

“DEVELOPMENT OF SOFTWARE TOOL FOR THE MODIFICATION OF DVB SUBTITLES ON DIGITAL TELEVISION”

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RESEARCH & DEVELOPMENT TELECOMMUNICATIONS INSTITUTE



DVB Subtitles



Pixel codification

- Size
- Color
- Font
- Position



Defined by manufacturer

DVB Subtitles



- Color
- CLUT Definition Segment

	Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8	Col. 9
Row 1	FFFFFF	000000	333333	666666	999999	CCCCCC	CCCC99	9999CC	666699
Row 2	660000	663300	996633	003300	003333	003399	000066	330066	660066
Row 3	990000	993300	CC9900	006600	336666	0033FF	000099	660099	990066
Row 4	CC0000	CC3300	FFCC00	009900	006666	0066FF	0000CC	663399	CC0099
Row 5	FF0000	FF3300	FFFF00	00CC00	INDIAN-SHARE-TIPS.COM 009999	0099FF	0000FF	9900CC	FF0099
Row 6	CC3333	FF6600	FFFF33	00FF00	00CCCC	00CCFF	3366FF	9933FF	FF00FF
Row 7	FF6666	FF6633	FFFF66	66FF66	66CCCC	00FFFF	3399FF	9966FF	FF66FF
Row 8	FF9999	FF9966	FFFF99	99FF99	66FFCC	99FFFF	66CCFF	9999FF	FF99FF
Row 9	FFCCCC	FFCC99	FFFFCC	CCFFCC	99FFCC	CCFFFF	99CCFF	CCCCFF	FFCCFF

DVB Subtitles



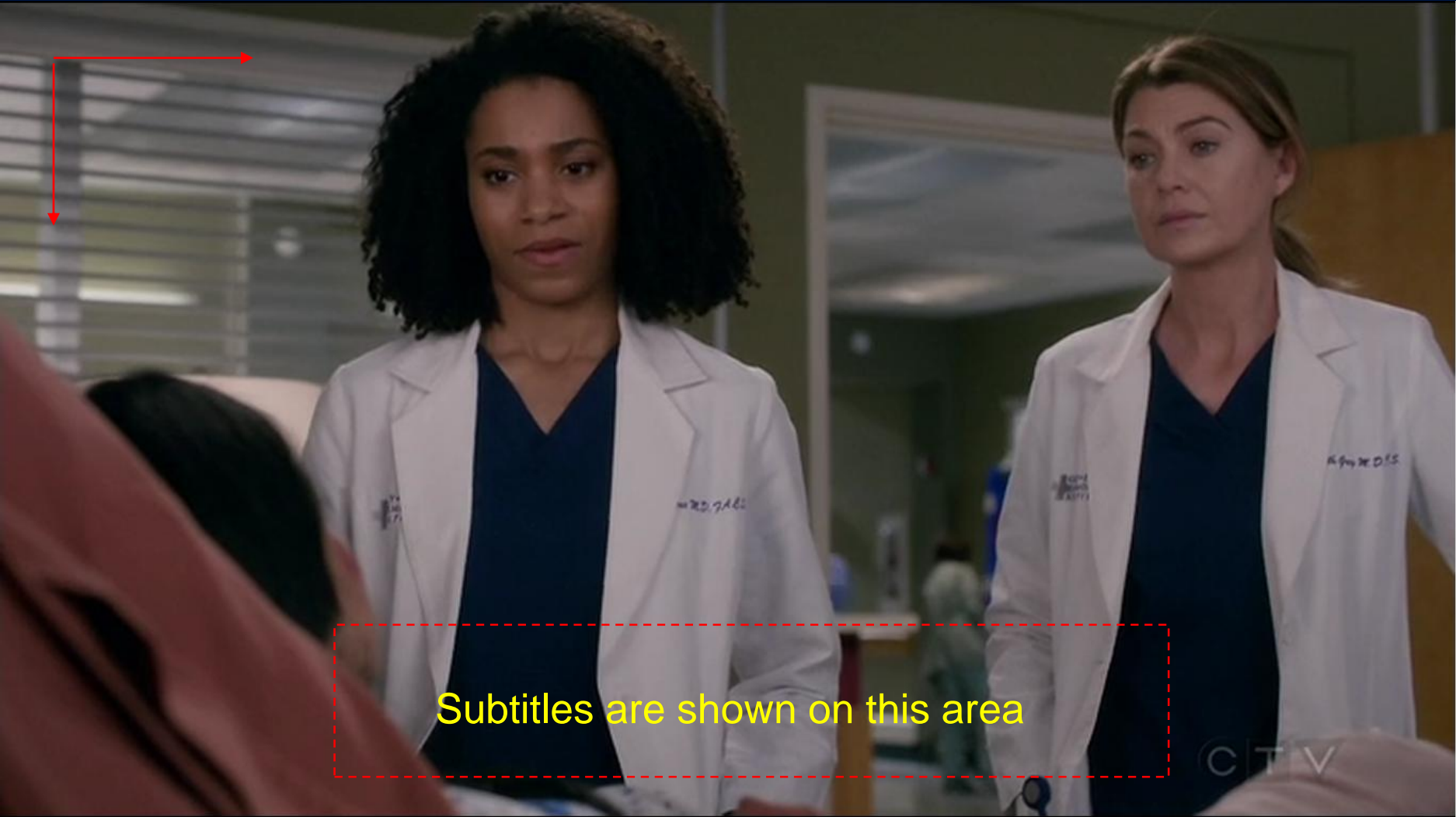
- Position

- Page Composition Segment (PCS)
- Region Composition Segment (RCS)
- Display Definition Segment (DDS)

Page Composition Segment (PCS)

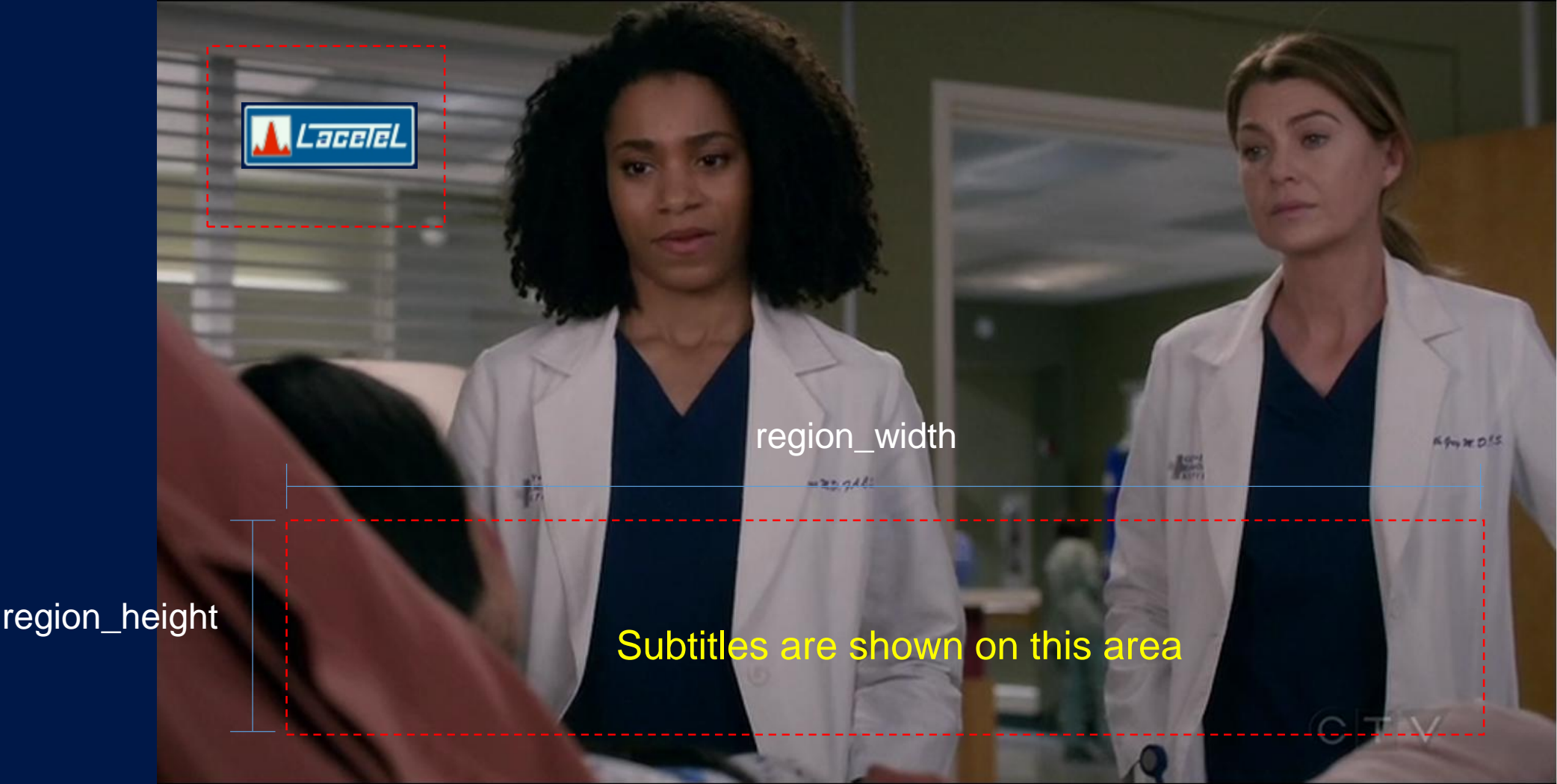
region_vertical_address

region_horizontal_address

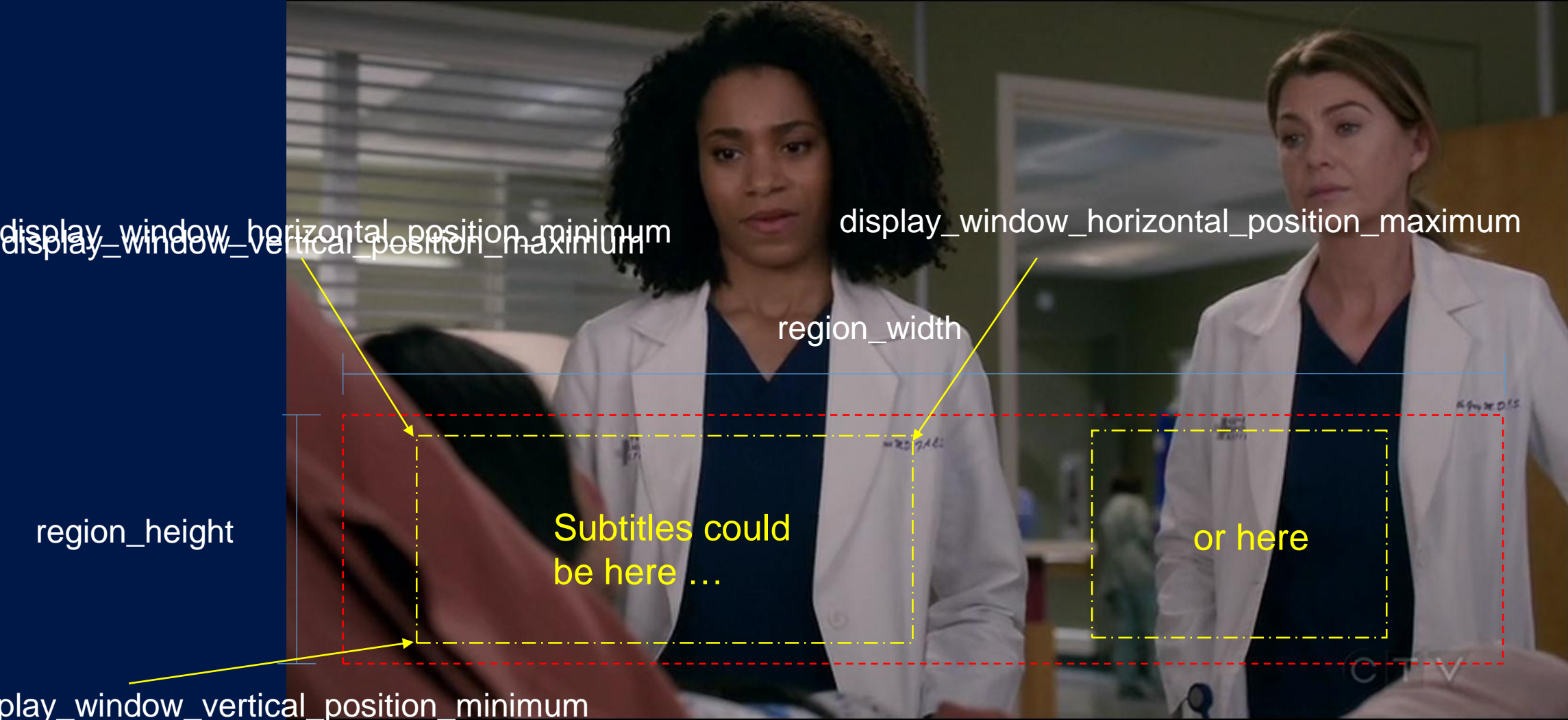


Subtitles are shown on this area

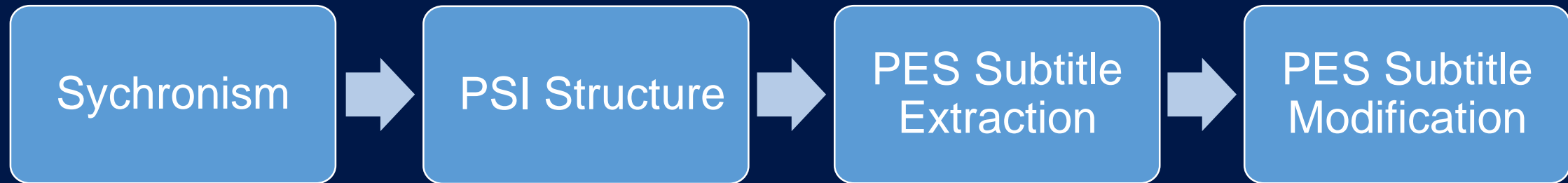
Region Composition Segment (RCS)



Display Definition Segment (DDS)



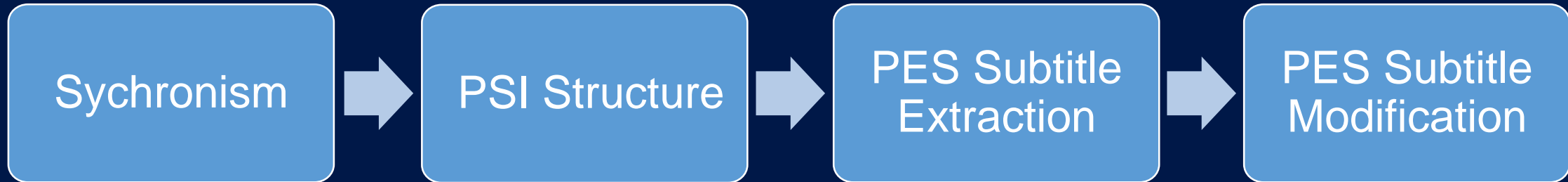
Software Tool Block Diagram



- ✓ Look for sync_byte
- ✓ If appear 5 consecutive times, synchronization
- ✓ If sync_byte is lost 3 consecutive times, re-sync



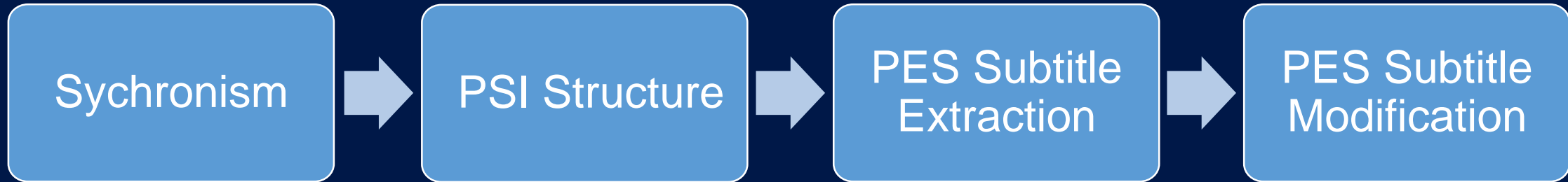
Software Tool Block Diagram



- ✓ Analyze Program Association Table (PAT)
 - How many programs and
 - Packet Identifier (PID) from each program
- ✓ Analyze Program Map Table (PMT)
 - What kind of Streams
 - Associate PID

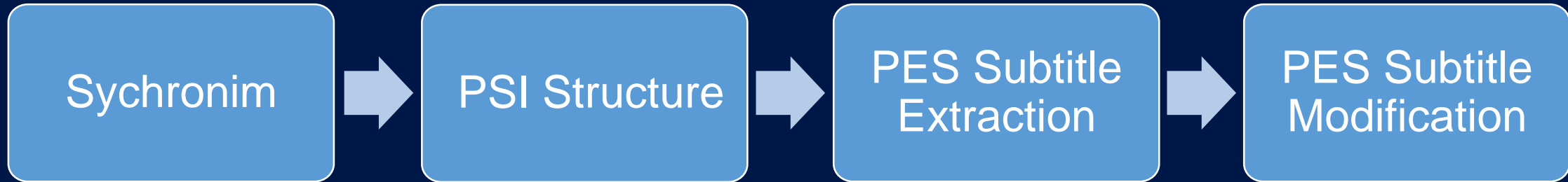
❖ Audio ❖ Video ❖ Data

Software Tool Block Diagram



- ✓ PID selection
- ✓ Validation
- ✓ Packets filtering
- ✓ PES Extraction

Software Tool Block Diagram



- ✓ Segment type identification
- ✓ Displacement values
- ✓ Software makes modifications
- ✓ New Transport Stream is generated.

Results

- ✓ The following modules are completely implemented:
 - Synchronism,
 - PSI Structure and
 - PES Subtitle Extraction
- ✓ PES subtitle module implemented to modify the position
 - In case it contains PCS
- ✓ TS generated with subtitles position modified

Software Validation

1st Transport Stream:

- ✓ TVC
- ✓ 17 programs
- ✓ 1 program contains DVB subtitles.
- ✓ Subtitles language: ENG

2nd Transport Stream:

- ✓ BBC
- ✓ 6 programs
- ✓ 4 programs contains DVB subtitles
- ✓ Subtitles language: ENG

Software Validation



4T2 Content Analyser



MPEG-2 TS
packet
analyser



Software Validation

2nd Transport Stream

Professional Software:TSR

Software Tool Developed

```
*****TABLA PAT*****
-Ualor del table_id:      0
-Ualor del section_length: 37
-Cantidad de programas:   7

PMT del programa 0 transmitida en el PID: 0x10
PMT del programa 4164 transmitida en el PID: 0x1044
PMT del programa 4228 transmitida en el PID: 0x1084
PMT del programa 4351 transmitida en el PID: 0x10ff
PMT del programa 4415 transmitida en el PID: 0x113f
PMT del programa 4479 transmitida en el PID: 0x117f
PMT del programa 4671 transmitida en el PID: 0x123f
```

PAT

SECTION: 0

- table_id: 0x00
- section_syntax_indicator: 0x01
- section_length: 0x25(37)
- transport_stream_id: 0x1004
- version_number: 0x02
- current_next_indicator: 0x1
- section_number: 0x00(0)
- last_section_number: 0x00(0)

programs

- program_number: 0x0000 (0) => pid: 0x0010 (16)
- program_number: 0x1044 (4164) => pid: 0x1044 (4164)
- program_number: 0x1084 (4228) => pid: 0x1084 (4228)
- program_number: 0x10ff (4351) => pid: 0x10ff (4351)
- program_number: 0x113f (4415) => pid: 0x113f (4415)
- program_number: 0x117f (4479) => pid: 0x117f (4479)
- program_number: 0x123f (4671) => pid: 0x123f (4671)

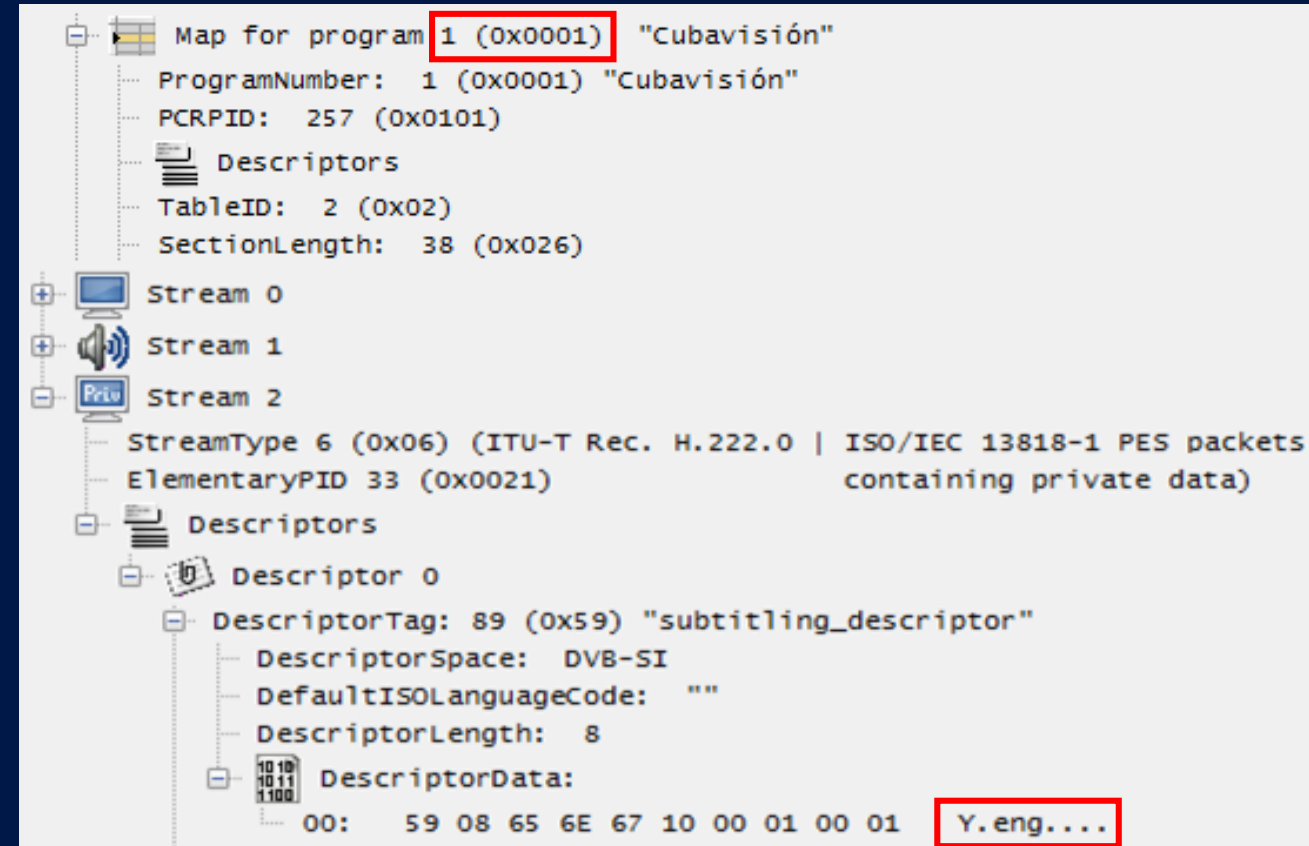
Software Validation

1st Transport Stream

Professional Software: 4T2 Content Analyser

Software Tool Developed

```
*****TABLA PMT*****  
***PMT del programa 1 transmitida en el PID 0x1001***  
-Table_id: 0x2  
-Section_length: 0x26  
-Program_number: 0x1  
-Section_number: 0  
-Last_section_number: 0  
-PCR_PID: 0x101  
-Program_info_length: 0  
-Stream_type: 0x1b  
-Elementary_PID: 0x101  
-es_info_length:  
  
Stream_Type: 0x1b:ITU-T Rec. H.222.0 : ISO/IEC 13818-1 Reserved  
PID: 0x101  
  
Stream_Type: 0x3:ISO/IEC 11172 Audio  
PID: 0x201  
  
Stream_Type: 0x6:ITU-T Rec. H.222.0 : ISO/IEC 13818-1 PES packets  
containing private data (contiene subtítulos DVB)  
*Idioma de subtítulos: ENG  
PID: 0x21
```



Software Validation

```
*****PMT procesada*****
cantidad de PIDs contenedores de Subtitulos: 4
PIDs de subtitulos: 0x25b
PIDs de subtitulos: 0x265
PIDs de subtitulos: 0x283
PIDs de subtitulos: 0x26f
```

Original TS

Generated TS



region_vertical
_address = 488

region_vertical
_address = 100

```
SEGMENT_TYPE: PGS
Region_vertical_address: 0x1e8
Cuanto quiere desplazar verticalmente los subtitulos:100
Region_vertical_address: 0
Cuanto quiere desplazar horizontalmente los subtitulos:0
```

Results in practice

Verification of TS generated



4 iDTV analyzed

4 iDTV shows correctly subtitles
of TS generated



16 Set-Top-Box analyzed

16 STB shows correctly subtitles
of TS generated

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