

Training Course Description

Course: HDTV, MPEG-4 and DVB-S2
Course code: ESS109
Duration: 3 day

Format: Classroom explanation and demonstration.

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 practical understanding of the technologies, vocabulary, techniques of HD, MPEG-4, DVB-S2 television systems, explaining the broadcast, the infrastructure, the creation of MPEG Elementary and Transport Streams, MPEG-4 video processing and DVB-S2 modulation, including the use of measurement, analysis and troubleshooting tools.

Who should attend:

Technical staff working in an MPEG video environment who need an understanding of the specific technologies and issues associated with implementing and working with HDTV, MPEG-2 Transports and MPEG-4 video coding systems in a satellite transmission environment..

Prerequisites:

No specific television or broadcast knowledge is required, but a general familiarity with technical concepts is assumed. A PC video projector should be available for presentation and to show demonstration sequences.

Key benefits:

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

- Understand DVB-S2 systems and architectures
- Describe DVB hardware architectures
- Describe the MPEG-4 video compression processes
- Understand the effects of bit rate reduction on picture quality
- Understand the issues involved in manipulating and transmitting MPEG signals
- Describe the MPEG-2 Transport processes
- Understand the relation between MPEG-2 Transport structure and DVB-S2 structure
- Describe the DVB-S2 structure and modulation

Course Content:

Broadcast Television and Audio systems

- Video sampling structures, 4:4:4, 4:2:2, 4:2:0
- SDTV, HDTV (high definition TV) and aspect ratios
- WideScreen WSS (Wide Screen Signalling) AFD (Active Format Descriptor)
- HDSDI, 3GSDI
- ITU-BT.709 and SMPTE HDTV standards
- Progressive scan and interlace, Segmented Format
- frame rates

MPEG-4 Video Compression

- MPEG-4 part 10 AVC and H264
- Use of MPEG-4 levels and profiles
- Enhancements in MPEG-4 coding techniques
- Intra and Inter slice coding, I, P and B slices
- MPEG structure, GOPs (Groups of Pictures) Slices, Macroblocks and Blocks
- Intra frame estimation
- Motion estimation
- Sub pixel motion estimation
- Integer transform coding
- Prediction Slices
- Use of arbitrary reference frames
- Hierarchical GOP
- Switch slices
- Exp Golomb coding
- Discrete Cosine Transform
- Entropy coding
- Zig Zag Scan
- Lossy and Lossless compression
- MPEG-4 decoding, use of de-blocking filters
- Performance comparison with MPEG-2

MPEG Audio Compression

- MPEG audio coding, layers and modes
- Sample frequencies and bit rates

MPEG-2 System and Transport Layer

- The PES, Packetised Elementary Stream
- The Transport Stream
- PID (Packet ID)
- PAT (Program Association Table)
- PMT (Program Map Table)
- Time synchronisation and time stamping
- PCR (Program Clock Reference)
- PTS (Program Time Stamp) and DTS (Decode Time Stamp)
- Buffer delays
- Lip Sync issues

DVB

- DVB SI and tables structure, NIT, TDT, TOT, EIT, BAT etc.
- Actual and Other tables

MPEG in Practice

- System Multiplexing
- Concatenating Compression
- Transrating and Transcoding

- Picture assessment quantisation and compression artefacts
- MPEG test signals
- Statistical Multiplexing

DVB-S2 SYSTEM

- PLPs (Physical Layer Pipes) and Data Structure
- FEC (Forward Error Correction)
- QPSK (Quadrature Phase Shift Keying), 8PSK (Eight Phase Shift Keying)
- 16APSK (Amplitude Phase Shift Keying) and 32 APSK modulation
- Pilot Tone Insertion
- Interactive modes and control through return channel
- Backwards compatibility mode

DVB-S2 STRUCTURING - DATA INPUTS TO FRAMES

- PLPs (Physical Layer Pipes)
- Input Stream Types
 - TS (Transport Stream)
 - Generic Streams
- BBFrame (BaseBand Frame) Creation
- Single PLP BBFrame
- Multiple PLP BBFrame
 - Input Sync
 - Delay
 - NULL Deletion
 - Scrambling
- FECFrame (Forward Error Correction Frame) Creation
- Bitstream to PSK Constellation formation
- FECFrames
- FEC Blocks

DVB-S2 ERROR CORRECTION SCHEME

- Outer BCH code
- Inner LDPC
- BCH and LDPC options
- Multipass error correction

DVB-S2 MODULATION

- QPSK (Quadrature Phase Shift Keying), 8PSK (Eight Phase Shift Keying)
- 16APSK (Amplitude Phase Shift Keying) and 32 APSK modulation
- Pilot Tones
- Roll-off filters and system performance

DVB-S2 PERFORMANCE COMPARISON

- Comparison with DVB-S and DVB-DSNG
- Phase noise issues
- Performance gain
- FEC and modulation advantage