



RESEARCH & DEVELOPMENT TELECOMMUNICATION'S INSTITUTE

Cuba 's Data

Broadcasting issue

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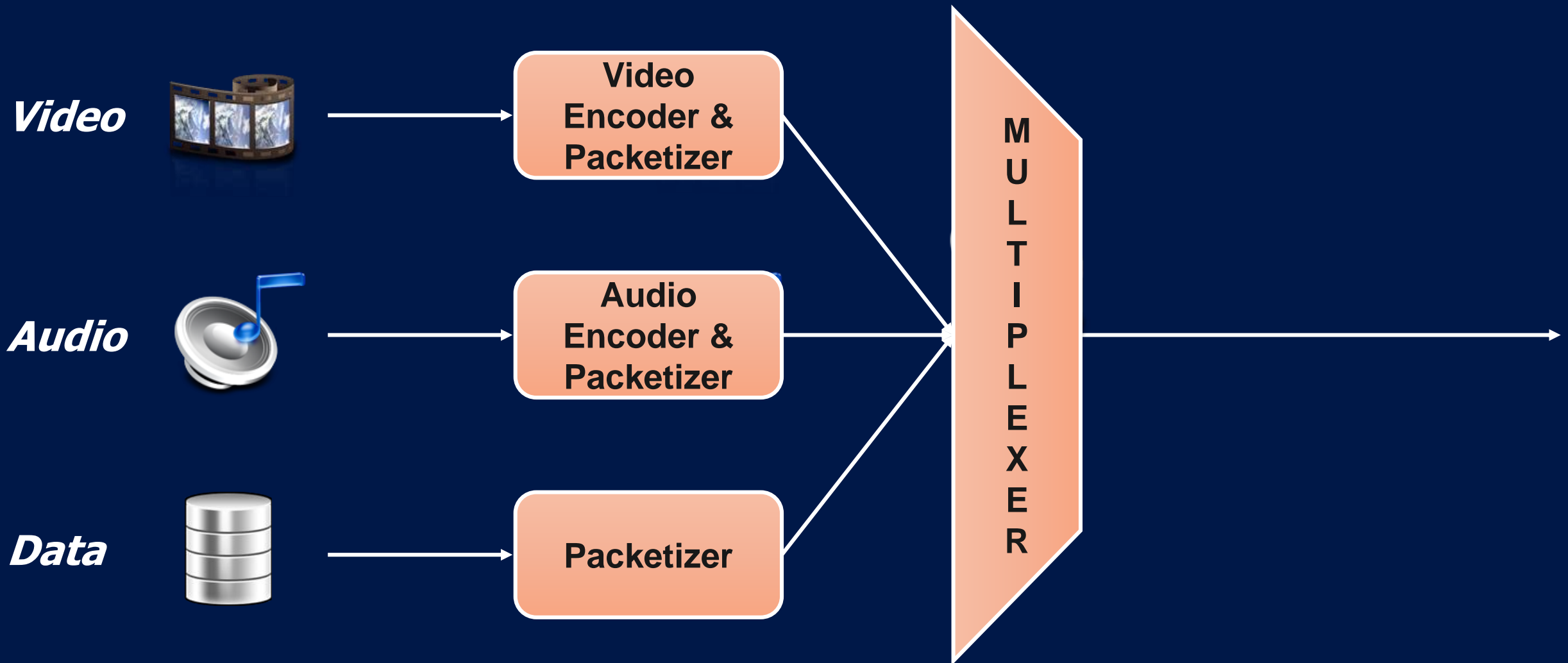
Introduction

The present work makes a deep study about how Data Broadcasting Service is being used in the current process of Digital TV's deployment. In fact, as occurs in every transition period of technology absorption, there is a lack of knowledge around this topic.



*So... what is Data
Broadcasting Service?*

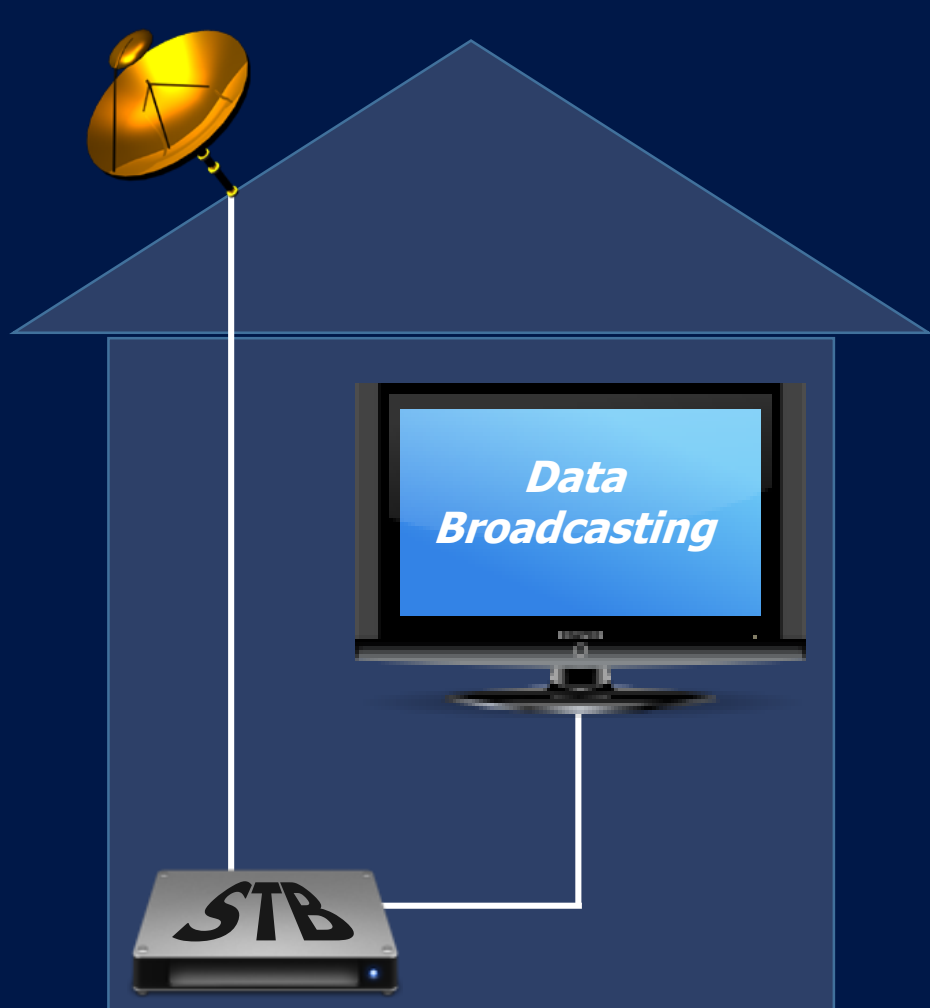
Data insertion



Data Broadcasting Service classification

Independent Data Broadcasting

Linked Data Broadcasting





Hypothesis

There are issues regarding GD/J027-2011 chinese standard in the employed transmission scheme of Data Broadcasting Service that avoid the correct reception of this service in STBs (Set Top Box).

Goals

- *Perform a comparative study between documents:*
 - *Document, "Information Data Broadcast Application Specification".*
 - *EN 300 468, "Specification for Service Information (SI) in DVB Systems".*
 - *GD/J027-2011, "Technical requirements and measurement methods of standard definition direct broadcasting satellite integrated receiver decoder with conditional access".*

Goals

- *Analyze the transmission schema that was being employed in head-end.*
- *Analyze with software tools the whole structure of the transmitted transport streams, specifically, the right decode of packets carried Data Broadcasting Service.*

Comparative study

*The document "Information Data Broadcast Application Specification" begins with a statement **specifying changes on PSI/SI** (Program Specific Information/Service Information), which **are in accordance, but not contained** in both ISO 13818-1 and EN 300 468 standards (the last one erroneously referenced as EN 300 406):*

4 SI for Data Broadcast

All PSI/SI exception of the following define is according to the spicifation of ISO-13818-1 and EN 300 406.

Comparative study

*The document continues making a **new definitions of both BAT (Bouquet Association Table) and FDT (File Data Table) tables. In case of BAT table, there are some changes in different elements.***

This document makes the new define of BAT with boquet_ID 0x7011, and makes an offset of PID to 0x1000, with link_type = 0x80 link descriptors in it. Another new define is file data table with table_ID 0x90.



*What are BAT
and FDT tables?*

BAT (Bouquet Association Table)

- ***Defined by EN 300 468 standard to provide information regarding **bouquets**, understanding by bouquet, a collection of services marketed as a single entity.***
- ***Packets carrying BAT table must have **PID = 0x0011**.***
- ***BAT sections must have **table_id = 0x4A**.***

FDT (File Data Table)

- *Defined by **GD/J027-2011** as a table where proprietary data format is packaged.*
- *FDT must be sent with a **table_id = 0x90**.*
- *Proprietary data format is **XML** (e**X**tensible **M**arkup **L**anguage).*

Comparative study

➤ *offset of PID to 0x1000*

4.1 BAT

The BAT for information data broadcast should with the bouquet_ID 0x7011, and the send out PID should be changed 0x1000.

BAT's PID offset made by the document.

The BAT shall be segmented into bouquet_association_sections using the syntax of table 4. Any sections forming part of a BAT shall be transmitted in TS packets with a PID value of 0x0011. The sections of a BAT sub_table describing a particular bouquet shall have the bouquet_id field taking the value assigned to the bouquet described in TS 101 162 [i.1]. All BAT sections shall take a table_id value of 0x4A.

BAT's definition by EN 300 468.

Comparative study

➤ ***bouquet_ID = 0x7011***

bouquet_id: This is a 16-bit field which serves as a label to identify the bouquet. Allocations of the value of this field are found in TS 101 162 [i.1].

Field's definition by EN 300 468.

4.4.1.1.2.1 链接描述符 linkage _descriptor

在bouquet_id为0x7011（由广播者约定）的BAT表中，用该描述符描述专有数据的链接。要求综合接收解码器按照表14的格式进行解析。

Field's assignation by GD/J027-2011.

Comparative study

➤ *linkage_type = 0x80*

linkage_type: This is an 8-bit field specifying the type of linkage e.g. to information (see table 58).

<u>0x80 to 0xFE</u>	<u>user defined</u>
---------------------	---------------------

Field's definition by EN 300 468.

<u>linkage_type</u>	8	uimsbf	链接类型, 8 位字段, 专有数据链接类型取值为 <u>0x80</u> 。
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Field's assignation by GD/J027-2011.

Comparative study

➤ *file data table with table_id 0x90*

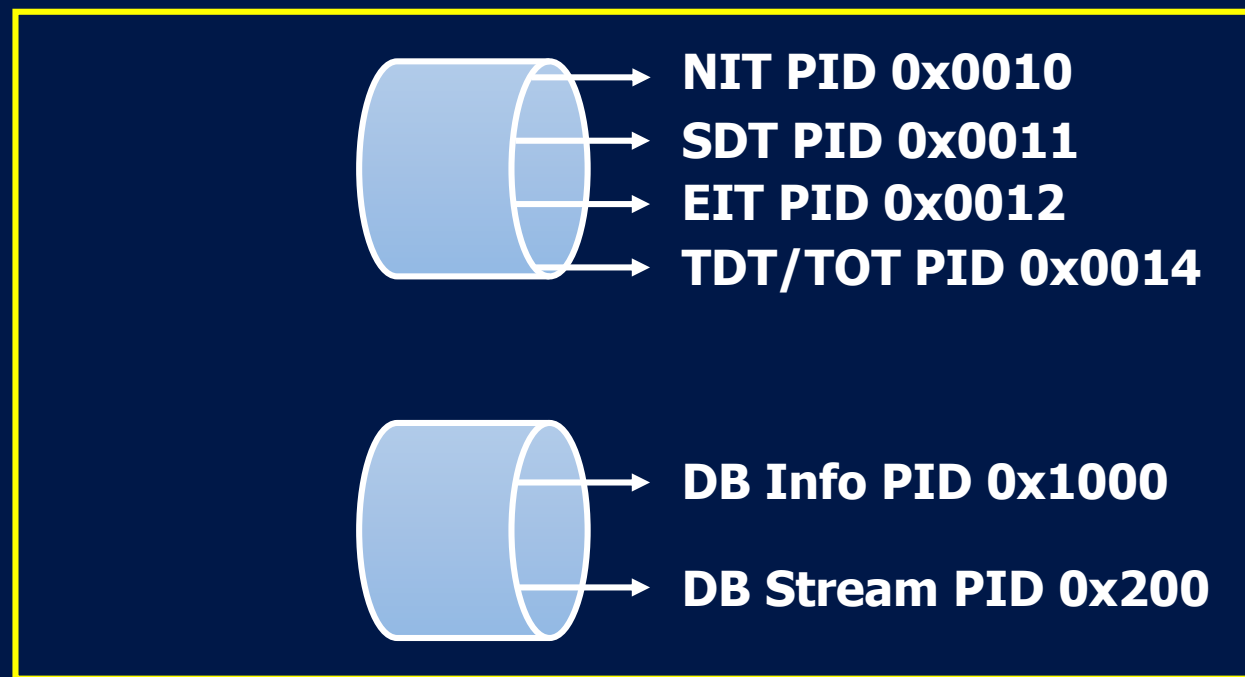
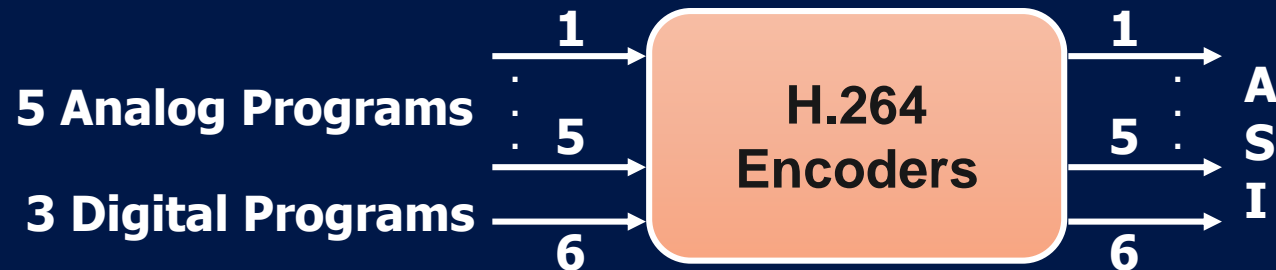
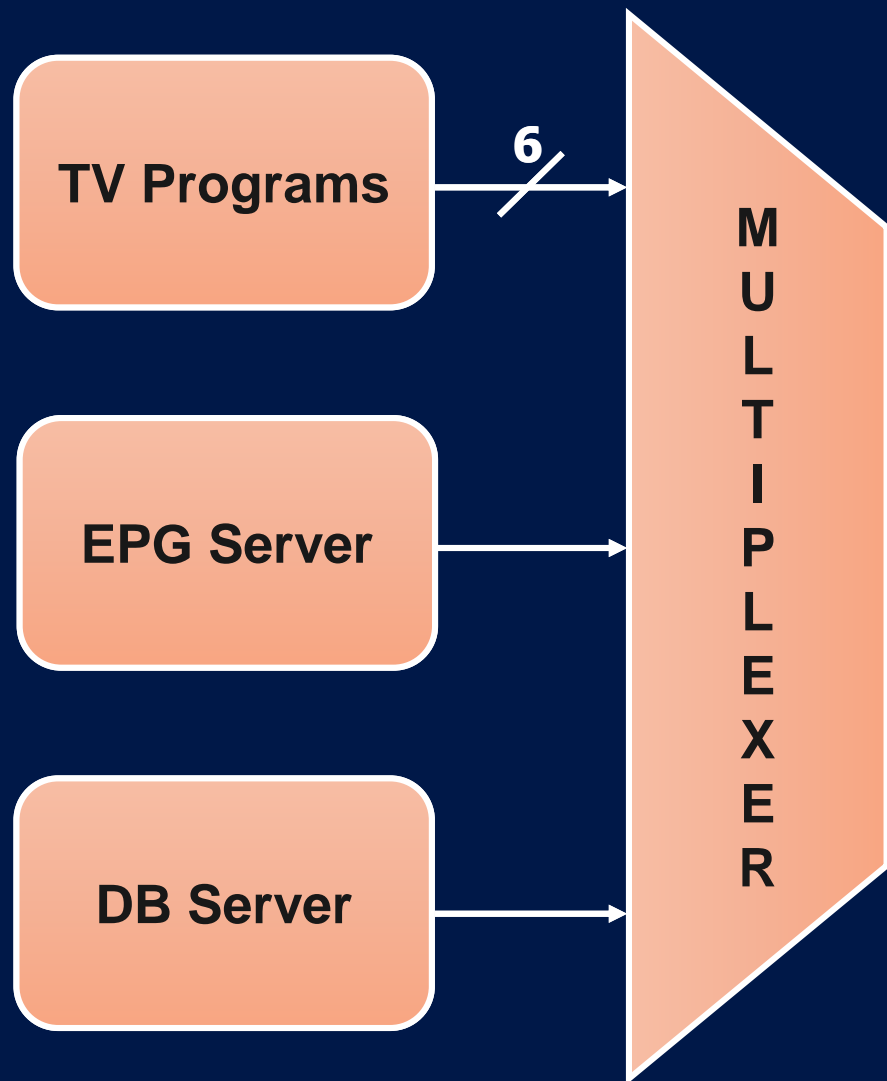
4.4.1.1.5 专有数据

专有数据用于信息服务，在传送流中用XML文件和图片文件传输，用本节定义的格式封装，要求综合接收解码器应处理。

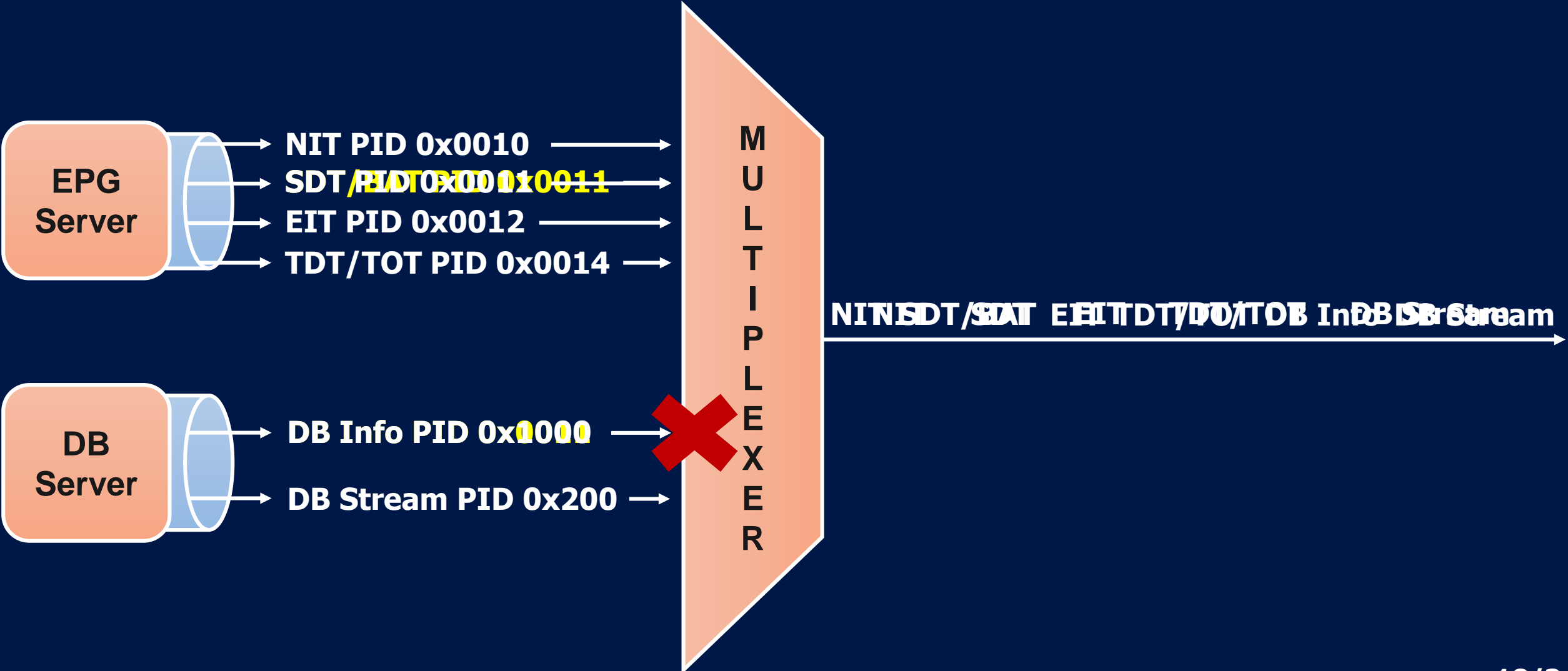
专有数据通过文件数据表FILE_DATA_TABLE来传送，表标识符(table_id)取值为0x90，文件数据表按照下面的格式切分成文件数据段FILE_DATA_SECTION。

Field's assignment by GD/J027-2011.

Transmission schema



Transmission schema



Software tools analysis

Software tools used to decode and analyze the transport streams :

- *DVB Inspector v1.2*
- *4T2 Content Analyser*
- *TS Expert*
- *TSR*
- *TSReader*

Byte to byte structure of packets PID 0x1000

0x00000000008C1E0B	0x1000	0x84									1	1	6			PLD	
Hex View																	
0x00000000008C1E00	2A	B0	29	3C	2D	9A	9F	E7	37	61	3D	47	50	00	16	00	*°)<-..ç7a=GP...
0x00000000008C1E10	4A	F3	84	70	11	C9	00	00	F3	77	47	08	64	61	74	61	Jó.p.É..ówG.data
0x00000000008C1E20	63	61	73	74	4A	F5	00	01	00	01	A0	01	80	02	00	90	castJö....
0x00000000008C1E30	64	00	00	00	00	01	02	00	02	07	00	03	07	00	04	07	d.....
0x00000000008C1E40	00	05	07	00	06	01	00	07	01	00	08	01	00	09	01	00
0x00000000008C1E50	0A	01	00	0B	08	00	0C	08	00	0D	08	00	0E	08	00	0F
0x00000000008C1E60	05	00	10	00	00	11	00	00	12	00	00	13	00	00	14	00
0x00000000008C1E70	00	15	00	00	16	00	00	17	00	00	18	00	00	19	00	00
0x00000000008C1E80	1A	00	00	1B	00	00	1C	00	00	1D	00	00	1E	00	00	1F
0x00000000008C1E90	00	00	20	00	00	21	00	00	22	00	00	23	00	00	24	00!.."..#..\$.

- "5000" -> PID 0x1000
- "4A" -> BAT's table_id
- "7011" -> bouquet_id
- "4A" -> linkage_descriptor
- "80" -> linkage_type
- "200" -> DB stream's PID
- "90" -> FDT's table_id

Byte to byte structure of packets PID 0x200

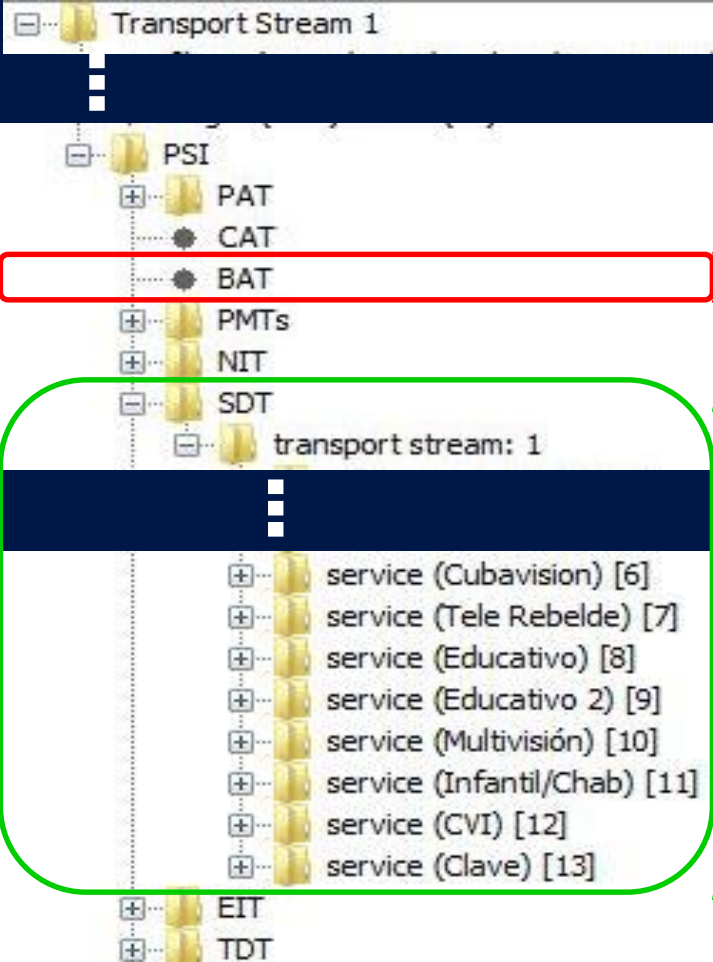
0x000000000000043CB	0x0200	0x36										1	1	6		PLD	
Hex View																	
0x000000000000043C0	90	F3	6E	ED	69	FD	BC	94	4B	F5	B4	<u>47</u>	<u>42</u>	<u>00</u>	<u>16</u>	00	.óníiý4.Kõ'GB...
0x000000000000043D0	<u>90</u>	B3	36	0B	5F	C9	00	00	0F	31	38	31	5F	32	31	33	. '6. _É...181_213
0x000000000000043E0	5F	30	37	39	2E	78	6D	6C	00	00	03	19	3C	3F	78	6D	_079.xml....<?xm
0x000000000000043F0	6C	20	76	65	72	73	69	6F	6E	3D	22	31	2E	30	22	20	l <u>version="1.0"</u>
0x00000000000004400	65	6E	63	6F	64	69	6E	67	3D	22	49	53	4F	2D	38	38	<u>encoding="ISO-88</u>
0x00000000000004410	35	39	2D	31	22	3F	3E	0D	0A	3C	63	64	62	73	3A	52	<u>59-1"?</u> >.. <cddb:r< td=""></cddb:r<>
0x00000000000004420	6F	6F	74	4D	65	6E	75	20	78	6D	6C	6E	73	3A	63	64	ootMenu xmlns:cd
0x00000000000004430	62	73	3D	22	75	72	6E	3A	63	64	62	73	3A	64	61	74	bs="urn:cddb:dat
0x00000000000004440	61	22	20	63	64	62	73	3A	42	61	63	6B	67	72	6F	75	a" cddb:Backgrou
0x00000000000004450	6E	64	3D	22	30	30	31	5F	42	61	63	6B	67	72	6F	75	nd="001_Backgrou

- "4200" -> PID 0x200
- "90" -> FDT's table_id
- XML version: 1.0
- Encoding method: ISO 8859-1 (defines the encoding of the Latin alphabet)

*So... what are the consequences of
changing this PID's?*

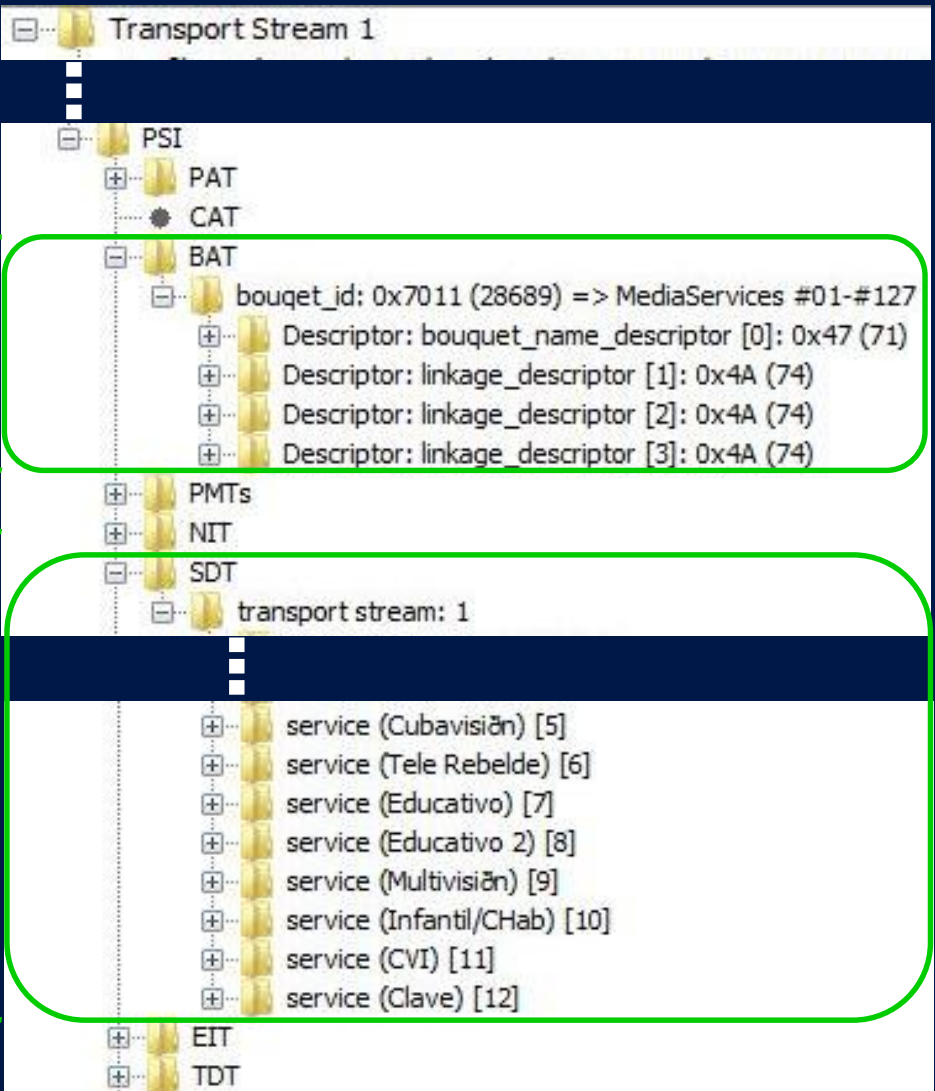


DVB Inspector v1.2



BAT with PID=
0x1000 0x0011
FAIL OK

SDT with PID=
0x0011 0x0011
OK OK



4T2 Content Analyzer

BAT with PID=

0x1000

FAIL

0x0011

OK

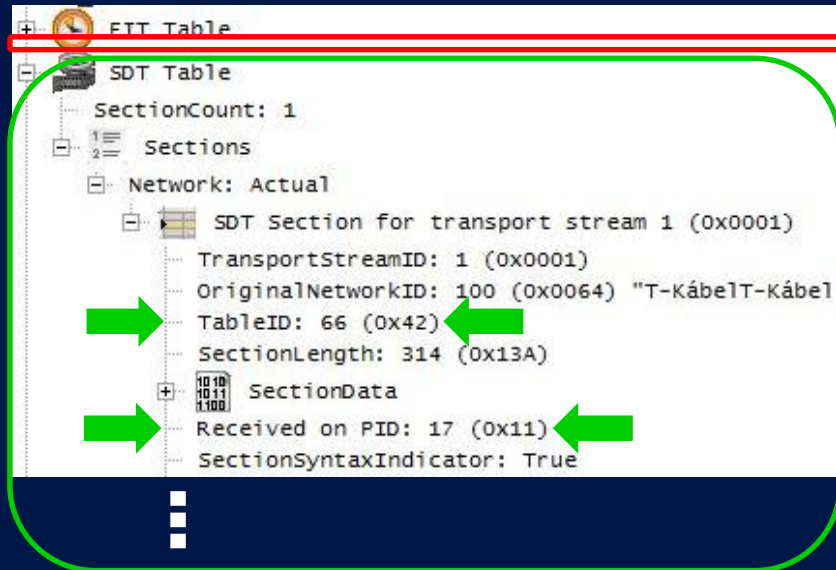
SDT with PID=

0x0011

OK

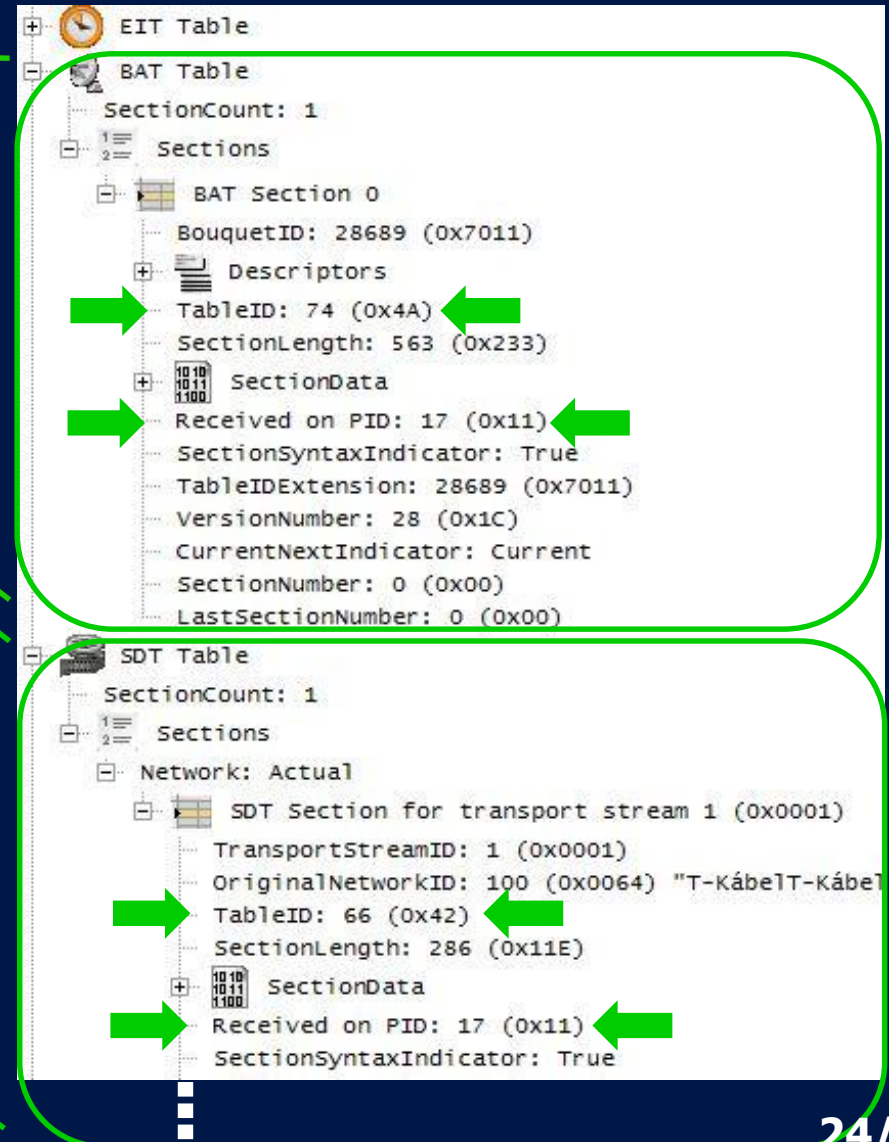
0x0011

OK



FIT Table

- SDT Table**
 - SectionCount: 1
 - Sections
 - Network: Actual
 - SDT Section for transport stream 1 (0x0001)
 - TransportStreamID: 1 (0x0001)
 - OriginalNetworkID: 100 (0x0064) "T-KábelT-Kábel"
 - TableID: 66 (0x42)
 - SectionLength: 314 (0x13A)
 - SectionData
 - Received on PID: 17 (0x11)
 - SectionSyntaxIndicator: True



EIT Table

- BAT Table**
 - SectionCount: 1
 - Sections
 - BAT Section 0
 - BouquetID: 28689 (0x7011)
 - Descriptors
 - TableID: 74 (0x4A)
 - SectionLength: 563 (0x233)
 - SectionData
 - Received on PID: 17 (0x11)
 - SectionSyntaxIndicator: True
 - TableIDExtension: 28689 (0x7011)
 - VersionNumber: 28 (0x1C)
 - CurrentNextIndicator: Current
 - SectionNumber: 0 (0x00)
 - LastSectionNumber: 0 (0x00)

- SDT Table**
- SectionCount: 1
- Sections
 - Network: Actual
 - SDT Section for transport stream 1 (0x0001)
 - TransportStreamID: 1 (0x0001)
 - OriginalNetworkID: 100 (0x0064) "T-KábelT-Kábel"
 - TableID: 66 (0x42)
 - SectionLength: 286 (0x11E)
 - SectionData
 - Received on PID: 17 (0x11)
 - SectionSyntaxIndicator: True

4T2 Content Analyzer

PIDs: 46		
<input type="checkbox"/>	0 (0x0000)	SI PAT
<input type="checkbox"/>	16 (0x0010)	SI NIT
<input type="checkbox"/>	17 (0x0011)	SI SDT
<input type="checkbox"/>	18 (0x0012)	SI EIT
<input type="checkbox"/>	20 (0x0014)	SI TDT/TOT



<input type="checkbox"/>	519 (0x0207)	PES Elementary Stream 3
<input type="checkbox"/>	520 (0x0208)	PES Elementary Stream 3
<input type="checkbox"/>	521 (0x0209)	PES Elementary Stream 3
<input type="checkbox"/>	4096 (0x1000)	Ghost
<input type="checkbox"/>	4097 (0x1001)	PMap PMT
<input type="checkbox"/>	4098 (0x1002)	PMap PMT
<input type="checkbox"/>	4099 (0x1003)	PMap PMT
<input type="checkbox"/>	4100 (0x1004)	PMap PMT

PID 0x1000 is identified by Analyzer **as "Ghost"**.

Analyzer identified by default PID = 0x0011 as BAT/SDT indistinctly

In left case packets with PID 0x0011 are carrying only SDT while **BAT** is being carried in packets with PID 0x1000

In right case packets with PID 0x0011 are actually carrying both SDT and BAT and there is no any packets with PID 0x1000.

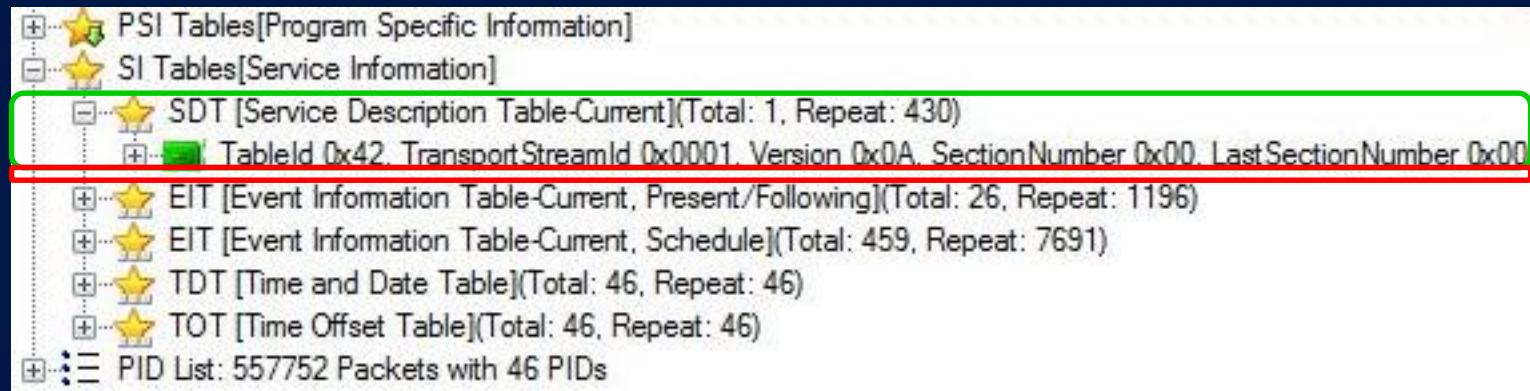
PIDs: 48		
<input type="checkbox"/>	0 (0x0000)	SI PAT
<input type="checkbox"/>	16 (0x0010)	SI NIT
<input type="checkbox"/>	17 (0x0011)	SI SDT/BAT
<input type="checkbox"/>	18 (0x0012)	SI EIT
<input type="checkbox"/>	20 (0x0014)	SI TDT/TOT



<input type="checkbox"/>	519 (0x0207)	PES Elementary Stream 4
<input type="checkbox"/>	520 (0x0208)	PES Elementary Stream 4
<input type="checkbox"/>	521 (0x0209)	PES Elementary Stream 4
<input type="checkbox"/>	770 (0x0302)	PES Elementary Stream 6
<input type="checkbox"/>	771 (0x0303)	PES Elementary Stream 6
<input type="checkbox"/>	772 (0x0304)	PES Elementary Stream 6
<input type="checkbox"/>	4097 (0x1001)	PMap PMT
<input type="checkbox"/>	4098 (0x1002)	PMap PMT
<input type="checkbox"/>	4099 (0x1003)	PMap PMT
<input type="checkbox"/>	4100 (0x1004)	PMap PMT

There is no any packets with PID 0x1000.

TS Expert



PSI Tables[Program Specific Information]

SI Tables[Service Information]

SDT [Service Description Table-Current](Total: 1, Repeat: 430)

TableId 0x42, TransportStreamId 0x0001, Version 0x0A, SectionNumber 0x00, LastSectionNumber 0x00

EIT [Event Information Table-Current, Present/Following](Total: 26, Repeat: 1196)

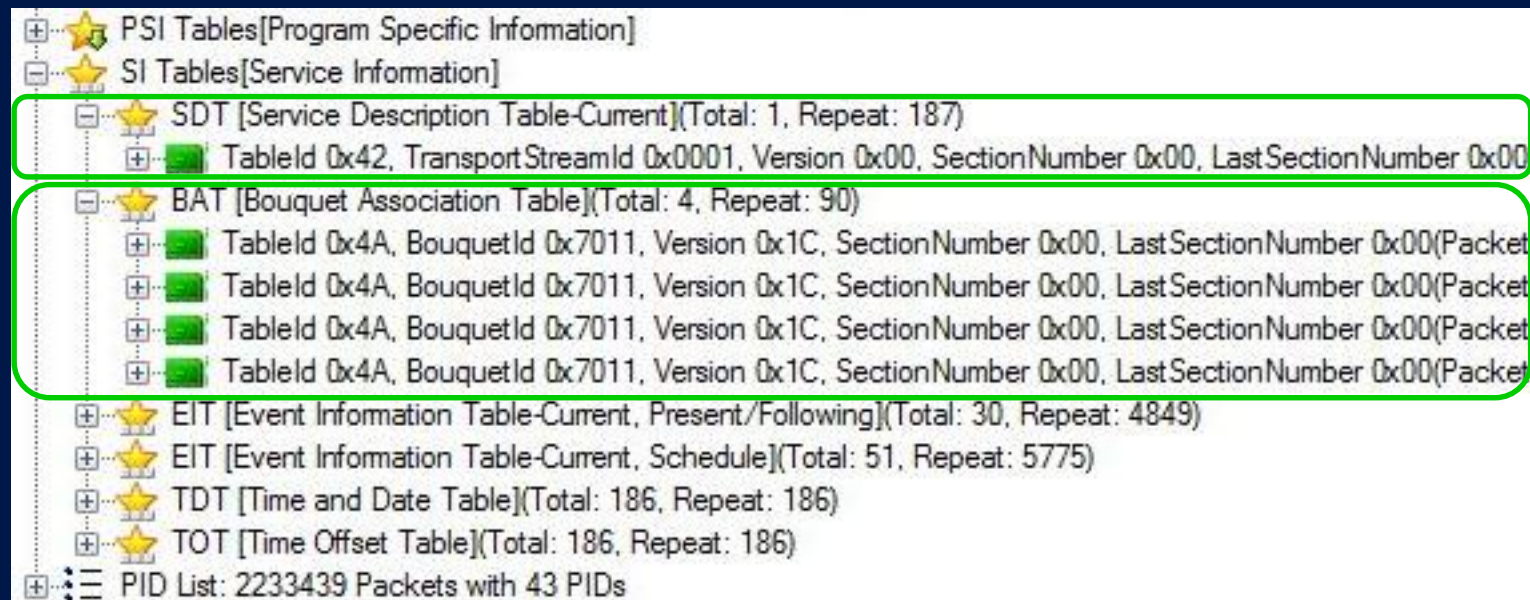
EIT [Event Information Table-Current, Schedule](Total: 459, Repeat: 7691)

TDT [Time and Date Table](Total: 46, Repeat: 46)

TOT [Time Offset Table](Total: 46, Repeat: 46)

PID List: 557752 Packets with 46 PIDs

SDT with PID=0x0011 OK
BAT with PID=0x1000
FAIL



PSI Tables[Program Specific Information]

SI Tables[Service Information]

SDT [Service Description Table-Current](Total: 1, Repeat: 187)

TableId 0x42, TransportStreamId 0x0001, Version 0x00, SectionNumber 0x00, LastSectionNumber 0x00

BAT [Bouquet Association Table](Total: 4, Repeat: 90)

TableId 0x4A, BouquetId 0x7011, Version 0x1C, SectionNumber 0x00, LastSectionNumber 0x00(Packet

TableId 0x4A, BouquetId 0x7011, Version 0x1C, SectionNumber 0x00, LastSectionNumber 0x00(Packet

TableId 0x4A, BouquetId 0x7011, Version 0x1C, SectionNumber 0x00, LastSectionNumber 0x00(Packet

TableId 0x4A, BouquetId 0x7011, Version 0x1C, SectionNumber 0x00, LastSectionNumber 0x00(Packet

EIT [Event Information Table-Current, Present/Following](Total: 30, Repeat: 4849)

EIT [Event Information Table-Current, Schedule](Total: 51, Repeat: 5775)

TDT [Time and Date Table](Total: 186, Repeat: 186)

TOT [Time Offset Table](Total: 186, Repeat: 186)

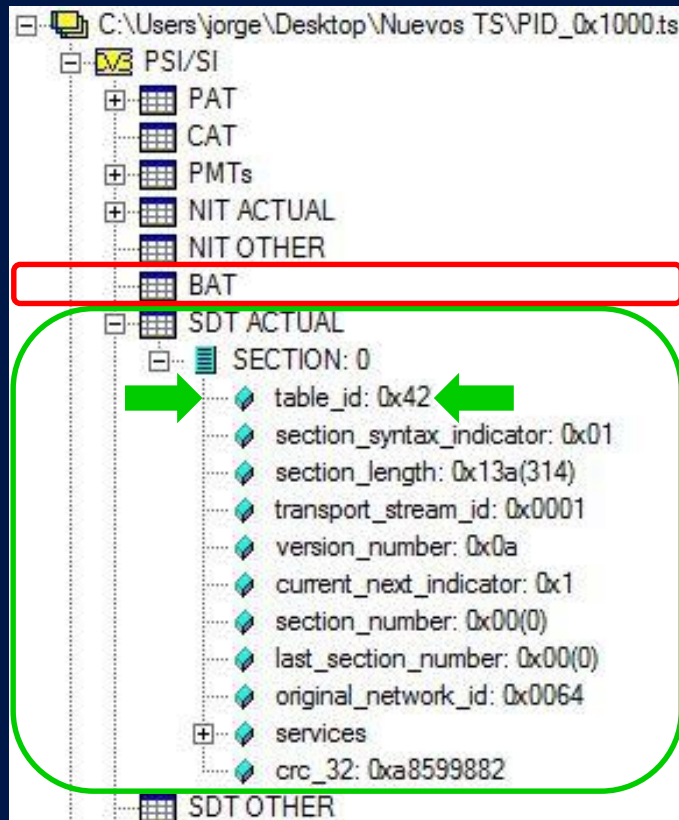
PID List: 2233439 Packets with 43 PIDs

SDT with PID=0x0011 OK
BAT with PID=0x0011 OK

TSR

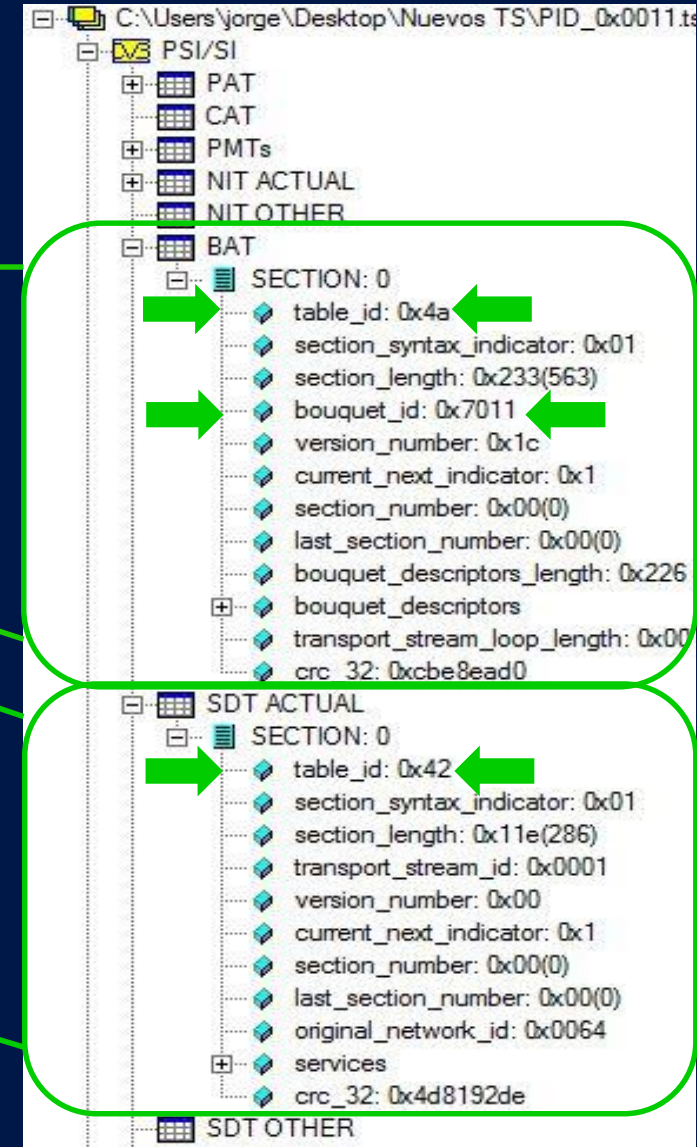
BAT with PID=
0x1000 0x0011
FAIL OK

SDT with PID=
 0x0011 0x0011
 OK OK



C:\Users\jorge\Desktop\Nuevos TS\PID_0x1000.ts

- PSI/SI
 - PAT
 - CAT
 - PMTs
 - NIT ACTUAL
 - NIT OTHER
 - BAT**
 - SDT ACTUAL
 - SECTION: 0
 - table_id: 0x42
 - section_syntax_indicator: 0x01
 - section_length: 0x13a(314)
 - transport_stream_id: 0x0001
 - version_number: 0x0a
 - current_next_indicator: 0x1
 - section_number: 0x00(0)
 - last_section_number: 0x00(0)
 - original_network_id: 0x0064
 - services
 - crc_32: 0xa8599882
 - SDT OTHER



C:\Users\jorge\Desktop\Nuevos TS\PID_0x0011.ts

- PSI/SI
 - PAT
 - CAT
 - PMTs
 - NIT ACTUAL
 - NIT OTHER
 - BAT
 - SECTION: 0
 - table_id: 0x4a
 - section_syntax_indicator: 0x01
 - section_length: 0x233(563)
 - bouquet_id: 0x7011
 - version_number: 0x1c
 - current_next_indicator: 0x1
 - section_number: 0x00(0)
 - last_section_number: 0x00(0)
 - bouquet_descriptors_length: 0x226
 - bouquet_descriptors
 - transport_stream_loop_length: 0x00
 - crc_32: 0xcbe8ead0
- SDT ACTUAL
 - SECTION: 0
 - table_id: 0x42
 - section_syntax_indicator: 0x01
 - section_length: 0x11e(286)
 - transport_stream_id: 0x0001
 - version_number: 0x00
 - current_next_indicator: 0x1
 - section_number: 0x00(0)
 - last_section_number: 0x00(0)
 - original_network_id: 0x0064
 - services
 - crc_32: 0x4d8192de
- SDT OTHER

TSReader

BAT with PID=

0x1000

FAIL

0x0011

OK

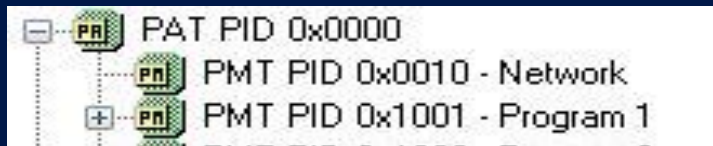
SDT with PID=

0x0011

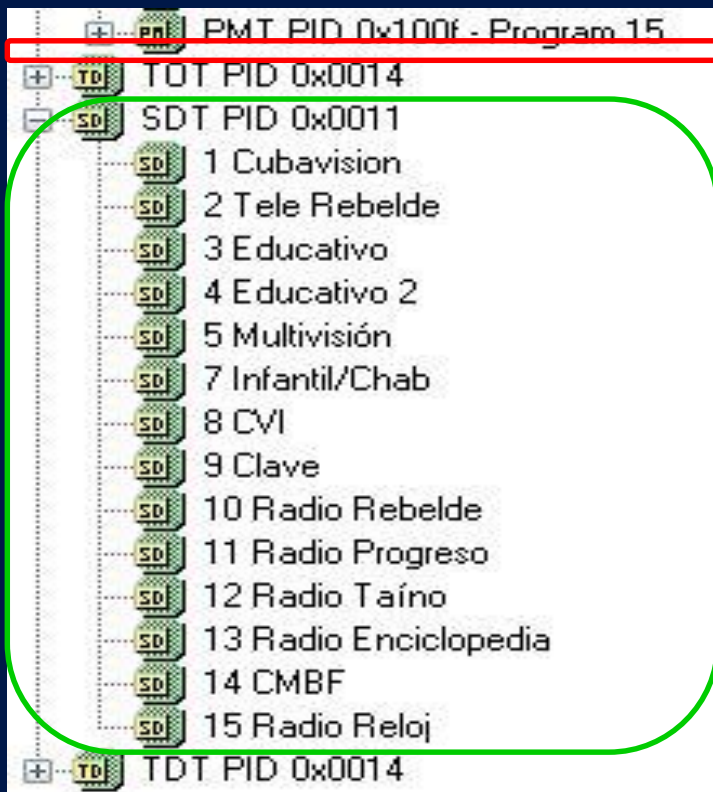
OK

0x0011

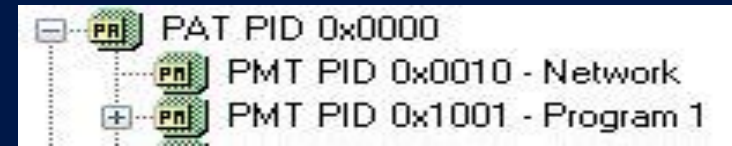
OK



PAT PID 0x0000
PMT PID 0x0010 - Network
PMT PID 0x1001 - Program 1



PMT PID 0x100f - Program 15
TOT PID 0x0014
SDT PID 0x0011
1 Cubavision
2 Tele Rebelde
3 Educativo
4 Educativo 2
5 Multivisión
7 Infantil/Chab
8 CVI
9 Clave
10 Radio Rebelde
11 Radio Progreso
12 Radio Taíno
13 Radio Enciclopedia
14 CMBF
15 Radio Reloj
TDT PID 0x0014



PAT PID 0x0000
PMT PID 0x0010 - Network
PMT PID 0x1001 - Program 1



PMT PID 0x100e - Program 14
BAT PID 0x0011
BAT 0x7011 (v28)
TOT PID 0x0014
SDT PID 0x0011
1 Cubavisión
2 Tele Rebelde
3 Educativo
4 Educativo 2
5 Multivisión
7 Infantil/CHab
8 CVI
9 Clave
10 Radio Rebelde
11 Radio Progreso
12 Radio Taíno
13 Radio Enciclopedia
14 CMBF
TDT PID 0x0014

Conclusions

- *There are **marked differences in the case of the use of BAT table** between both EN 300 468 and GD/J027-2011 standards:*
 - *EN 300 468 defines this table **to provide information regarding bouquets.***
 - *GD/J027-2011 employs BAT table **to carry Data Broadcasting Service Information.***

Conclusions

- *There is **a difference in BAT table PID value** between both EN 300 468 and GD/J027-2011 standards and the document, "Information Data Broadcast Application Specification":*
 - *EN 300 468 defines packets carrying BAT table **must have PID value 0x0011.***
 - *GD/J027-2011 **doesn't make any change** in BAT table PID value.*
 - *"Information Data Broadcast Application Specification" document **makes an offset in BAT table PID value.***

Conclusions

- ***Impossibility to analyze with software tools the whole structure of the transport streams, specifically, packets with PID 0x1000 containing BAT table .***
- ***There is NO ANY Chinese standard that suggest the use of PID = 0x1000 for BAT identification.***

Recommendations

- *Update the EPG Server's software to make possible the **automatic conformation of BAT table** to send it in the defined PID value by EN 300 468 standard.*
- *Continue the study of XML language in order **to improve the current Data Broadcasting Service** with new features and facilities.*



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