Cuba´s Data Broadcasting issue

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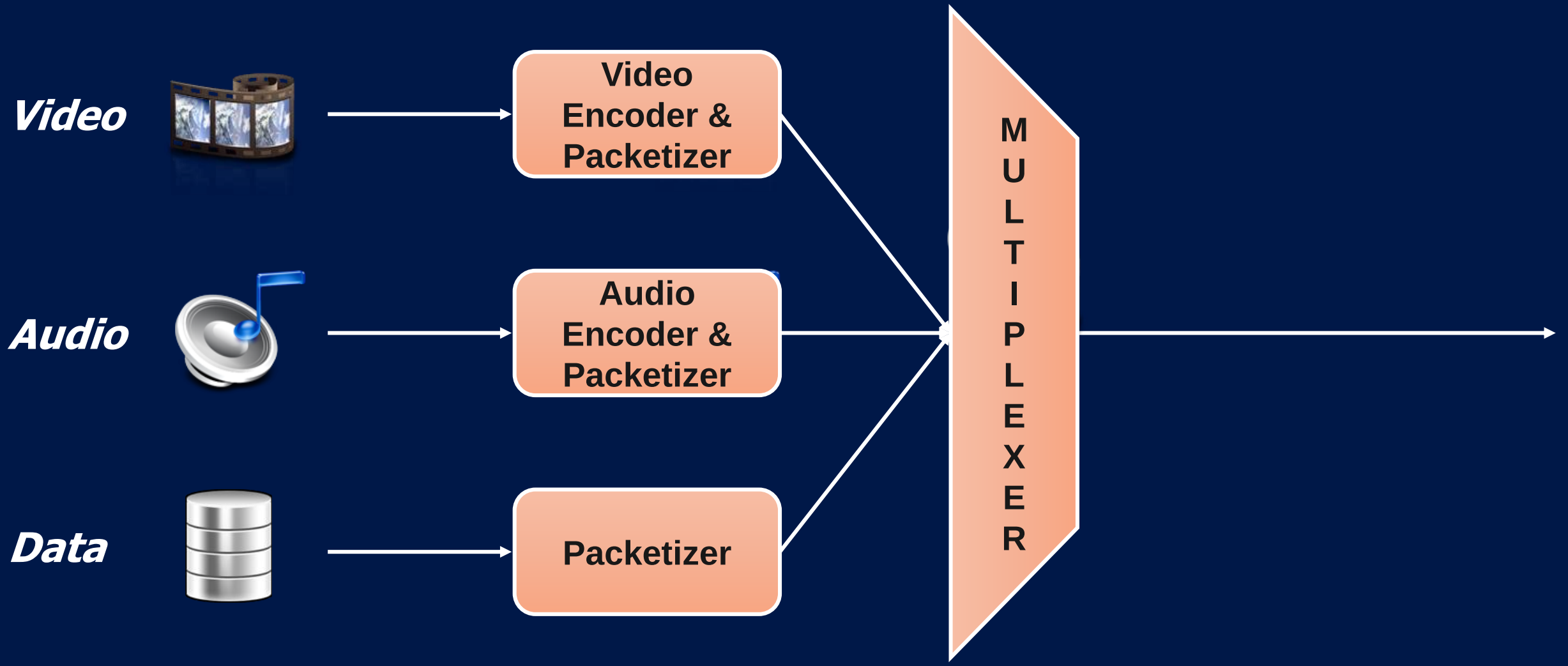
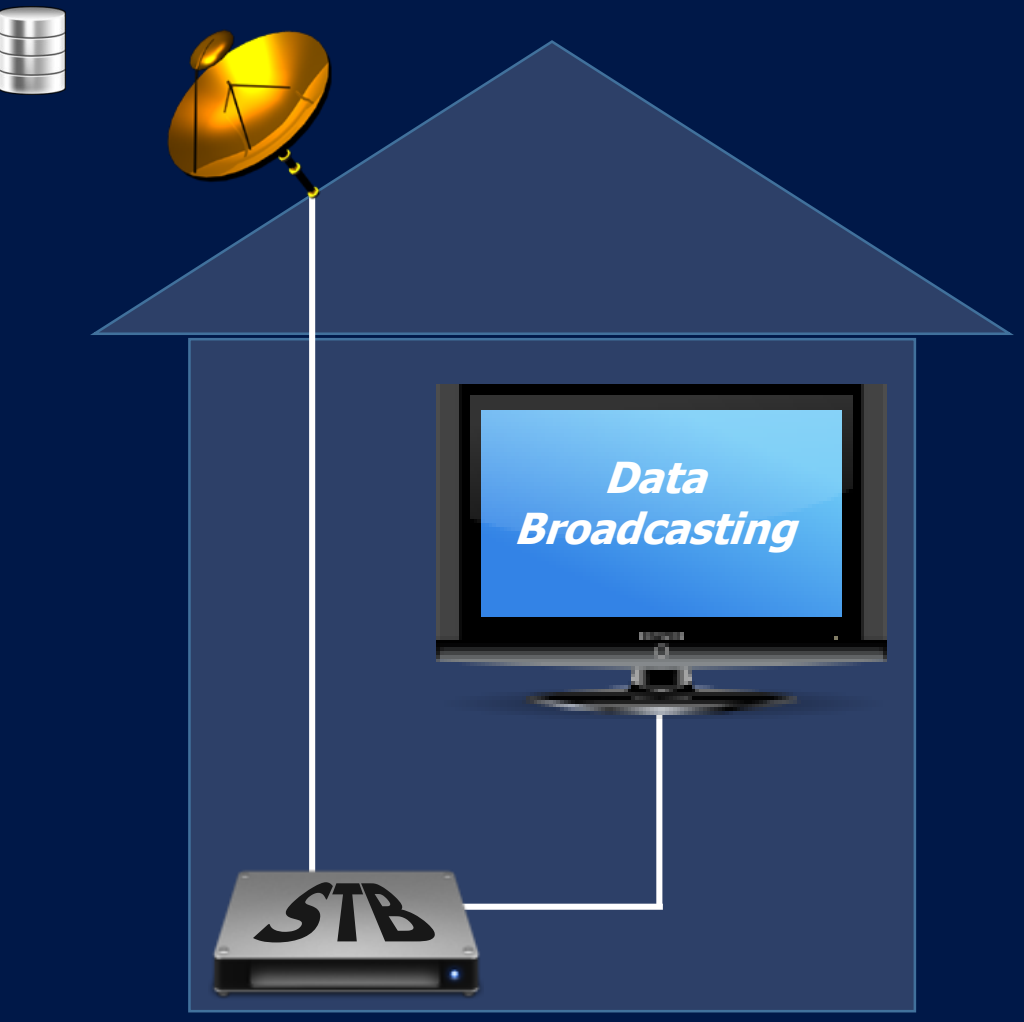
Introduction

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.

Data insertion



Data Broadcasting Service classification



Independent Data Broadcasting

Linked Data Broadcasting

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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 difine 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 boquet_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bouqet_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).

0x80 to 0xFE	user defined

Field's definition by EN 300 468.

linkage_type	8	uimsbf	链接类型，8 位字段，专有数据链接类型取值为 0x80。

Field's assignation by GD/J027-2011.

Comparative study

- *file data table with table_id 0x90*

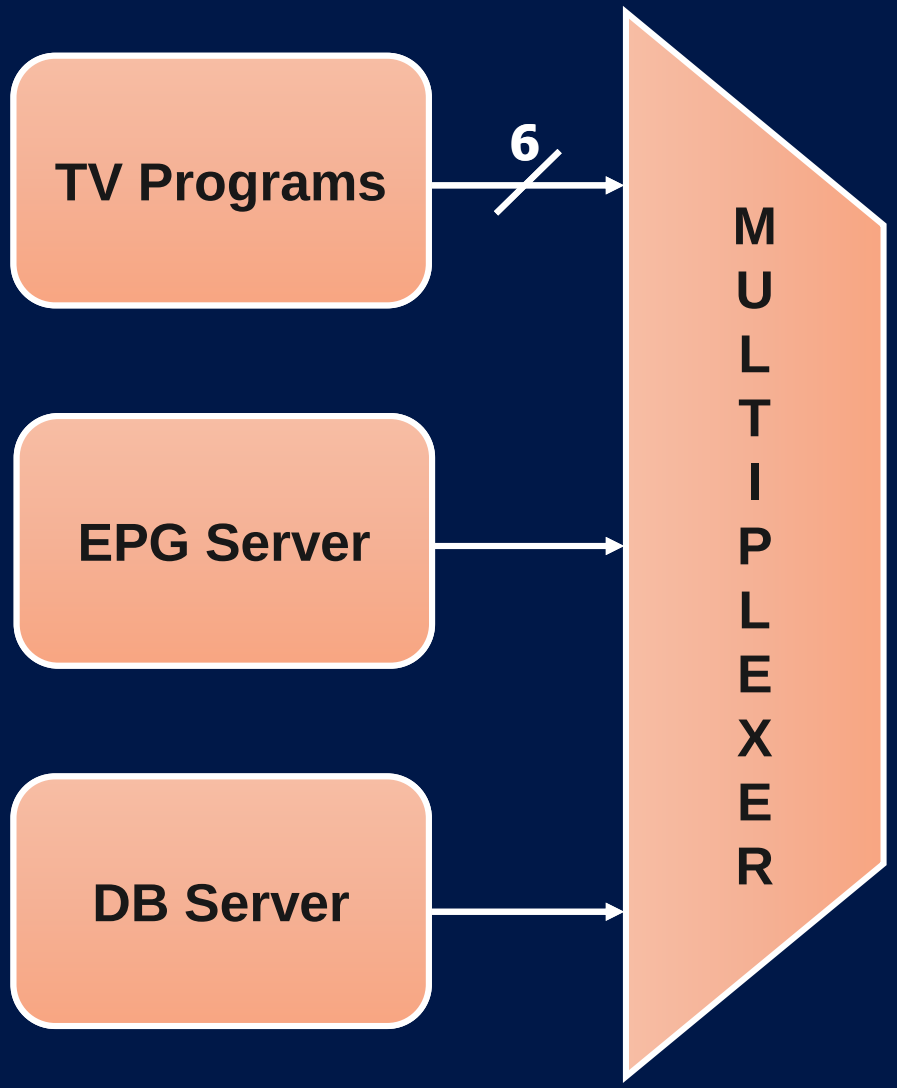
4.4.1.1.5 专有数据

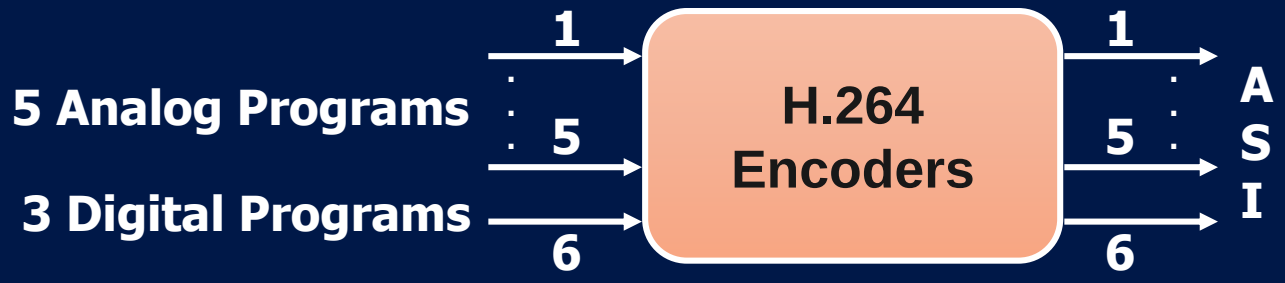
专有数据用于信息服务，在传送流中用XML文件和图片文件传输，用本节定义的格式封装，要求综合接收解码器应处理。

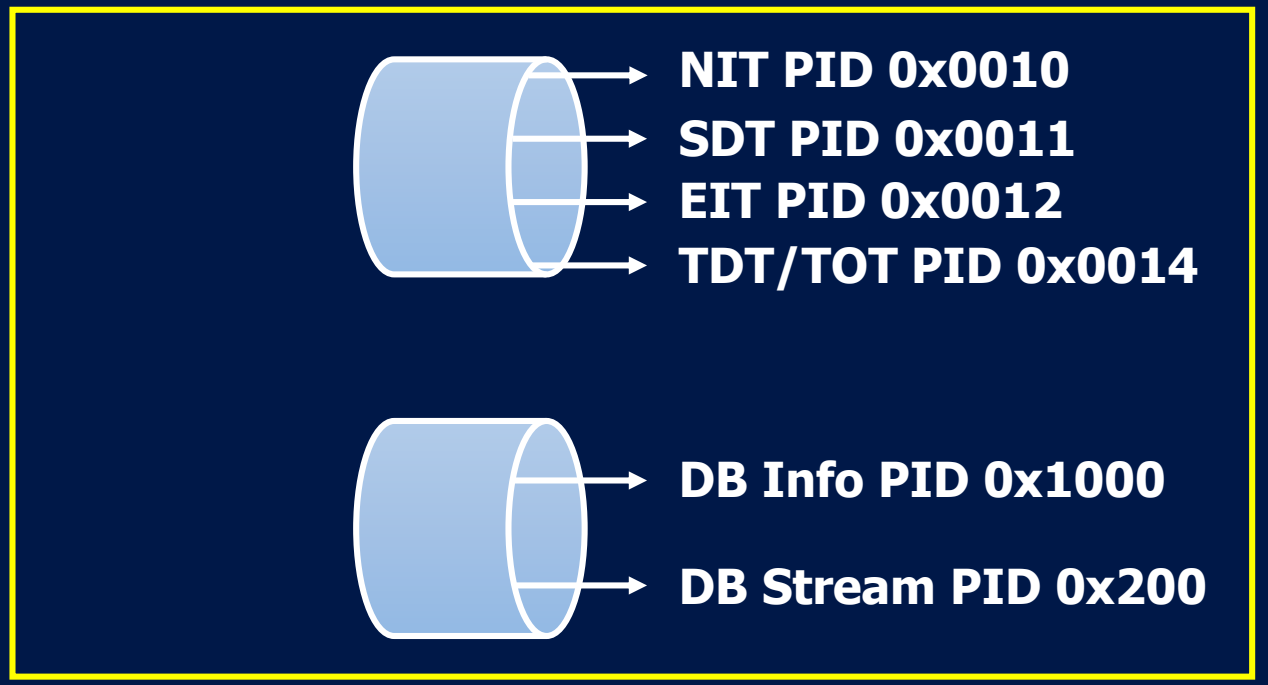
专有数据通过文件数据表FILE_DATA_TABLE来传送，表标识符(table_id)取值为0x90，文件数据表按照下面的格式切分成文件数据段FILE_DATA_SECTION。

Field's assignation by GD/J027-2011.

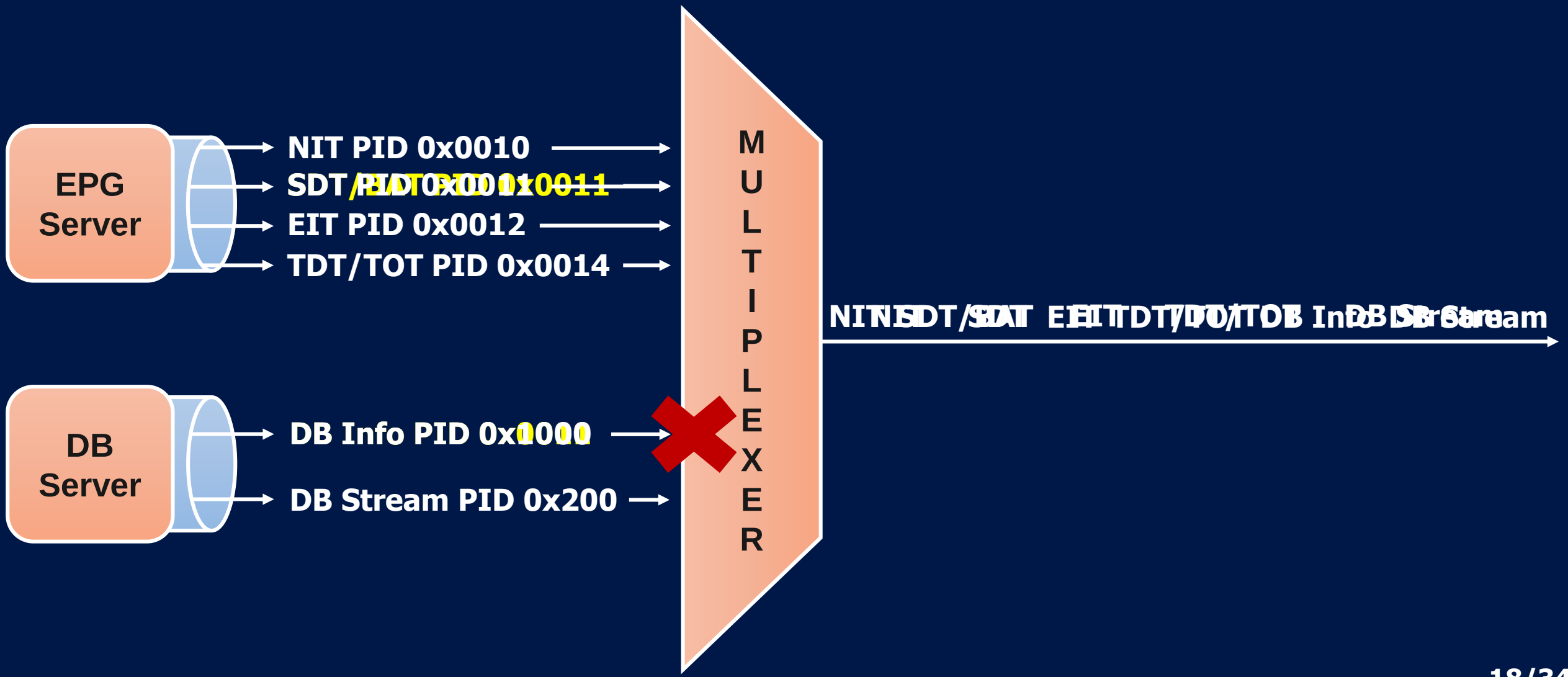
Transmission schema







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   castJõ.... .....
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

0x00000000000043CB	0x0200	0x36				1	1	6		PLD

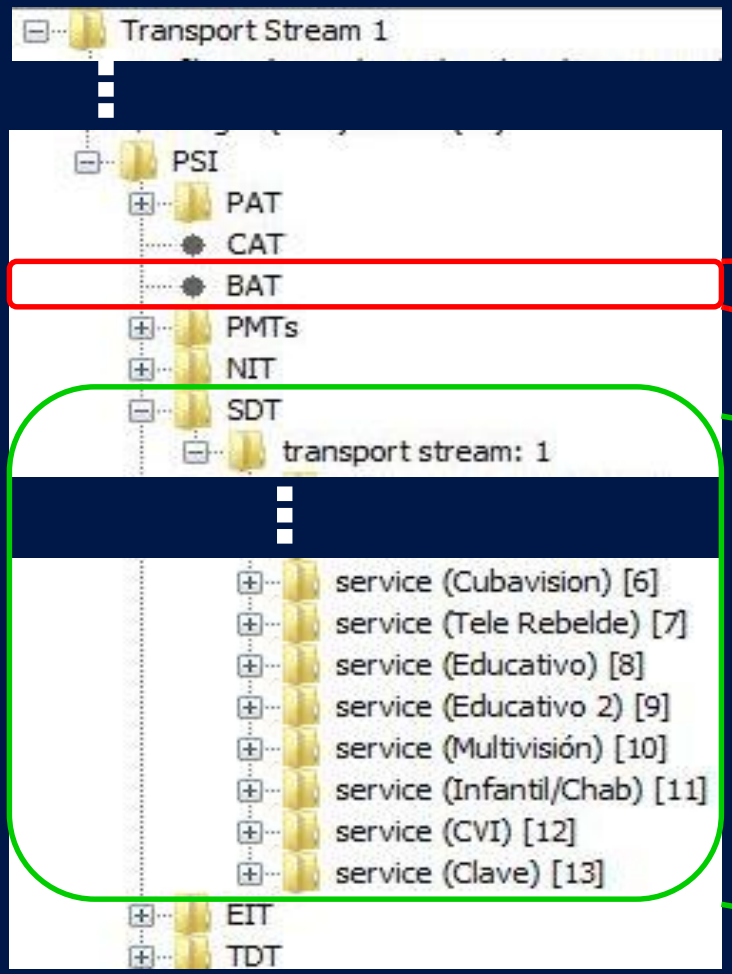
Hex View

```
0x00000000000043C0   90 F3 6E ED 69 FD BC 94 4B F5 B4 47 42 00 16 00   .óníiý¼.Kõ´GB...
0x00000000000043D0   90 B3 36 0B 5F C9 00 00 0F 31 38 31 5F 32 31 33   .³6._É...181_213
0x00000000000043E0   5F 30 37 39 2E 78 6D 6C 00 00 03 19 3C 3F 78 6D   _079.xml....<?xm
0x00000000000043F0   6C 20 76 65 72 73 69 6F 6E 3D 22 31 2E 30 22 20   l version="1.0"
0x0000000000004400   65 6E 63 6F 64 69 6E 67 3D 22 49 53 4F 2D 38 38   encoding="ISO-88
0x0000000000004410   35 39 2D 31 22 3F 3E 0D 0A 3C 63 64 62 73 3A 52   59-1"?>..<cdbs:R
0x0000000000004420   6F 6F 74 4D 65 6E 75 20 78 6D 6C 6E 73 3A 63 64   ootMenu xmlns:cd
0x0000000000004430   62 73 3D 22 75 72 6E 3A 63 64 62 73 3A 64 61 74   bs="urn:cdbs:dat
0x0000000000004440   61 22 20 63 64 62 73 3A 42 61 63 6B 67 72 6F 75   a" cdbs:Backgrou
0x0000000000004450   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=

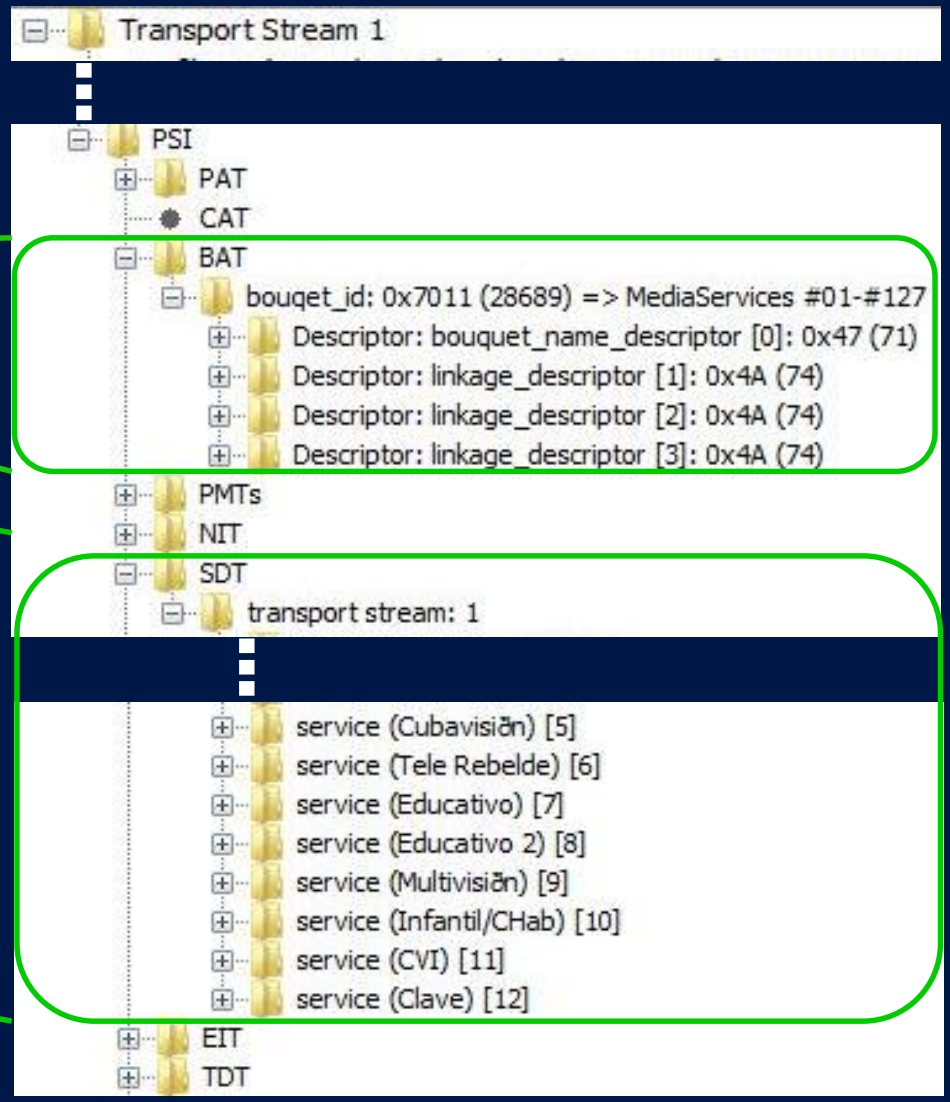
0x1000 0x0011

FAIL OK

SDT with PID=

0x0011 0x0011

OK OK



4T2 Content Analyzer

BAT with PID=

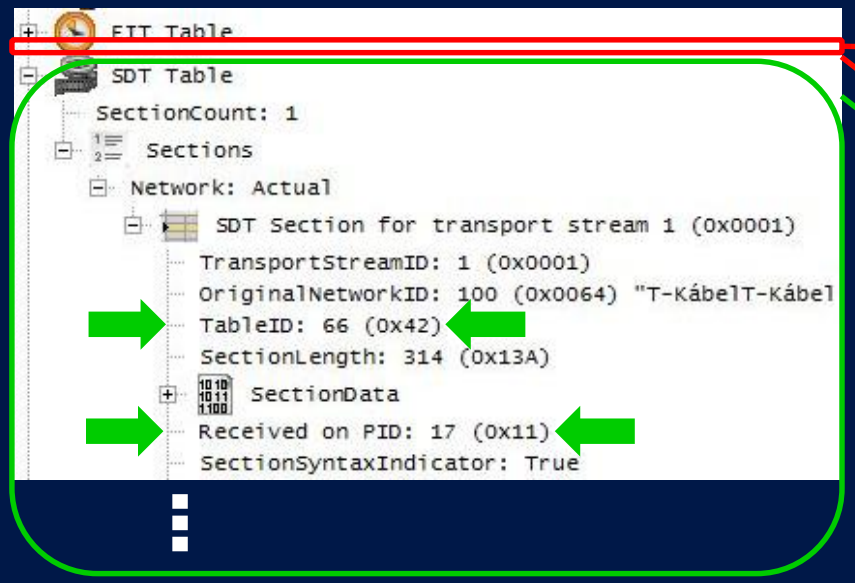
0x1000 FAIL

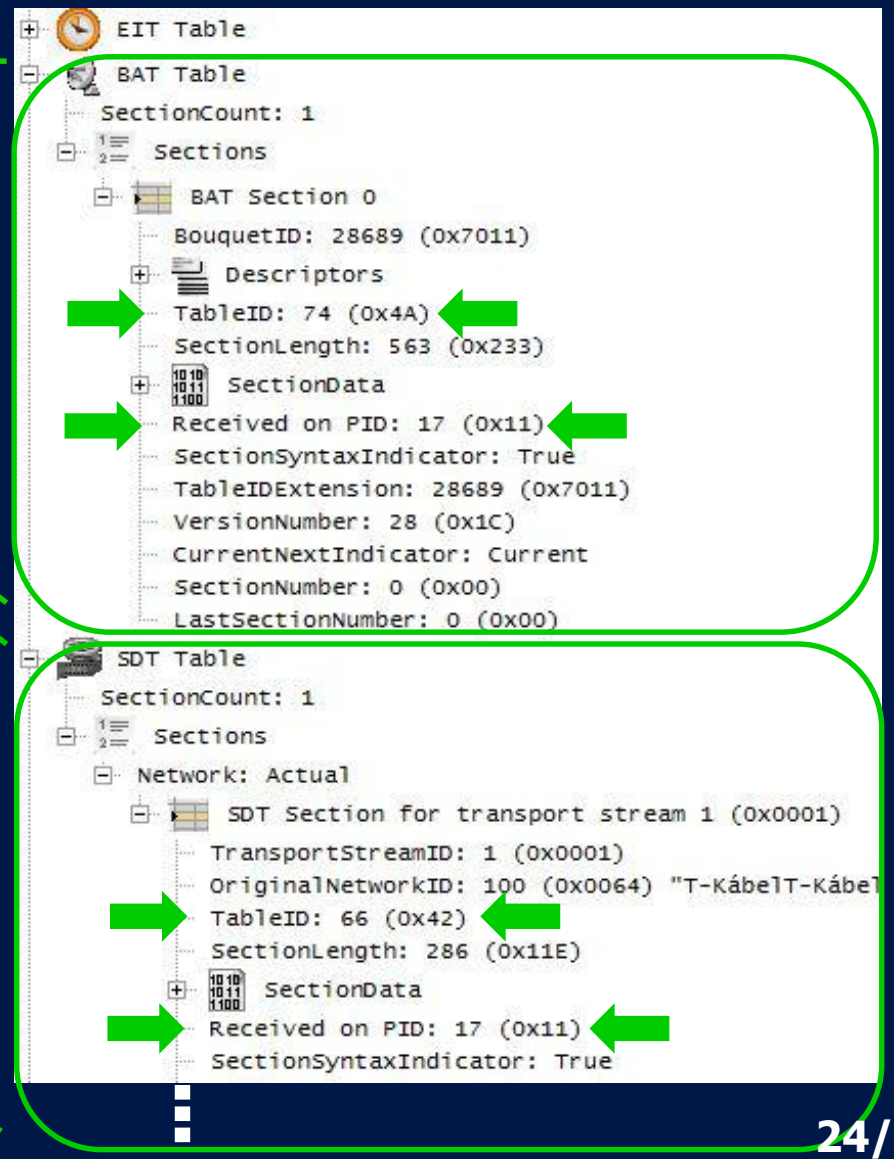
0x0011 OK

SDT with PID=

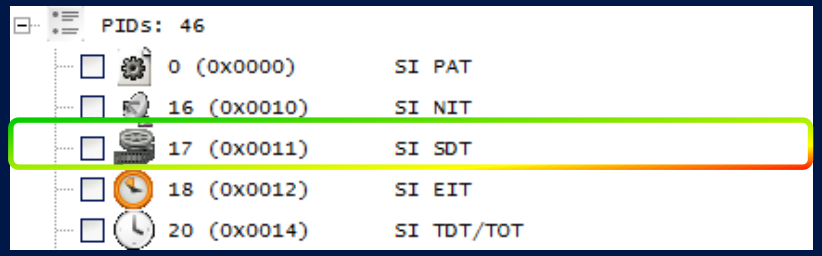
0x0011 OK

0x0011 OK

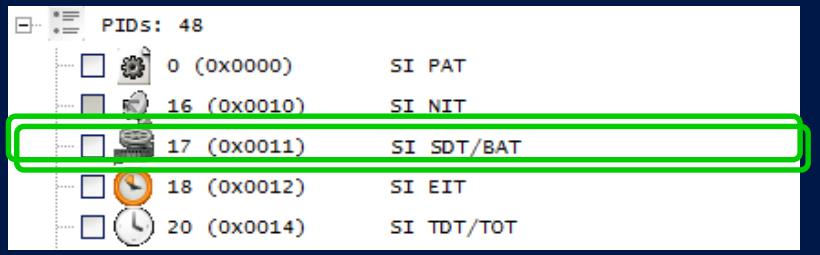


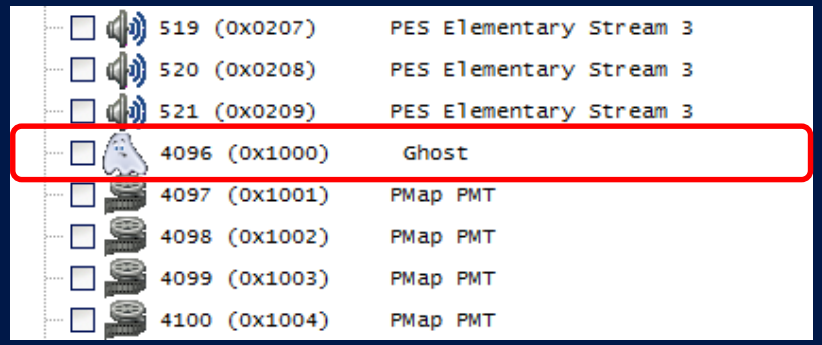


4T2 Content Analyzer



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

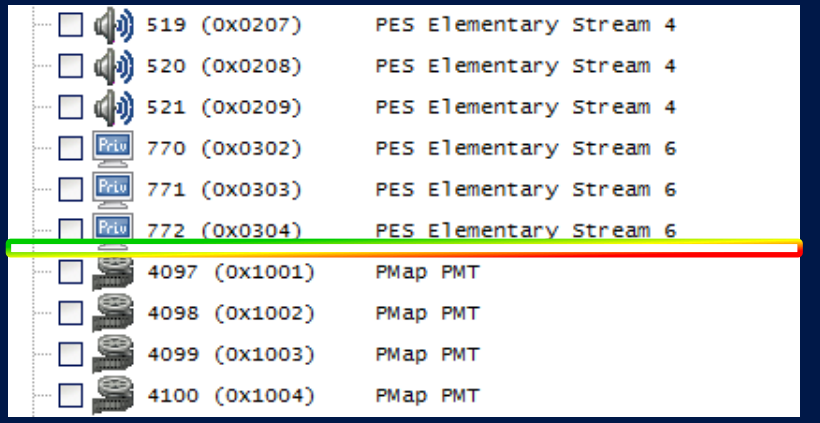




PID 0x1000 is identified by Analyzer **as "Ghost"**.

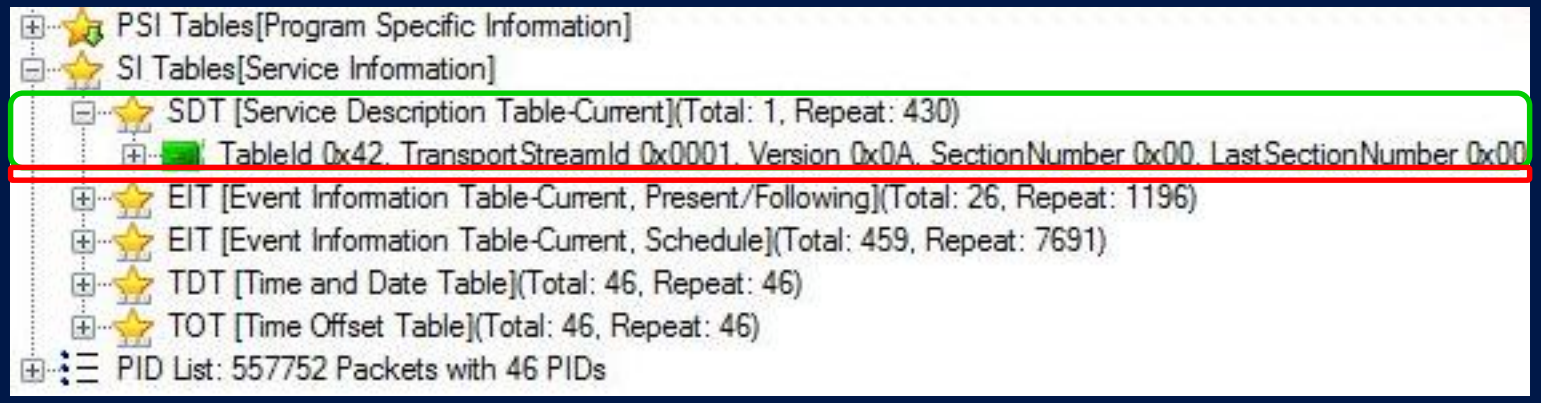
In left case packets with PID 0x0011 are carrying only SDT while BAT is being carried in packets with PID 0x1000

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



There is no any packets with PID 0x1000.

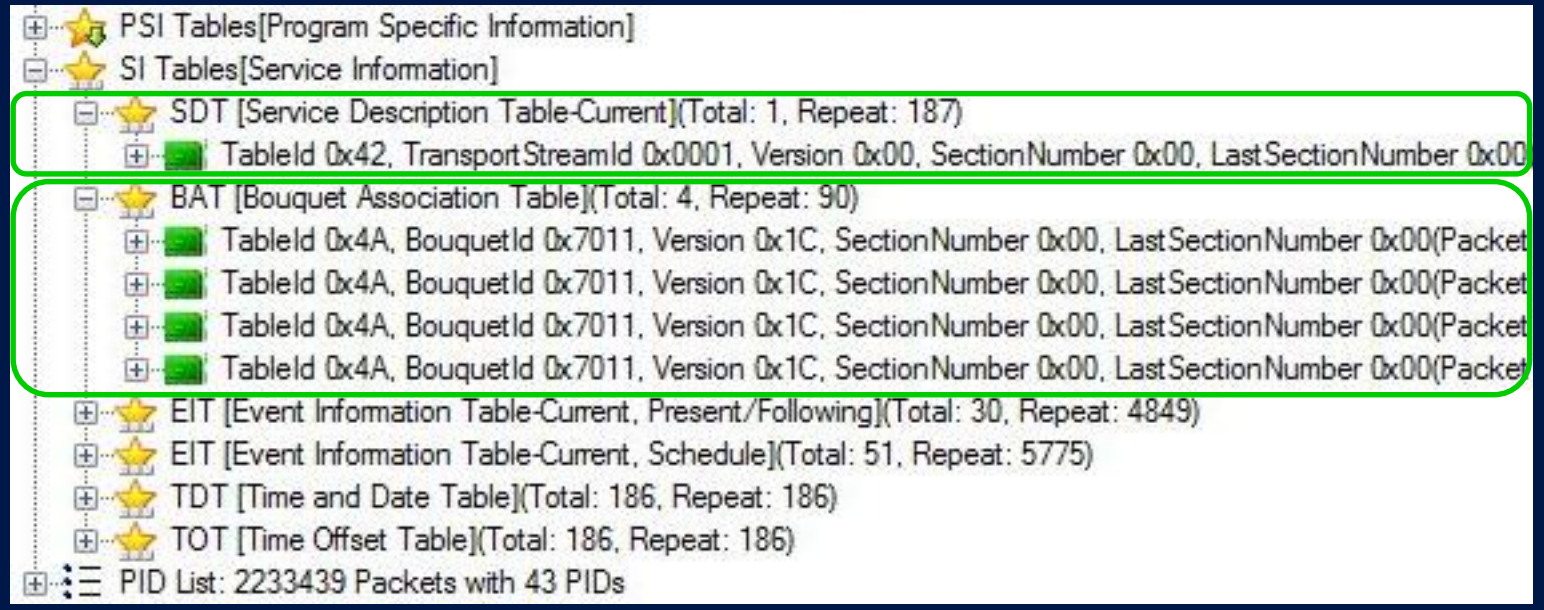
TS Expert



SDT with PID=0x0011 OK

BAT with PID=0x1000

FAIL



SDT with PID=0x0011 OK

BAT with PID=0x0011 OK

TSR

BAT with PID=

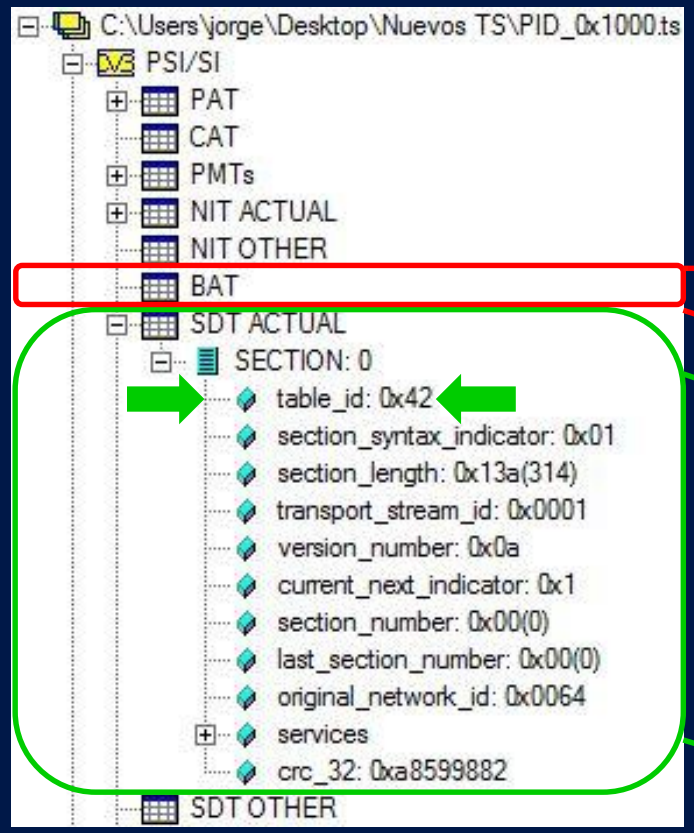
0x1000 — **FAIL**

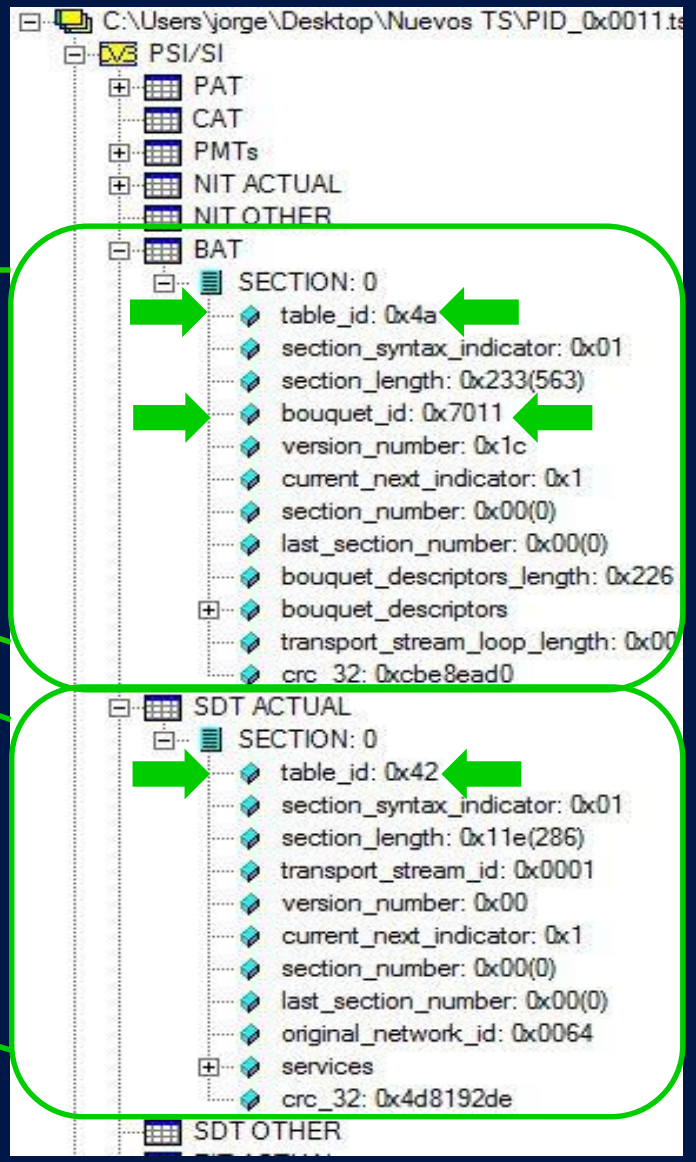
0x0011 — OK

SDT with PID=

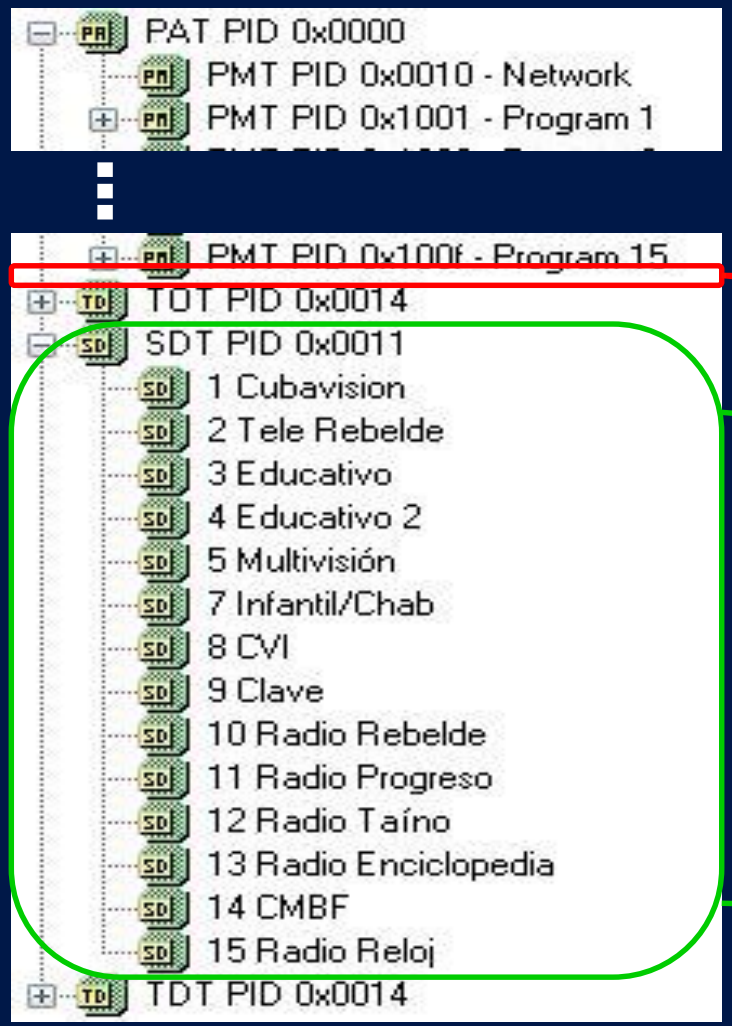
0x0011 — OK

0x0011 — OK





TSReader



BAT with PID=

0x1000	0x0011
FAIL	OK

SDT with PID=

0x0011	0x0011
OK	OK

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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