

Relatório do 3º trabalho laboratorial de Sistemas de Comunicações Multimédia:

5.1

Utilizando o *TSReader*, obteve-se a seguinte tabela PAT, onde se encontram especificados os vários programas: RTP1, RTP2, SIC, TVI e Canal HD.

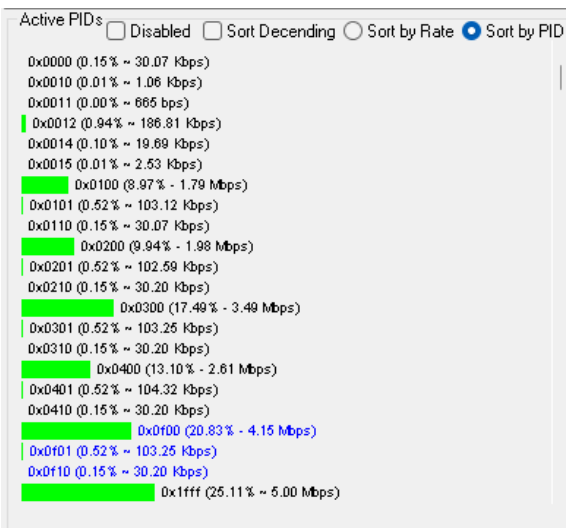
```
PAT Version Number: 7
Transport Stream ID: 1101 (0x044d)
NIT: 842.0 MHz

PMT PID 16 (0x0010) - Network
PMT PID 272 (0x0110) - Program 1101 RTP 1
PMT PID 528 (0x0210) - Program 1102 RTP 2
PMT PID 784 (0x0310) - Program 1103 SIC
PMT PID 1040 (0x0410) - Program 1104 TVI
PMT PID 3856 (0x0f10) - Program 1111 Canal HD
```

Obteve-se também, da mesma forma, a tabela PMT correspondente a cada programa, como se encontra a seguir representado.

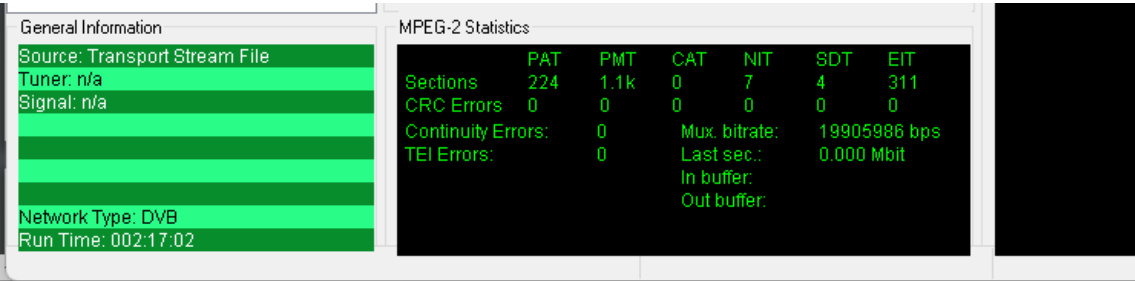
<p>Program Number: 1101 PCR on PID 256 (0x0100) PMT Version: 7 Service name: RTP 1</p> <p>Stream Type: 0x1b H.264 Video Elementary Stream PID 256 (0x0100)</p> <p>Stream Type: 0x11 MPEG-4 Audio Elementary Stream PID 257 (0x0101)</p>	<p>Program Number: 1102 PCR on PID 512 (0x0200) PMT Version: 5 Service name: RTP 2</p> <p>Stream Type: 0x1b H.264 Video Elementary Stream PID 512 (0x0200)</p> <p>Stream Type: 0x11 MPEG-4 Audio Elementary Stream PID 513 (0x0201)</p>
<p>Program Number: 1103 PCR on PID 768 (0x0300) PMT Version: 5 Service name: SIC</p> <p>Stream Type: 0x1b H.264 Video Elementary Stream PID 768 (0x0300)</p> <p>Stream Type: 0x11 MPEG-4 Audio Elementary Stream PID 769 (0x0301)</p>	<p>Program Number: 1104 PCR on PID 1024 (0x0400) PMT Version: 5 Service name: TVI</p> <p>Stream Type: 0x1b H.264 Video Elementary Stream PID 1024 (0x0400)</p> <p>Stream Type: 0x11 MPEG-4 Audio Elementary Stream PID 1025 (0x0401)</p>
<p>Program Number: 1111 PCR on PID 3840 (0x0f00) PMT Version: 2 Service name: Canal HD</p> <p>Stream Type: 0x1b H.264 Video Elementary Stream PID 3840 (0x0f00)</p> <p>Stream Type: 0x11 MPEG-4 Audio Elementary Stream PID 3841 (0x0f01)</p>	

Para cada programa obtém-se um bit rate específico, tal como se apresenta a seguir:



Sabe-se que:

- ✓ 0x01 ... refere-se à PMT1, correspondente ao programa RTP1
- ✓ 0x02 ... refere-se à PMT2, correspondente ao programa RTP2
- ✓ 0x03 ... refere-se à PMT3, correspondente ao programa SIC
- ✓ 0x04 ... refere-se à PMT4, correspondente ao programa TVI
- ✓ 0x0f ... refere-se à PMT5, correspondente ao programa Canal HD



Obteve-se, para este ficheiro *transport stream*, o bit rate de 18432 kbits/s.

Utilizou-se, de seguida, o Wireshark, para verificar a ocorrência de tabelas PMT associadas a pacotes, definindo-se uma condição específica como filtro de visualização, nesse sentido.

Filter Name	Filter Expression
Ethernet broadcast	eth.addr == ff:ff:ff:ff:ff:ff
No ARP	not arp
IPv4 only	ip
IPv4 address 192.0.2.1	ip.addr == 192.0.2.1
IPv4 address isn't 192.0.2.1 (don't use != for this!)	!(ip.addr == 192.0.2.1)
IPv6 only	ipv6
IPv6 address 2001:db8::1	ipv6.addr == 2001:db8::1
TCP only	tcp
UDP only	udp
Non-DNS	!(udp.port == 53 tcp.port == ...
TCP or UDP port is 80 (HTTP)	tcp.port == 80 udp.port == 80
HTTP	http
No ARP and no DNS	not arp and !(udp.port == 53)
Non-HTTP and non-SMTP to/from 192.0.2.1	ip.addr == 192.0.2.1 and tcp.p...
New display filter	mp2t.pid==0x0

Definindo uma nova condição, verificou-se a proximidade de pacotes com tabelas PMT a pacotes com tabelas PAT. Inicialmente verificou-se uma separação de 12 pacotes, sendo que numa 2ª instância, esta distância passa a ser apenas de um único pacote.

5.2. b)

Executou-se o comando:

```
ffmpeg -i ContinenteTs_20090402.ts -map p:0:1101 -map p:0:1102 -map p:0:1103 -map p:0:1104 -map  
p:0:1111 -c copy myTS.ts
```

Obteve-se o erro abaixo representado:

```
[mpegts @ 000002549407f1c0] PES packet size mismatch  
[mpegts @ 000002549407f1c0] Packet corrupt (stream = 4, dts = 2484820647).  
[mpegts @ 000002549407f1c0] PES packet size mismatch  
[mpegts @ 000002549407f1c0] Packet corrupt (stream = 2, dts = 2490070171).  
Input #0, mpegts, from 'ContinenteTs_20090402.ts':  
  Duration: 00:00:12.21, start: 27598.077800, bitrate: 18432 kb/s  
  Program 1101  
    Metadata:  
      service_name       : RTP 1  
      service_provider:  
  Stream #0:9[0x100]: Video: h264 (Main) ([27][0][0][0] / 0x001B), yuv420p(tv, bt470bg, top first), 720x576 [SAR 12:11 DAR 15:11], 25 fps, 50 tbr, 90k tbn  
  Stream #0:10[0x101]: Audio: aac_latm (HE-AAC) ([17][0][0][0] / 0x0011), 48000 Hz, stereo, fltp  
  Program 1102  
    Metadata:  
      service_name       : RTP 2  
      service_provider:  
  Stream #0:7[0x200]: Video: h264 (Main) ([27][0][0][0] / 0x001B), yuv420p(tv, bt470bg, top first), 720x576 [SAR 12:11 DAR 15:11], 25 fps, 25 tbr, 90k tbn  
  Stream #0:8[0x201]: Audio: aac_latm (HE-AAC) ([17][0][0][0] / 0x0011), 48000 Hz, stereo, fltp  
  Program 1103  
    Metadata:  
      service_name       : SIC  
      service_provider:  
  Stream #0:5[0x300]: Video: h264 (Main) ([27][0][0][0] / 0x001B), yuv420p(tv, bt470bg, top first), 720x576 [SAR 12:11 DAR 15:11], 25 fps, 50 tbr, 90k tbn  
  Stream #0:6[0x301]: Audio: aac_latm (HE-AAC) ([17][0][0][0] / 0x0011), 48000 Hz, stereo, fltp  
  Program 1104  
    Metadata:  
      service_name       : TVI  
      service_provider:  
  Stream #0:3[0x400]: Video: h264 (Main) ([27][0][0][0] / 0x001B), yuv420p(tv, bt470bg, top first), 720x576 [SAR 12:11 DAR 15:11], 25 fps, 50 tbr, 90k tbn  
  Stream #0:4[0x401]: Audio: aac_latm (HE-AAC) ([17][0][0][0] / 0x0011), 48000 Hz, stereo, fltp  
  Program 1111  
    Metadata:  
      service_name       : Canal HD  
      service_provider:  
  Stream #0:1[0xf00]: Video: h264 (Main) ([27][0][0][0] / 0x001B), yuv420p(tv, bt709, progressive), 1280x720 [SAR 1:1 DAR 16:9], 50 fps, 50 tbr, 90k tbn  
  Stream #0:2[0xf01]: Audio: aac_latm (HE-AAC) ([17][0][0][0] / 0x0011), 48000 Hz, stereo, fltp  
  No Program  
  Stream #0:0[0x12]: Data: epg  
Stream map 'p:0:1101' matches no streams.  
To ignore this, add a trailing '?' to the map.
```