



CONSEIL SUPÉRIEUR DE L'AUDIOVISUEL

**SIGNALLING PROFILE FOR THE BROADCASTING OF DIGITAL
TERRESTRIAL TELEVISION SERVICES IN METROPOLITAN
FRANCE AND FRENCH OVERSEAS DEPARTMENTS AND
TERRITORIES**

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Note for the English version:

This document “Signalling Profile for the broadcasting of digital terrestrial television services of metropolitan France and French overseas departments and territories” is the English translation of the French version of the document “Profil de signalisation pour la diffusion des services de la télévision numérique de terre métropolitaine et ultramarine”, available on the CSA website www.csa.fr. Only the French version shall be taken as the reference of the document published by the Conseil Supérieur de l’Audiovisuel.

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1. INTRODUCTION

1.1 PURPOSE

The technical characteristics of the broadcast signal which delivers audiovisual services over the digital terrestrial platform are set by the government's decree of the 24th of December 2001.

Moreover, the characteristics of the Digital Terrestrial Television (DTT) broadcast signal conform to the decisions of the Conseil supérieur de l'audiovisuel (CSA). The CSA authorizes

- Each DTT channel editor to use a part of the radio spectrum resource to operate a television service;
- Multiplex operators to carry out technical operations which are required to broadcast and to transmit programs;
- The companies 'Compagnie du numérique hertzien' (CNH, which operates the R3 multiplex) and SMR6 (which operates the R6 multiplex) to use a radio spectrum resource to operate a service of electronic communication which is aimed at updating the material concerning the DTT reception and the subscriber's rights management;
- The company 'Association du téléchargement hertzien' (ATH) to use a radio spectrum resource to operate a service of electronic communication which is exclusively aimed at updating the software implemented in the DTT receiver.

The latter are required to abide by the rules on the use of the resource they have been provided for by their permission, as specified there.

This document specifies the signalling profile of the DTT services both in metropolitan France and French overseas departments and territories¹. The French DTT signal is broadcast under the DVB-T standard [15].

The services carried on the DTT include

- National and national with regional or local variation, regional or local television services;
- On-demand audiovisual media services;
- Services of data downloading like updating processes for DTT terminals (except for receivers of pay TV operators).

The services described in this document mainly target home terminals (adapters or television with built-in adapters) linked to an aerial roof.

A detailed description of some tables which are broadcast on the DTT network of metropolitan France and French overseas departments and territories (Program Specific Information (PSI) tables [1] and Service Information (SI) tables [2]) is available from the

¹ French Guiana, Reunion, Martinique, Guadeloupe, Polynesia, Saint Martin, Saint Barthélémy, Mayotte, Saint Pierre and Miquelon, Wallis and Futuna, New Caledonia.

Department of Technologies of the CSA (cten@csa.fr) as well as on the extranet of the Comité technique des experts du numérique² (CTEN): www.extranet.csa.fr/cten.

1.2 ORGANIZATION

Chapter 2 provides the list of the references quoted in this signalling profile.

Chapter 3 references the acronyms used in this document.

Chapter 4 recapitulates a few inherent characteristics of the broadcast services on the DTT.

Chapter 5 is about the signalling of the different types of DTT television services.

Chapter 6 is about the signalling of the on-demand audiovisual media services.

Chapter 7 is about the signalling of the data services.

Chapter 8 describes a few characteristics of the PSI/SI signalling used on the DTT.

Appended to the document:

Appendix A describes a possible behavior of a DTT receiver when installed, when the network's configuration changes and when the signalling is inaccurate or wrong, **for information purposes**.

Appendix B describes the signalling for a DVB SSU download in extended profile, **for information purposes**.

Appendix C describes an example of the signalling for HbbTV interactive applications of television services, **for information purposes**.

Appendix D describes a use case of logical numbering descriptors in Standard Definition (SD) and High Definition (HD) services, **for information purposes**.

Appendix E references the service identifiers allocated to the metropolitan television services.

Appendix F references the service identifiers allocated to the television services of the French overseas departments and territories.

² The Comité technique des experts du numérique (CTEN) is a working group lead by the director of the Technology Division of the Conseil supérieur de l'audiovisuel. This group is in charge of the technical considerations of the French digital broadcasting.

2. REFERENCES

The following documents are referenced in the signalling profile:

- [1] ISO/IEC 13818-1: “Information Technology – Generic coding of Moving pictures and associated Audio Information – Part I: Systems – International Standard (IS)”.
- [2] ETSI EN 300 468: “Digital Video Broadcasting (DVB); Specification for service Information (SI) in DVB systems”.
- [3] ETSI TR 101 211: “Digital Video Broadcasting (DVB); Guidelines on implementation and usage of service information”.
- [4] ETSI EN 301 192: “Digital Video Broadcasting (DVB); DVB Specification for data broadcasting”.
- [5] ISO/IEC 13818-6: “Information Technology – Generic coding of Moving pictures and associated Audio Information – Part 6: Extension for Digital Storage Media Command and Control (DSM-CC) – International Standard (IS)”.
- [6] ETSI TS 102 809: “Signalling and carriage of interactive applications and services in hybrid broadcast / broadband environments”.
- [7] IEC/CENELEC 62 216: “Baseline Digital Terrestrial TV Receiver Specification”.
- [8] ETSI EN 300 743: “Digital Video Broadcasting (DVB); Subtitling systems”.
- [9] ETSI TS 101 154: “Digital Video Broadcasting (DVB); Specification for the use of Video and Audio Coding in Broadcasting Applications based on the MPEG-2 Transport Stream”.
- [10] ETSI TS 102 006: “Digital Video Broadcasting (DVB); Specification for System Software Update in DVB Systems”.
- [11] Arrêté du 24 décembre 2001 relatif à la télévision numérique hertzienne terrestre fixant les caractéristiques des signaux émis (*Decree of the 24th of December of 2001 about digital terrestrial television setting the characteristics of broadcast signals*);
- [12] Arrêté du 27 décembre 2001 relatif aux caractéristiques des équipements de réception des services diffusés par voie hertzienne numérique terrestre (*Decree of the 27th of December of 2001 about the characteristics of the receivers of broadcast services on digital terrestrial television*).
- [13] ISO/IEC 14496-10: “Information technology – Coding of audio-visual objects, Part 10: Advanced Video Coding”.
- [14] ISO/IEC 13818-2: “Generic coding of moving pictures and associated audio, Part 2: Video”.
- [15] ETSI EN 300 744: “Framing structure, channel coding and modulation for digital terrestrial television”.

3. ABBREVIATIONS

AFD	Active Format Description
AIT	Application Information Table
BAT	Bouquet Association Table
BER	Bit Error Rate
CAT	Conditional Access Table
CRC	Cyclic Redundancy Check
DVB	Digital Video Broadcasting
DTT	Digital Terrestrial Television
ECM	Entitlement Control Message
EIT	Event Information Table
EMM	Entitlement Management Message
HBTV	Hybrid Broadcast Broadband Television
HD	High Definition
HD_LCN	High Definition Logical Channel Number
LCN	Logical Channel Number
MFN	Multi Frequency Network
MPEG	Moving Picture Experts Group
NIT	Network Information Table
OFDM	Orthogonal Frequency Division Multiplexing
OUI	Organization Unique Identifier
PAT	Program Association Table
PCR	Program Clock Reference
PID	Packet Identifier
PMT	Program Map Table
PSI	Program Specific Information
QAM	Quadrature Amplitude Modulation
QEF	Quasi Error Free
RST	Running Status Table
SD	Standard Definition
SDT	Service Description Table
SFN	Single Frequency Network
SI	Service Information
SSU	System Software Update

TDT	Time Date Table
TOT	Time Offset Table
TPS	Transmission Parameter Signalling
TS	Transport Stream
UHF	Ultra High Frequency
UNT	Update Notification Table

4. BROADCASTING CONTEXT ON DTT

4.1 DTT NETWORK

The digital terrestrial television network is built on a set of transmitters. The coverage zone of each multiplex consequently depends on the characteristics of their different emission sites: some DTT multiplex are not reachable in some geographical zones covered by other DTT multiplex. Conversely, two emission sites may locally cover the same zone. The DTT receiver may have a different service offer according to the geographical location. The DTT signalling provides information which is needed to correctly reproduce on the receiver the service offer.

A DTT cell matches the geographical zone where a multiplex is broadcast with the same broadcasting parameters. It corresponds to a coverage zone where the signal may be transmitted over one or several frequencies; the first case corresponds to the Single Frequency Network (SFN) configuration, the second one to the Multiple Frequency Network (MFN) configuration. Both configurations exist on the French DTT network. If a multiplex is configured in SFN on a zone, it does not mean that the other multiplex are configured in the same way on this zone.

A cell identifier (`cell_id`) is incorporated into the TPS signalling information of the physical layer. A `cell_id` value is allocated to each multiplex operator (see Section 8.4.5). Transmitters from the same SFN plate shall transmit the same `cell_id` value to ensure their synchronization.

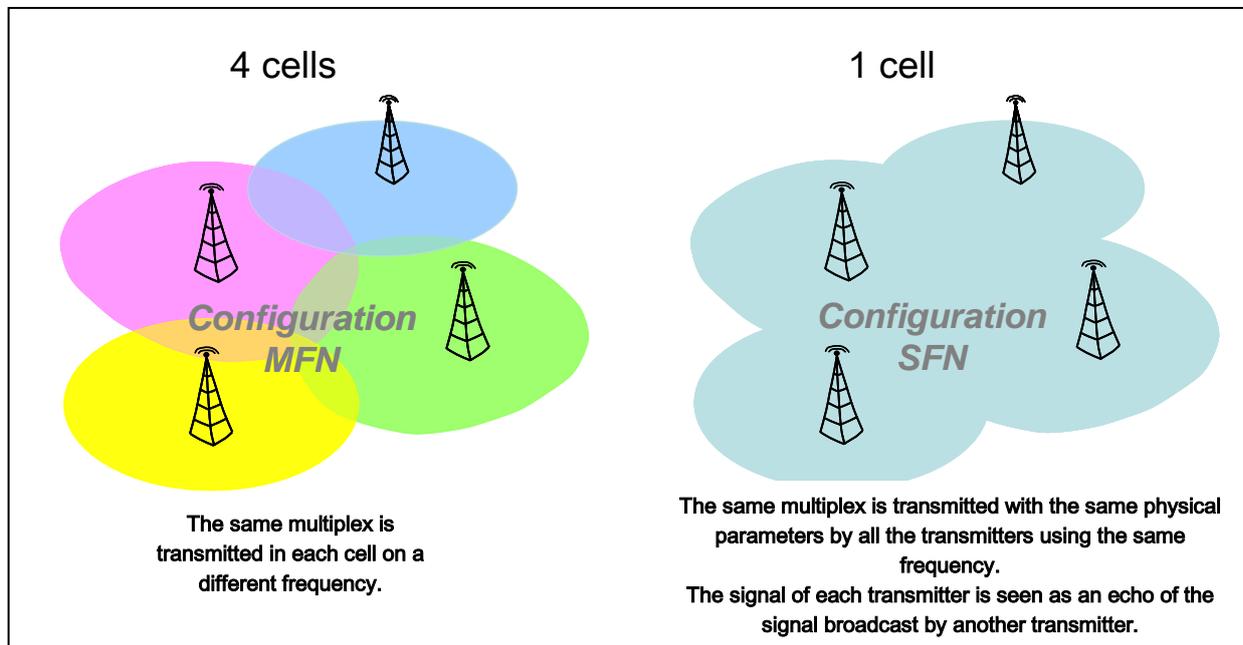


Figure 1: Notion of cell – SFN and MFN configurations

4.2 UHF CHANNELING

The DTT broadcasting in France uses the VHF III, the UHF IV and the UHF V bands divided in 7-MHz-bandwidth or in 8-MHz-bandwidth channels.

The following formula defines the central frequency of the received DVB-T radio frequency signals:

- VHF, 7-MHz-bandwidth channels:

$$f_c = 177,5 \text{ MHz} + (N - 5) \times 7 \text{ MHz}$$

$$N = \{5, \dots, 12\} \text{ (VHF channel number)}$$

- UHF, 8-MHz-bandwidth channels:

$$f_c = 474 \text{ MHz} + (N - 21) \times 8 \text{ MHz} + n \times f_{\text{offset}}$$

$$N = \{21, \dots, 60\} \text{ (UHF channel number)}$$

where f_c is the central frequency of the DVB-T signal, f_{offset} is the frequency offset (+166 kHz) from the central frequency, n may be -1, 0 or +1. For the large majority of transmitters, n is fixed to +1.

The list of the channels allocated to the DTT multiplex in metropolitan France and in the French overseas departments and territories is available on the CSA website (www.csa.fr, website in French only).

4.3 BROADCAST SERVICES ON DTT

4.3.1 SERVICE TYPOLOGY

Three types of service are broadcast on the DTT network:

- **Television services**, dealt with in Chapter 5;
- **On-demand audiovisual media services**, dealt with in Chapter 6;
- **Data services**, dealt with in Chapter 7.

4.3.2 GEOGRAPHICAL COVERAGE

Several coverage configurations exist for the DTT services:

- **National services** are broadcast throughout the whole national territory;
- **Regional services** have a regional coverage;
- **Local services** have a local coverage;
- **Services with regional or local variation** substitute certain national or regional programs by respectively regional or local programs at one or more spots on the territory.

4.4 SERVICE IDENTIFICATION

The DVB specification [2] defines a service as a unique triplet of identifiers (original_network_id; transport_stream_id; service_id).

- `original_network_id` is unique for the DTT in metropolitan France and French overseas departments and territories. Its value is specified in Section 8.4.1
- the values of the `transport_stream_id` for the French DTT multiplex are described in Section 8.4.3
- the `service_id` is specific to each service but may be allocated to several regional or local variations of one service, as applied for local news broadcasting of the television service of France 3 (see example in Section 4.6)

4.5 SERVICE PLAN CHANGE

4.5.1 SERVICE APPEARANCE (OR DISAPPEARANCE)

DTT service appearance (or disappearance) leads to an update of the Program Association Table (PAT, see Section 8.2.2) and of the Service Description Table Actual (SDT Actual, see Section 8.3.4) of the multiplex that carries this service, as well as the addition (or removal) of the related Program Management Table (PMT, see Section 8.2.3)

Sections 4.5.2 and 4.5.3 detail how the appearance (or disappearance) impacts the Network Information Table (NIT, see Section 8.3.3) for the national services and for the other types of services respectively.

4.5.2 CHANGE OF NATIONAL IMPACT

Any change of the service plan that affects national services (among French metropolitan national multiplex R1 to R8 or the OM1 multiplex of the French overseas departments and territories) leads to a new version of the NIT. The last is inserted in the signalling simultaneously by all the DTT multiplex. The NITs broadcast on the overseas departments and territories are all independent both from the metropolitan NIT and from one another: their version number and their content evolve independently. Each overseas department or territory has its own NIT.

A change of the service plan of national impact may have different aims:

- Existing multiplex rearrangement eventually with the appearance of one or several national services;
- Launch of a new multiplex.

4.5.3 CHANGE OF REGIONAL OR LOCAL IMPACT

Any regional or local change of the service plan is taken into account in the NIT. Either the change is done simultaneously with a modification of national impact, or this change has no national consequence and may be done at the local or regional level without increasing the NIT's version number. In any way, the aim is to avoid the notification on the national scale when the change has a regional or a local impact only.

A change of the service plan of regional or local impact may have different aims:

- Appearance (or disappearance) of a local service carried by a multiplex with national coverage or by a multiplex with local coverage;
- Appearance (or disappearance) of a local or regional variation of a national service.

4.6 LOCAL CUTAWAY (LOCAL VARIATION)

A local cutaway (local variation of a service), as described in this document, is exclusively carried out by substituting the components of a national or regional service by the components of a local service.

A local cutaway generally has no impact on the service signalling. The latter is modified only if the characteristics of the component change (for example, if the audio component has a different coding, only the PMT changes).

Example of the cutaway of a regional service:

In Brittany, the regional program “France 3” presents local variations on the transmitters of Brest and Vannes: during a part of the day the broadcast signals are the same and they are different during the local variations. On the multiplex R1, the program “France 3” broadcast in Brest (and Vannes) and the program “France 3” broadcast in Rennes are differently identified, each one having its own service identifier. The same logical number can be allocated to the regional service and to the regional service with local variation in Brest (see the `logical_channel_descriptor()` in Section 8.5.2).

In some geographical zones, a DTT receiver getting the signals from several transmitters could receive several variations of the same service. In such a case, the receiver may renumber some variations.

As a specific French feature, some local services and some regional variations of the television service “France 3” share the same triplet of identifiers (`original_network_id`; `transport_stream_id`; `service_id`). For example, several regional variations of “France 3” (which logical number is 3) have the same service identifier (`service_id`) 0x0111 on the multiplex with the same transport stream identifier 0x0001. This solution has been adopted in 2007 and consolidated in 2011-2012 in order to limit the number of service identifiers (`service_id`) allocated to each multiplex.

5. TELEVISION SERVICE

The DTT television services have a logical channel number (`logical_channel_`, `number`) according to the terms described in Sections 8.4.4 and 8.5.2.

The different types of television services (`service_type`) are described in Section 8.5.1. This last classification is stated in the NIT and in the SDT (see Sections 8.3.3 and 8.3.4 for the description of these tables).

5.1 GENERAL PRESENTATION

A television service includes a video component and at least one audio component. The signal decree [11] lays down the compression standards for the video and audio components:

- Unscrambled television services in standard definition (SD) broadcast in metropolitan France include a video component in MPEG-2 (ISO/IEC 13818-2) and shall provide at least one main audio component in MPEG-1 Layer 2 (ISO/IEC 13818-3);
- Unscrambled television services in standard definition (SD) broadcast in the French overseas departments and territories include a video component in MPEG-4 Part 10 (ISO/IEC 14496-10) and shall provide at least one main audio component in MPEG-1 Layer 2 (ISO/IEC 13818-3);
- Pay television services in standard definition (SD) as well as all high definition services (HD) include a video component in MPEG-4 Part 10 and one stereo or multichannel audio component.

Some pay television services (SD or HD) may be broadcast unscrambled at some times of the day (unscrambled time slots). At these times, the characteristics of the video and audio components are those of an unscrambled SD service.

The video format may be 4/3 SD, 16/9 SD, 16/9 HD. It may dynamically vary according to the program.

Television services may provide several types of associated data in addition to their video and main audio components to enrich their program:

- Multichannel audio component(s);
- Audio description component;
- Sound component(s) in multilingual version;
- Interactive application(s);
- Information about ongoing and following programs (mandatory in broadcasting).

5.2 CHARACTERISTICS OF THE VIDEO COMPONENT

The video component conform to the standard ETSI TS 101 154 [9].

5.2.1 IMAGE FORMAT (ASPECT RATIO)

According to the signal decree [11], the following formats are likely to be used:

- **Unscrambled SD television services broadcast in metropolitan France:**
 - MPEG-2 MP @ ML
 - Maximum bitrate 10 Mbits/s
 - Resolution: 720x576, 704x576, 544x576, 480x576, 352x576
- **Unscrambled SD television services broadcast in the French overseas departments and territories:**
 - MPEG-4 MP @ L.3
 - Maximum bitrate 10 Mbits/s
 - Resolution: 720x576, 704x576, 544x576, 480x576, 352x576
- **Pay television SD services:**
 - MPEG-4 MP @ L.3
 - Maximum bitrate 10 Mbits/s
 - Resolution: 720x576, 704x576, 544x576, 480x576, 352x576
- **Unscrambled HD television services and pay television HD services:**
 - MPEG-4 HP @ L.4
 - Maximum bitrate 20 Mbits/s
 - Resolution: 1920x1080i, 1440x1080i, 1280x720p

The image format (`aspect_ratio_information`) shall be included in each sequence header of the video component according to Table 1.

Table 1: Image format of the video component

<code>aspect_ratio_information</code>	Format	Comment
0010	4:3	
0011	16:9	Mandatory for the video component of HD television services.

5.2.2 ACTIVE FORMAT DESCRIPTOR (AFD)

The AFD describes the area actually used by the image. The AFD is optional in broadcasting. For example, when an HD program stated in 16/9 (default) actually includes a program in 4/3, the AFD can clarify it.

The format of the AFD depends on the video coding which is used between MPEG-2 and MPEG-4. Table 2 reminds the interpretation of the AFD field values according to the standard TS 101 154 [9].

Table 2: Aspect ratio of the “area of interest”

<code>Active_format_description</code>	Aspect ratio of the “area of interest”
0000	Information not provided
0001	Reserved
0010	Box 16:9 (top)
0011	Box 14:9 (top)
0100	Box>16:9 (center)
0101 – 0111	Reserved
1000	Active format is the same as the coded frame
1001	4:3 (center)
1010	16:9 (center)
1011	14:9 (center)
1100	Reserved

1101	4:3 with shoot & protect 14:9 centered
1110	16:9 with shoot & protect 14:9 centered
1111	16 :9 with shoot & protect 4:3 centered

5.3 CHARACTERISTICS OF THE AUDIO COMPONENT

As noticed in Section 5.1, the signal decree [11] defines a mandatory coding only for the main audio component of unscrambled SD television services and of the unscrambled time slots of pay television services: the MPEG-1 Layer-2 standard (ISO/IEC 13818-3).

Channel editors can choose the coding of additional audio components as well as of the main audio component of HD television services³ and pay television services (except unscrambled time slots).

The DTT signalling profile describes information that is required to broadcast an audio component using the MPEG-1 Layer 2, AC-3 (Dolby Digital), E-AC3 (Dolby Digital Plus), MPEG-4 HE-AAC v1 or MPEG-4 HE-AAC v2 coding.

5.3.1 LANGUAGE OF THE AUDIO COMPONENT

The language of an audio component of a television service shall be notified in two ways:

- Using the ISO-639 language descriptor (`ISO_639_language_descriptor()`) in the PMT of the involved service;
- Using the component descriptor (`component_descriptor()`) in the Event Information Table present/following (EITp/f) related to the involved program.

The ISO-639 language descriptor and the component descriptor associated to each audio component of a television service include an ISO-639 language code (`ISO_639_language_code`) which shall be coded according to the Table 3.

Table 3: Language of audio component (ISO_639_language_code)

Code 639-2/B	Code 639-2/T	Langue
"ger"	"deu"	German
"eng"	"eng"	English
"fre"	"fra"	French
"spa"	"spa"	Spanish
"ita"	"ita"	Italian
"por"	"por"	Portuguese
"qaa"	"qaa"	Original Version
"qad"	"qad"	Audio description

5.3.2 AUDIO DESCRIPTION

When broadcast, the audio description component shall be notified in the PMT of the television service in the following way:

- In the **receiver-mix** mode with:

³ Unscrambled HD television services do not have any regulatory constraints concerning audio compression standard. The E-AC3 (Dolby Digital +) coding is used at the publication date of this document but the MPEG-4 HE-AAC-v2 coding may be used later.

- An ISO-639 language descriptor (`ISO_639_language_descriptor()`) with a field `audio_type=0x03` if the audio component have to be mixed to the main audio component by the DTT receiver. In such a case, the main audio language and the audio description language shall be the same and are indicated in the `ISO_639_language_code` field (eng for English, see Table 3).
- A supplementary audio descriptor (`supplementary_audio_descriptor()`) with a field `mix_type=0`. The audio description language and the main audio language shall be the same and are indicated in the `ISO_639_language_code` field (eng for English, see Table 3).
- In the **broadcaster-mix** mode with:
 - An ISO-639 language descriptor (`ISO_639_language_descriptor()`) with a field `audio_type=0x00` if the audio component is made up of the main audio track mixed with the track of the scene description. In such a case, the audio component language which is indicated in the `ISO_639_language_code` field is “qad” (see Table 3).
 - A supplementary audio descriptor (`supplementary_audio_descriptor()`) with a field `mix_type=1`. The audio description language is indicated in the `ISO_639_language_code` field (eng for English, see Table 3).

Table 4: PMT signalling of the audio description component

<code>audio_type</code> ¹	<code>mix_type</code> ²	Editorial classification	Audio description type
0x00	1	00001	Audio description (broadcaster- mix)
0x03	0	00001	Audio description (receiver-mix)

¹`audio_type` is a field of the ISO-639 language descriptor
²`mix_type` is a field of the supplementary audio descriptor

When an audio description component is broadcast, the component descriptor in the Event Information Table present/following (EITp/f) of the involved program shall be coded according to Table 5.

Table 5: EITp/f signalling of the audio description component

<code>stream_content</code> ¹	<code>component_type</code> ¹	Meaning
0x02	0x48	Mono or stereo MPEG-1 Layer 2 independent audio description.
0x02	0x47	Mono MPEG-1 Layer 2 audio description to be mixed to the main audio track by the receiver.
0x04	0b01010xxx ²	Independent AC-3 audio description.
0x04	0b11010xxx ²	Independent E-AC-3 audio description.
0x04	0x90	Mono E-AC-3 audio description to be mixed to the main audio track by the receiver.
0x06	0x48	Stereo or mono HE-AAC independent audio description.
0x06	0x47	Mono HE-AAC audio description to be mixed with the main audio track by the receiver.
0x06	0x4A	Mono or stereo HE-AAC v2 independent audio description.
0x06	0x49	Mono HE-AAC v2 audio description to be mixed to the main audio track by the receiver.

¹ `stream_content` and `component_type` are fields of the component descriptor
² `xxx` varies according to the number of channels (see Section 8.5.7)

5.4 CHARACTERISTICS OF SUBTITLES

The signal decree [11] specifies that subtitles shall conform to the DVB Subtitling standard [8]. Subtitles components may be tracks in multilingual version or specific tracks for the deaf or hard-of-hearing⁴.

The broadcasting of subtitles for deaf or hard-of-hearing in the DVB teletext format should be not favored on DTT in order to avoid any confusion by the viewer when he looks for the subtitles for deaf or hard-of-hearing on the different television services.

The DVB Subtitling standard [8] has introduced since its version 1.3.1 the opportunity to define specific subtitles components for HD services by using a display definition segment descriptor (`display_definition_segment_descriptor()`) which defines the screen size for which the stream was specifically created.

5.4.1 SUBTITLES FOR THE DEAF OR HARD-OF-HEARING

A subtitles component for the deaf or hard-of-hearing shall be described in the PMT of the involved service according to the Table 8:

- For an SD television service by its combination with a subtitling descriptor with a field `subtitling_type=0x20`. The subtitling language shall be indicated in the `ISO_639_language_code` field (eng for English, see Table 3).
- For an HD television service by its combination with a subtitling descriptor with a field `subtitling_type=0x24`. The subtitling language shall be indicated in the `ISO_639_language_code` field (eng for English, see Table 3).

Table 6: PMT signalling of subtitling component for the deaf or hard-of-hearing

<code>subtitling_type</code> ¹	Television service type
0x20	SD television service
0x24	HD television service

¹ `subtitling_type` is a field of the subtitling descriptor

5.4.2 MULTILINGUAL SUBTITLES

A subtitle component in multilingual version shall be coded in the PMT of the involved service according to the Table 7.

- For an SD television service by its combination with a subtitling descriptor with a field `subtitling_type=0x10`. The subtitling language shall be indicated in the `ISO_639_language_code` field (eng for English, see Table 3).

⁴ The CSA and the channel editors finalized a charter related to the quality of subtitling for the deaf or hard-of-hearing. DVB subtitles shall be displayed on a translucent black banner.

- For an HD television service by its combination with a subtitling descriptor with a field `subtitling_type=0x14`. The subtitling language shall be indicated in the `ISO_639_language_code` field (eng for English, see Table 3).

Table 7: PMT signalling of the multilingual subtitles component

subtitling_type ¹	Television service type
0x10	SD television service
0x14	HD television service
¹ subtitling_type is a field of the <code>subtitling_descriptor()</code>	

5.5 INFORMATION ABOUT PROGRAM DESCRIPTION: EVENT INFORMATION TABLE (EIT)

5.5.1 CROSS REFERENCE (EIT OTHERS)

The signalling of the multiplex provides information to the DTT receiver about the programming of the television services. This signalling is overlapped from one multiplex to another.

Each multiplex carries signalling of ongoing and following national services and national services with regional variation of all DTT multiplex (EITp/f actual and EITp/f other). The Section 8.3.5 defines the minimum mandatory profile for the EITp/f by setting the essential descriptors to insert in those tables which enable the electronic program guide to work and the parental control to be efficient and reliable.

5.6 INTERACTIVE APPLICATIONS

A television service may carry one or several interactive applications. The Application Information Table (AIT, see Section 8.3.7), specific to each service, describes those applications. The AIT is referenced in the PMT of the television services which include at least one interactive application.

5.6.1 STATEMENT OF INTERACTIVE APPLICATIONS

Each television service which includes an interactive application shall notify it by declaring in its PMT an interactive component (`stream_type=0x05`) which includes the application signalling descriptor (`application_signalling_descriptor()`) according to Table 8.

Table 8: PMT signalling of the interactive component

application_type ¹	Interactive application type
0x10	HbbTV Application
¹ application_type is a field of the <code>application_signalling_descriptor()</code>	

5.6.2 DESCRIPTION OF INTERACTIVE APPLICATIONS

The AIT (8.3.7) of a television service is broadcast through the interactive component declared in the PMT (see Section 5.6.1). The AIT shall include the following descriptors:

- The application descriptor (`application_descriptor()`) describes the application's priority, profile and visibility;
- The application name descriptor (`application_name_descriptor()`) describes the name of the main application;
- The transport protocol descriptor (`transport_protocol_descriptor()`) describes the application's broadcasting mode as described in Table 9.

Table 9: AIT signalling of the interactive application's broadcasting mode

protocol_id¹	Interactive application's broadcasting mode
0x0001	Application transmitted –at least partly, by means of an object carousel
0x0003	Broadband connection is mandatory for all application parts
¹ protocol_id is a field of the <code>transport_protocol_descriptor()</code>	

5.6.3 HBBTV DATA COMPONENT

The broadcasting of HbbTV data of an application stated in the AIT requires the statement of at least one component of an object carousel. Should the opposite occur, the HbbTV data are entirely transmitted by an Internet connection ('broadband' transport protocol as indicated in Section 5.6.2).

Each HbbTV data component may include the data broadcast id descriptor (`data_broadcast_id_descriptor()`) according to the Table 10 in order to optimize the acquisition speed of the HbbTV data of an interactive application. The type of component used to carry HbbTV data is an object carousel (`stream_type=0x0B`).

Table 10: PMT signalling of an HbbTV data component

data_broadcast_id¹	application_type¹	Broadcast data type
0x0123	0x10	HbbTV data
¹ data_broadcast_id and application_type are fields of the <code>data_broadcast_id_descriptor()</code>		

5.6.4 EVENT COMPONENT

In order to trigger actions during the life cycle of an interactive application, some events may be broadcast (stream events). The type of component used to carry these events is an object carousel (`stream_type=0x0C`).

5.7 UNSCRAMBLLED/ENCRYPTED TRANSITIONS

Regarding pay television services that have unscrambled service time slots, the signal decree lays down:

- During the unscrambled time slots of a metropolitan DTT television service, the video component shall be coded in MPEG-2 (ISO.IEC 13818-2) and the service shall include at least one main audio component coded in MPEG-1 Layer 2 (ISO/IEC 13818-3);
- During the unscrambled time slots of a DTT television service in the French overseas departments and territories, the video component shall be coded in MPEG-4 Part 10 (ISO.IEC 14490-10) and the service shall include at least one main audio component coded in MPEG-1 Layer 2 (ISO/IEC 13818-3);

Transitions between encrypted time slots and unscrambled ones cause a change in the PMT's component statement of the television service.

5.7.1 ENCRYPTED CONTROL WORD AND ENTITLEMENT CONTROL MESSAGE (ECM)

The Entitlement Control Message (ECM) contains the encrypted control word and the access conditions of the program.

5.7.2 ACCESS RIGHTS : ENTITLEMENT MANAGEMENT MESSAGE (EMM)

The Entitlement Management Message (EMM) contains the access rights of the program for a subscriber (or for a group of subscribers).

6. ON-DEMAND AUDIOVISUAL MEDIA SERVICE

The on-demand audiovisual media services on the DTT enable subscribers to download programs by the radio-relay channel and supply them some on-demand video contents through a program catalog.

6.1 SERVICE SIGNALLING

The radio-relay downloads of on-demand audiovisual media services on the DTT have a service identifier according to the terms described in Section 8.4.4.

This kind of service has a service type (*service_type*) described in Section 8.5.1. This classification is stated in the NIT and in the SDT related to the service.

7. DATA SERVICE

Two types of data services may be broadcast on the DTT:

- Interactive services described in Section 7.1;
- Service of download of software update for the DTT receivers, described in Section 7.2.

7.1 INTERACTIVE SERVICE

An interactive service on the DTT enables to access to an interactive application regardless of a television service or an on-demand audiovisual media service.

The interactive services on the DTT have a service identifier according to the terms described in Section 8.4.4.

7.2 DOWNLOAD SERVICE

Download services for system software updates are aimed at DTT terminals which are not under supervision of a pay-television distributor. Distributors of services on the DTT network can use proprietary transport mechanisms for updating the terminal software while respecting the current regulatory measures.

Download services shall apply the standard mechanisms of signalling and software updating transport called DVB SSU [10]. This specification defines a standardized transport mechanism but the use of supplementary proprietary mechanisms is not prohibited.

The behavior of a terminal when updated is planned by the IEC/CENELEC EN 62216 standard [7] (referenced in the terminal decree [12]), for information purposes.

7.2.1 DVB SSU PROFILES

The DVB SSU profile chosen for the DTT is the simple profile.

- **Simple Profile:**

The simple profile defines the common frame of the signalling and the optional transport mechanism. It describes a signalling which enables to locate in a digital bouquet the service(s) that carries the update. It may also describe the (optional) transport mechanism for updating based on the broadcasting of an object carousel component.

For example, the simple profile does not enable to launch a standardized update campaign on specific criteria (programmed in time, targeted, automated...).

The extended profile should be used according to the needs of the equipment (using the extended profile leads to apply the simple profile).

- **Extended Profile:**

The extended profile differs from the simple profile by the addition of the Update Notification Table (UNT) that defines a set of criteria to implement the software update. The UNT enables to associate some selection criteria to an update:

- Receivers are identified by a serial number, by a smart card, by an IP, an IPv6 or a MAC address or by a software version, etc.;
- Immediate or postponed, automatic or manual, optional or mandatory update implementation;
- Priority degree of the updating;
- Scheduling of the update campaign (start time, end time and broadcasting frequency...);

- Broadcasting of specific messages of update information.

7.2.2 SERVICE SIGNALLING

The statement of a DTT download service is notified in the NIT through the linkage descriptor (`linkage_descriptor()`). It specifies the brand of the terminals concerned by the data of the download service through the Organization Unique Identifier field (OUI), managed by the IEEE. Moreover, the standard enables to use a generic OUI field. In such a case, the brands concerned by the data of the download service are notified in the PMT.

As an example, the OUI fields allocated by the IEEE (referring to IEEE-802.1990 standard) are provided for a few brands below:

- 0x001095 Thomson
- 0x00D037 Pace
- 0x00604C Sagem
- 0x080046 Sony
- 0x00D060 Panasonic

This solution is used in the current implementation in order to avoid the preliminary compendium of OUI as well as to avoid frequent updates of the NIT.

A download service per national multiplex has been planned. Each one is stated in the NIT.

Table 11: NIT signalling for a download service

linkage_type ¹	OUI ²	Download service statement
0x09	0x000015A	The list of terminal constructors which are concerned is notified in the PMT of the involved download service.
¹ linkage_type is a field of the <code>linkage_descriptor()</code>		
² OUI is a field of the <code>system update link structure descriptor()</code>		

7.2.3 SERVICE DESCRIPTION

The PMT describes the list of the different update components which are included in each download service. A data broadcast identifier descriptor (`data_broadcast_id_descriptor()`) is associated with each component which carries the data of a software update. This descriptor specifies the OUI of the involved maker as well as some contingent private data which are intended for him.

Table 12: PMT signalling of the component of software download

data_broadcast_id ¹	OUI ²	update_type ²	Data type broadcast
0x000A	Depends on the maker	0x01 (simple profile)	Data of a software download (simple profile) aimed at the DTT receiver maker named by the OUI.
0x000A	Depends on the maker	0x02 (extended profile)	Id. (extended profile)
¹ data_broadcast_id is a field of the <code>data_broadcast_id_descriptor()</code>			
² OUI and update_type are fields of the <code>system software info update descriptor()</code>			

The transport protocol for the components of download data is a DSM-CC object carousel (stream_type=0x0B).

8. PSI/SI SIGNALLING PROFILE

8.1 INTRODUCTION

This Chapter provides the list of the signalling tables which are broadcast on the French DTT network. For each one of them, the descriptors likely to be used are listed.

In addition, two points should be reminded:

- A descriptor which is not listed in this document but which is still present in a signalling table shall not disturb a DTT receiver; the last should simply ignore it.
- Any signalling table may be contained in one MPEG-2 section or may be segmented in several MPEG-2 sections. The maximal size of a section is specified in the ISO 13818-1 standard [1].

For each signalling descriptor, the following information is provided:

- Standard:
This field notifies which standard provides the definition of the descriptor:
 - **MPEG :** ISO/IEC 13818-1 [1] (MPEG System)
 - **SI :** ETSI EN 300 468 [2] (DVB SI)
 - **Dcast :** ETSI EN 301 192 [4] (DVB DATACAST)
 - **Interac :** ETSI TS 102 809 [6] (HBB)
- Broadcasting information:
 - **Mandatory:** the descriptor shall be present in the table
 - **Conditional:** inserting the descriptor depends on the fulfillment of a condition. If the condition is met, the descriptor is mandatory.
 - **Optional:** broadcasting the descriptor is optional.

8.2 PSI INFORMATION

8.2.1 LIST OF TABLES

The table below lists the PSI tables which are broadcast on the DTT and provides for each of them the maximum allowed cycle time and the cycle time used for their broadcasting.

Table 13: List of PSI tables with their cycle times

Table	Broadcasting	Typical repetition	Max repetition
PAT	Mandatory	0.2s	0.5s
PMT	Mandatory	0.1s	0.5s
CAT	Conditional	0.1s	10s

8.2.2 PROGRAM ASSOCIATION TABLE (PAT)

The **Program Association Table (PAT)** contains the list of the program numbers (the program number corresponds to the service identifier, `service_id`) that are broadcast in the DTT multiplex as well as the Packet IDentifiers (PID) carrying the program map sub-tables corresponding to each service. The broadcasting of a Program Association sub-Table in each multiplex is mandatory.

The maximal size of an MPEG-2 section carrying a PAT is 1024 bytes.

8.2.3 PROGRAM MAP TABLE (PMT)

The **Program Map Table (PMT)** describes the components of the services (Elementary Stream, ES) by combining a PID with each of them. Broadcasting a Program Map sub-Table for each service of a multiplex is mandatory.

The maximal size of an MPEG-2 section carrying a PMT is 1024 bytes.

The PMT of download services shall have a maximum cycle time of 1s.

Table 14: List of the descriptors in a PMT

Descriptor	Tag Value	Standard	Broadcasting	Comment
application_signalling_descriptor	0x6F	Interac	Conditional	Shall be present if the service broadcasts one or several interactive applications for components carrying some sections of the Application Information sub-Tables.
carousel_identifier_descriptor	0x13	Dcast interac	Conditional	Shall be present if the service broadcasts one or several applications according to the DVB DSM-CC Object Carousel for the component carrying the carousel's entry point (DSM-CC DSI message).
CA_descriptor	0x09	MPEG	Conditional	Shall be present if one or several service components are encrypted.
ISO_639_Language_descriptor	0x0A	MPEG	Conditional	Shall be present in audio components and in subtitles components.
AC-3_descriptor	0x6A	SI	Conditional	Shall be present in an AC-3 audio component.
Enhanced_AC-3_descriptor	0x7A	SI	Conditional	Shall be present in an E_AC-3 audio component.
AAC_descriptor	0x7C	SI	Conditional	Shall be present in an HE_AAC audio component.
subtitling_descriptor	0x59	SI	Conditional	Shall be present in subtitles components.
teletext_descriptor	0x56	SI	Conditional	Shall be present in Teletext components.
association_tag_descriptor	0x14	Dcast interac	Conditional	Shall be present in the components carrying encapsulated data according to the DVB DSM-CC Object Carousel protocol. A terminal that manages interactivity shall take into account this descriptor.
deferred_association_tag_descriptor	0x15	Dcast interac	Optional	May be present if the service broadcasts one or several applications according to the DVB DSM-CC Object Carousel protocol in case the application is split between several services.
data_broadcast_id_descriptor	0x66	SI Dcast interac	Optional	May be present if the service broadcasts one or several applications according to the DVB DSM-CC Object Carousel protocol in the component carrying the carousel's entry point (DSM-CC DSI message).
supplementary_audio_descriptor	0x06	SI	Conditional	Shall be present in the audio description components.

8.2.4 CONDITION ACCESS TABLE (CAT)

The **Conditional Access Table (CAT)**, which is broadcast only if some services of the multiplex are encrypted, identifies the conditional access systems which are used, indicates their parameters and links them to the component which carries the EMM. If some tables are encrypted, this table is mandatory in the multiplex.

Table 15: List of the descriptors in a CAT

Descriptor	Tag Value	Standard	Broadcasting	Comment
CA_descriptor	0x09	MPEG	Mandatory	

8.3 SI INFORMATION

8.3.1 LIST OF TABLES

Table 16: List of SI tables with their cycle times

Table	Broadcasting	Typical repetition (indicative)	Max repetition (according to the standard)
BAT	Optional	-	-
NIT actual	Mandatory	2s	10s
SDT actual	Mandatory	1s	2s
EIT p/f actual	Mandatory	1s	2s
EIT p/f other	Mandatory	5s	20s
EIT s actual (1 st day)	Optional	-	10s
EIT s actual	Optional	25 s	30 s
EIT s other (1 st day)	Not used	-	60s
EIT s other	Not used	-	300s
TDT	Mandatory	20s	30s
TOT	Mandatory	2s	30s
AIT	Optional	1s	10s

The maximal size of an MPEG-2 section is 1024 bytes for the SI tables except for the EIT whose maximal size of section is 4096 bytes. **The SI tables, including the NIT, can be broadcast on several sections.**

The broadcasting of these tables may be smoothed or burst. Two consecutive sections of the same table shall be separated by a minimum 25ms time period (EN 300 468 Section 5.1.4).

8.3.2 BOUQUET ASSOCIATION TABLE (BAT)

The **Bouquet Association Table (BAT)** describes the set of services which are gathered in a bouquet. It provides the name of the bouquet and the list of the services included in the bouquet. One service can belong to one or several bouquets. This table is optional in a multiplex.

8.3.3 NETWORK INFORMATION TABLE (NIT)

The **Network Information Table (NIT)** describes the current network (NIT Actual) and is broadcast on each DTT multiplex. It provides the list of multiplex which are broadcast on the network. This description is quasi-static: the updates of the NIT are infrequent and they follow the changes in the network (see Section 4.5).

For each multiplex, all DTT services, including temporary services, may be permanently described in the service list descriptor (`service_list_descriptor()`). A logical number is allocated to each service and is defined in the logical channel descriptor (`logical_channel_descriptor()`). Broadcasting the NIT in each multiplex is mandatory.

The NIT may be segmented in several sections, each one of 1024 bytes maximal size. The minimum time period between two sections of the NIT is 25ms.

Table 17 : List of the descriptors in a NIT

Descriptor	Tag Value	Standard	Broadcasting	Comment
linkage_descriptor	0x4A	SI	Mandatory	The linkage descriptor is mandatory on the multiplex which broadcasts a download service to signal the presence of this service.
network_name_descriptor	0x40	SI	Mandatory	Indicates the network's name.
private_data_specifier_descriptor	0x5F	SI	Mandatory	Shall be present in the sub-table to introduce the private logical channel descriptor and eventually other private descriptors.
logical_channel__descriptor	0x83	xxx	Mandatory	This descriptor shall be present in the second descriptor loop to combine a presentation number with each SD or HD service of the involved multiplex. If the multiplex does not carry any video service, the descriptor shall be absent.
HD_simulcast_logical_channel_descriptor	0x88	xxx	Mandatory	This descriptor shall be present only for the services which have an SD/HD simulcast.
terrestrial_delivery_system_descriptor	0x5A	SI	Mandatory	The terrestrial delivery system descriptor which is included in the NIT corresponds to the general case: the NIT does not exhaustively describe the current network of transmitters but the organization of the services in the multiplex. The multiplex frequency which is notified in the center frequency parameter takes the fixed value 0xFFFFFFFF. This frequency should not be taken into account.
service_list_descriptor	0x41	SI	Optional ⁵	This descriptor may be inserted in the second descriptor loop of the sub-table to indicate the services present in each multiplex.

⁵ Today, the insertion of the service list descriptor in each second-level loop of the NIT is required because some adapters on the market cannot be installed without it.

8.3.4 SERVICE DESCRIPTION TABLE (SDT)

The **Service Description Table (SDT)** indicates the services present in the current multiplex (SDT Actual) including the temporary services. Broadcasting an SDT in each multiplex is mandatory.

If the presence of the services dynamically changes, it may be notified by the `running_status` field.

The `EIT_present_following_flag` is necessarily always enabled (set to '1').

The `free_CA_mode_flag` is inactive (set to '0') for all the unscrambled services as well as for the services with some unscrambled time slots. The flag is enabled (set to '1') for the services with conditional access on the whole service time (without unscrambled time slots).

Table 18: List of the descriptors in an SDT

Descriptor	Tag Value	Standard	Broadcasting	Comment
service_descriptor	0x48	SI	Mandatory	
data_broadcast_descriptor	0x64	Dcast Interac	Conditional	Shall be present in the table if one or several components carry some associated data of the service. One data broadcast descriptor corresponds to each data component which is encapsulated according to the DVB MultiProtocol Encapsulation. A data broadcast descriptor is associated with each main component of a DVB carousel: a component carrying the DSM-CC DSI message of a DSM-CC Object Carousel or a two-level DSM-CC Data Carousel, a component carrying the DSM-CC DII message of a one-level DSM-CC Data Carousel. Terminals implementing these transport protocols shall take into account this descriptor.
linkage_descriptor	0x4A	SI	Optional	May be present in the sub-table to describe temporary services. When it is present, it shall be taken into account by the terminal.
CA_identifier_descriptor	0x53	SI	Optional	May be present in the sub-table if a component has a conditional access.
component_descriptor	0x50	SI	Optional	

8.3.5 EVENT INFORMATION TABLE (EIT)

Current event and following event

The **Event Information Table present/following actual (EIT p/f actual)** indicates the present event and the following event for each service broadcast in the multiplex. The broadcasting of an EITp/f actual is mandatory for national television services and national services with regional variation.

The **EITp/f other** which is broadcast in each multiplex of the network indicates the present and following events of the services which are broadcast on the other DTT multiplex. The broadcasting of the EITp/f other is mandatory in each multiplex for national television services and national services with regional variation.

Table 19: List of the descriptors in an EITp/f

Descriptor	Tag Value	Standard	Broadcasting	Comment
component_descriptor	0x50	SI	Mandatory	Shall be present in the sub-table for each event's component (video, audio) excepting data components.
content_descriptor	0x54	SI	Optional	Description of the program's type (culture, news, sport...) at the discretion of the content editor.
parental_rating_descriptor	0x55	SI	Mandatory	Start time and duration of the program correctly indicated in the EIT enable an optimal management of parental control. Correct notification of this descriptor indicating the category of the program is mandatory and required.
short_event_descriptor	0x4D	SI	Mandatory	Indicates the program's title and a gives a succinct description of the program.
data_broadcast_descriptor	0x64	SI Dcast	Conditional	Shall be present in the sub-table of one or several components carrying some data associated with the event. Each data component encapsulated according to the DVB Multiprotocol is associated with a data broadcast descriptor. A main component of a DVB carousel is associated to a data broadcast descriptor: component carrying the DSM-CC DSI message of a DSM-CC Object Carousel or of a two-level DSM-CC Data Carousel, component carrying the DSM-CC DII message of a one-level DSM-CC Data Carousel. A terminal implementing these transport protocols shall take into account this descriptor.
extended_event_descriptor	0x4E	SI	Optional	Shall be taken into account when present.
CA_identifier_descriptor	0x53	SI	Optional	May be present to indicate an encrypted event.

Start time and duration of the program should be accurately notified in the EIT to optimize the possibilities to automatically record some programs by the DTT adaptors which have an integrated hard disk.

Events over several days

The **schedule Event Information Table actual (EITs actual)** indicates the events to come of each service broadcast in the multiplex. The broadcasting of an EITs actual is optional.

The EITs actual may be broadcast in each multiplex with a description's depth limited to 7 days and with adapted repetition cycle times (according to the description's depth for example) in order to limit the bitrate.

The description may be limited to the name, the start time and the duration of the program (required data for recorders which go by the Electronic Program Guide - EPG).

Table 20: List of the descriptors in an EITs

Descriptor	Tag Value	Standard	Broadcasting	Comment
short_event_descriptor	0x4D	SI	Mandatory	Indicates the program's title and gives a succinct description of the program.
CA_identifier_descriptor	0x53	SI	Optional	Shall be present in the sub-table to indicate an encrypted event.
component_descriptor	0x50	SI	Optional	Shall be present in the sub-table for each event

				component excepting the data components.
content_descriptor	0x54	SI	Optional	
extended_event_descriptor	0x4E	SI	Optional	Shall be taken into account by the terminal when present.
parental_rating_descriptor	0x55	SI	Optional	

8.3.6 TIME OFFSET TABLE (TOT)

Table 21: List of the descriptors in a TOT

Descriptor	Tag Value	Standard	Broadcasting	Comment
local_time_offset_descriptor	0x58	SI	Mandatory	<ul style="list-style-type: none"> • Country_code = FRA according to the ISO 3166 Standard • Country_region_id = "000000" (metropolitan France does not have time differences between its regions) • Local_time_offset_polarity = "0" the polarity is positive (metropolitan France is to the east of Greenwich) and the local time is the UTC time ahead • Local_time_offset = shall be set to 2 in summer time and set to 1 in winter time • Time_of_change = shall be set to 1 am UTC the last Sunday of March (at 2 am metropolitan French local time) and set to 1 am UTC the last Sunday of October (at 2 am metropolitan French local time) • Next_time_offset = shall be set to 1 (the UTC winter time is +1 in metropolitan France) or set to 2 (the UTC winter time is +2 in metropolitan France)

8.3.7 APPLICATION INFORMATION TABLE (AIT)

The **Application Information Table (AIT)** is broadcast for each DTT service which carries one or several interactive applications and indicates the characteristics of the application.

The descriptors which are present in the AIT shall be taken into account by the terminal in conformity with the TS 102 809 Standard [6].

The maximal size of an MPEG-2 section carrying an AIT is 1024 bytes.

Table 22: List of the descriptors in an AIT

Descriptor	Tag Value	Standard	Broadcasting	Comment
application_descriptor	0x00	interac	Mandatory	For each broadcast application.
application_name_descriptor	0x01	interac	Mandatory	For each broadcast application.
transport_protocol_descriptor	0x02	interac	Mandatory	Shall be present in the first or second loop of the sub-table. Any application described in the sub-table shall have this descriptor.
dvb_j_application_descriptor	0x03	interac	Conditional	This descriptor shall be present for each application, in the second loop of the sub-table if some DVB JAVA applications are broadcast.
dvb_j_application_location_descriptor	0x04	interac	Conditional	This descriptor shall be present for each application, in the second loop of the sub-table if some DVB JAVA applications are broadcast.
external_application_autorisation_descriptor	0x05	interac	Optional	
application_recording_descriptor	0x06	interac		
dvb_html_application_descriptor	0x08	interac	Conditional	This descriptor shall be present for each application, in the second loop of the sub-table

				if some DVB HTML applications are broadcast.
dvb_html_application_location_descriptor	0x09	interac	Conditional	This descriptor shall be present for each application, in the second loop of the sub-table if some DVB HTML applications are broadcast.
application_icons_descriptor	0x0B	interac	Optional	
dii_location_descriptor	0x0D	interac	Optional	
dvb_html_application_boundary_descriptor	0x0A	interac	Optional	This descriptor shall be present to notify HTML applications.
prefetch_descriptor	0x0C	interac	Optional	
graphics_constraints_descriptor	0x14	interac		
simple_application_location_descriptor	0x15	interac		
simple_application_boundary_descriptor	0x17	Interac		

8.3.8 UPDATE OF SI TABLES

Update mechanisms of the on-air signalling tables are in conformity with the implementation guideline TR 101 211 [3].

8.4 OVERVIEW OF SOME IDENTIFIERS USED ON THE DTT

8.4.1 ORIGINAL_NETWORK_ID AND NETWORK_ID

The original network identifier (`original_network_id`) and the network identifier (`network_id`) are identical and unique in metropolitan France and in the French overseas departments and territories. The values of the identifiers are specific to the French network and have been allocated by the DVB Consortium as requested by the Conseil Supérieur de l'Audiovisuel. They are described in Tables 23 and 24, for metropolitan France and French overseas departments and territories respectively.

Table 23: Identifiers of the DTT network of metropolitan France

Identifier	Value
original_network_id	0x20FA
network_name	F
network_id	0x20FA

Table 24: Identifiers of the DTT network of French overseas departments and territories

Identifier	Value
original_network_id	0x20FA
network_name	TNT Outre-Mer
network_id	0x20FA

8.4.2 BOUQUET_ID

Distributors of pay-television services may include a BAT in the DTT signalling. In such a case, the distributor asks the DVB Consortium for a dedicated and unique bouquet identifier (`bouquet_id`). These identifiers are referenced on the DVB website:

http://www.dvbservices.com/identifiers/bouquet_id

8.4.3 TRANSPORT_STREAM_ID

Each multiplex has a unique transport stream identifier (`transport_stream_id`). The last remains the same for a multiplex regardless of a local or regional cutaway.

Transport stream identifiers are allocated by the Conseil Supérieur de l'Audiovisuel and are specified in the Tables 25 and 26, for metropolitan France and French overseas departments and territories respectively.

Table 25: Identifiers of the multiplex for the DTT network of metropolitan France

Multiplex	transport_stream_id
R1	0x0001
R2	0x0002
R3	0x0003
R4	0x0004
R5	0x0005
R6	0x0006
R7	0x000A
R8	0x000B
L8	0x0008

Table 26 : Identifiers of the multiplex for the DTT network of the French overseas departments and territories

multiplex	transport_stream_id
OM1	0x0021
OM2	0x0022

8.4.4 SERVICE_ID

Each service has a unique service identifier (`service_id`) according to the values in Appendix E and F, for metropolitan France and French overseas departments and territories respectively.

In theory, each service with a regional variation has a distinct service identifier while keeping the same logical channel number. However, the number of television services with a regional or local variation on the multiplex R1 is pretty large compared with the limited amount of information that is usually planned in the NIT for numbering descriptors and for descriptors of service's type. Consequently, it has been decided to allocate the same service identifier to several regional variations of the television service France 3.

Moreover, local television services share some service identifiers according to their logical number and to the multiplex which carries them.

Service identifiers are set in accordance with the following rules:

- The [0x0n01; 0x0nEF] interval is allocated to the metropolitan multiplex Rn, except for the multiplex R7 and R8 to which the [0x0A01; 0x0A0F] and [0x0B01; 0x0B0F] intervals are respectively allocated. For example, the services of the multiplex R1 have service identifiers that range from 0x0101 to 0x01EF.

- The [0x2n01; 0x2nEF] interval is allocated to the multiplex OMn of the French overseas departments and territories. For example, the services of the multiplex OM1 have service identifiers that range from 0x2101 to 0x21EF.
- Download services use service identifiers that range from 0x0nF0 to 0x0nFF, n representing the number of the multiplex carrying the download service, except for the multiplex R7 and R8.

8.4.5 CELL_ID

A cell identifier (*cell_id*) is notified in the TPS carriers of the OFDM signal. It shall be identical for all the transmitters of a SFN plate. A unique cell identifier is allocated to each multiplex. The values of the cell identifier are allocated to each national metropolitan multiplex. They are described in Table 27.

If the cell identifier is not notified, it shall be set to the default value 0 in the DVB-T signal.

Table 27 : Values of the cell identifier for each multiplex operator

Operator	Cell identifier (decimal value)
R1	Variable ⁶
R2	2
R3	3
R4	4
R5	5
R6	6
R7	7
R8	8

8.5 OVERVIEW OF SOME SPECIFIC DESCRIPTORS USED ON THE DTT

8.5.1 SERVICE_TYPE

The services available on the DTT network are referenced in the SDT actual (Section 8.3.4) which is broadcast on each multiplex. Table 28 lists the types of service that are used depending on the service's nature.

Table 28: Service type on the DTT (SDT)

Type of service on the DTT	Coding	Service_type ¹				
		0x01	0x16	0x19	0x0C	0x02
Unscrambled metropolitan SD service	MPEG-2	X				
Encrypted metropolitan service (SD/HD) with unscrambled SD time slots	MPEG-4 part 10 MPEG-2	X				
Encrypted metropolitan SD service without unscrambled time	MPEG-4 part 10	X	X			

⁶ The detail of the values for the multiplex R1 is available by the Technology Division of the Conseil Supérieur de l'Audiovisuel (email: cten@csa.fr).

slots						
Unscrambled or encrypted French overseas SD service	MPEG-4 part 10		X			
Unscrambled metropolitan SD service*	MPEG-4 part 10	X		X		
Unscrambled French overseas SD service	MPEG-4 part 10			X		
Encrypted HD service with or without unscrambled HD time slots	MPEG-4 part 10	X		X		
Data service (downloading for example)					X	
Audiovisual media-on-demand service by radio-relay download					X	
All television service		X				
¹ service_type is a field of the service descriptor						

(*) When an HD service has a logical number lower than some SD services in MPEG-2, the service type of HD service is equal to 0x19.

8.5.2 LOGICAL_CHANNEL_DESCRIPTOR

The logical channel number (`logical_channel_number`, LCN) is assigned to each service enabling the service presentation and selection. This number is uniquely linked to one service or to a set of services that are gathered into a television channel for example. The logical channel numbers are assigned by the Conseil Supérieur de l’Audiovisuel.

The third paragraph of the article 2 of the terminal decree [12] precises that “*excepting specific intervention of the user, reception terminals [...] order the services according to their logical number*”. This default arrangement of the channels by the terminals is set thanks to the private logical channel descriptor (`logical_channel_descriptor()`) that links a logical channel number to each service. This descriptor shall be inserted in the NIT (Section 8.3.3) for each multiplex.

This descriptor is not standardized by DVB. This private descriptor is defined by DigitalEurope (previously EICTA and inherited from the EACEM). Its structure is defined in the IEC/CENELEC 62 216 [7] specification. DVB has described how to integrate this descriptor in the signalling. It shall be set after a private data specifier descriptor (`private_data_specifier_descriptor()`), which is localized in the same descriptor loop and whose the private data specifier field (`private_data_specifier`) is equal to 0x00000028 (value allocated by DVB to DigitalEurope).

The private `logical_channel_descriptor()` may appear more than one time in a second-level loop in the NIT.

Logical channel number identifiers included in the private logical channel descriptor associated to each service of the network, enable the terminal to present in a user-friendly manner the program’s numbers in the displayed service’s list.

Table 29 : Logical channel descriptor ()

Syntax	Number of bits	Identifier
<code>logical_channel_descriptor () {</code>		

descriptor_tag	8	uimsbf
descriptor_length	8	uimsbf
for (i=0 ;i<N ;i++) {		
service_id	16	uimsbf
visible_service_flag	1	Bslbf
reserved	5	
logical_channel_number	10	uimsbf
}		

This descriptor has the following syntax:

descriptor_tag: identifies the descriptor with the value 0x83.

service_id: identifies the service in the multiplex.

visible_service_flag: not used.

logical_channel_number: logical number of the service.

The law gives jurisdiction to the Conseil Supérieur de l'Audiovisuel to organize the logical numbering of the television services that are broadcast by the radio-relay channel. The decisions of the CSA about the logical numbering allocation are published in the Official Journal of the French Republic (www.journal-officiel.gouv.fr). For information, this numbering is resumed as following:

- 1 - TF1
- 2 - France 2
- 3 - France 3
- 4 - Canal+
- 5 - France 5
- 6 - M6
- 7 - Arte
- 8 - D8
- 9 - W9
- 10 - TMC
- 11 - NT1
- 12 - NRJ 12
- 13 - La Chaîne parlementaire Assemblée nationale /Public Sénat
- 14 - France 4
- 15 - BFM TV
- 16 - I-Télé
- 17 - D17
- 18 - Gulli
- 19 - France Ô
- 20 - HD1
- 21 - L'Equipe HD
- 22 - 6Ter
- 23 - NUMERO 23

- 24 – RMC Découverte
- 25 – Chérie 25
- 30 to 38 – regional or local channels, supplementary regional variations of France 3,
- 41 – Paris Première
- 42 – Canal+ Sport
- 43 – Canal+ Cinéma
- 45 – Planète+
- 46 – TF6
- 48 – LCI
- 49 – Eurosport France
- 51 – TF1 HD
- 52 – France 2 HD
- 56 – M6 HD
- 57 – Arte HD

Logical numbers for the DTT in the French overseas departments and territories are:

- 1 – Department/COM 1^{ère}⁷,
- 2 – Local 1 or France 2 depending on the department or on the COM⁸,
- 3 – Locale 2 or France 2 or France 3 depending on the department or on the COM,
- 4 – France 2 or France 3 or France 4 depending on the department or on the COM,
- 5 – France 3 or France 4 or France 5 depending on the department or on the COM,
- 6 – France 4 or France 5 or France Ô depending on the department or on the COM,
- 7 – France 5 or France Ô or Arte depending on the department or on the COM,
- 8 – France Ô or Arte or France 24 depending on the department or on the COM,
- 9 – Arte, France 24 or Local 1 for some department or COM,
- 10 – France 24 or Local 2 for some department or COM,
- 11 – Locale 3.

8.5.3 HD_SIMULCAST_LOGICAL_CHANNEL_DESCRIPTOR

This descriptor (`HD_simulcast_logical_channel_descriptor()`) is used when an HD television service is broadcast likewise in SD. It follows the syntax of the logical channel descriptor and enables to specify some changes in channel numbering in the service plan that are taken into account by receptors HD only (see Table 30).

It enables to:

- Define a logical number of an HD service to set it in place of its SD version.
- Change the logical number of an SD service to set it in place of its HD version.

This descriptor is not standardized by DVB. This private descriptor is defined by DigitalEurope (previously EICTA and inherited from the EACEM). Its structure is defined in the IEC/CENELEC 62 216 [7] specification. DVB has described how to integrate this descriptor in the signalling. It shall be set after a private data specifier descriptor (`private_data_specifier_descriptor()`), which is localized in the same descriptor loop

⁷ Saint-Pierre et Miquelon 1^{ère}, Guadeloupe 1^{ère}, Martinique 1^{ère}, Guyane 1^{ère}, Réunion 1^{ère}, Wallis-et-Futuna 1^{ère}, Polynésie 1^{ère}, Nouvelle Calédonie 1^{ère}, Mayotte 1^{ère}.

⁸ French overseas collectivities

and whose the private data specifier field (`private_data_specifier`) is equal to 0x00000028 (value allocated by DVB to DigitalEurope).

In [3] is notified that the private data specifier (`private_data_specifier`) enables to identify all private descriptors that follow in the same loop until the next private data specifier or until the end of the loop. Because of the private data specifier value 0x00000028 enables to identify both the logical channel descriptor and the HD simulcast logical channel descriptor, the use of the HD simulcast logical channel descriptor requiring the use of the logical channel descriptor, there is consequently only one occurrence of the private data specifier descriptor per loop.

Table 30: HD simulcast logical channel descriptor ()

Syntax	Number of bits	Identifier
HD_simulcast_logical_channel_descriptor(){		
descriptor_tag	8	uimsbf
descriptor_length	8	uimsbf
for (i=0;i<N;i++){		
service_id	16	uimsbf
Visible_service_flag	1	bslbf
reserved	5	bslbf
logical_channel_number	10	uimsbf
}		
}		

This descriptor has the following syntax:

descriptor_tag: identifies the descriptor with the value 0x88.

service_id: identifies the service in the multiplex.

visible_service_flag: not used.

logical_channel_number: logical number of the service.

Conditions of use: this descriptor enables to identify the SD and the HD services in simulcast whose respective logical numbers should be exchanged, according to the abilities of the receiver and to the respective reception quality of both versions. The viewer can find on the usual service number the best version that his receiver can use. For instance, SD services should be replaced by their HD version when it is for the betterment of the viewer. It implies that substitution is not systematic and shall be made only under specific conditions (see Appendix A):

- The receiver is able to display HD services;
- The HD service is available and is received with satisfactory quality;
- Both services are identified as having to be substituted: they belong to the same network and have a coherent LCN-HD_simulcast_LCN pair).

As part of this signalling profile, for a service that is present under both SD and HD versions, this descriptor shall be used combined with a logical channel descriptor for each version of

the service. For both SD and HD versions of a service, the HD simulcast LCN of the SD version shall correspond to the LCN of the HD version and vice versa. The logical channel number of the HD version is necessarily greater than the LCN of the corresponding SD version.

8.5.4 PARENTAL_RATING_DESCRIPTOR

To enable the implementation of protection measures for young audiences, the parental rating descriptor (`parental_rating_descriptor()`) indicates the category of each program, according to the CSA descriptive labels, in the corresponding EIT as defined in Section 6.2.28 of the EN 300 468 Standard [2].

The broadcasting of this descriptor is **mandatory** as part of this signalling profile. The matching between the CSA descriptive labels and the rating field of the descriptor is presented in the Table 31).

Table 31: Morality levels

Program category	Explanation	Rating field of the parental rating descriptor
I	All audiences	Set to 0x00
II	Not recommended for children under 10	Set to 0x07
III	Not recommended or forbidden in theaters for children under 12	Set to 0x09
IV	Not recommended or forbidden in theaters for children under 16	Set to 0x0D
V	Not recommended or forbidden in theaters for children under 18	Set to 0x0F

8.5.5 ISO_639_LANGUAGE_DESCRIPTOR

The ISO-639 language descriptor (`ISO_639_language_descriptor()`) is used to specify the language of the audio component (see Table 32).

Table 32: ISO-639 language descriptor ()

Syntax	Number of bits	Identifier
<code>ISO_639_language_descriptor(){</code>		
<code>descriptor_tag</code>	8	uimsbf
<code>descriptor_length</code>	8	uimsbf
<code>for (i=0 ; i < N ; i++){</code>		
<code>ISO_639_language_code</code>	24	bslbf
<code>audio_type</code>	8	bslbf
<code>}</code>		
<code>}</code>		

ISO_639_language_code: identifies the selected language. The ISO-639 language code contains a 3-character code as specified by the ISO 639-2 standard. Each character is coded on 8 bits according to the ISO 8859-1 and inserted in a 24-bit field.

audio_type: coded on 8 bits, it specifies the stream type (see Table 33).

Table 33 : Audio type values

Value	Description
-------	-------------

0x00	Undefined
0x01	Listening effect
0x02	Stream for the hearing-impaired
0x03	Stream for the partially sighted
0x04-0xFF	Reserved

8.5.6 SUPPLEMENTARY_AUDIO_DESCRIPTOR

The supplementary audio descriptor (`supplementary_audio_descriptor()`) gives some additional information about the audio streams enabling the receiver to present the audio stream expected by the viewer (see Table 34).

Table 34 : Supplementary audio descriptor ()

Syntax	Number of bits	Identifier
<code>supplementary_audio_descriptor(){</code>		
<code>descriptor_tag</code>	8	uimsbf
<code>descriptor_length</code>	8	uimsbf
<code>descriptor_tag_extension</code>	8	uimsbf
<code>mix_type</code>	1	uimsbf
<code>editorial_classification</code>	5	uimsbf
<code>reserved</code>	1	uimsbf
<code>language_code_present</code>	1	uimsbf
<code>if (language_code_present == 1) {</code>		
<code>ISO_639_language_code</code>	24	bslbf
<code>}</code>		
<code>for (i=0;i<N;i++){</code>		
<code>private_data_byte</code>	8	uimsbf
<code>}</code>		
<code>}</code>		

This descriptor has the following syntax:

descriptor_tag: identifies the descriptor with the value 0x06.

mix_type: this 1-bit field indicates if the audio stream is a supplementary audio stream that should be mixed with another audio stream.

editorial_classification: this 5-bit field indicates the editorial nature of the audio stream (see Table 35).

Table 35: Editorial classification codes

Editorial classification	Description
00000	Main audio (contains all components of the main audio and can be individually presented or mixed with the supplementary audio stream).
00001	Audio description for the blind or for the partially sighted people (contains an oral descriptor of the visual content of the service).
00010	Audio for the deaf or for the hearing-impaired people (the dialogue is

	set on the central channel).
00011	Spoken subtitles for the partially sighted people (contains the main audio with a spoken interpretation of the subtitles).
00100 à 10111	Reserved for a future use.
11000 à 11111	Defined by the editor.

language_code_present: this 1-bit field indicates if the ISO-639 language code is present or missing.

ISO_639_language_code: this 24-bit field indicates the language of the audio.

8.5.7 AC3_DESCRIPTOR AND E_AC3_DESCRIPTOR

This advanced signalling enables the receiver to make a distinction between the 2.0 and 5.1 audio streams which use the same codec and the same language code. In the PMT, the AC3 descriptor and the E-AC3 descriptor include an optional component type (`component_type`) field that enables to describe the stream type (stereo, multichannel, audio description). The component type flag (`component_type_flag`) takes the value of 1 to notify the presence of the component type field.

The component type is coded on 8 bits and takes values according to the audio coding as specified in Table 36.

Table 36: Values of the component type field for audio components coded in AC3 or in E-AC3

Codec	Stream type	Component type
AC3	2.0	01000010
E-AC3	2.0	11000010
AC3	5.1	01000100
E-AC3	5.1	11000100

For audio description, the values of the component type field are presented in Table 37.

Table 37: Values of the component type field for audio description components coded in AC3 or in E-AC3

Codec	Stream type	Mixing	Component type
AC3	Mono	Receiver-mix	00010000
E-AC3	Mono	Receiver-mix	10010000
AC3	2.0	Broadcaster-mix	01010010
E-AC3	2.0	Broadcaster-mix	11010010
AC3	5.1	Broadcaster-mix	01010100
E-AC3	5.1	Broadcaster-mix	11010100

8.5.8 SUBTITLING_DESCRIPTOR

When some subtitles are broadcast, this descriptor (`subtitling_descriptor()`) is declared in the PMT of the service including these subtitles (see Table 38).

Table 38: Subtitling descriptor ()

Syntax	Number of bits	Identifier
subtitling_descriptor(){		
descriptor_tag	8	uimsbf
descriptor_length	8	uimsbf
for (i=0 ;I<N ;I++){	8	uimsbf
ISO_639_language_code	24	bslbf
subtitling_type	8	bslbf
composition_page_id	16	bslbf
ancillary_page_id	16	bslbf
}		
}		

This descriptor has the following syntax:

descriptor_tag: identifies the descriptor with the value 0x59.

ISO_639_language_code: this 24-bit field identifies the language of the subtitles stream.

subtitling_type: this 8-bit field gives information about the subtitles content, namely if the subtitles stream is intended for the deaf or hard-of-hearing.

8.5.9 COMPONENT_DESCRIPTOR

The component descriptor identifies the stream type of the component and may be used to provide a literal description of the elementary stream (see Table 39).

Table 39 : Component descriptor ()

Syntax	Number of bits	Identifier
component_descriptor(){		
descriptor_tag	8	uimsbf
descriptor_length	8	uimsbf
reserved_future_use	4	bslbf
stream_content	4	uimsbf
component_type	8	uimsbf
component_tag	8	uimsbf
ISO_639_language_code	24	bslbf
for (i=0; i<N; i++){		
text_char	8	uimsbf
}		
}		

stream_content: this 4-bit field specifies the stream type (video, audio, data).

component_type: this 8-bit field specifies the type of video, audio or data.

ISO_639_language_code: this 24-bit field identifies the language of the component (for audio or data) or the literal description that may be contained in this descriptor. The ISO-639

language code is coded on 3 characters as specified in the ISO 639-2 (ISO 639-2/B or ISO 639-2/T). Each character is coded on 8 bits and is inserted in a 24-bit field.

text_char: this field is coded on 8 bits. A set of “text_char” fields specifies the literal description of the component.

8.5.10 MAXIMUM SIZES OF FIELDS AND OF CHARACTER STRINGS

The Table 40 indicates the recommended maximal size of the main fields included in the signalling depending on the typical displaying capacities of the receiver.

Table 40: Recommended maximum sizes of the literal fields in the signalling

Name of the field	Maximum size as recommended in France	Maximum size as recommended in IEC 62216 [7]
Network Name	24	24
Service Provider Name	20	20
Full Service Name	16	32
Short Service Name	Not used	8
Event Name	25	40
Short Event Description	200	200
Extended Event Description	255	3984
Content Description	32	nc
Component Description	32	32

APPENDIX A. USE OF THE SIGNALLING BY THE TERMINALS – FOR INFORMATION PURPOSES

This appendix describes how a reception terminal may perform. It does not have any prescriptive value.

A.1 TERMINAL INSTALLATION

The DTT broadcasting presents specificities, especially the variation of the coverage area according to the multiplex and to the transmitting stations of the network as well as the local service signalling. In order to efficiently take into account these specificities, the terminal is able to implement an adapted installation procedure.

The proposed installation strategy is based on a tuning of the frequency band and on the broadcast signalling extraction and analysis.

When the terminal is switched on, it tunes the whole frequency band.

This scanning applies a 166 kHz-frequency offset and eventually a null-frequency offset and a -166 kHz-frequency offset.

For each detected and reachable digital multiplex, the terminal records:

- The broadcast frequency of the multiplex,
- The description of the services that are carried by this multiplex (SDT) by eventually excluding the non-supported service types.

The service list is found by the terminal as follows:

- It takes into account the logical number of the defined services (`logical_channel_descriptor()` in the NIT).
- An HD terminal takes into account the information about the service number substitution between SD and HD versions of a channel (provided by the HD simulcast logical channel descriptors). This operation should be undertaken only for the channels whose HD version is correctly received by the terminal. The following mechanism is recommended:
 - Tuning and storage of the information about all received channels.
 - Identification of HD channels (service type and/or test on the video component)
 - For HD channels with an HD simulcast LCN, find the corresponding SD channels.
 - The SD and the HD versions of a channel are hence substituted only under the following conditions:
 - The HD channel is received in good conditions. For example, the Bit-Error-Rate (BER) of the HD channel after the Viterbi decoding is below $2 \cdot 10^{-4}$, corresponding to the “quasi error free” mode.
 - The LCN of the SD channel corresponds to the HD simulcast LCN of the HD channel. The HD simulcast LCN of the SD channel corresponds to the LCN of the HD channel.

- The SD channel and the HD channel belong to the same network (same `network_identifier`).
 - The channels of the French DTT network without a service number provided by the signalling are set at the end of the service plan.
 - The channels of other networks come next.

It extracts the EIT corresponding to the services which are actually reachable.

Services with the same service identifier but on different frequencies are not put in the service list. The SDT enables to confirm their identities (via the service name) and the terminal can select one service thanks to its better reception quality.

The terminal uses information about date and time carried by the TDT and by the TOT to initialize its clock.

A.2 BEHAVIOR IN CASE OF CONFIGURATION'S CHANGE

The terminal detects any configuration's change in a transparent way for the user. It uses the cross-signalling which is present in each multiplex of the network by monitoring the version number of the tables.

The terminal detects a change by observing the NIT Actual Delivery System, the SDT Actual Transport Stream, the EIT Actual Transport Stream and The EIT Other Transport Stream.

Any increase (including a return to 0) of the version number of a table leads the terminal to process the table and to update its stored information.

If the terminal detects a new network or any change in the structure of an existing network (number of multiplex, frequency list...), it makes a frequency tuning and it updates the service list. This tuning may be made immediately after the detection and with the user's agreement or it may be postponed (during standby for example).

If the terminal detects the removal of a network, it does not delete the corresponding services from the service list without the user's agreement.

Any service's change is detected by the terminal by observing the SDT Actual Transport Stream. Any permanent change leads to update the corresponding information which is stored in the terminal, and eventually to update the service list.

A.3 INCORRECT SI PROCESSING

The broadcast signalling conforms to the specifications in [1] and [2] and to the recommendations which are described in this document.

If the signalling does not conform to these specifications, the terminal implements a strategy to limit the effects of this noncompliance.

It stores the following information:

- The current network description (NIT Actual Delivery System),

- The description of the services which are broadcast on this network (SDT Actual and Other Transport Stream).

The noncompliance may be:

- Some signalling sub-tables are missing in the multiplex:
 - The terminal uses stored sub-tables.
 - It considers them as valid and uses them, i.e. their version corresponds to the current network configuration.
 - If the terminal cannot browse these tables (their version is obsolete for example), the failure is notified to the user by displaying a message on the screen.
- Incoherence between the broadcast signalling sub-tables, for example between the service lists of the NIT and those of the SDTs of the multiplex:
 - Since the terminal constantly monitors the NIT of the current network, it can check the coherence between tables and display only the services present in both tables.
 - The terminal checks the relevance of EIT information (coherence between the start time and the duration of the described events in relation to the internal clock).
- Some signalling sub-tables are incorrect (for example, a CRC is wrong):
 - It is equivalent to the case that some sub-tables are missing.
- Broadcast characteristics of the signalling sub-tables are out of range (too large repetition frequency, discontinuity in or too frequent change of version number):
 - The terminal should not be disturbed.

APPENDIX B. SIGNALLING OF DOWNLOAD SERVICES IN EXTENDED PROFILE – FOR INFORMATION PURPOSES

B.1 IDENTIFICATION OF SERVICE(S) CARRYING AN UPDATE

A specific signalling has been designed in [10] enabling to precisely target terminals which should be updated and to control the way in which these terminals update their software. This signalling uses an Update Notification Table (UNT).

A 0x09-type `linkage_descriptor()` is present in the NIT⁹. It points at the PMT in which the update service is referenced. This `linkage_descriptor()` contains the DVB generic OUI which is common to all the makers. The terminal shall follow the `linkage_descriptor()` to access the information that is useful later in the SSU mechanism (UNT, data carousel...).

In order to be able to locate the NIT which contains this 0x09-type `linkage_descriptor()` (if it is not present in all the NITs), a 0x0A-type specific `linkage_descriptor()` has been defined. The aim is to avoid scanning all multiplex to find the update service(s): the terminal has a direct access to the target NIT. This `linkage_descriptor()` does not contain any information relative to makers in order to have the smallest size as possible.

When a terminal has found a suited update service via the NIT, it analyses the PMT which contains a `data_broadcast_id_descriptor()` (0x000A). This PMT may either directly point at a data carousel or at a UNT. The UNT contains all the additional information that will help to describe the update, its parameters and its conditions if relevant.

For the DTT, this table also enables:

- To optimize the use of the available frequency band by enabling terminal update by night when the broadcasting of some programs is stopped,
- To perform updates on previously defined times,
- To reduce the update's duration by limiting the number of updates which are simultaneously broadcast: the bandwidth is shared into time slots by means of a "scheduling",
- To inform and explain the updates' effects via some messages.

Figure 2 describes the SSU signalling. In this example, a 0x0A-type `linkage_descriptor()` refers to the multiplex which carries the NIT-SSU. This NIT contains a 0x09-type `linkage_descriptor()` whose DVB OUI is 0x00015A. In the PMT, a `data_broadcast_id_descriptor()` (0x000A) notifies the UNT corresponding to the desired maker. The UNT contains the update's parameters (hardware and software versions, update's type, messages for the user...). The terminal then finds the carousel by the `location_descriptor()` and its tag in the PMT. If a deferred association tag is used, the carousel may be in another multiplex. The carousel may be moved as required (according to the available bandwidth); only the PMT should be updated. Several carousels may be

⁹ The standard allows putting a linkage descriptor in the NIT or in the BAT. Choosing the BAT can be useful for satellite television to distinguish between television bouquets from different countries. On the DTT, the NIT is preferred due to its mandatory broadcast on each multiplex.

referenced according to the models/makers. In order to monitor the version's changes more easily, the terminal does not need to regularly analyze the UNT but should monitor the version's number only. An update leads to a change in the UNT and in its version number; the last change leads to change the PMT's `data_broadcast_id_descriptor()` and the PMT's version number. Monitoring the version number of the PMT enables to detect a change and to analyze the new PMT. The same analysis mechanism done in the opposite order enables to take into account a new update.

The Section 9.2 in the document TS 102 006 [10] describes in detail the fields which are used in the PMT and in the UNT as well as their interpretation.

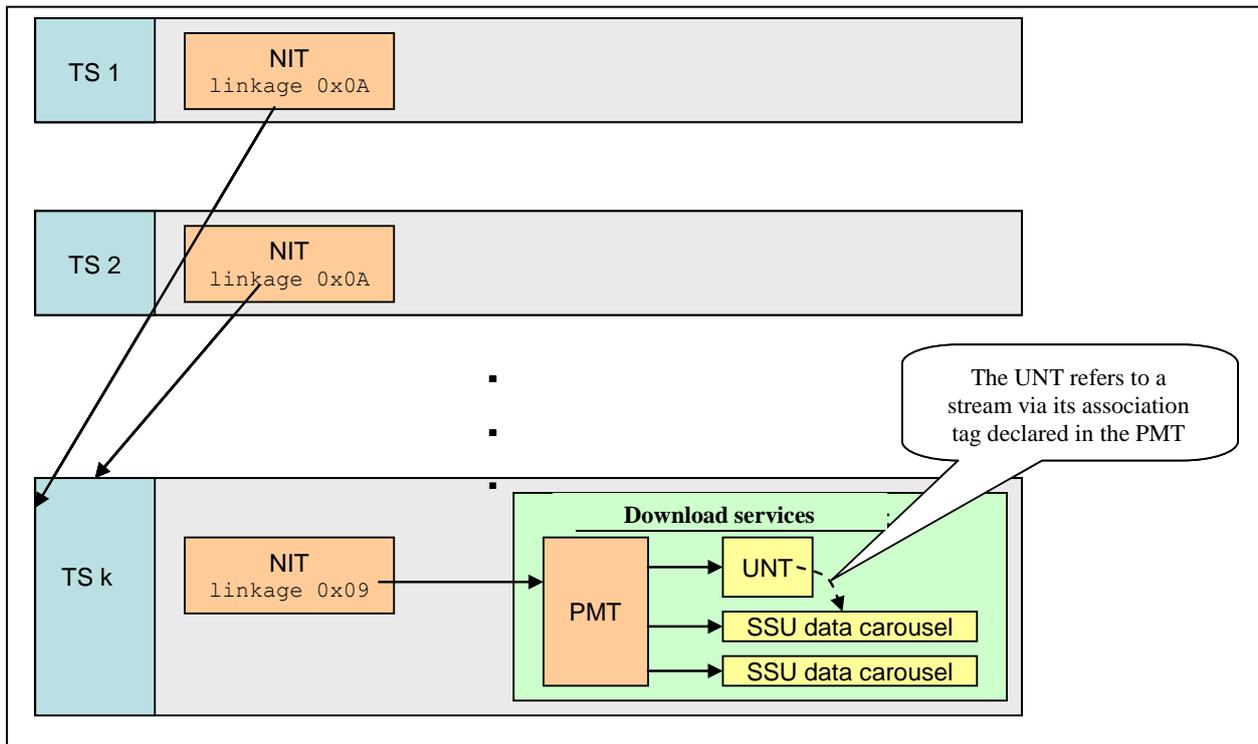


Figure 2: DVB SSU update in extended mode

B.2 INTEROPERABILITY

The DVB SSU standard in extended profile contains several recommendations concerning the minimal set of options that the terminal and the operators should implement to enable interoperability between terminals and networks. As specified in the standard DVB TS 102 06 [10] (Section 9.8), it is mandatory to implement the following descriptors in the UNT:

- `SSU_location_descriptor()`,
- `SSU_subgroup_association_descriptor()`,
- `scheduling_descriptor()`,
- `private_data_specifier_descriptor()`.

It is mandatory to implement:

- **The** `update_descriptor()`,
- **The** `message_descriptor()`,

In order to

- Inform the user about the purpose and the consequences of his agreement or rejection of the update;
- Manage the type of update (mandatory, optional, with or without agreement).

Some dispensations could be exceptionally granted if some changes in the NIT are indispensable.

APPENDIX C. SIGNALLING OF HBBTV INTERACTIVE APPLICATIONS – FOR INFORMATION PURPOSES

An HbbTV interactive application consists of a set of files whose format may be CE-HTML, javascript or image. These files describe what is displayed on the screen and how the application behaves when the user takes action with his remote control.

Two transport modes can be implemented for an HbbTV interactive application:

1. “Broadcast mode”: the entire arborescence of the application (files and directories) is broadcast on the radio-relay network. It uses a specific DSM-CC Object Carousel protocol enabling the cyclic broadcasting of the files and carried on a dedicated component. The Stream Event Objects (lightweight and quickly inserted) may be used to accurately synchronize the interactive data with the video and audio components.
2. “Broadband mode”: available when the terminal is connected to the Internet, the application is available from a server address. The terminal connects to the server to download the application.

The AIT specifically notifies an interactive application linked to a television service. The table gives information about the interactive application such as its name, its status (visible, automatically started, to remove), a link to the data broadcast in object carousel, a link to a web server (<http://...>).

Initializing an HbbTV interactive application on a DTT receiver is set in conformity with the following general principles:

- The application can be loaded through the AIT. The last is reachable through the PMT of the service. When the user selects a channel, the DTT-HbbTV receiver detects and analyses the AIT. If it should restart an interactive application, the receiver extracts information about the transport mode of the application (broadcast or broadband) and loads the application’s content on the specific transport channel.
- If the interactive application is broadcast, the application’s data are broadcast according to the DSM-CC Object Carousel protocol on one or several components. This protocol is based on a cyclic broadcasting of the data enabling the user to access to the application whenever he zaps to a channel that supplies interactivity. The application starts to execute when the content of the carousel with the main data has been loaded.

When one or several HbbTV interactive applications are linked to a service, its signalling is changed:

- Change of the PMT (see Section 5.6.1)
- Addition of the component of the AIT (see Section 5.6.2)
- Possibly addition of one or several HbbTV data components. (see Section 5.6.3)

C.1 DESCRIPTION OF HBBTV INTERACTIVE APPLICATIONS

The AIT contains a first descriptor loop which is common to all the interactive applications of the service. A second descriptor loop is specific to each application with the following fields:

- The `organization_id` and the `application_id` uniquely identify the application. The values of the `organization_id` are allocated by the DVB Consortium.
- The `application_control_code` enables to control the life cycle of the application. For example, the following values are possible:
 - AUTOSTART (0x01): the application loads on the receiver and is automatically run;
 - PRESENT (0x02): the application loads on the receiver without being run;
 - KILL (0x04): the application which is broadcast and run on the receiver shall stop and shall be removed from the memory of the receiver.
- The `application_priority` is included in the application descriptor and takes a value from 1 to 255 (1 corresponds to the lowest priority level).
- The `visibility` specifies if the user can see the application or not. It is included in the application descriptor.

The scenario of broadcasting an HbbTV application is the following:

	Description	AIT
HbbTV portal	The portal is the only broadcast application	<u>Application 1</u> { application_name_char = 'portail' application_priority = 1 visibility = 1 application_control_code = AUTOSTART }
Context application + HbbTV portal	The ongoing broadcast program proposes a dedicated application while integrating a link to the portal	<u>Application 1</u> { } + <u>Application 2</u> { application_name_char = 'application contexte' application_priority = 10 visibility = 1 application_control_code = AUTOSTART }
Alert application + Context application + HbbTV portal	This configuration can be considered in several ways: Case n°1: the application is notified in the service only when the alert is received. Case n°2: the application is permanently notified in the service with a high priority. When the alert is received, the status of the application (application control code) changes from PRESENT to	<u>Application 1</u> { } + <u>Application 2</u> { } + <u>Application 3</u> { application_name_char = 'application alerte' application_priority = 150 (cases n°1 and n°2) visibility = 1 or (case n°3) visibility = 0 → 1

	<p>AUTOSTART.</p> <p>Case n°3: the application is permanently notified in the service with a high priority and an AUTOSTART status but does not display anything. When the alert is received, a Stream Event is sent to enable the display of the application.</p>	<p>(cases n°1 and n°3)</p> <pre>application_control_code = AUTOSTART or (case n°2) application_control_code = PRESENT → AUTOSTART }</pre>
--	---	---

APPENDIX D. EXAMPLE OF A MECHANISM OF SD/HD NUMBERING

D.1 CASE 1: HD SIMULCAST AND HD/SD COUPLE STORAGE

The numbering of the HD channels in simulcast is the same as the corresponding SD channels. However, the HD channels are visible at the end of the list for SD receivers (for promotion) and the SD channels are visible at the end of the list for HD receivers (if the quality of the HD signal decreases).

For the last, an HD receiver uses the `HD_simulcast_logical_channel_descriptor()` to describe the HD/SD service's substitutions and to describe the place of the SD services.

```

logical_channel_descriptor {
    service_id = X 1; LCN = 1; // TF1
    service_id = X 2; LCN = 2; // France 2
    service_id = X 3; LCN = 3; // France 3
    service_id = X 4; LCN = 4; // Canal+
    service_id = X 5; LCN = 5; //France 5
    service_id = X 6; LCN = 6; //M6
    .....
    service_id = X 51; LCN = 51; // TF1 HD
    service_id = X 52; LCN = 52; // France 2 HD
    service_id = X 56; LCN = 56; // M6HD
}

HD_simulcast_logical_channel_descriptor {
    service_id = X 51; LCN = 1; // TF1 HD
    service_id = X 52; LCN = 2; // France 2 HD
    service_id = X 56; LCN = 6; // M6HD
    service_id = X 1; LCN = 51; // TF1
    service_id = X 2; LCN = 52; // France 2
    service_id = X 6; LCN = 56; //M6
}

```

Figure 3: SD/HD simulcast signalling of the channels TF1, France 2 and M6

An SD receiver does not interpret the `HD_simulcast_logical_channel_descriptor()` and displays the following service plan:

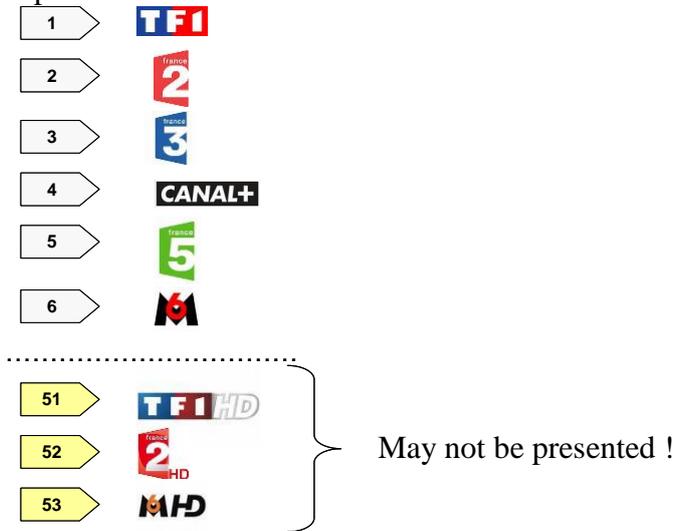


Figure 4: SD service plan

The HD channels could not be presented at all if they would be signaled with a `service_type=0x19` and if the terminal could not interpret this value of `service_type`.

An HD receiver interprets the `logical_channel_descriptor()` and the `HD_simulcast_logical_channel_descriptor()` and displays the following service plan:

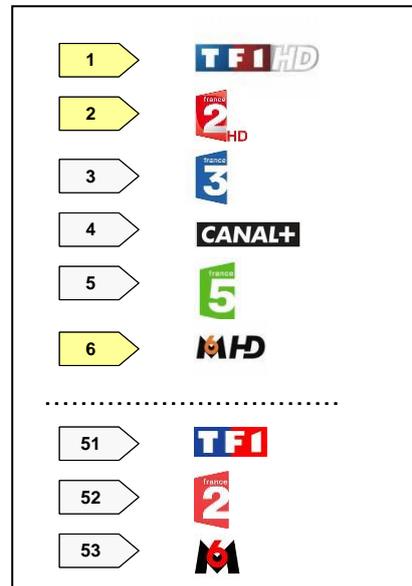


Figure 5: HD service plan

When HD programs have a bad reception quality, the user receives only SD services.

D.2 CASE 2: SPECIFIC HD CHANNELS WITHOUT SIMULCAST

The numbering of the HD channels which are in simulcast with SD channels is the same as the respective SD channel. The standalone HD channels have a specific number.

In such a case, the `HD_simulcast_logical_channel_descriptor()` is not used. Only the substitutions between the HD/SD services are described for the HD receivers. The `logical_channel_descriptor()` enables to order the HD channels which are not a simulcast of an SD channel.

```

logical_channel_descriptor {
    service_id = X1; LCN = 1; // TF1
    service_id = X 2; LCN = 2; // France 2
    service_id = X 3; LCN = 3; // France 3
    service_id = X 4; LCN = 4; // Canal+
    service_id = X 5; LCN = 5; //France 5
    service_id = X 6; LCN = 6; //M6

    .....

    service_id = X 20; LCN = 20; //HD1
    service_id = X 21 ;LCN = 21; //L'Equipe HD
    service_id = X 22 ;LCN = 22; //6Ter
    service_id = X 23; LCN = 23; //TVous
    service_id = X 24 ;LCN = 24; //RMC Découverte
    service_id = X 25; LCN = 25; //ChérieHD

    .....

    service_id = X 51; LCN =51; // TF1 HD
    service_id = X 52; LCN =52; // France 2 HD
    service_id = X 56; LCN =56; // M6HD
}

HD_Simulcast_logical_channel descriptor {
    service_id = X 51; LCN =1; // TF1 HD
    service_id = X 52; LCN =2; // France 2 HD
    service_id = X 56; LCN =6; // M6HD
    service_id =X1; LCN = 51; // TF1
    service_id = X 2; LCN =52; // France 2
    service_id = X 6; LCN =56; //M6
}

```

Figure 6: HD channels which not simulcasts of SD channels

An SD receiver does not interpret the `HD_simulcast_logical_channel_descriptor()` and displays the following service plan:

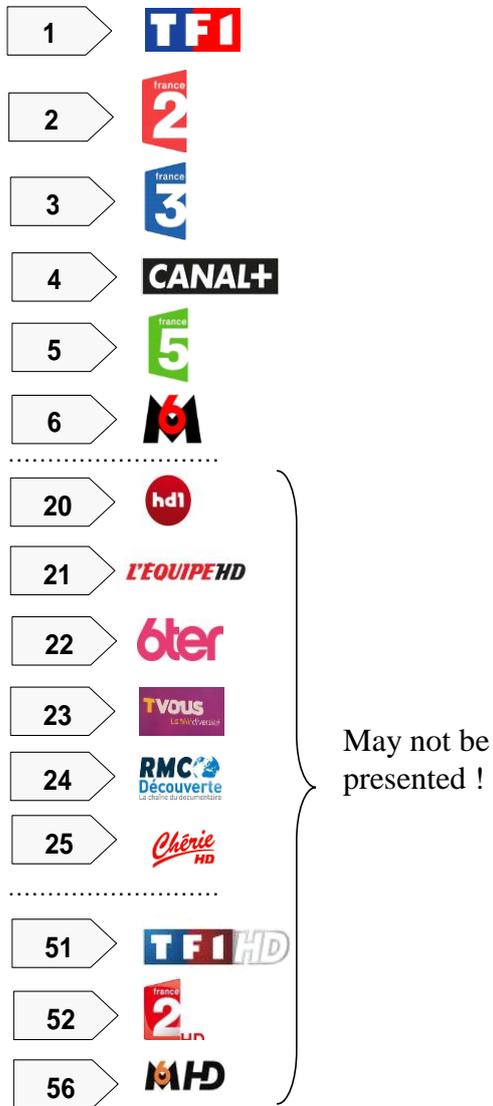


Figure 7: SD service plan

An HD receiver interprets the `logical_channel_descriptor()` and the `HD_simulcast_logical_channel_descriptor()` and displays the following service plan:

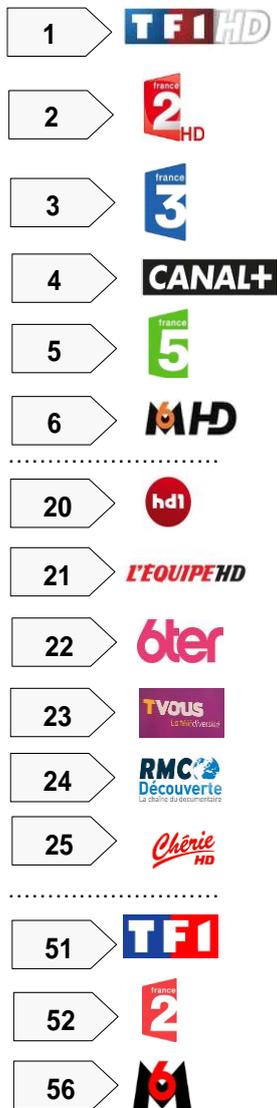


Figure 8: HD service plan

APPENDIX E. SERVICE_ID ALLOCATED TO METROPOLITAN TELEVISION SERVICES

Table 41: Service identifiers of French metropolitan television services

service_name	service_id
Multiplex R1	
France 2	0x0101
France 5	0x0104
La Chaîne Parlementaire Assemblée nationale/Public Sénat	0x0106
France 3(*)	0x0110
France 3(**)	0x0111, 0x0112, 0x0113, 0x0115, 0x0119, 0x011A, 0x011F, 0x0120, 0x0124
France 3 (***)	0x0145, 0x0146
France 3 (****)	0x0143, 0x0144
Local channel n°30	0x0170
Local channel n°31	0x0171
Local channel n°32	0x0172
Local channel n°33	0x0173
Local channel n°35	0x0175
Local channel n°36	0x0176
Local channel n°37	0x0177
Local channel n°38	0x0178
France Ô	0x0105
ATH downloading	0x01FF
Multiplex R2	
D8	0x0201
BFM TV	0x0203
I>Télé	0x0204
D17	0x0205
Gulli	0x0206
France 4	0x0207
ATH downloading	0x02FF
Multiplex R3	
Canal+	0x0301
Canal+ Cinéma	0x0302
Canal+ Sport	0x0303
Planète+	0x0304
ATH downloading	0x03FF
Multiplex R4	
M6	0x0401
W9	0x0402
NT1	0x0403
Paris Première	0x0404
Arte HD	0x0407

service_name	service_id
ATH downloading	0x04FF
Multiplex R5	
TF1 HD	0x0501
France 2 HD	0x0502
M6 HD	0x0503
ATH downloading	0x05FF
Multiplex R6	
TF1	0x0601
NRJ 12	0x0602
LCI	0x0603
Eurosport France	0x0604
TF6	0x0605
TMC	0x0606
Arte	0x0607
ATH downloading	0x06FF
Multiplex L8	
Local channel n°30	0x0801
Local channel n°31	0x0802
Local channel n°32	0x0803
Local channel n°33	0x0804
Local channel n°34	0x0805
France 3 (***)	0x0883
Multiplex R7	
HD1	0x0A01
L'Equipe HD	0x0A02
Chérie 25	0x0A03
ATH downloading	0x0AFF
Multiplex R8	
6Ter	0x0B01
NUMERO 23	0x0B02
RMC Découverte	0x0B03
ATH downloading	0x0BFF

(*) On the satellite only

(**) France 3 numbered 3. Names of regional channels from France 3 to be defined by France 3

(***) France 3 numbered 32. Names of the second or of the third regional variation from France 3 to be defined by France 3

(****) France 3 numbered 33. Names of the second or of the third regional variation from France 3 to be defined by France 3

These tables may change according to any possible multiplex reconfiguration. The accurate multiplex organization is described in the NIT (two files exist, for metropolitan France and for the French overseas departments and territories respectively). These files are available by the Technology Division of the CSA (cten@csa.fr) as well as on the extranet of the CTEN.

APPENDIX F. SERVICE_ID ALLOCATED TO TELEVISION SERVICES IN FRENCH OVERSEAS TERRITORIES AND DEPARTMENTS

Table 42: Service identifiers of television services of the French overseas departments and territories

service_name	service_id
Multiplex OM1 (Wallis and Futuna territories)	
Wallis et Futuna 1 ^{ère}	0x2107
France 2	0x2151
France 3	0x2154
France 4	0x2157
France 5	0x215A
France Ô	0x215D
Arte	0x2161
France 24	0x2164

service_name	service_id
Multiplex OM1 (New Caledonia)	
Nouvelle-Calédonie 1 ^{ère}	0x2106
France 2	0x2151
France 3	0x2154
France 4	0x2157
France 5	0x215A
France Ô	0x215D
Arte	0x2161
France 24	0x2164

service_name	service_id
Multiplex OM1 (Réunion)	
Réunion 1 ^{ère}	0x2102
Antenne Réunion	0x2112
Kréol TV	0x2121
France 2	0x2151
France 3	0x2154
France 4	0x2157
France 5	0x215A
France Ô	0x215D
Arte	0x2161
France 24	0x2164

service_name	service_id
Multiplex OM1 (Mayotte)	
Mayotte 1 ^{ere}	0x2109
France 2	0x2151
France 3	0x2154
France 4	0x2157
France 5	0x215A
France Ô	0x215D
Arte	0x2161
France 24	0x2164
KweziTV	0x2117
Telemante	0x2124

service_name	service_id
Multiplex OM1 (Saint Pierre and Miquelon)	
Saint-Pierre et Miquelon 1 ^{ere}	0x2108
France 2	0x2151
France 3	0x2154
France 4	0x2157
France 5	0x215A
France Ô	0x215D
Arte	0x2161
France 24	0x2164

service_name	service_id
Multiplex OM1 (French Guiana)	
Guyane 1 ^{ere}	0x2101
ATG	0x2111
France 2	0x2151
France 3	0x2154
France 4	0x2157
France 5	0x215A
France Ô	0x215D
Arte	0x2161
France 24	0x2164
KTV	0x2125

service_name	service_id
Simplex (French Guiana)	
Canal CNES CSG	0x2203

service_name	service_id
Multiplex OM1 (Martinique)	
Martinique 1 ^{ère}	0x2103
ATV	0x2113
KMT	0x2122
France 2	0x2151
France 3	0x2154
France 4	0x2157
France 5	0x215A
France Ô	0x215D
Arte	0x2161
France 24	0x2164

service_name	service_id
Simplex (Martinique)	
ZoukTV	0x2201

service_name	service_id
Multiplex OM1 (Guadeloupe)	
Guadeloupe 1 ^{ère}	0x2104
LA UNE Guadeloupe	0x2114
Canal 10	0x2123
France 2	0x2151
France 3	0x2154
France 4	0x2157
France 5	0x215A
France Ô	0x215D
Arte	0x2161
France 24	0x2164

service_name	service_id
Multiplex OM1 (Saint Barthélemy)	
Guadeloupe 1 ^{ère}	0x2104
CARIB'INTV	0x2115
France 2	0x2151
France 3	0x2154
France 4	0x2157
France 5	0x215A
France Ô	0x215D
Arte	0x2161
France 24	0x2164

service_name	service_id
Multiplex OM1 (Saint Martin)	
Guadeloupe 1 ^{ère}	0x2104
CARIB'INTV	0x2115
France 2	0x2151
France 3	0x2154
France 4	0x2157
France 5	0x215A
France Ô	0x215D
Arte	0x2161
France 24	0x2164

service_name	service_id
Multiplex OM1 (French Polynesia)	
Polynésie 1ère	0x2105
TNTV	0x2116
France 2	0x2151
France 3	0x2154
France 4	0x2157
France 5	0x215A
France Ô	0x215D
Arte	0x2161
France 24	0x2164