



# **Rules of Operation of Service Information in the Georgia DTTV Networks**

Version 1.2

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**ANNEXES**

# 1 General information

## 1.1 Document history

**Table 1. Document history**

Date	Version	Author	Comment
30.10.2013	0.1	Henri Viljasjärvi	The first version of the document
06.03.2014	0.8	Kari Risberg	Minor changes
20.03.2014	1.0	Kari Risberg	Final version, operator related information will be added later
30.3.2015	1.1	Kari Risberg	IDs added, minor bug fixing
27.4.2015	1.2	Kari Risberg	Regional network additions

This document describes technical parameters for the Georgia Digital Terrestrial TV-Networks. This document describes a set of transmission rules to satisfy Georgia compliant set-top boxes. This document shall be applied in addition to or, if so indicated in this document, instead of the NorDig Rules of Operation. Please note that the column *At DTTV* in this document means that a given descriptor is in use in DTTV. The value *Optional* in the *DTTV* column means that the corresponding descriptor should or can be used if some service, function or feature is added.

If nothing else is mentioned in this document, the rules of operation of SI shall comply with the specification EN 300 468[3]. The current version of this document is made to satisfy the present demand and the document will be updated whenever needed. The Georgia DTTV operators reserves all rights to change the content of this document, these changes being aimed to improve the quality of services to both the customers and broadcasters. If there's something to add or comment, please do not hesitate to contact any of the Georgia DTTV network operators.

## 1.2 References

- [1] ETSI TS 101 162 V1.2.1: Digital broadcasting systems for television, sound and data services; Allocation of Service Information (SI) codes in Digital Video Broadcasting
- [2] ETSI TS 101 211 V1.9.1: "Digital broadcasting systems for television; Guidelines on implementation and usage of service information".
- [3] ETSI EN 300 468 V1.11.1: "Digital Video Broadcasting (DVB) Specification for Service Information (SI) in DVB systems."

- [4] NorDig Unified Requirements for profiles Basic TV, Enhanced, Interactive and Internet for Digital Integrated Receiver Decoders for use in cable, satellite, terrestrial and IP-based networks, version 2.2
  
- [5] ISO/IEC 13818-1:2007: "Information Technology - Generic Coding of Moving Pictures and Associated Audio Recommendation H.222.0 (systems)".
  
- [6] Specification of a Mega-Frame for SFN Synchronisation, DVB Document A024
  
- [7] ETSI TS 102 006 V1.3.2: Digital Video Broadcasting (DVB) ; Specification for System Software Update in DVB Systems
  
- [8] ETSI EN 300 743 V1.3.1: Digital Video Broadcasting (DVB) ; DVB Subtitling systems
  
- [9] ETSI TR 101 290 V1.2.1: Digital Video Broadcasting (DVB) ; Measurement guidelines for DVB Systems

### 1.3 Abbreviations

<i>AIT</i>	Application Information table
<i>BAT</i>	Bouquet Association Table
<i>bslbf</i>	bit string, left bit first
<i>CA</i>	Conditional Access
<i>CAT</i>	Conditional Access Table
<i>DIT</i>	Dithering Information Table
<i>EIT</i>	Event Information Table
<i>LSN</i>	Local Service Network
<i>MFN</i>	Multiple Frequencies Network
<i>NIT</i>	Network Information Table
<i>NVOD</i>	Near Video On Demand
<i>PAT</i>	Program Association Table
<i>PMT</i>	Program Map Table
<i>PSI</i>	Program Specific Information
<i>p/f</i>	Present / following
<i>RST</i>	Running Status Table
<i>SDT</i>	Service Description Table
<i>SFN</i>	Single Frequency Network
<i>SI</i>	Service Information
<i>SIT</i>	Selection Information Table
<i>ST</i>	<i>Stuffing Table</i>
<i>TS</i>	<i>Transport Stream</i>
<i>Uimsbf</i>	<i>Unsigned integer most significant bit first</i>
<i>UTC</i>	<i>Universal Time, Co-ordinated</i>

### 1.4 Definitions

<i>API</i>	<i>Application Programming Interface</i>
<i>DTT/DTTV</i>	<i>Digital Terrestrial TV</i>
<i>DTTV</i>	<i>Digital Terrestrial Television</i>
<i>DVB</i>	<i>Digital Video Broadcasting</i>
<i>ECM</i>	<i>Entitlement Control Message</i>
<i>EMM</i>	<i>Entitlement Management Message</i>
<i>EPG</i>	<i>Electronic Program Guide</i>
<i>ES</i>	<i>Elementary Stream</i>
<i>ID</i>	<i>Identification</i>
<i>IRD</i>	<i>Integrated Receiver Decoder</i>
<i>MHP</i>	<i>Multimedia Home Platform</i>
<i>MIP</i>	<i>Mega-frame Initialisation Packet</i>
<i>MPTS</i>	<i>Multi-Program Transport Stream</i>
<i>FTA</i>	<i>Free-To-Air</i>
<i>ms</i>	<i>Milli second</i>
<i>ONID</i>	<i>Original Network ID</i>
<i>PCR</i>	<i>Program Clock Reference</i>
<i>PDN</i>	<i>Public Data Network</i>
<i>PID</i>	<i>Packet ID</i>
<i>SC</i>	<i>Scrambled</i>

<i>SID</i>	<i>Service Information</i>
<i>STB</i>	<i>Set Top Box</i>
<i>TDT</i>	<i>Time Date Table</i>
<i>TOT</i>	<i>Time Offset Table</i>
<i>TSID</i>	<i>Transport Stream ID</i>

### **1.5 Table definitions**

O	Optional
M	Mandatory always/all time
m	Mandatory if applicable

## 2 DTTV Networks

### 2.1 Network structure

Georgia Digital Terrestrial Network consists of 4 different nationwide or almost nationwide networks (2015). There is a reservation for a total of 7 nationwide DVB-T2 networks. The networks 2015 are:

- TRC DVB-T2 network multiplex I
- Stereo+ DVB-T2 networks multiplexes II,III, IV

All Georgia Digital Terrestrial Networks share the same Original Network ID (0x210C). Each service can be uniquely defined by the DVB triplet (ONID, SID and TSID). TRC DTT and Stereo+ network services can be received from multiple frequencies depending of the region. SFN is used also in some parts of Networks.

DVB-PSI/SI information is cross-distributed within the terrestrial networks. The EIT Present/Following and 8 days EIT schedule data is sent and is cross-distributed between networks.

All networks utilize NorDig LCN Version 2 numbering and this numbering shall not conflict between the networks.

The DVB-T2 networks are MFN networks, with local SFN regions. The TRC DVB-T2 network contains one multiplex. The Stereo+ DVB-T2 network contains three multiplexes i.e. multiplexes. In addition to mentioned networks there are following regional networks.

#### Local Multiplexes

#	Multiplex Operator	
1	Ltd "TVRadiocompany Evrika"	Tbilisi Multiplex
	Ltd "TV company Kvakasia"	
	"Obiektivi"	
	Ltd "TV company Piki"	
	Ltd "TV company Tbilisi"	
2	Ltd "Ekomi"	Lagodekhi Multiplex
3	Ltd "TV company Gurjaani"	Gurjaani Multiplex
4	Ltd "TV company Tanamgzavri"	Telavi Multiplex
5	Ltd "TVRadio company Tvali"	Sagarejo Multiplex
6	Ltd "TV company Kvemo Kartli"	Rustavi Multiplex
		Marneuli Multiplex
		Bolnisi Multiplex
7	Ltd "Omega"	Manglisi Multiplex
8	Ltd "TVRadio company Trialeti"	Gori Multiplex
9	Ltd "TV company Dia"	Khashuri Multiplex
10	Ltd "TVRadio company Borjomi"	Borjomi Multiplex
11	Ltd "Broadcasting company Imervizia"	Chiatura Multiplex
12	Ltd "TVRadio company Inphormkavshiri TV	Zestaphoni



	company Argo"	Multiplex
13	Ltd "Imperia"	Akhalsikhe Multiplex
14	Ltd "TVRadio company Rioni"	Kutaisi Multiplex
15	Ltd "Independent TV company Mega-TV"	Khoni Multiplex
16	Ltd "TVRadio company Zari"	Samtredia Multiplex
17	Media Center "Ghia Apkhazeti"	Chkhorotsku Multiplex
		Tsalenjikha Multiplex
18	Ltd "Independent TV company Egrisi"	Senaki Multiplex
19	Ltd "Independent Broadcasting company Guria"	Ozurgeti Multiplex
20	Ltd "Independent TVRadio company Odishi"	Zugdidi Multiplex
21	Ltd "TV Channel 25"	Batumi Multiplex
22	Ltd "Broadcasting company Metskhre Talga"	Poti Multiplex

Latest information on network structure on on-frequency repeaters and on transponders can be found on digital television info website [www.XXX.gov](http://www.XXX.gov)

## 2.2 Service Information and Program Specific Information

Rules for PSI- and SI-tables can be found on this document. ID's (Service ID, program number) are fixed i.e. no dynamic changing is done.

Number of components (e.g. audio, DVB Subtitling) and components' descriptors (audio language, DVB Subtitling language, application descriptors) can be dynamically changed i.e. PMT table is updated dynamically.

All transmitters have same SI-tables i.e. no regional service definitions are used except regional services (see chapter 3.1).

PCR can be on separate PID value or embedded inside component, usually video component.

### **2.3 Conditional Access, CA**

A CA system(s) will be chosen to be used in the Georgia DTTV. The HD services can use chip-set pairing.

Location of CA-descriptors at PMT can be either in program\_loop or at ES-info loop. Scrambling will be on at all the times on all services. Signalling of ECM PID is in PMT-table, and ECM PID can change within service.

Simulcrypting can be used on Georgia DTTV networks to facilitate the existence of multiple CA systems. CA systems shall be identified by CA\_SYSTEM\_IDs in the CA table (CAT) with corresponding EMM PIDs and in the CA-descriptors of the PMT.

All System operators have to agree on one card Conditional Access System(s) for all receivers. All services on Georgia DTTV networks have to be able to receive in one card.

### **2.4 Subtitling**

DVB Subtitling [10] is used in the Georgia DTTV on services where applicable. More information about the subtitling system itself: please contact service providers using DVB Subtitling.

### **2.5 Measurement guidelines**

Georgia DTTV systems provides signals which follows ETSI TR 101 290 [11] measurement guidelines i.e. signals pass priority 1, 2 and 3 tests. For IRD's it is assumed that if temporarily priority 2 or 3 events fails tests, IRD should still show picture, audio, subtitling, teletext and applications normally.

### 3 Network signalling

#### 3.1 Overview

In general, the network signaling follows the DVB standards referenced in this document as closely as possible. The only deviations from the DVB standard is the NorDig specification [4] which defines NorDig logical channel descriptors.

For all PSI/SI defined in this document the minimum time between the arrival of the last byte of a section to the first byte of the next transmitted section with the same PID, table\_id and table\_id\_extension and with the same or different section number shall be 25 ms (= max. repetition rate 25 ms).

The following table summarizes the mandatory and optional tables of the environment and the minimum repetition rates used in the Georgia DTTV network. DVB and MPEG minimum repetition rates are included as reference.

Table	PID (hex)	Mandatory	Optional	MPEG/DVB Standard (ms)	Georgia DTTV network (ms)
PAT	0000	X		25-500	500
PMT	0010-1FFE	X		25-500	500
CAT	0001	X		25-500	100
NIT	0010	X		25-10000	10000
NIT other	0010		X	25-10000	
SDT actual	0011	X		25-2000	1000
SDT other	0011		X <sup>1</sup>	25-10000	2000
EIT p/f	0012	X		25-2000	2000
EIT schedule actual	0012	X <sup>2</sup>		25-10000 25-30000	10000 (current day) (30000 +7 days)
EIT other p/f	0012	X		25-10000	2000
EIT other schedule	0012		X	25-10000 25-30000	30000
TDT/TOT	0014	X		25-30000	1000
SFN					

1) Receiver will only rely on SDT actual tables. SDT other is transmitted for informative purposes.

2) Mandatory for one day when the scheduled information is available.

The mandatory and optional descriptors of the tables are defined later in this chapter.

The text strings will be coded using the “Latin alphabet number 5” as specified in ISO 8859-9 or optionally using the “Latin alphabet” as specified in ISO/IEC 6937 or Georgia native alphabets

#### 3.2 DVB – Program Specific Information (DVB-PSI) Tables

The PSI is mentioned here in connection with the SI (Service information) although the PSI is generally defined in MPEG-2.

The repetition rates are based on the DVB recommendations. PAT and PMT tables are transmitted every 100 milliseconds.

The following PSI tables shall be used within the DTTV networks:

- Program Association Table, PAT
- Program Map Table, PMT
- Single Frequency Network, SFN
- Conditional Access Table, CAT

The PSI tables are discussed more in the next chapters. Mandatory and optional descriptors according to references [5] and [6] are listed in tables, where also the practice in a DTTV Networks is taken into account.

### 3.2.1 Program Association Table (PAT)

The PAT indicates the location (PID values of the Transport Stream packets) of the corresponding Program Map Table for each service in the multiplex. It also gives the location of the NIT.

The PAT is encoded according to ISO/IEC 13818-1 [6]. The PAT shall contain a program\_map\_PID for all services in the appropriate transport stream. Program\_number 0 is reserved for the Network Information Table (NIT). The network\_PID shall always be 0x0010.

### 3.2.2 Program Map Table (PMT)

The PMT identifies and indicates the locations of streams that make up each service.

There shall be a corresponding Program Map Table for each service in a transport stream. The PMT shall be encoded according to ISO/IEC 13818-1 [6]. There is a separate program\_map\_PID for each service or programme. The PID allocation is described in section 0 of this document.

**Table 2. Descriptors of PMT.**

Descriptor	Explanation	M/O
<b>CA_descriptor</b>	CA_descriptor shall be inserted whenever a service or service component is scrambled. It may be inserted both in the service level or component level (first or second descriptor loop). Private data is optional.	<b>Mandatory</b>
<b>Video_stream_descriptor</b>	Mandatory if still pictures (MPEG) are transmitted.	<b>Mandatory</b>
<b>ISO_639_language_descriptor</b>	Will be inserted for every transmitted audio component. Any value defined in 13818-1 is allowed. For dual mono components, the first descriptor refers to the left audio channel and the second refers to the right audio channel.	<b>Mandatory</b>
<b>Teletext_descriptor</b>	Mandatory whenever a teletext component is defined.	<b>Mandatory</b>
<b>Subtitling_descriptor</b>	Mandatory whenever DVB Subtitles are transmitted.	<b>Mandatory</b>

<b>Private_data_specifier</b>	Mandatory whenever privately defined descriptors are used. For NorDig private defined descriptors the private_data_specifier shall be set to 0x00000029. (www.dvb.org/index.php?id=16)	<b>Mandatory</b>
<b>Data_broadcast_id_descriptor</b>	Mandatory whenever DVB Bootloading mechanism is used.	<b>Mandatory</b>
<b>Stream_identifier_descriptor</b>	Mandatory for elementary streams carrying DSM-CC object carousels. Optional but recommended for other elementary streams.	<b>Mandatory</b>

### 3.2.3 Dynamic changes in PMT

PMT is changed dynamically according to event changes. Typically changes relates to number of audio components, language code of audio component, number of DVB subtitling components, language of DVB subtitling and page id of subtitling component. PMT should be read when PMT version number changes and when tuning/moving to other service.

### 3.2.4 Conditional Access Table (CAT)

The CAT provides information on the CA systems used in the multiplex. CAT shall be transmitted at all times. CAT is encoded according to ISO/IEC 13818-1 [6]. CAT is described more detailed in annex A. Simulcrypt can be used.

Descriptor	Explanation	M/O
<b>CA_descriptor:</b>	In the CAT, the CA_descriptor identifies the CA_System_Id of the CA operator as well as the EMM PID.	<b>Mandatory</b>

CA_System_ID	Operator
0x0B00	XXX
0x0B01	XXX
0x0B02	XXX

### 3.2.5 Single Frequency Network (SFN)

The MIP, i.e. the mega-frame\_initialisation\_packet, contains the SFN table. The mandatory parameters are defined below.

**Table 3. SFN-parameters**

Field descriptions	DVB	DTTV
synchronisation_id:	M	M
section_length:	M	M
pointer:	M	M
periodic_flag:	M	M
future_use:	M	M
synchronisation_time_stamp:	M	M
maximum_delay:	M	M
tps_mip.	M	M
Individual_addressing_length:	M	M

crc_32:	M	M
stuffing_byte:	M	M

The MIP table shall be transmitted whenever a transport stream is transmitted in SFN network. Receiver can ignore this table. Please refer to GNCC for information about SFN-regions.

### 3.2.6 PSI table repetition rates

Rates are based on ETSI recommendation [2]. The following minimum repetition rates are specified in order to reflect the need to impose a limit on the amount of available bandwidth used for this purpose. All rates defined in the following table are in use in the DTTV network.

**Table 4. Minimum repetition rates (ms)**

Table	ETSI	DTTV
PAT	500	500
PMT	500	500

### 3.3 DVB-Service Information (DVB-SI) Tables

The following SI tables shall be used within the DTTV network:

- Network Information Table NIT (actual)
- Service Description Table SDT (actual)
- Event Information Table EIT (present/following actual / other, scheduling actual / other)
- Time Date Table TDT
- Time Offset Table TOT

The SI tables are discussed more in the next chapters. Mandatory and optional descriptors according to reference [2] are listed in the tables below where also the practice in a DTTV Network is taken into account.

#### 3.3.1 Network Information Table (NIT)

NIT conveys information relating to the physical organization of the multiplexes/TSs carried via a given network, and the characteristics of the network itself.

The NIT will be transmitted for each transport stream on the network. NIT other may also be transmitted. The NIT shall always be transmitted on PID 0x0010. All sections of NIT shall be transmitted as specified in chapter 3.1.

The NIT version number will be monitored to detect changes on the network. If the version number is changed, the IRD shall start an automatic channel information update process. For this reason, the version number of the NIT should be the same for each transport stream on the same network.

The second descriptor loop of the NIT includes the NorDig logical channel descriptor.

NIT actual shall be transmitted in each delivery system. Also NIT\_other may be transmitted. Mandatory and optional descriptors of NIT are defined in the table below.

At DTTV networks NIT actual shall be transmitted.

**Table 5. The descriptors of NIT.**

<b>Descriptor</b>	<b>Explanation</b>	<b>DVB-T2 M/O</b>
<b>Network_name_descriptor</b>	A network_name_descriptor will be inserted for each NIT sub_table.	<b>Mandatory</b>
<b>T2_delivery_system_descriptor</b>	Will be inserted for each transport stream. All transport streams on the network shall be defined in the appropriate NIT section.	<b>Mandatory</b>
<b>Terrestrial_delivery_system_descriptor</b>	Will be inserted for each transport stream. All transport streams on the network shall be defined in the appropriate NIT section.	<b>Optional</b>
<b>Linkage_descriptor</b>	The following linkage_descriptors are mandatory (where applicable): - linkage_type 0x04 Linkage to the transport stream that carries EIT schedule information for all services on the network. (barker)	<b>Mandatory</b>
<b>Private_data_specifier</b>	Mandatory whenever privately defined descriptors are used. For NorDig private defined descriptors the private_data_specifier shall be set to 0x00000029. ( <a href="http://www.dvb.org/index.php?id=16">www.dvb.org/index.php?id=16</a> )	<b>Mandatory</b>
<b>Logical_channel_descriptor Version 2</b>	NorDig private descriptor. Inserted in the 2 <sup>nd</sup> descriptor loop. All services in a transport stream should then be listed.	<b>Mandatory</b>
<b>Logical_channel_descriptor Version 1</b>	NorDig private descriptor. Inserted in the 2 <sup>nd</sup> descriptor loop. All services in a transport stream should then be listed.	<b>Optional</b>

\* At the moment Terrestrial\_delivery\_system\_descriptor contains only Espoo transmitter frequencies

*Linkage descriptor* is discussed more in the chapter 5.3 *Over-The-Air Downloading (Bootloading)*.

*Service list descriptor* is used to list the services and service types for each TS. Service list descriptor is optional according to reference [2], but it is mentioned to be mandatory for the IRD's navigator in reference [4].

### 3.3.2 Logical\_channel\_descriptor

The *logical\_channel\_descriptor* is a NorDig privately defined descriptor (i.e. not DVB specified) intended for use in terrestrial networks. If used, this descriptor shall be inserted in the second descriptor loop in NIT. The descriptor is used to comply with the fact that some services are to the viewers related to a specific channel position. The use of the *logical\_channel\_descriptor* shall be as below:

1. It is not necessary to include all services in the network into the *logical\_channel\_descriptor* (Not included services will be "visible", but located last in the service list, without control of order). The numbers used may start at any value, and need not be continuous.
2. For each service type, the *logical\_channel\_number* shall be unique across the network (defined by the *network\_id*). In areas where several network intersect and the same logical channel number is used by several services, only the service belonging to the preference network (see below for definition) will be assigned to its logical channel number.

Please contact GNCC for logical channel numbers.

### 3.3.3 Service Description Table (SDT)

The Service Description Table is mandatory for each transport stream on the network. SDT is always transmitted on PID 0x0011. The table id values 0x42 and 0x46 are used to identify actual and other tables, respectively. SDT will be transmitted (both actual and other) every as specified in chapter 3.1.

SDT describes all services within the multiplex. SDT actual describes services for current TS and SDT other describes services for other TSs in the same network.

SDT\_actual is mandatory for each transport stream in the network. Transmission of SDT\_other is optional. For each service the parameter "running\_status" is currently set to "running". See annex D for list service type values. The mandatory and optional descriptors of SDT are defined in the tables below:

**Table 6. The descriptors of SDT.**

Descriptors	DVB	DTTV
Service_descriptor:	M	M
CA_identifier_descriptor:	O	O
Stuffing_descriptor:	O	O
Bouquet_name_descriptor:	O	O
Linkage_descriptor:	O	O
Telephone_descriptor:	O	O
Multilingual_service_name_descriptor:	O	M



Private_data_specifier_descriptor:	O	X
Data_broadcast_descriptor:	O	O
ci_protection_descriptor:	O	O

*Multilingual\_service\_name\_descriptor* conveys the names of the service provider and service name in one or more languages. At DTTV networks Georgian, English and Russian languages are used.

*Private\_data\_specifier\_descriptor* is used to identify within the SI (SDT and/or EIT) data broadcast services in the DVB framework. For service based implementation of data broadcasting it is recommended to place the descriptor within the SDT. For an event oriented data broadcasting service, a descriptor may also be placed within the EIT. Values 0x0001-0x0007 of the data\_broadcast\_id (see ETR162 [4]) are specified in EN 301192 [5]. Guidelines for the use of EN 301 192 [5] are given in TR 101 202 [6]. A range of values (0x0100 - 0xFFFFE) can be used for the registration of private data broadcast systems. ETR 162 [4], which is frequently updated, gives a list of all registered data\_broadcast\_ids.

### 3.3.4 Event Information Table (EIT)

EIT Provides information in chronological order regarding the events contained within each service. The information covers the name, short text description, starting time and duration for an event. The name and short description for an event are presented in Georgia and other languages are optional in the DTTV networks.

The Transmission of the Event Information table present/following sections is mandatory for both actual and other transport streams. EIT p/f for both actual and other sections shall be transmitted every 2000 milliseconds (2 seconds). EIT\_actual schedule sections shall be transmitted every 10 000 milliseconds (10 seconds) for the current day. For the rest of the days, they shall be transmitted every 30 000 milliseconds (30 seconds). If available, EIT\_other schedule shall be transmitted every 30 000 milliseconds (30 seconds). All Event Information table sections are transmitted on PID 0x0012.

EIT present/following and EIT schedule information for actual and other transport streams is transmitted in each transport stream in the network. In the DTTV network, the schedule actual of 8 days is transmitted and also schedule other for 8 days.

The transmission of EIT schedule sections is mandatory for an actual transport stream for one day (when information is available) and optional for the rest of the days and for other transport streams.

It is anticipated that in the future the EIT schedule information will be transmitted only on one transport stream on the network, called the barker channel. All transport streams that have EIT information on the barker channel will contain a linkage descriptor in the NIT. The linkage type 0x04 is defined for EIT schedule information.

**Table 7. The descriptors of EIT.**

Descriptors	DVB	DTTV
Short_event_descriptor:	M	M
Extended_event_descriptor:	O	O
Component_descriptor *:	M	M
Content_descriptor:	O	M
Parental_rating_descriptor:	O	O
Stuffing_descriptor	O	O
Linkage_descriptor:	O	O
CA_identifier_descriptor:	O	O
Telephone_descriptor:	O	O
Multilingual_component_name_descriptor:	O	O
Private_data_specifier_descriptor:	O	M
Data_broadcast_descriptor:	O	O

\* Only in EIT P/f

### 3.3.5 Time Date Table (TDT)

TDT carries only the UTC-time and date information.

TDT is mandatory (optional for local operators) in each transport stream in the network. The time accuracy shall be within  $\pm 2$  seconds from UTC. Each section of the TDT shall be transmitted at least once every 30 seconds.

### 3.3.6 Time Offset Table (TOT)

TOT carries the UTC-time and date information and local time offset.

TOT is mandatory (*optional for local operators*) in each transport stream in the network. The time accuracy shall be within  $\pm 2$  seconds from UTC. Each section of the TOT shall be transmitted at least once every 30 seconds.

Descriptor	Explanation	M/O
Local_time_offset_descriptor	Georgia DTTV operators use at least the country code GEO (Georgia) Country_region_id shall be set to zero.	<b>Mandatory</b>

### 3.3.7 SI table repetition rates

Rates are based on DVB recommendation [2]. The following minimum repetition rates are specified in order to reflect the need to impose a limit on the amount of available bandwidth used for this purpose. All rates defined in the following table are in use in the DTTV network.

Table 8. Minimum repetition rates

Table	DVB	Georgia DTTV
NIT	10	8

SDT actual	2	1
SDT other	10	2
EIT p/f actual	2	0,5
EIT p/f other	20	4
EIT schedule actual, first day	10	40
EIT schedule actual	60	40
EIT schedule other, first day	30	40
EIT schedule other	300	40
TDT	30	30
TOT	30	30

## 4 Use of IDs at DTTV network

The use of IDs relating to the SI tables are defined in this chapter. Document ETR 162 defines the SI code allocation for Network\_id, bouquet\_id, CA\_system\_id and Country codes [1]. In Georgia, bouquets are not used, so bouquet\_ids are not in use either. GNCC is responsible for the ETR 162 parameters.

### 4.1 Original Network\_id

Georgia like all other countries has one original\_network\_id value. The value in Georgia is *0x210C*.

### 4.2 Network\_IDs

Georgia has 100 unique network\_id values for its sub-networks. Document ETR 162 defines a "Colour" to each European country. Colour-code of Georgia is D. Due to the country colour the values for networks of Georgia are between 0x3001 and 0x3100. Unique Network\_id values are described in the table below.

**Table 9. Network ID values**

Network Operator	Values (Hex)
TRC	0x3001
Stereo+	0x3002
Stereo+	0x3003
Stereo+	0x3004
<i>Tbilisi Multiplex</i>	0x3010
<i>Lagodekhi Multiplex</i>	0x3011
<i>Gurjaani Multiplex</i>	0x3012
<i>Telavi Multiplex</i>	0x3013
<i>Sagarejo Multiplex</i>	0x3014
<i>Rustavi Multiplex</i>	0x3015
<i>Marneuli Multiplex</i>	0x3016

<i>Bolnisi Multiplex</i>	0x3017
<i>Manglisi Multiplex</i>	0x3018
<i>Gori Multiplex</i>	0x3019
<i>Khashuri Multiplex</i>	0x301A
<i>Borjomi Multiplex</i>	0x301B
<i>Chiatura Multiplex</i>	0x301C
<i>Zestaphoni Multiplex</i>	0x301D
<i>Akhaltzikhe Multiplex</i>	0x301E
<i>Kutaisi Multiplex</i>	0x301F
<i>Khoni Multiplex</i>	0x3020
<i>Samtredia Multiplex</i>	0x3021
<i>Chkhorotsku Multiplex</i>	0x3022
<i>Tsalenjikha Multiplex</i>	0x3023
<i>Senaki Multiplex</i>	0x3024
<i>Ozurgeti Multiplex</i>	0x3025
<i>Zugdidi Multiplex</i>	0x3026
<i>Batumi Multiplex</i>	0x3027
<i>Poti Multiplex</i>	0x3028

### 4.3 TS\_ID (Transport\_Stream\_IDentifier)

This is a 16-bit field which serves as a label to identify this Transport Stream from any other multiplex within a network. The first nibble (HEX) indicates the multiplex, the next indicates the frequency range (UHF=0xx0xx, VHFIII=0xx3xx) and last two numbers indicate which network or region is used.

**Table 10. Transport\_Stream\_Identifier. "Multiplex-part", the first 8 bits**

<b>Transport Stream</b>	<b>Network Operator</b>	<b>Value (Hex.)</b>
Reserved		0x0xxx
Multiplex I	TRC	0x1001
Multiplex II	Stereo+	0x2002
Multiplex III	Stereo+	0x3003
Multiplex IV	Stereo+	0x4004
<i>Tbilisi Multiplex</i>	<i>Ltd "TVRadiocompany Evrika" Ltd "TV company Kvakasia" "Obiektivi" Ltd "TV company Piki" Ltd "TV company Tbilisi"</i>	0x5010



---

TRC	17	11	Stereo+	1537	601
TRC					
TRC					
TRC					

The two first nibble's is from TS id and followed by a running number. e.g. TRC Multiplex 0x1001 → SID 0x10xx and Stereo+ Multiplex B 0x2001 → SID 0x20xx.

#### 4.5 PID (Packet Identifier)

Every MPEG-packet, SI tables, video, audio, etc., has the identifier PID. The PID locates the 188 byte packet header. PID is 13-bit field, which has 8192 different values in the range of [0...1FFF].

#### 4.6 Observations on the DVB and MPEG Documents

- Any SDT for another TS than the actual one (i.e. with table\_id = 0x46) shall list all services of that TS [2].
- It is strongly recommended that service\_ids, once assigned to a specific service within a network, remain unchanged in order to enable IRDs to implement features like favourite channel lists, etc [2].
- The PID value 0x1FFC is reserved for carriage of ATSC SI, and the PID value 0x1FFD is reserved for the ATSC Master Program Guide. It can be reasonable to reserve these values to the ATSC also in DVB systems [2].
- Applications are encouraged to use low numbered PID values (avoiding reserved values) and group values as much as possible [5].

## 5 Broadcasting systems

### 5.1 General characteristics

General parameters of the broadcasting system and parameters of the MPEGvideo/audio encoding are presented in the tables below.

Local operators or SMATV are not restricted to values given in following tables.

**Table 11. RF parameters**

<b>RF Characteristics for TRC T2 network</b>	
<i>Channels</i>	21-48*
<i>Mode</i>	256QAM
<i>Code Rate</i>	2/3
<i>Guard Interval</i>	1/8
<i>Modulation</i>	COFDM
<i>Transmission Mode</i>	32k
<i>Pilot pattern</i>	PP2
<i>Time-Frequency Slicing</i>	Not used

<b>RF Characteristics for Stereo+ T2 network</b>	
<i>Channels</i>	21-48*
<i>Mode</i>	256QAM
<i>Code Rate</i>	2/3
<i>Guard Interval</i>	1/8
<i>Modulation</i>	COFDM
<i>Transmission Mode</i>	32k
<i>Pilot pattern</i>	PP2
<i>Time-Frequency Slicing</i>	Not used

\* In UHF channels 21-48 channel raster is 8 MHz.

**Table 12. Video encoding parameters**

<b>Video Encoding Characteristics for T2 networks</b>	
<i>Profile and Level</i>	AVC (MPEG4) HP@L4
<i>Bitrate</i>	1-20 Mbit/s variable bitrate
<i>Aspect Ratio</i>	16:9
<i>Resolution and Frame Rate</i>	720x576i25 720x576i25 1280x720p50 1920x1080i25

If still pictures are transmitted this shall be indicated by setting the "still\_picture\_flag" in the video\_stream\_descriptor in the PMT to "1". The video\_stream\_descriptor is mandatory in the PMT whenever still pictures are transmitted.

Table 13. Audio encoding parameters to be confirmed after Beauty contest

Encoding parameters	
• Layer:	Both layer I and II may be transmitted.
• Bitrate:	As specified by ISO/IEC 13818-3.
• Modes	<p>The following audio modes may be transmitted:</p> <ul style="list-style-type: none"> <li>• Single channel</li> <li>• Dual channel</li> <li>• Stereo</li> <li>• Joint Stereo</li> <li>• AC-3 (DolbyDigital)</li> <li>• E-AC3 (Dolby Digital Plus)</li> <li>• HE-AAC stereo and multichannel</li> </ul> <p>The language is indicated in the ISO_639_language_descriptor in the PMT. In case of dual mono, the first language_code in the ISO_639_language_descriptor represents the left audio channel while the second language_code represents the right audio channel.</p>
• Sampling frequency:	According to Georgia receiver Specifications

## 5.2 Tuning procedures

T2\_delivery\_system\_descriptor. Frequency\_list\_descriptor is not in use.

Basic scan over the whole frequency range or refer to chapter 3 for a description of NIT transmission. If a service is moved from one multiplex to another, this shall be accomplished by using the service\_move\_descriptor in the PMT (refer to chapter 3).

If a complete multiplex is moved a new terrestrial\_delivery\_system\_descriptor or T2\_delivery\_system\_descriptor reflecting the new transmission parameters shall be inserted in NIT for all transport streams in the network as soon as the multiplex is re-established on a new frequency. The network operator will not move any multiplex unless strictly required in order to maintain service availability.

Information will also be given in PSI/SI which will enable the IRD to track a service which is moved from one multiplex to another, see ETR 211. Such information shall be decoded and used for updating the service list.

Information about used RF channels can be provided by GNCC.

## 5.3 Over-The-Air Downloading (Bootloading)

All the system software updates are carried typically in the same service in one or more of the transport streams of the network, see chapter 3. This service is indicated by the linkage\_descriptor in NIT as defined by Specification for System Software Update in DVB



Systems (ETSI TS 102 006) [9]. The linkage may include references to several updates that may be available simultaneously.

In order to make the receivers identify the correct update, the manufacturers should follow the guidelines set in "Locating the appropriate System Software Update service" in the DVB SSU specification Annex A. It is still possible that some updates are broadcast in a different service than others, and in that case there shall be multiple linkage descriptors present in NIT also. All the linkages are present in the NIT of every transport stream, which means that a linkage may refer to another transport stream in the DVB-T network. The network operator decides and sets all the network parameters in the linkage, i.e. the network id, transport stream id and service id. The linkage descriptor for system software updates shall be present only in NIT, but not SDT or other tables. Proprietary or foreign linkage parameters cannot be accepted for broadcast. The supported linkages are described in Annex E and F for convenience.

The system software update data shall be transmitted as provided by its manufacturer and using some agreed bitrate and transmission times that depend on the available network resources. For the delivery of the material, the SSU providers must follow the guidelines set by "Recommendations for transferring System Software Update service data from receiver manufacturer to network operator" in the DVB SSU specification, Annex B.

The networks may use also DVB-SSU Enhanced profile including scheduling as specified in ETSI TS 102 006 [6].

**Table 14. Linkage type coding**

<b>Linkage_type</b>	<b>Description</b>
0x00	reserved for future use
0x01	information service
0x02	Electronic Programme Guide (EPG) service
0x03	CA replacement service
0x04	transport stream containing complete Network/Bouquet SI
0x05	service replacement service
0x06	data broadcast service
0x07	RCS Map
0x08	Mobile Hand-Over
0x09	Bootloading (DVB, ETSI EN 102 006)
0x0A to 0x7F	reserved for future use
0x81	Bootloading (Nordig)
0x80 to 0xFE	user defined
0xFF	reserved for future use

According to the DVB specification the linkage\_type value 0x09 is reserved for the Over-The-Air Downloading.

## ANNEX A

Table A1. Mandatory descriptors of CAT

Mandatory descriptors		
CA_descriptor:	This descriptor shall always be included in the CAT.	
Syntax	No. of bits	Mnemonics
CA_descriptor(){		
Descriptor_tag	8	uimsbf
Descriptor_length	8	uimsbf
CA_system_ID	16	uimsbf
Reserved	3	bslbf
CA_PID	13	uimsbf
operator_id_tag	16	uimsbf
operator_id_length	8	uimsbf
for (i = 0; i < N, i++){		
operator_id	8	uimsbf
}		
}		

Table A2. Field descriptors of CAT

Field descriptions	
<b>CA_system_ID:</b>	This is a 16-bit field indicating the type of CA system applicable. The coding of this is privately defined. Allocation of CA_system_ID is given in ETR 162.
<b>CA_PID:</b>	This is a 13-bit field indicating the PID of the Transport Stream packets which shall contain either ECM or EMM information for the CA systems as specified with the associated CA_system_ID. If the CA_descriptor is contained in the CAT, the CA_PID refers to EMM information. If the CA_descriptor is contained in the PMT, the CA_PID refers to ECM information.
<b>Operator_id_tag:</b>	Shall always be set to 0x10. This parameter is part of the private data field in the CA_descriptor.
<b>Operator_id_length:</b>	Indicates the length (in bytes) of the "operator_id" following this field. This parameter is part of the private data field in the CA_descriptor.
<b>Operator_id:</b>	Unique identifier for the network operator. Each operator retransmitting signals from the PDN is allocated a unique "operator_id" by the PDN operator. This "operator_id" may be used to prevent smart cards from other operators from being used in a specific network. This parameter is part of the private data field in the CA_descriptor.

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**ANNEX B**
**Table B1. Logical\_channel\_descriptor, version 1**

Syntax	No. of bits	Identifier
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	1	Bslbf
logical_channel_number	14	Uimsbf
}		
}		

**Table B2. Fields of Logical\_channel\_descriptor**

Syntax	Explonation
Descriptor_tag	This shall be assigned to be [0x83].
Service_id:	This is a 16-bit field which serves as a label to identify this service from any other service within the Transport Stream. The service_id is the same as the program_number in the corresponding program_map_section. Services shall be included irrespective of their running status.
Visible_service_flag	This 1-bit field when set to '1' indicates that the service is normally visible and selectable (subject to the service type being suitable etc.) via the receiver service list. When set to '0' this indicates that the receiver is not expected to offer the service to the user in normal navigation modes however the receiver should provide a mechanism to access these services (for example by direct entry of the logical channel number).
Reserved:	All reserved bits shall be set to "1".
Logical_channel_number:	This is a 14-bit field which indicates the broadcaster preference for ordering services.

Table B3. Logical channel number values

Visible_service flag	Logical_channel_number (Decimal value)	Description
0	0	Service not suitable for selection by the user. For example, the value zero may be used for data services only intended for selection from interactive applications or for firmware download services etc.
1	0	Reserved
0	1 – 9999	Service not displayed in service list (default nor personal) nor ESG, not accessible via P+/- keys. But service shall (if possible) be able to be reached from numeric keys (same value as decimal value of logic_channel_number). Service do not have any event information).
1	1 – 9999	Service displayed in service list and EPG. Accessible via P+/- keys or from numeric keys (same value as decimal value of logic_channel_number)
0	> 9999	Reserved for future use
1	> 9999	Reserved for future use

The intended use of the logic\_channel\_descriptor is given below:

All “visible” services shall be displayed in the service list (s), sorted according to logic\_channel\_number and be addressed with a number in the service list equal to the logic\_channel\_number, as much as possible. The receiver may have several default service lists (or sections inside one) for the different service\_types, for example one for each service\_type or typically for three main categories; TV, Radio and Others. If the receiver has several service\_lists, the addressing of each service in each list shall match, as much as possible the logic\_channel\_number value.

Services shall first be ordered depending on their service\_type and secondly on their logic\_channel\_number (regardless of if several services have collision in the logic\_channel\_number or if they are listed or not in the logic\_channel\_descriptor). I.e. first all services with service\_type 0x01 (digital television services), after that 0x02 (digital radio sound services) and so on.

Services listed in the logic\_channel\_descriptor shall have higher priority when ordering the services in the default service list, than services that are not listed. In other words, the broadcasted service may not be listed in any logic\_channel\_descriptor and these shall be displayed and accessible in the default service list, but be located last in the service list, in the order of their service\_type.

If several services are allocated to the same logic\_channel\_number, (may be the case for example if several terrestrial regions can be received at the same location or several satellite networks are received), one of them shall be placed according to the logic\_channel\_number and the others shall be placed last in that list. Empty spaces in the broadcasted logic channel numbering shall not be used then, instead they shall be located last, after the service with highest logic\_channel\_number of that service\_type. (The broadcaster may quite consciously choose to leave empty spaces in the logic channel numbering for example future coming services etc) This is to avoid a complete rearrangement of the list. How to choose which one that should be placed according to the channel list is up to the receiver manufacturer.

## ANNEX C

Table C1 Service\_type Description

Service_type	Description
0x00	Reserved for future use
0x01	digital television service
0x02	digital radio sound service
0x03	Teletext service
0x04	NVOD reference service
0x05	NVOD time-shifted service
0x06	mosaic service
0x07	PAL coded signal
0x08	SECAM coded signal
0x09	D/D2-MAC
0x0A	FM Radio
0x0B	NTSC coded signal
0x0C	Data broadcast service
0x0D	reserved for Common Interface Usage
0x0E	RCS Map (see EN 301 790 )
0x0F	RCS FLS (see EN 301 790 )
0x10	DVB MHP service
0x11 to 0x7F	Reserved for future use
0x81	Bootloading
0x80 to 0xFE	User defined
0xFF	Reserved for future use

**Table D1. Syntax of linkage descriptor, type 0x081**

Syntax	No. of bits	Identifier
Linkage_descriptor(){		
Descriptor_tag (0x4A)	8	Uimsbf
Descriptor_length	8	Uimsbf
Transport_stream_id	16	Uimsbf
Original_network_id	16	Uimsbf
Service_id	16	Uimsbf
Linkage_type	8	Uimsbf
For (i=0;i<n;i++){		
Manufacturer_id	16	Uimsbf
Version_id	64	Uimsbf
Private_id	32	Uimsbf
Start_time	40	Bslbf
}		
}		

The linkage\_type for the software download service shall be 0x081.

Nordig private identifiers not defined in ETS 300 468 are specified below:

**Table E2. Identifiers of linkage descriptor**

Syntax	Identifier
Manufacturer_id:	This is a 16-bit field identifying the manufacturer of the IRD. The registration of manufacturer_id is done via the NorDig project office.
Version_id:	This is a 64-bit field that uniquely identifies the software that is downloaded within the manufacturer_id, i.e. the manufacturer_id / version_id uniquely identifies all software within the NorDig marketplace.
Private_id	This is a 32-bit field that carries private data. In case of DSM-CC the private_id can be used for transaction_id where it has a dual role, providing both identification and versioning mechanisms for download control messages.
Start_time:	This is a 40-bit field that defines at what time and date the software will be available to download. This field is coded as the UTC_time field in the TDT.

**Table E1. Syntax of linkage descriptor type 0x09**

Syntax	No. Of bits	Identifier
Linkage_descriptor(){		
Descriptor_tag (0x4A)	8	uimsbf
Descriptor_length	8	uimsbf
Transport_stream_id	16	uimsbf
Original_network_id	16	uimsbf
Service_id	16	uimsbf
Linkage_type	8	uimsbf
OUI Data length	8	uimsbf
For (i=0;i<n;i++){		
OUI	24	bslbf
Selector length	8	uimsbf
For (i=0;i<n;i++){		
Selector byte	8	uimsbf
}		
}		
For (i=0;i<n;i++){		
Private_data_byte	8	uimsbf
}		

The linkage\_type for the software download service shall be 0x09.

**Table F2. Identifiers of linkage descriptor**

Syntax	Identifier
OUI_data_length	This field specifies the total length in bytes of the following OUI-loop
OUI	This is a 24-bit field containing an IEEE OUI (as described in IEEE 802-1990 [5]) of the organization providing a system software update service on the transport-stream/service. DVB has defined OUI x00015A to signal that the stream is from any OUI.
Selector_length	This 8-bit field specifies the total length in bytes of the following selector field.
Selector_byte	This field provides information additional to the OUI that can be used by a receiver to locate and identify the system software update service, e.g. model type or ranges. The syntax and semantics of the selector field are defined by the organization owning the OUI.
Private_data_byte	This is an 8-bit field, the value of which is privately defined.