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Schweizerische Radio- und Fernsehgesellschaft  
Société suisse de radiodiffusion et télévision  
Società svizzera di radiotelevisione  
Societad svizra da radio e televisiun

Operations | Technology and IT

Internet: [www.broadcast.ch](http://www.broadcast.ch) -> Retailer Section

Email: [info@broadcast.ch](mailto:info@broadcast.ch)

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# DVB-S2 White Paper

Digital transmission signal characteristics

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## 1 Introduction, target group

SRG SSR (the Swiss Broadcasting Corporation) transmits its radio and TV services digitally as Free-to-Air services (FTA) via DVB-S2.

Thanks to the technical characteristics of the system, satellite broadcasting (DVB-S2) allows the highest quality transmission of all SRG SSR TV and radio services, including any additional data. The DVB-S2 vector therefore constitutes the reference vector.

In accordance with legal requirements regarding basic coverage in Switzerland, TV services are also transmitted terrestrially via DVB-T. The DVB-T system is described in a separate document: "DVB-T White Paper, digital transmission signal characteristics".

Digital radio services are broadcast via DVB-S2 and also via DAB+. Details relating to DAB+ transmission are given in the document "DAB+ White Paper, digital transmission signal characteristics".

The present document describes the digital transmission signal characteristics of the DVB-S2 system. Target group:

- Manufacturers of receivers
- Redistribution specialists
- Specialist dealers

## 2 Terminology and basic information

### Terminology

The ETSI Standards define minimum (mandatory) DVB transmission characteristics, which are supported by all broadcasters. In addition, DVB offers further (optional) characteristics for optimizing reception, some of which are supported by SRG SSR. The term "Service" is used in DVB terminology in preference to "Programme". Numerical values are stated either in binary (prefix: bin), hexadecimal (prefix: 0x) or decimal notation (prefix: dec or no prefix).

### Encryption

Partial DVB-S2 encryption of TV services or individual TV broadcasts is undertaken for copyright reasons and serves to limit reception to Swiss territory. Satellite radio services are transmitted unencrypted.

### HDTV, DVB-S2

The HDTV services are transmitted by SRG SSR solely by satellite.

### Operating data

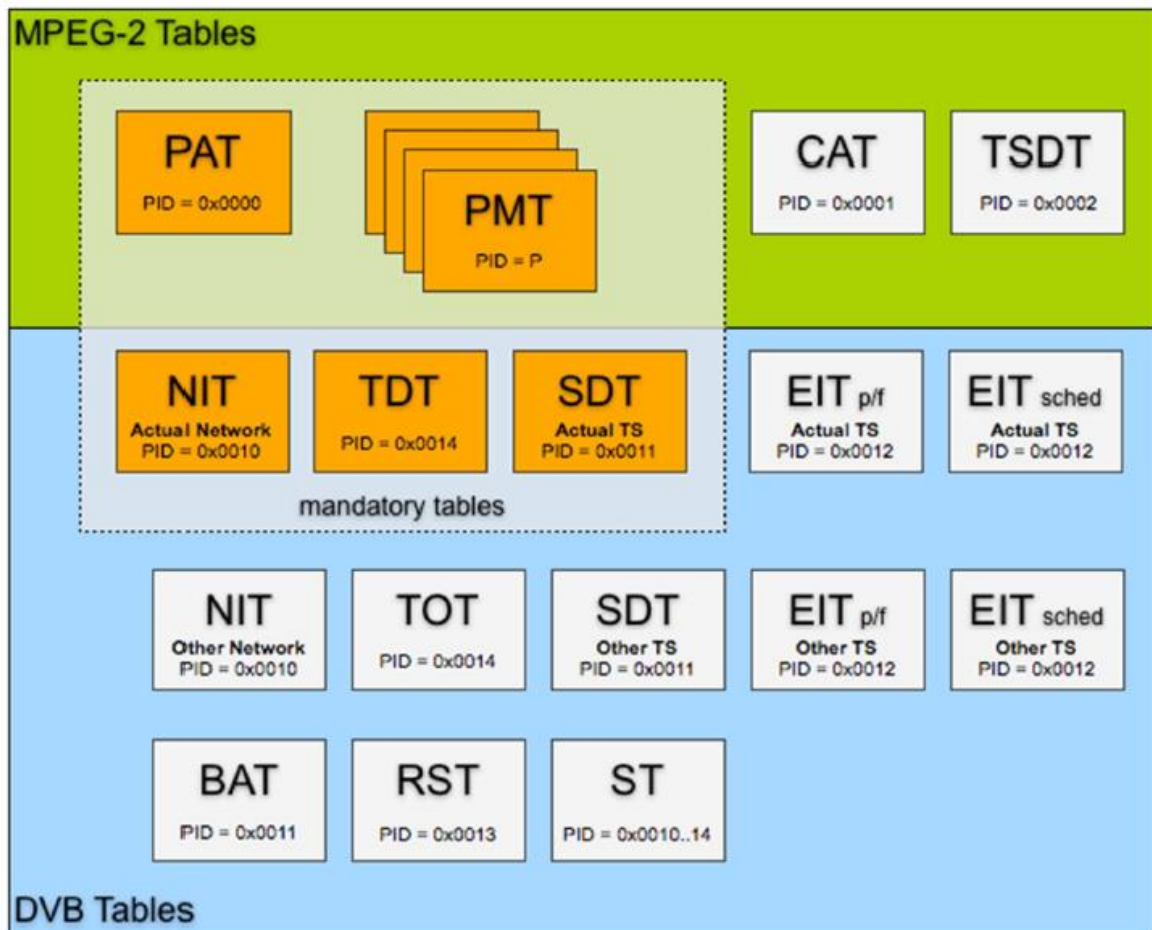
Some operating data and parameters are subject to dynamic modification, for example IDs, frequencies, bitrates, etc. Some of the currently valid operating data are listed in this document or may be found on the SRG SSR website [www.broadcast.ch](http://www.broadcast.ch). For the most part, the present document only states characteristics of a static nature or value ranges according to standards.

### General information relating to SRG SSR

General information about SRG SSR TV and radio services may be found at: [www.srgssr.ch](http://www.srgssr.ch) and [www.broadcast.ch](http://www.broadcast.ch)

## 3 Mandatory/optional distinction

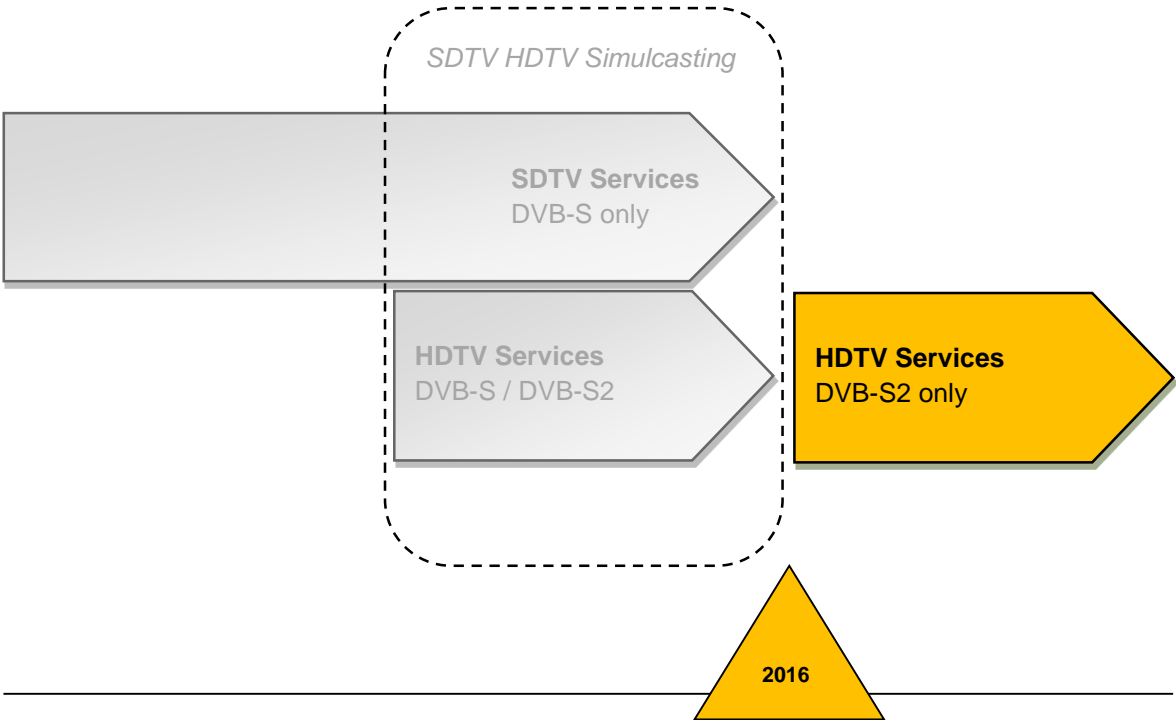
Mandatory tables are presented as orange-coloured elements in the following overview; optional tables are listed as white-coloured elements. Figure from ETSI EN 300 468 V1.15.1 (2015-12):



#### 4 Overview of HDTV / DVB-S2 migration

From 29 February 2016 the standard-quality TV services (SDTV) provided by the SRG SSR enterprise units are removed from satellite and HDTV-only services are currently on air via satellite.

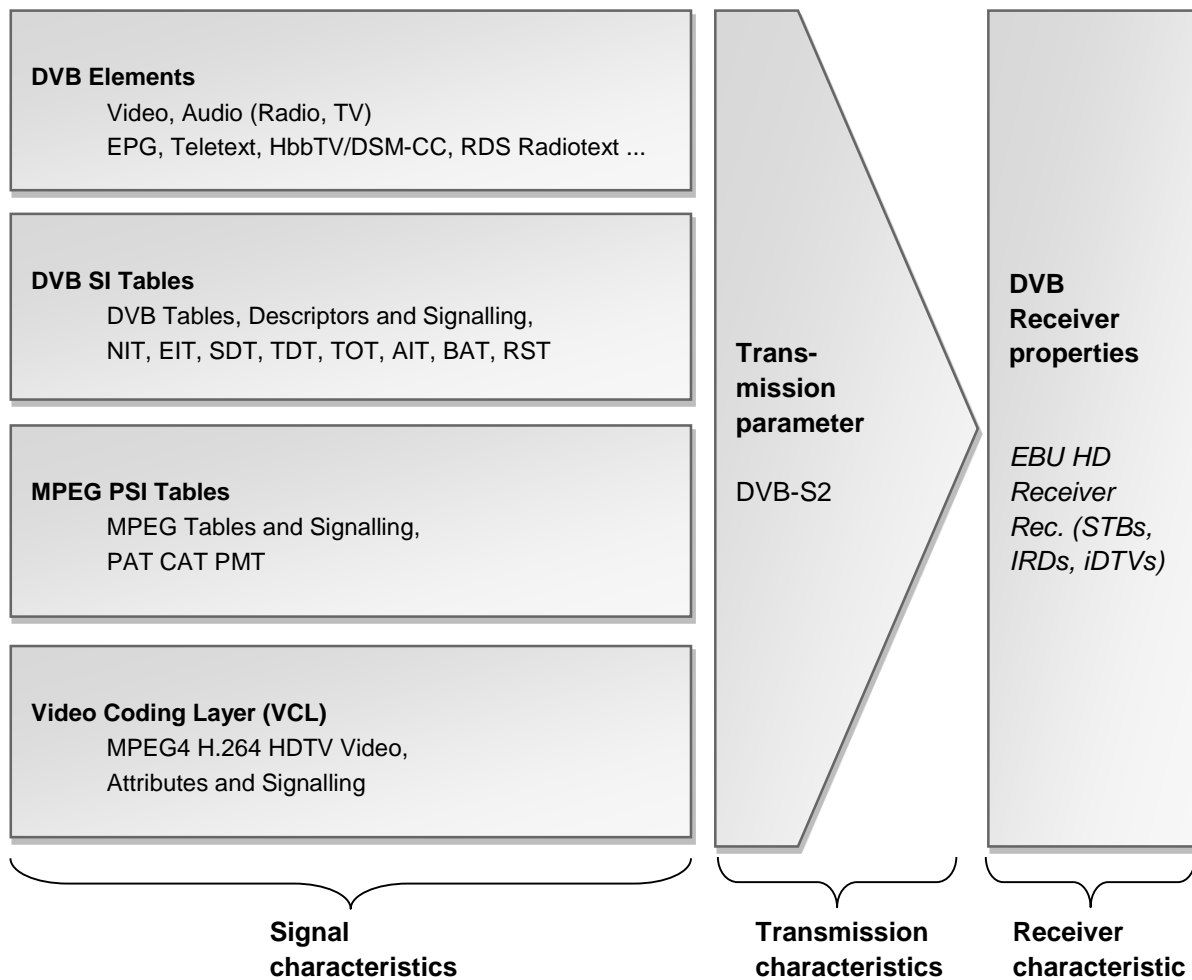
At the same time the transmission mode of all SRG SSR transponders (Eutelsat Hotbird 13° East No.17/13C and No.123/13B) are switched to DVB-S2 modulation.



## 5 Document structure

This document is divided into the following functional blocks:

- **Signal characteristics** (components, parameters, signalling, etc.)
- **Transmission characteristics** (modulation, error control and further distribution signal characteristics)
- **Receiver characteristics** (technical requirements for receivers)



## 6 Signal characteristics

### 6.1 Elements of DVB-S2 Radio Services (audio, EPG, data)

Elements of DVB-S2 Radio Services		
. DVB-S2 Radio: Main Services and regional Services ("Regional Journales") . Reference: ETSI TS 101 154 v1.9.1		
Element	Description	Remarks
<b>Audio</b>	MPEG1 Layer 2 (MP2) . Bitrate: min. 128 kBit/s, max. 320 kBit/s, CBR . Audiomode: stereo, joint stereo . Service Type: 0x02, digital radio sound service . Stream Type: 0x03, Audio MPEG1	ETSI TS 101 154 v1.11.1 (MPEG Audio) Dolby Digital not supported at this time
<b>RDS Radiotext (RT)</b>	. UECP RDS-RT: song information (title, performer) . Transport: UECP via ancillary data field of MPEG audio frames (ETSI TS 101 154)	RDS RT (Radiotext): information about songs and service providers. Can be used by redistributors (headend IRDs) and CE units (STBs) which are capable of decoding and displaying RDS RT
<b>EPG DVB SI EIT p/f</b>	✓	EIT present/following information: event name, title/performer (or default text)
<b>EPG DVB SI EIT Schedule</b>	-	Schedule information not supported at this time



## 6.2 Elements of DVB-S2 HDTV Services

Elements in DVB-S2 HDTV Services		
. Reference: ETSI TS 101 154 v1.11.1, ISO/IEC 14496-10 (2005)		
Element	Description	Remarks
<b>Video</b>	<p>MPEG4 H.264 AVC Part10, HP@L4.0, 4:2:0</p> <ul style="list-style-type: none"> <li>. GOP: 24-2B static or 16/32 (with dynamic B-Frame)</li> <li>. Resolution: 1280*720 /p50</li> <li>. Bitrate: 10.5 MBit/s CBR</li> <li>. Service Type: 0x19 Advanced Codec HD Digital Service</li> <li>. Stream Content: 0x05</li> <li>. Component Type: 0x0B, H.264/AVC high definition video, 16:9 aspect ratio, 25/50 Hz</li> </ul>	ISO/IEC 14496-10 (2005) (AVC H.264 HDTV Video)
<b>Audio (2*MPEG, 1*DD)</b>	<ul style="list-style-type: none"> <li>. Channel 1: MPEG1 L2</li> <li>. Channel 2: MPEG1 L2</li> <li>. Channel 3: DD (Dolby Digital)</li> </ul> <p>MPEG1 Layer 2:</p> <ul style="list-style-type: none"> <li>. Bitrate: min. 128 kBit/s, max. 320 kBit/s, CBR</li> <li>. Audiomode: stereo, joint stereo</li> <li>. Stream Type: 0x03, Audio MPEG1</li> </ul> <p>Dolby Digital (DD) 5.1 or 2.0:</p> <ul style="list-style-type: none"> <li>. Bitrate: 448 kBit/s</li> <li>. Language: ger, fre, ita, eng (depending on SRG SSR Service Provider) (MPEG PMT ISO_639_Language_Descriptor)</li> <li>. Stream Type: 0x06, PES private data</li> <li>. Stream Content: 0x04 DD AC-3 Multichannel Audio</li> <li>. Component Type: <ul style="list-style-type: none"> <li>- 0x44 DD 5.1 AC-3 Multich. Audio</li> <li>- 0x42 DD 2.0 AC-3 Multich. Audio</li> </ul> </li> </ul>	<p>ETSI TS 101 154 v1.11.1 (MPEG Audio)</p> <p>ETSI TS 101 154 v1.11.1 (AC-3 Dolby Digital Audio)</p> <p>Channel 1: Original language stereo, Channel 2: Foreign language stereo (or audio description AD)</p> <p>Channel 3: original language DD</p>
<b>Teletext, Teletext Subtitles</b>	<ul style="list-style-type: none"> <li>. Teletext level: 2.5 (Level 1.5 compatible)</li> <li>. Stream Type: 0x03, teletext service</li> <li>. DVB Data, separate PIDs for each Teletext Service</li> <li>. Data Service ID: 0x01 EBU Teletext</li> </ul>	ETSI 300706
<b>DVB Subtitles</b>	-	No plan to launch service
<b>HbbTV / DSM-CC</b>	<p>Basic services via DVB-S2 broadcast; additional services via IP broadband (if TV set is connected to the internet). Possibly support for HbbTV subtitles soon</p>	HbbTV broadcast: bitrate DSM-CC <=2 MBit/s
<b>EPG DVB SI EIT p/f</b>	✓	Event name and short description of present/following event. Can be used by CE devices for PVR control
<b>Event Running Status (EIT value, p/f)</b>	<ul style="list-style-type: none"> <li>. running (present event)</li> <li>. pausing (pause present event)</li> <li>. not running (following event)</li> <li>. starts in a few seconds / starts soon</li> <li>. undefined (scheduled events)</li> </ul>	Event Running Status can be used by CE devices for PVR control (event transition and event status). See EBU Tech 3333 and ETSI TR 101211 V1.9.1 (2009-06)
<b>EPG DVB SI EIT Schedule</b>	✓ 7 day schedule overview	Can be used by CE devices for event scheduling and PVR control/programming

<b>EPG DVB SI Short Event Descriptor</b>	✓ max. 248 characters	Event name and short description of event
<b>EPG DVB Extended Description</b>	✓ max. 1000 characters	Extended description of event (content)

## 6.3 DVB SI Tables

SRG SSR in principle transmits all mandatory tables. This document describes only those tables and descriptors which contain values typical of SRG SSR. The descriptors contained in the tables may in turn be mandatory or optional; this is pointed out in the text.

### 6.3.1 NIT

The NIT (Network Information Table) describes broadcasting system and network characteristics. The specific characteristics of the satellite system are described by the "Satellite Delivery System Descriptor".

DVB SI Tables		
NIT – Network Information Table		
<ul style="list-style-type: none"> <li>. The same NIT is transmitted by all of the transponders: Tr. 17 and Tr. 123</li> <li>. The NIT provides information about its own and also the neighbouring transponder</li> <li>. Reference: ETSI EN 300 468 V1.15.1</li> </ul>		
Element	Description	Remarks
<ul style="list-style-type: none"> <li>• <b>Network Information Section, Actual Network, Transponders 17 and 123</b></li> </ul>		
<b>Network name</b>	EUTELSAT 13 EAST	
<b>Transport Stream ID</b>	. Transponder 17: 0x06A4 (1700) . Transponder 123: 0x300C (12300)	
<b>Original Network ID</b>	0x013E (318)	
<b>Network ID</b>	0x013E (318)	
<b>Network Name</b>	EUTELSAT 13 EAST	
<ul style="list-style-type: none"> <li>• <b>Service List Descriptor</b></li> </ul>		
<b>Service ID</b>	See <a href="http://www.broadcast.ch">www.broadcast.ch</a>	Service IDs, PIDs, etc. see <a href="http://www.broadcast.ch">www.broadcast.ch</a>
<b>Service type</b>	. 0x19, advanced codec HD digital television service (HDTV) . 0x02, digital radio sound service . 0x03, teletext service	Service Types in DVB-S Transport Streams
<ul style="list-style-type: none"> <li>• <b>Satellite Delivery System Descriptor, Transponders 17 and 123</b></li> </ul>		
<b>Frequency</b>	. Transponder 17: 0x01152613 = 11.52613 GHz . Transponder 123: 0x01097141 = 10.97141 GHz	
<b>Orbital position</b>	0x0130, 13.0 degrees	
<b>West/east flag</b>	1, east	
<b>Polarisation</b>	0, linear – horizontal	
<b>modulation_system</b>	1, DVB-S2 (Tr. 17 and 123)	
<b>Modulation type</b>	10, 8PSK	
<b>Symbol rate</b>	0x0297000, 29.700 MSymbol/s	
<b>FEC inner</b>	2, 2/3 conv. Code rate	
<b>Roll-Off</b>	. Tr. 17: 0.25 . Tr. 123: 0.35	


### 6.3.2 SDT

DVB SI Tables		
SDT actual – Service Description Table		
. SDT other is supported (provides information about its own and also the neighbouring transponder)		
. Reference: ETSI EN 300 468 V1.15.1		
Element	Description	Remarks
<ul style="list-style-type: none"> <li>Service Description Section</li> </ul>		
Transport Stream ID	see www.broadcast.ch	
Original Network ID	0x013E (318)	
<ul style="list-style-type: none"> <li>Service Loop</li> </ul>		
Service ID	see www.broadcast.ch	
EIT schedule flag	1, EIT Schedule supported	
EIT p/f flag	1, EIT p/f supported	
Free/CA Mode	. for all TV Services: 1, CA Mode (active) . for all Radio Services: 0, Free Mode	Conditional access state relating to services (in contrast to events; CA events: see EIT) Because of copyright issues TV services are always scrambled – exception: "SRF info HD" service: events could be partly non-scrambled. No scrambling on radio services.
Service Type	. 0x19, advanced codec HD digital television service (HDTV) . 0x02, digital radio sound service . 0x03, teletext service	Service types in DVB-S2 transport streams
Service Provider Name, TV	. German-speaking area of Switzerland, incl. Romansh language region: "Schweizer Radio und Fernsehen" "Radiotelevisiun Svizra Rumantscha" . French-speaking area of Switzerland: "Television Suisse Romande" . Italian-speaking area of Switzerland: "Radiotelevisione svizzera"	
Service Provider Name, Radio	. Switzerland: "Swiss Satellite Radio" . German-speaking area of Switzerland: "Schweizer Radio SRF" . Romansh-speaking area of Switzerland: "Radio Rumantsch" . French-speaking area of Switzerland: "Radio Suisse Romande" . Italian-speaking area of Switzerland: "Radiotelevisione svizzera"	
Service Name	see www.broadcast.ch	Example: SRF 1 HD, etc.

## 6.3.3 EIT

DVB-SI Tables		
EIT – Event Information Table (actual TS)		
. "EIT other" not supported at this time		
. Reference: ETSI EN 300 468 V1.15.1		
Element	Description	Remarks
<ul style="list-style-type: none"> <li>Event Information Section (present/following)</li> </ul>		
Service ID	see www.broadcast.ch	
Transport Stream ID	. Transponder 17: 0x06A4 (1700) . Transponder 123: 0x300C (12300)	
Original Network ID	0x013E (318)	
<ul style="list-style-type: none"> <li>Event Loop (loop for each event in TS)</li> </ul>		
Running Status (Event)	. undefined (scheduled events) . not running (following event) . starts in a few seconds / starts soon . pausing (pause present event) . running (present event)	Event Running Status can be used by CE devices for PVR control (event transition and event status). See EBU Tech 3333 and ETSI TR 101211 V1.9.1 (2009-06)
Free/CA mode	1, CA Mode (active) 0, CA Free (for all radio events and in part for "SRF info HD" TV events)	Conditional Access State relating to events (in contrast to services; CA for services: see SDT)  Because of copyright issues TV services (events) are always scrambled – exception: "SF info HD" service: Events could be partly non-scrambled. No scrambling of radio services (events).
PDC Descriptor (EIT p/f) . Program Identification Label (PIL)	Supported, ("digital VPS")	PIL = Time stamp of event (expected/planned start time). Example: 0x86219 (549401), day: 16, month: 12, hour: 8, minute: 25
Short Event Descriptor	Max. 248 characters Character Set: Latin No. 5 (8 bit) control code: 0x05	Event name and short description of event
Extended Event Descriptor	Max. 1000 characters Character Set: Latin No. 5 (8 bit) control code: 0x05	Extended description of event (content)
Content Descriptor . Content nibble level 1+2	Supported	Type of event. Example: 0x2/0x0 News/Current affairs (general)
Content Descriptor . User nibble	Not supported at this time	
Component Descriptor (audio)	<b>HDTV:</b> . Stream content: 0x04, DD AC-3 Multichannel Audio . Component type: . 0x44, DD 5.1 AC-3 Multich. Audio . 0x42, DD 2.0 AC-3 Multich. Audio . ISO 639 language code: ger, fre, ita, eng	

<b>Component Descriptor (AD)</b>	. Stream content: 0x02 . Component type: 0x40	MPEG-1 Layer2 Audio Description (AD) for the visually impaired
<b>Component Descriptor (video)</b>	<b>HDTV:</b> . Stream Content: 0x05 H.264/AVC Video . Component Type: 0x0B, H.264/AVC high definition video, 16:9 aspect ratio, 25/50 Hz	
<b>Component Descriptor (teletext subtitles)</b>	. Stream content: 0x03 . Component type: 0x01	EBU teletext subtitles
<b>Component Descriptor (sign language, in-vision)</b>	. Component type: 0x30	open (in-vision) sign language interpretation for the deaf
• EIT Schedule (optional)		
<b>EIT Schedule</b>	7 day schedule overview	Can be used by CE devices for event scheduling and PVR control/programming

 The SRG SSR CA system (copyright law / restriction of reception to Swiss territory) is based on Clv1 and Viaccess Smartcards. For details, see CAT.

6.3.4 EIT – Event Transitions and PVR Control (Event Running Status etc.)

For PVR recording, receivers may implement various methods, based on:

- Manual programming (user defined date/time)
- Usage of PDC\_Descriptor (PIL), say “digital VPS” – supported by SRG SSR TV services
- Usage of EIT p/f (schedule) information and transitions – supported by SRG SSR services
- or a combination of above elements

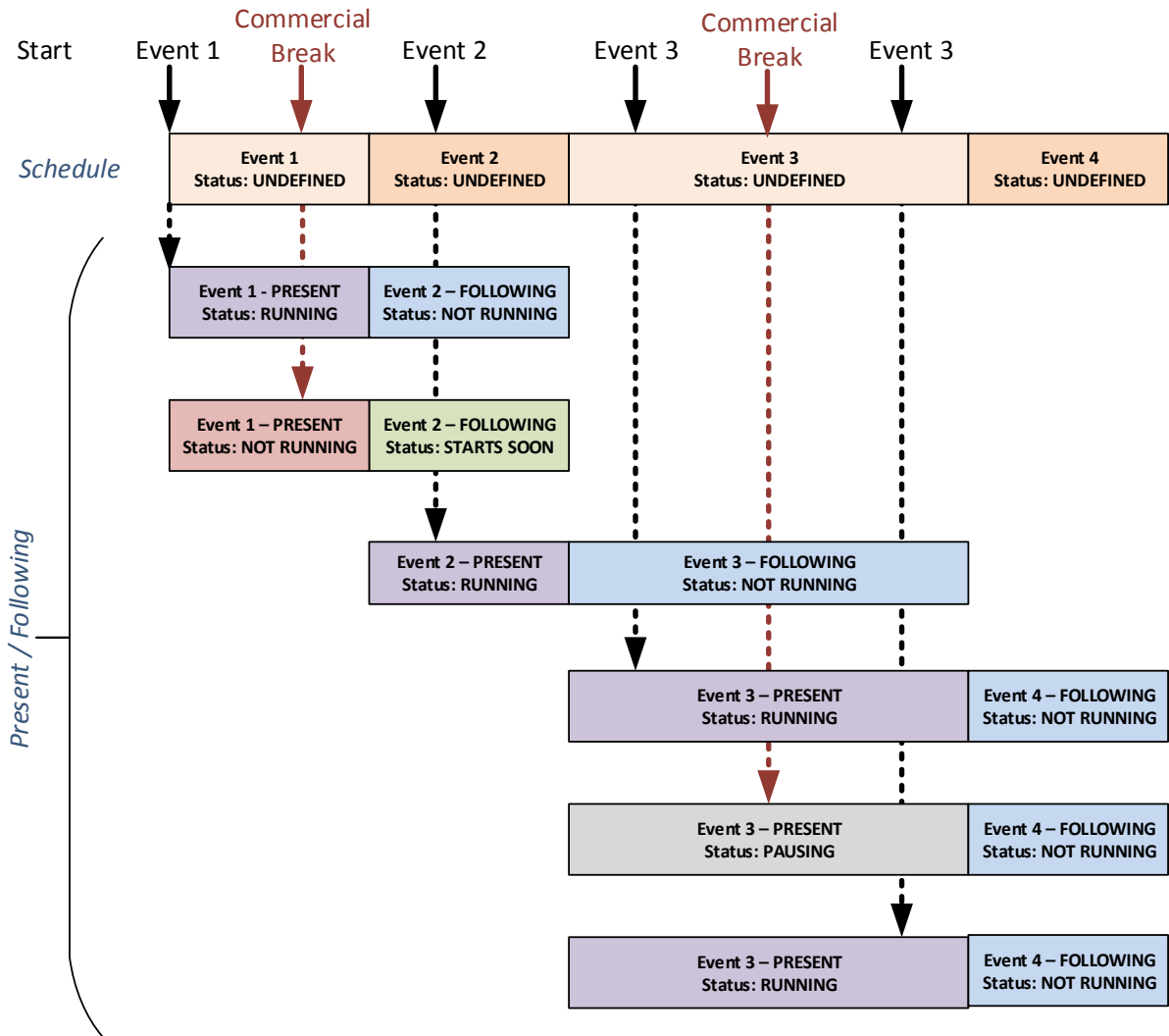
Smart recording methods which make use of these elements are known as “accurate recording” or “perfect recording”, etc. Although DVB-S2 EIT information is correctly updated at any time - also in case of delay or removing of events -, it is recommended to extend the recording time by a certain (user defined) time offset.

The following table shows the status value of an event (schedule and present/following in EIT):

<b>Value</b>	<b>Running_Status (Event)</b>
0	undefined / scheduled
1	not running
2	starts in a few seconds / starts soon
3	pausing
4	running

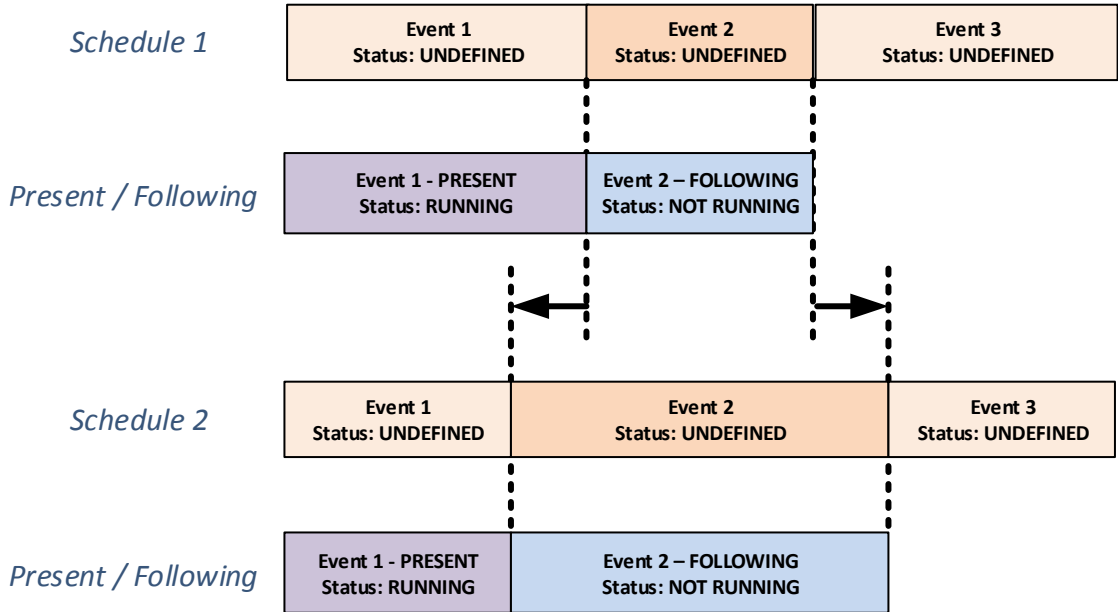
**Present / Following Event Transition:**

The following diagram shows possible event transitions:



**Scheduled Events:**

There are never gaps in the schedule. A planned event always starts at the time at which the previous event ends. Present and following events are generated based on scheduled events (copy), with a change of status. An event not existing in the schedule cannot be a present or a following event. If an event in the schedule changes, the generated present and following events are changing as well.





### 6.3.5 TDT

<b>DVB SI Tables</b> <b>TDT – Time Date Table</b> . Reference: ETSI EN 300 468 V1.15.1		
Element	Description	Remarks
<ul style="list-style-type: none"> <li><b>Time and Date Section</b></li> </ul>		
<b>UTC Time</b>	Example: 0xD63D = 2009/01/14 0x073925 = 07:39:25	Universal Time Coordinated (World Time)

### 6.3.6 TOT (optional)

<b>DVB SI Tables</b> <b>TOT – Time Offset Table (optional)</b> . Reference: ETSI EN 300 468 V1.15.1		
Element	Description	Remarks
<ul style="list-style-type: none"> <li><b>Local Time Offset Descriptor</b></li> </ul>		Winter-/Summertime offset
<b>Country code</b>	CHE	Switzerland
<b>Country region ID</b>	0, no time zone extension used	
<b>Local time offset polarity</b>	0, local time is advanced to UTC	
<b>Local time offset</b>	0x0100, 0x0200	Winter-/Summertime offset
<b>Time of change</b>	Example: 0xD687 = 2009/03/29 0x010000, 01:00:00	Date of transition Time of transition: 1:00
<b>Next time offset</b>	0x0100, 0x0200	Next Offset Value (Winter/Summer)

### 6.3.7 BAT (optional)

The BAT (Bouquet Association Table) is currently not supported by the SRG SSR DVB-S2 system.

### 6.3.8 RST (optional)

The RST (Running Status Table) is currently not supported by the SRG SSR DVB-S2 system. Please note: the RST should not be confused with the event-based Running Status in the EIT (p/f).

### 6.4 MPEG PSI Tables

The MPEG PSI tables PAT CAT PMT are supported as standard. This section mentions only those descriptors and attributes which contain values typical of SRG SSR.

#### 6.4.1 PAT

<b>MPEG PSI Tables</b> <b>PAT - Program Association Table</b> . Reference: ISO/IEC 13818-1 / ETSI EN 300 468 V1.15.1		
Element	Description	Remarks
	<ul style="list-style-type: none"> <li>Program Association Section</li> </ul>	
Transport Stream ID	. Transponder 17: 0x06A4 (1700) . Transponder 123: 0x300C (12300)	
	<ul style="list-style-type: none"> <li>Reference Loop</li> </ul>	Loop for each service
Program Number / Program Map PID (for each service in TS)	Program Number = Service ID, see <a href="http://www.broadcast.ch">www.broadcast.ch</a>	Assignment: Services to Transport Stream Marker

#### 6.4.2 CAT

<b>MPEG PSI Tables</b> <b>CAT – Conditional Access Table, DVB-S / DVB-S2</b> . Reference: ISO/IEC 13818-1 / ETSI EN 300 468 V1.15.1		
Element	Description	Remarks
	<ul style="list-style-type: none"> <li>Conditional Access Descriptor</li> </ul>	
CA System ID	0x0500, Viaccess France	Smartcard: V2.6/3.0, 4.0, 5.0 and 6.0

6.4.3 PMT

MPEG PSI Tables		
PMT - Program Mapping Table		
. Reference: ISO/IEC 13818-1 / ETSI EN 300 468 V1.15.1		
Element	Description	Remarks
<ul style="list-style-type: none"> <li>ISO 639 Language Descriptor</li> </ul>		Audio language (ISO 639-2/B language codes)
Descriptor Tag	0x0A, dec10	
ISO 639 Language Code, HDTV, MPEG1 / Dolby Digital Audio	Channel1: ger, fre or ita (depending on SRG SSR Service-Provider) Channel2: eng, mul (foreign language, depending on SRG SSR Service Provider) Channel 3 (DD): ger, fre, ita, eng (depending on SRG SSR Service Provider)	Original language of dedicated area
<ul style="list-style-type: none"> <li>Dolby Digital AC-3</li> </ul>		
Stream Type (PES)	0x06 = PES Packets containing private data	Valid for DD channels
Stream ID (ES)	0xBD = indicating Private_Stream_1	Valid for DD channels

🔔 At present no dynamic signalling concerning audio language is transmitted in the PMT. In future the language versions of the audio channels could be signalled at event level using "ISO 639 Language Descriptors", i.e. the actual language is signalled in each case.

## 6.5 Video Coding Layer (VCL), HDTV

Video Coding Layer (VCL), HDTV		
MPEG4 H.264 HDTV Video		
. Reference: ISO/IEC 14496-10 (2005)		
Element	Description	Remarks
<ul style="list-style-type: none"> <li>Video H.264/AVC, Sequence Parameter Set, Profile</li> </ul>		
Profile_Idc	100 (high profile)	Static Setting
constraint_set0_flag	0	Static Setting
constraint_set1_flag	0	Static Setting
constraint_set2_flag	0	Static Setting
constraint_set3_flag	0	Static Setting
gaps_in_frame_num_value_allowed_flag	0 (gaps not allowed)	Static Setting
vui_parameters_present_flag	1	Static Setting
<ul style="list-style-type: none"> <li>Video: H.264/AVC, Sequence Parameter Set, Level</li> </ul>		
Level_Idc	40	Static Setting
<ul style="list-style-type: none"> <li>Video: DH.264/AVC, VUI-Parameters, Aspect Ratio</li> </ul>		
Aspect_Ratio_Idc	1 (1280x720, 1:1 square, 16:9)	Static Setting, 1280x720
<ul style="list-style-type: none"> <li>Video: H.264/AVC, VUI-Parameters, Colour Parameter Information</li> </ul>		
colour_primaries	1	Static Setting
transfer_characteristics	1	Static Setting
matrix_coefficients	1	Static Setting
<ul style="list-style-type: none"> <li>Video: H.264/AVC, Luminance Resolution</li> </ul>		
Luminance Resolution	1280x720 (Source Aspect Ratio: 16:9, Aspect_Ratio_Idc : 1)	Static Setting, 1280x720
<ul style="list-style-type: none"> <li>Video: H.264/AVC, VUI-Parameters, Frame Rate</li> </ul>		
Frame Rate	50	Static Setting
Interlaced or Progressive	P (progressive)	Static Setting
time_scale	100	Static Setting
num_units_in_tick	1	Static Setting

## 7 Transmission characteristics

The SRG SSR transponders are located on the Eutelsat position 13° East. The following tables give the transmission parameters of the transponder signals.

### 7.1 Transponder No. 17 (13C)

DVB-S2 transmission parameters	
<b>Transponder No. 17</b>	
. Reference: ETSI EN 300 421 v1.1.2, ETSI EN 302 307 v1.1.2	
Parameter	Value/Description
Satellite	Eutelsat Hotbird 13C
Orbital position	13° East
Original Network ID	0x13E, dec318
Network ID	0x13E, dec318
Network Name	EUTELSAT 13 EAST
Transponder No.	17
Transport Stream ID	1700 = 0x06A4
Frequency	11.526 GHz
Polarisation	Horizontal
FEC code rate	2/3
Roll-off factor	0.25
Modulation	8PSK
Pilot mode	Active (yes)
Symbol rate	29.700 MSym/s

### 7.2 Transponder No. 123 (13B)

DVB-S2 transmission parameters	
<b>Eutelsat Hotbird 13B, Transponder No. 123</b>	
. Reference: ETSI EN 302 307 v1.1.2	
Parameter	Value/Description
Satellite	Eutelsat Hotbird 13B (formerly Hotbird 8)
Orbital position	13° East
Original Network ID	0x13E, dec318
Network ID	0x13E, dec318
Network Name	EUTELSAT 13 EAST
Transponder No.	123
Transport Stream ID	0x300C (12300)
Frequency	10971.41 MHz
Polarisation	horizontal
FEC code rate	2/3
Roll-off factor	0.35
Pilot mode	active (yes)
Modulation	8PSK
Symbol rate	29.700 MSym/s

## 8 Miscellaneous

- As far as "FTA Content Management Descriptors" (HDTV) are concerned, SRG SSR intends to follow EBU requirements.
- The SSU (System Software Update) mechanism is not supported by SRG SSR. Other TV or data services on the same satellite or transponder are available to producers as alternatives to SSU.
- The SRG SSR CA system (copyright law / restriction of reception to CH territory) is based on Clv1 and Viaccess Smartcards. At the moment, Smartcard versions V2.6/3.0, 4.0, 5.0 and 6.0 are supported.
- Audio levels / loudness:
  - **Radio Services:** The audio signals are transmitted with a loudness level of -20 LUFS (cultural/classic services) and -16 LUFS (other services).
  - **HDTV Services:** The audio signals are transmitted with loudness levels of -23 LUFS, according to EBU R128 recommendation
- TV EPG – Series Identification:

Event names of TV series are not changed. For series handling, PVR recording control can reference to event names.

## 9 Receiver characteristics / SRG SSR recommendations

Together with the European broadcasting corporations, incl. SRG SSR, the EBU has drafted minimum technical guidelines for HDTV receivers. The result was published in 2009 in EBU recommendation "EBU Tech 3333":

<http://tech.ebu.ch/webdav/site/tech/shared/tech/tech3333.pdf>

- 📌 SRG SSR expects receivers to fulfil EBU recommendation Tech 3333.

## 10 Future prospects

### 10.1 Radio EPG

The present/following information contains descriptions of songs (title, performer). Optionally and depending on the individual radio services, a radio broadcast grid may possibly be transmitted via the EIT Schedule; timing of this and whether the option will be supported is not yet clear.

Btw: Song information is also transmitted for radio services in the DVB signal via the UECP RDS-RT Stream; this information may be displayed by the receiver display (GUI / alphanumeric displays).

### 10.2 EBU Teletext, EBU Teletext Subtitles

Teletext and Teletext Subtitles are supported. A new feature will be the use of Teletext Level 2.5. Level 2.5 is backwards compatible, meaning that Level 1.5 teletext decoders can still fully display the content.

### 10.3 DVB Subtitles

There are no plans at this time for DVB subtitle support.

### 10.4 HbbTV Subtitles

HbbTV subtitles may be supported soon.

### 10.5 HbbTV

Basic services via broadcast DSM-CC as well as extended services via IP broadband (if TV set is connected to the internet) are available. New services such as live radio streams and live event video streams are supported or coming soon.

## 11 Standards/Recommendations

All SRG SSR DVB broadcasting systems are covered by the relevant standards and recommendations from the following European and international organizations:

EBU, ETSI, DVB, MPEG, ISO, CEI, CEN, DIGITALEUROPE etc.

Standard/ Recommendation	Remarks
EBU Tech 3299	High Definition (HD) Image Formats for Television Production
EBU Tech 3321	EBU guidelines for Consumer Flat Panel Displays (FPDs)
EBU Tech 3333	EBU HDTV Receiver Requirements, <a href="http://tech.ebu.ch/webdav/site/tech/shared/tech/tech3333.pdf">http://tech.ebu.ch/webdav/site/tech/shared/tech/tech3333.pdf</a>
EBU R68-2000	Alignment level in digital audio production equipment
EBU R128	Loudness recommendation
ETSI TS 101 154 v1.11.1	DVB; Implementation guidelines for the use of Video and Audio Coding in Broadcasting Applications based on the MPEG-2 Transport Stream
ETSI EN 300 421 v1.1.2	DVB-S; Framing Structure, Channel Coding and Modulation for 11/12 GHz Satellite Services
ETSI EN 302 307 v1.1.2	DVB; Second generation framing structure, channel coding and modulation systems for Broadcasting, Interactive Services, News Gathering and other broadband satellite applications (DVB-S2)
ETSI TS 102 323 v1.3.1	DVB; Carriage and signalling of TV-Anytime information in DVB transport streams
ETSI TS 102 366 v1.2.1	Digital Audio Compression (AC-3, Enhanced AC-3) Standard
ETSI EN 300 744 v1.6.1	DVB; Framing structure, channel coding and modulation for digital terrestrial television
ETSI EN 300 468 V1.15.1	DVB; Specification for Service Information (SI) in DVB systems
ISO/IEC 13818-1	Generic coding of moving pictures and associated audio information: Systems
ISO/IEC 13818-2	Information technology – Coding of audio-visual objects – Part 2: Video
ISO/IEC 14496-3	Information technology – Coding of audio-visual objects – Part 3: Audio
ISO/IEC 14496-10 (2005)	Information technology – Coding of audio-visual objects – Part 10: Advanced Video Coding
ETSI EN 300 743 v1.3.1	DVB; Subtitling systems
ETSI TR 101 211 v1.9.1	DVB; Guidelines on implementation and usage of Service Information (SI)
ITU-R Rec. BT 601	Studio encoding parameters of digital television for standard 4:3 and wide screen 16:9 aspect ratios
ITU-R BS.775	International recommendation for multichannel stereophonic sound systems with and without accompanying picture. This recommendation gives speaker placements for various types of sound systems
ITU-R Rec. BT 709	Parameter Values for the HDTV Standards for Production and international Program Exchange
Dolby Technical Bulletin Number 11	Dolby Guidelines (Audio Levels DD / MPEG)
DLNA Guidelines 1.5	Digital Living Network Alliance, home networking
HDMI 1.3a	High Definition Multimedia Interface
DVB TM-GBS0275	RDS Radiotext, transmission method



## 12 Glossary

5.1	Left Front/Right Front/Left Rear/Right Rear/Centre/LFE (Low Frequency Effects)
AC-3	AC-3 Dolby Digital
AD	Audio Description
CBR	Constant Bit Rate
COFDM	Coded Orthogonal Frequency Division Multiplexing
DD	Dolby Digital
DVB	DVB - Digital Video Broadcasting
EPG	Electronic Program Guide
ETSI	European Telecommunications Standards Institute
FEC	Forward Error Correction
FTA	Free-to-Air (in contrast to: Pay-TV)
HDTV	High Definition Television
iDTV	Integrated Digital Television
IRD	Integrated Receiver Decoder
MFN	Multi Frequency Network
MPEG-2	Moving Picture Experts Group
MPEG-4	Moving Picture Experts Group
PDC Descr.	PDC Descriptor contains PIL
PIL	Program Identification Label
PVR	Personal Video Recorder
RTVG	Swiss Federal Radio and Television Law
RTVV	Swiss Federal Radio and Television Decree
SI	Service Information (DVB SI)
STB	Set Top Box
UE	SRG SSR enterprise unit
VBR	Variable Bit Rate
Vector	Synonym for transmission system (DVB-S, DVB-T, DAB+, etc.)

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