

Training Course Description

Course: DTV Stream Structure and Analysis
Course code: TEC102
Duration: 2 day

Format: Classroom explanation, demonstration and workshop.

Supporting materials:

Each delegate completing the course will receive the following:

- A full set of course notes
- Certificate of attendance

Overview:

The course provides delegates with a detailed understanding of the construction of MPEG and DVB streams; covering the structure and analysis of the MPEG-2 Elementary Stream and PES, MPEG-2 Transport Streams, MPEG-2 PSI and timing management, and DVB SI tables. A variety of stream analysers are used to demonstrate, assess, record, replay and troubleshoot DTV streams in both their native form and as carried over RTP and IP, looking at timing, buffering and ETR 101 290 faults. The use of the standards documents MPEG ISO 13818-1, DVB ETR 300 468 and ETR 101 290 is described.

Who should attend:

Engineering staff working in a digital television environment who need an in-depth understanding of the detailed structure, analysis and troubleshooting of DTV streams..

Prerequisites:

The course assumes existing experience and familiarity of, and of working with, MPEG, DVB and IP TV systems. To maximise the effectiveness of the training delegates should have a laptop or PC available on which to run analysis tools during the class. A PC video projector should be available for presentation and demonstration.

Key benefits:

At the end of the course delegates will be able to:

- Describe MPEG-2 Elementary and PES streams
- Describe MPEG-2 Transport streams and PSI
- Understand the timing and timing issues of MPEG-2 transports
- Describe DVB SI tables and understand their use
- Use transport stream analysers to troubleshoot DTV streams
- Understand the significance and meaning of ETR101 290 alarms
- Use IP analysis tools to troubleshoot DVB and MPEG carried over IP

- **Course Content:**

MPEG-2 / DVB Structures

- Sequence
- GOP (Group of Pictures)
- Picture
- Slice
- MacroBlock
- Block
- SPTS (Single Program Transport Stream)
- MPTS (Multiple Program Transport Stream)

MPEG-2 Elementary Stream

- Video ES Buffering
- PES (Packetised Elementary Stream) structure
- GOP per PES and picture per PES issues and implications
- PES Header construction
- PES sync
- ESCR (Elementary Stream Clock Reference)
- PTS (Presentation Time Stamp) and DTS (Decode Time Stamp)
- Alignment Indicator

MPEG-2 Transport Stream

- 188 byte packetisation
- The TS packet header
- Sync Byte and issues
- TEI (Transport Error Indicator)
- PUSI (Payload Unit Start Indicator)
- TP (Transport Priority)
- PID (Packet ID)
- Reserved PIDs
- Problematic PID values
- CC (Continuity Count)
- CC issues
- TSC (Transport Scrambling Control)
- AF (Adaptation Field)
- PCR location and structure
- PCR jitter
- PCR specifications
- Embedded, stream and independent PCRs and issues
- NULL packets

MPEG-2 PSI (Program Specific Information)

- PSI structure and linking
- PAT (Program Association Table)
- PMT (Program Map Table)
- NIT (Network Information Table)
- PSI table structure
- Table ID
- Table Version Number

DVB SI (Service Information)

- NIT (Network Information Table)
- BAT (Bouquet Association Table)
- SDT (Service Descriptor Table)
- TDT (Time and Date Table) and TOT (Time Offset Table)
- Event Information Tables EIT(p/f) and EIT(s)
- RST (Running Status Table)
- ST (Stuffing Table)
- SI table structure
- Table ID
- Table Version Number

DTV ID Structure

- Network ID
- Original Network ID
- Transport ID
- Service ID
- Component tag value

Practical Stream Analysis

- Use of various Transport Stream analysers in different tasks
- Use of WireShark as an MPEG analysis tool
- Analysis of good and bad streams
- Real time and offline analysis
- ETR 101 290 alarm implications
- ETR 101 alarm logging
- Stream recording and playback
- RTP (Real Time Protocol) header analysis
- PES header analysis
- TS header analysis
- TS packet analysis
- Understanding MPEG timing calculations
- PTS and DTS analysis
- PCR analysis
- ES Buffer analysis