currently defined by specs.

Standard	Modulation types
ATSC (version 1)	8-VSB and 16-VSB.
DMTB	4-QAM, 16-QAM, 32-QAM, 64-QAM and 4-QAM-NR.
DVB-C Annex A/C	16-QAM, 32-QAM, 64-QAM and 256-QAM.
DVB-C Annex B	64-QAM.
DVB-T	QPSK, 16-QAM and 64-QAM.

Standard	Modulation types
DVB-T2	QPSK, 16-QAM, 64-QAM and 256-QAM.
DVB-S	No need to set. It supports only QPSK.
DVB-S2	QPSK, 8-PSK, 16-APSK and 32-APSK.
ISDB-T	QPSK, DQPSK, 16-QAM and 64-QAM.
ISDB-S	8-PSK, QPSK and BPSK.

Note

Please notice that some of the above modulation types may not be defined currently at the Kernel. The reason is simple: no driver needed such definition yet.

DTV_BANDWIDTH_HZ

Bandwidth for the channel, in HZ.

Should be set only for terrestrial delivery systems.

Possible values: 1712000, 5000000, 6000000, 7000000, 8000000, 10000000.

Terrestrial Standard	Possible values for bandwidth
ATSC (version 1)	No need to set. It is always 6MHz.
DMTB	No need to set. It is always 8MHz.
DVB-T	6MHz, 7MHz and 8MHz.
DVB-T2	1.172 MHz, 5MHz, 6MHz, 7MHz, 8MHz and 10MHz
ISDB-T	5MHz, 6MHz, 7MHz and 8MHz, although most places use 6MHz.

Note

- For ISDB-Tsb, the bandwidth can vary depending on the number of connected segments. It can be easily derived from other parameters (DTV_ISDBT_SB_SEGMENT_IDX, DTV_ISDBT_SB_SEGMENT_COUNT).
- On Satellite and Cable delivery systems, the bandwidth depends on the symbol rate. So, the Kernel will silently ignore any setting [ref: 'DTV-BANDWIDTH-HZ'](#). I will however fill it back with a bandwidth estimation.

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Such bandwidth estimation takes into account the symbol rate set with [ref: 'DTV-SYMBOL-RATE'](#), and the rolloff factor, with is fixed for DVB-C and DVB-S.

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For DVB-S2, the rolloff should also be set via [ref: 'DTV-ROLLOFF'](#).

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DTV_INVERSION

Specifies if the frontend should do spectral inversion or not.

The acceptable values are defined by `:c:type:'fe_spectral_inversion'`.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\userspace-api\media\dvb\[linux-master] [Documentation] [userspace-api] [media] [dvb] fe_property_parameters.rst, line 159); [backlink](#)

Unknown interpreted text role "c:type".

DTV_DISEQC_MASTER

Currently not implemented.

DTV_SYMBOL_RATE

Used on cable and satellite delivery systems.

Digital TV symbol rate, in bauds (symbols/second).

DTV_INNER_FEC

Used on cable and satellite delivery systems.

The acceptable values are defined by `:c:type:'fe_code_rate'`.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\userspace-api\media\dvb\[linux-master] [Documentation] [userspace-api] [media] [dvb] fe_property_parameters.rst, line 187); [backlink](#)

Unknown interpreted text role "c:type".

DTV_VOLTAGE

Used on satellite delivery systems.

The voltage is usually used with non-DiSEqC capable LNBs to switch the polarization (horizontal/vertical). When using DiSEqC equipment this voltage has to be switched consistently to the DiSEqC commands as described in the DiSEqC spec.

The acceptable values are defined by `:c:type:'fe_sec_voltage'`.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\userspace-api\media\dvb\[linux-master] [Documentation] [userspace-api] [media] [dvb] fe_property_parameters.rst, line 202); [backlink](#)

Unknown interpreted text role "c:type".

DTV_TONE

Currently not used.

DTV_PILOT

Used on DVB-S2.

Sets DVB-S2 pilot.

The acceptable values are defined by `:c:type:'fe_pilot'`.

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Unknown interpreted text role "c:type".

DTV_ROLLOFF

Used on DVB-S2.

Sets DVB-S2 rolloff.

The acceptable values are defined by `:c:type:'fe_rolloff'`.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\userspace-api\media\dvb\[linux-master] [Documentation] [userspace-api] [media] [dvb] fe_property_parameters.rst, line 234); [backlink](#)

Unknown interpreted text role "c:type".

DTV_DISEQC_SLAVE_REPLY

Currently not implemented.

DTV_FE_CAPABILITY_COUNT

Currently not implemented.

DTV_FE_CAPABILITY

Currently not implemented.

DTV_DELIVERY_SYSTEM

Specifies the type of the delivery system.

The acceptable values are defined by `:c:type:'fe_delivery_system'`.

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Unknown interpreted text role "c:type".

DTV_ISDBT_PARTIAL_RECEPTION

Used only on ISDB.

If `DTV_ISDBT_SOUND_BROADCASTING` is '0' this bit-field represents whether the channel is in partial reception mode or not.

If '1' `DTV_ISDBT_LAYERA_*` values are assigned to the center segment and `DTV_ISDBT_LAYERA_SEGMENT_COUNT` has to be '1'.

If in addition `DTV_ISDBT_SOUND_BROADCASTING` is '1' `DTV_ISDBT_PARTIAL_RECEPTION` represents whether this ISDB-Tsb channel is consisting of one segment and layer or three segments and two layers.

Possible values: 0, 1, -1 (AUTO)

DTV_ISDBT_SOUND_BROADCASTING

Used only on ISDB.

This field represents whether the other `DTV_ISDBT_*`-parameters are referring to an ISDB-T and an ISDB-Tsb channel. (See also `DTV_ISDBT_PARTIAL_RECEPTION`).

Possible values: 0, 1, -1 (AUTO)

DTV_ISDBT_SB_SUBCHANNEL_ID

Used only on ISDB.

This field only applies if `DTV_ISDBT_SOUND_BROADCASTING` is '1'.

(Note of the author: This might not be the correct description of the `SUBCHANNEL-ID` in all details, but it is my understanding of the technical background needed to program a device)

An ISDB-Tsb channel (1 or 3 segments) can be broadcasted alone or in a set of connected ISDB-Tsb channels. In this set of channels every channel can be received independently. The number of connected ISDB-Tsb segment can vary, e.g. depending on the frequency spectrum bandwidth available.

Example: Assume 8 ISDB-Tsb connected segments are broadcasted. The broadcaster has several possibilities to put those channels in the air: Assuming a normal 13-segment ISDB-T spectrum he can align the 8 segments from position 1-8 to 5-13 or anything in

between.

The underlying layer of segments are subchannels: each segment is consisting of several subchannels with a predefined IDs. A sub-channel is used to help the demodulator to synchronize on the channel.

An ISDB-T channel is always centered over all sub-channels. As for the example above, in ISDB-Tsb it is no longer as simple as that.

The `DTV_ISDBT_SB_SUBCHANNEL_ID` parameter is used to give the sub-channel ID of the segment to be demodulated.

Possible values: 0 .. 41, -1 (AUTO)

DTV_ISDBT_SB_SEGMENT_IDX

Used only on ISDB.

This field only applies if `DTV_ISDBT_SOUND_BROADCASTING` is '1'.

`DTV_ISDBT_SB_SEGMENT_IDX` gives the index of the segment to be demodulated for an ISDB-Tsb channel where several of them are transmitted in the connected manner.

Possible values: 0 .. `DTV_ISDBT_SB_SEGMENT_COUNT` - 1

Note: This value cannot be determined by an automatic channel search.

DTV_ISDBT_SB_SEGMENT_COUNT

Used only on ISDB.

This field only applies if `DTV_ISDBT_SOUND_BROADCASTING` is '1'.

`DTV_ISDBT_SB_SEGMENT_COUNT` gives the total count of connected ISDB-Tsb channels.

Possible values: 1 .. 13

Note: This value cannot be determined by an automatic channel search.

DTV-ISDBT-LAYER[A-C] parameters

Used only on ISDB.

ISDB-T channels can be coded hierarchically. As opposed to DVB-T in ISDB-T hierarchical layers can be decoded simultaneously. For that reason a ISDB-T demodulator has 3 Viterbi and 3 Reed-Solomon decoders.

ISDB-T has 3 hierarchical layers which each can use a part of the available segments. The total number of segments over all layers has to 13 in ISDB-T.

There are 3 parameter sets, for Layers A, B and C.

DTV_ISDBT_LAYER_ENABLED

Used only on ISDB.

Hierarchical reception in ISDB-T is achieved by enabling or disabling layers in the decoding process. Setting all bits of `DTV_ISDBT_LAYER_ENABLED` to '1' forces all layers (if applicable) to be demodulated. This is the default.

If the channel is in the partial reception mode (`DTV_ISDBT_PARTIAL_RECEPTION` = 1) the central segment can be decoded independently of the other 12 segments. In that mode layer A has to have a `SEGMENT_COUNT` of 1.

In ISDB-Tsb only layer A is used, it can be 1 or 3 in ISDB-Tsb according to `DTV_ISDBT_PARTIAL_RECEPTION`. `SEGMENT_COUNT` must be filled accordingly.

Only the values of the first 3 bits are used. Other bits will be silently ignored:

`DTV_ISDBT_LAYER_ENABLED` bit 0: layer A enabled

`DTV_ISDBT_LAYER_ENABLED` bit 1: layer B enabled

`DTV_ISDBT_LAYER_ENABLED` bit 2: layer C enabled

`DTV_ISDBT_LAYER_ENABLED` bits 3-31: unused

DTV_ISDBT_LAYER[A-C]_FEC

Used only on ISDB.

The Forward Error Correction mechanism used by a given ISDB Layer, as defined by `xtype:'fe_code_rate'`.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\userspace-api\media\dvb\[linux-master] [Documentation] [userspace-

[api](#) [\[media\]](#) [\[dvb\]](#) [fe_property_parameters.rst, line 434](#); [backlink](#)

Unknown interpreted text role "c:type".

Possible values are: FEC_AUTO, FEC_1_2, FEC_2_3, FEC_3_4, FEC_5_6, FEC_7_8

DTV_ISDBT_LAYER[A-C]_MODULATION

Used only on ISDB.

The modulation used by a given ISDB Layer, as defined by `c:type:'fe_modulation'`.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\userspace-api\media\dvb\[linux-master] [Documentation] [userspace-api] [\[media\]](#) [\[dvb\]](#) [fe_property_parameters.rst, line 449](#); [backlink](#)

Unknown interpreted text role "c:type".

Possible values are: QAM_AUTO, QPSK, QAM_16, QAM_64, DQPSK

Note

1. If layer C is DQPSK, then layer B has to be DQPSK.
2. If layer B is DQPSK and DTV_ISDBT_PARTIAL_RECEPTION= 0, then layer has to be DQPSK.

DTV_ISDBT_LAYER[A-C]_SEGMENT_COUNT

Used only on ISDB.

Possible values: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, -1 (AUTO)

Note: Truth table for DTV_ISDBT_SOUND_BROADCASTING and DTV_ISDBT_PARTIAL_RECEPTION and LAYER[A-C]_SEGMENT_COUNT

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Unknown directive type "flat-table".

```
.. flat-table:: Truth table for ISDB-T Sound Broadcasting
   :header-rows: 1
   :stub-columns: 0

   - .. row 1
     - Partial Reception
     - Sound Broadcasting
     - Layer A width
     - Layer B width
     - Layer C width
     - total width

   - .. row 2
     - 0
     - 0
     - 1 .. 13
     - 1 .. 13
     - 1 .. 13
     - 13

   - .. row 3
```

```

- 1
- 0
- 1
- 1 .. 13
- 1 .. 13
- 13
- .. row 4
- 0
- 1
- 1
- 0
- 0
- 1
- .. row 5
- 1
- 1
- 1
- 2
- 0
- 13

```

DTV_ISDBT_LAYER[A-C]_TIME_INTERLEAVING

Used only on ISDB.

Valid values: 0, 1, 2, 4, -1 (AUTO)

when DTV_ISDBT_SOUND_BROADCASTING is active, value 8 is also valid.

Note: The real time interleaving length depends on the mode (fft-size). The values here are referring to what can be found in the TMCC-structure, as shown in the table below.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\userspace-api\media\dvb\[linux-master] [Documentation] [userspace-api] [media] [dvb] fe_property_parameters.rst, line 569)

Unknown directive type "ctype".

```
.. ctype:: isdbt_layer_interleaving_table
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\userspace-api\media\dvb\[linux-master] [Documentation] [userspace-api] [media] [dvb] fe_property_parameters.rst, line 571)

Unknown directive type "flat-table".

```
.. flat-table:: ISDB-T time interleaving modes
   :header-rows: 1
   :stub-columns: 0

- .. row 1
- ``DTV_ISDBT_LAYER[A-C]_TIME_INTERLEAVING``
- Mode 1 (2K FFT)
```

- Mode 2 (4K FFT)
- Mode 3 (8K FFT)
- .. row 2
 - 0
 - 0
 - 0
 - 0
- .. row 3
 - 1
 - 4
 - 2
 - 1
- .. row 4
 - 2
 - 8
 - 4
 - 2
- .. row 5
 - 4
 - 16
 - 8
 - 4

DTV_ATSCMH_FIC_VER

Used only on ATSC-MH.

Version number of the FIC (Fast Information Channel) signaling data.

FIC is used for relaying information to allow rapid service acquisition by the receiver.

Possible values: 0, 1, 2, 3, ..., 30, 31

DTV_ATSCMH_PARADE_ID

Used only on ATSC-MH.

Parade identification number

A parade is a collection of up to eight MH groups, conveying one or two ensembles.

Possible values: 0, 1, 2, 3, ..., 126, 127

DTV_ATSCMH_NOG

Used only on ATSC-MH.

Number of MH groups per MH subframe for a designated parade.

Possible values: 1, 2, 3, 4, 5, 6, 7, 8

DTV_ATSCMH_TNOG

Used only on ATSC-MH.

Total number of MH groups including all MH groups belonging to all MH parades in one MH subframe.

Possible values: 0, 1, 2, 3, ..., 30, 31

DTV_ATSCMH_SGN

Used only on ATSC-MH.

Start group number.

Possible values: 0, 1, 2, 3, ..., 14, 15

DTV_ATSCMH_PRC

Used only on ATSC-MH.

Parade repetition cycle.

Possible values: 1, 2, 3, 4, 5, 6, 7, 8

DTV_ATSCMH_RS_FRAME_MODE

Used only on ATSC-MH.

Reed Solomon (RS) frame mode.

The acceptable values are defined by `:c:type:'atscmh_rs_frame_mode'`.

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Unknown interpreted text role "c:type".

DTV_ATSCMH_RS_FRAME_ENSEMBLE

Used only on ATSC-MH.

Reed Solomon(RS) frame ensemble.

The acceptable values are defined by `:c:type:'atscmh_rs_frame_ensemble'`.

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Unknown interpreted text role "c:type".

DTV_ATSCMH_RS_CODE_MODE_PRI

Used only on ATSC-MH.

Reed Solomon (RS) code mode (primary).

The acceptable values are defined by `:c:type:'atscmh_rs_code_mode'`.

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Unknown interpreted text role "c:type".

DTV_ATSCMH_RS_CODE_MODE_SEC

Used only on ATSC-MH.

Reed Solomon (RS) code mode (secondary).

The acceptable values are defined by `:c:type:'atscmh_rs_code_mode'`.

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Unknown interpreted text role "c:type".

DTV_ATSCMH_SCCC_BLOCK_MODE

Used only on ATSC-MH.

Series Concatenated Convolutional Code Block Mode.

The acceptable values are defined by `xtype:'atscmh_sccc_block_mode'`.

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Unknown interpreted text role "c:type".

DTV_ATSCMH_SCCC_CODE_MODE_A

Used only on ATSC-MH.

Series Concatenated Convolutional Code Rate.

The acceptable values are defined by `xtype:'atscmh_sccc_code_mode'`.

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Unknown interpreted text role "c:type".

DTV_ATSCMH_SCCC_CODE_MODE_B

Used only on ATSC-MH.

Series Concatenated Convolutional Code Rate.

Possible values are the same as documented on enum `xtype:'atscmh_sccc_code_mode'`.

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Unknown interpreted text role "c:type".

DTV_ATSCMH_SCCC_CODE_MODE_C

Used only on ATSC-MH.

Series Concatenated Convolutional Code Rate.

Possible values are the same as documented on enum `xtype:'atscmh_sccc_code_mode'`.

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Unknown interpreted text role "c:type".

DTV_ATSCMH_SCCC_CODE_MODE_D

Used only on ATSC-MH.

Series Concatenated Convolutional Code Rate.

Possible values are the same as documented on enum `xtype:'atscmh_sccc_code_mode'`.

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Unknown interpreted text role "c:type".

DTV_API_VERSION

Returns the major/minor version of the Digital TV API

DTV_CODE_RATE_HP

Used on terrestrial transmissions.

The acceptable values are defined by `:c:type:'fe_transmit_mode'`.

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Unknown interpreted text role "c:type".

DTV_CODE_RATE_LP

Used on terrestrial transmissions.

The acceptable values are defined by `:c:type:'fe_transmit_mode'`.

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Unknown interpreted text role "c:type".

DTV_GUARD_INTERVAL

The acceptable values are defined by `:c:type:'fe_guard_interval'`.

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Unknown interpreted text role "c:type".

Note

1. If `DTV_GUARD_INTERVAL` is set the `GUARD_INTERVAL_AUTO` the hardware will try to find the correct guard interval (if capable) and will use TMCC to fill in the missing parameters.
2. Intervals `GUARD_INTERVAL_1_128`, `GUARD_INTERVAL_19_128` and `GUARD_INTERVAL_19_256` are used only for DVB-T2 at present.
3. Intervals `GUARD_INTERVAL_PN420`, `GUARD_INTERVAL_PN595` and `GUARD_INTERVAL_PN945` are used only for DMTB at the present. On such standard, only those intervals and `GUARD_INTERVAL_AUTO` are valid.

DTV_TRANSMISSION_MODE

Used only on OFTM-based standards, e. g. DVB-T/T2, ISDB-T, DTMB.

Specifies the FFT size (with corresponds to the approximate number of carriers) used by the standard.

The acceptable values are defined by `:c:type:'fe_transmit_mode'`.

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Unknown interpreted text role "c:type".

Note

1. ISDB-T supports three carrier/symbol-size: 8K, 4K, 2K. It is called **mode** on such standard, and are numbered from 1 to 3:

Mode	FFT size	Transmission mode
1	2K	TRANSMISSION_MODE_2K

Mode	FFT size	Transmission mode
2	4K	TRANSMISSION_MODE_4K
3	8K	TRANSMISSION_MODE_8K

2. If `DTV_TRANSMISSION_MODE` is set the `TRANSMISSION_MODE_AUTO` the hardware will try to find the correct FFT-size (if capable) and will use TMCC to fill in the missing parameters.
3. DVB-T specifies 2K and 8K as valid sizes.
4. DVB-T2 specifies 1K, 2K, 4K, 8K, 16K and 32K.
5. DTMB specifies C1 and C3780.

DTV_HIERARCHY

Used only on DVB-T and DVB-T2.

Frontend hierarchy.

The acceptable values are defined by `:c:type:'fe_hierarchy'`.

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Unknown interpreted text role "c:type".

DTV_STREAM_ID

Used on DVB-S2, DVB-T2 and ISDB-S.

DVB-S2, DVB-T2 and ISDB-S support the transmission of several streams on a single transport stream. This property enables the digital TV driver to handle substream filtering, when supported by the hardware. By default, substream filtering is disabled.

For DVB-S2 and DVB-T2, the valid substream id range is from 0 to 255.

For ISDB, the valid substream id range is from 1 to 65535.

To disable it, you should use the special macro `NO_STREAM_ID_FILTER`.

Note: any value outside the id range also disables filtering.

DTV_DVBT2_PLP_ID_LEGACY

Obsolete, replaced with `DTV_STREAM_ID`.

DTV_ENUM_DELSYS

A Multi standard frontend needs to advertise the delivery systems provided. Applications need to enumerate the provided delivery systems, before using any other operation with the frontend. Prior to it's introduction, `FE_GET_INFO` was used to determine a frontend type. A frontend which provides more than a single delivery system, `FE_GET_INFO` doesn't help much. Applications which intends to use a multistandard frontend must enumerate the delivery systems associated with it, rather than trying to use `FE_GET_INFO`. In the case of a legacy frontend, the result is just the same as with `FE_GET_INFO`, but in a more structured format

The acceptable values are defined by `:c:type:'fe_delivery_system'`.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\userspace-api\media\dvb\[linux-master] [Documentation] [userspace-api] [media] [dvb] fe_property_parameters.rst, line 959); [backlink](#)

Unknown interpreted text role "c:type".

DTV_INTERLEAVING

Time interleaving to be used.

The acceptable values are defined by `:c:type:'fe_interleaving'`.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\userspace-api\media\dvb\[linux-master] [Documentation] [userspace-

DTV_LNA

Low-noise amplifier.

Hardware might offer controllable LNA which can be set manually using that parameter. Usually LNA could be found only from terrestrial devices if at all.

Possible values: 0, 1, LNA_AUTO

0, LNA off

1, LNA on

use the special macro LNA_AUTO to set LNA auto

DTV_SCRAMBLING_SEQUENCE_INDEX

Used on DVB-S2.

This 18 bit field, when present, carries the index of the DVB-S2 physical layer scrambling sequence as defined in clause 5.5.4 of EN 302 307. There is no explicit signalling method to convey scrambling sequence index to the receiver. If S2 satellite delivery system descriptor is available it can be used to read the scrambling sequence index (EN 300 468 table 41).

By default, gold scrambling sequence index 0 is used.

The valid scrambling sequence index range is from 0 to 262142.