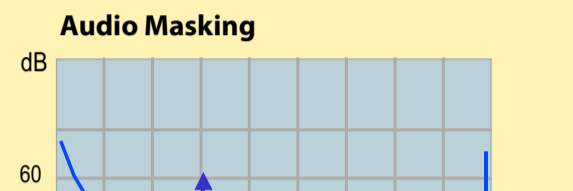
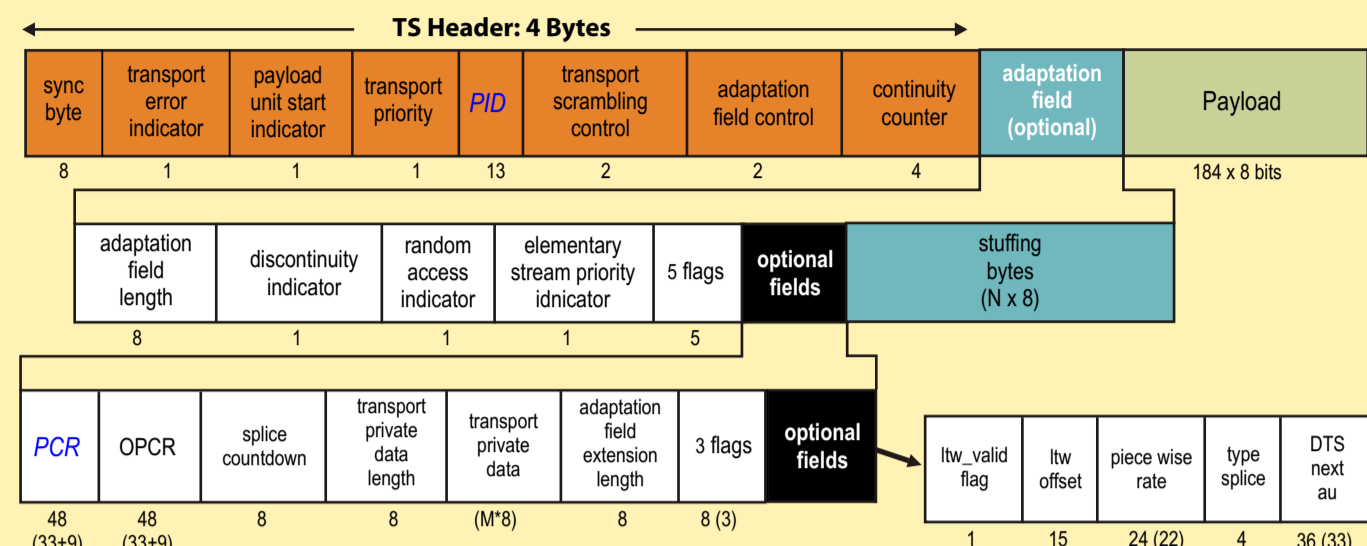
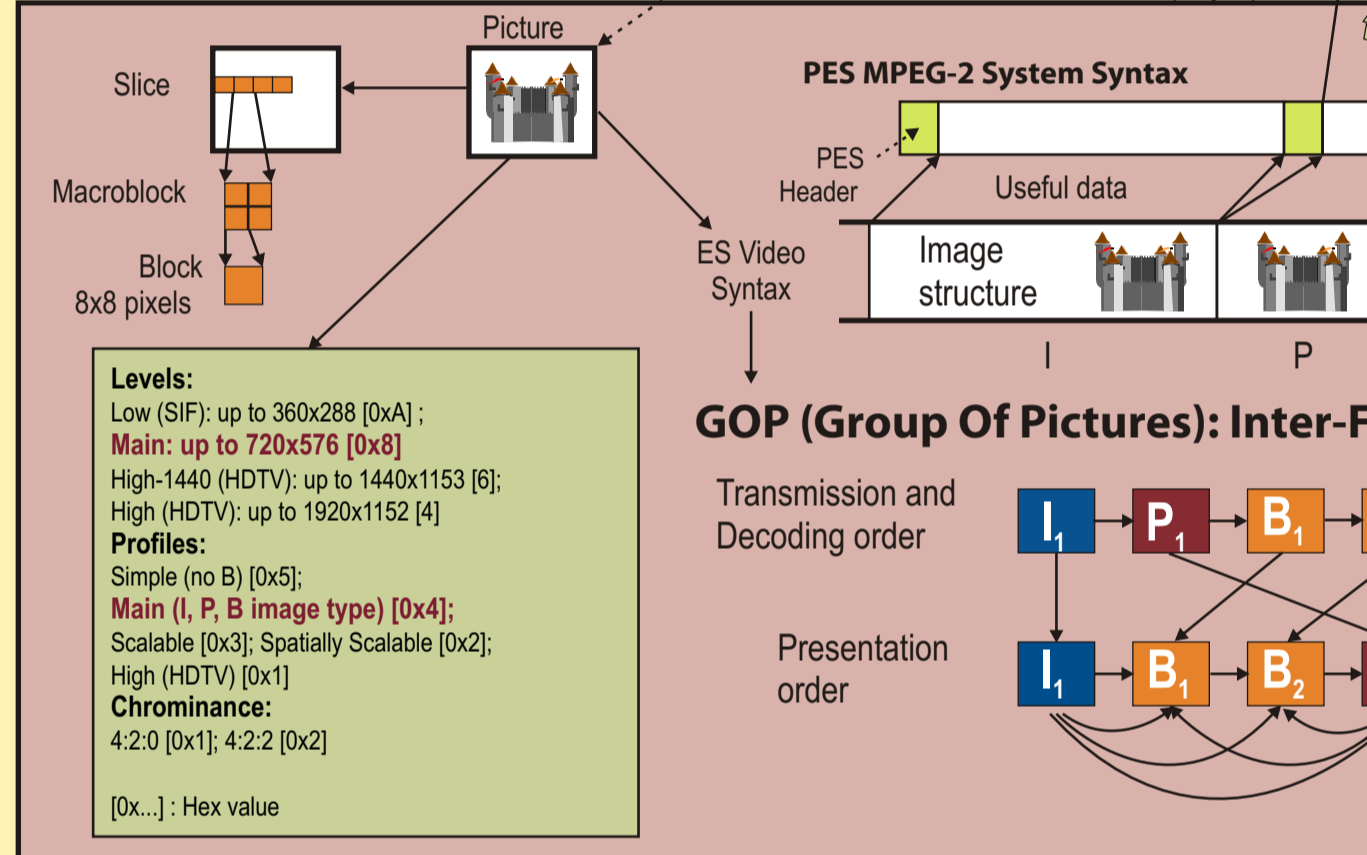
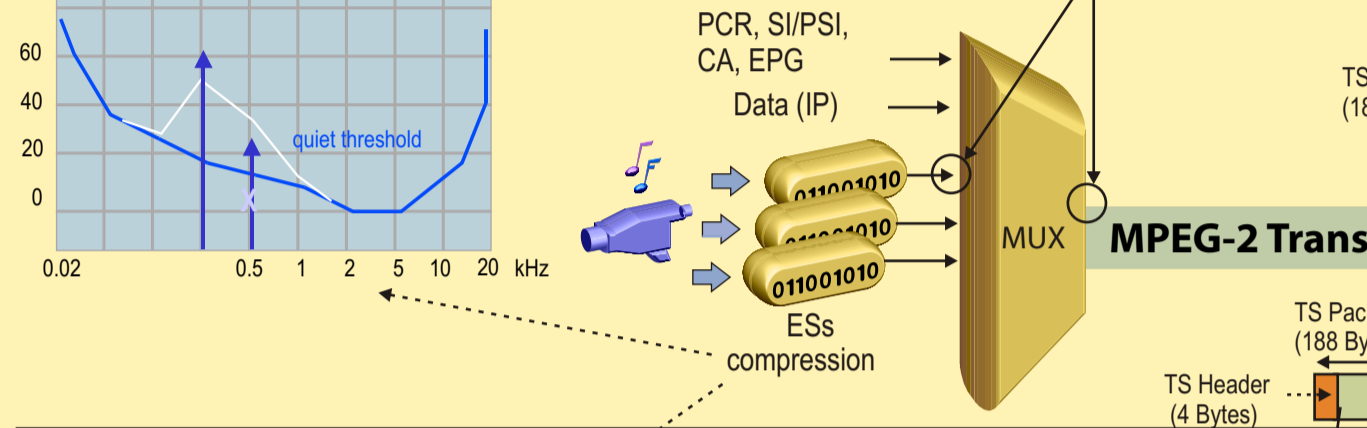


MPEG-2 and DVB Digital Broadcasting

MPEG-2 detailed Transport Stream (TS) Syntax



MPEG-2 baseband interfaces:
 DVB-ASI: 270 Mbit/s, coax 75 ohms or fiber optic
 DVB-SPI or LVDS: max. 108 Mbit/s, type D pin 25 (100 ohms)



JDSU Digital Broadcast Test & Monitoring Solutions:

MPEG-2 Transport Stream Generation, Simulation, Capture and Analysis
 Digital Broadcast Test Solutions for Labs and Field Applications

- Flexible and complete MPEG-2, DVB, and ATSC test solution
- Modular design provides flexibility to add interfaces and features
- Expert A/V Analysis
- DVB-RCS Analysis and Simulation

QoS All Along the Broadcast Chain
 Digital Broadcast Monitoring System

- Network Operator's tool for detailed MPEG-2/DVB problem diagnosis
- Advanced Surveillance Platform for digital and analog TV
- DVB Service Assurance
- Real-time global EPG creation on a single transport stream

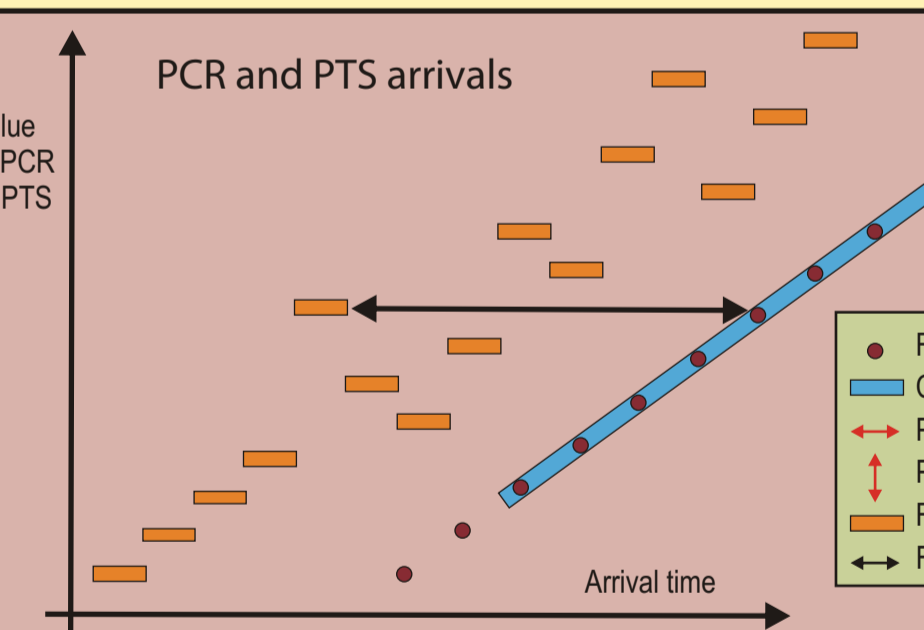
Detailed information under:
www.jdsu.com/acterna

Glossary and Acronyms

1318 V	Vertical polarization switching (Sat)
22 kHz	High/Low Band switching (Sat)
64QAM	Quadrature Amplitude Modulation with 64 states
ADC	Analog-to-Digital Converter
ADPCM	Adaptive Differential Pulse Code Modulation
DIA	Digital-Video Analog
DAB	Digital Audio Broadcasting
DAC	Digital-to-Analog Converter
DAPK	Differential Amplitude Phase Shift Keying
DAT	Digital Audio Tape
DAVIC	Digital Audio Visual Council
DBS	Direct Broadcasting Satellite
DCT	Discrete Cosine Transformation
DTS	Decoding Time Stamp
DSNG	Digital Satellite News Gathering
DSR	Digital Satellite Radio
DSS	Digital Satellite System
DTG	Digital To Home
DTH	Direct To Home
DTV	Digital Terrestrial Television
DTVB	Digital Television Broadcasting
DVB	Digital Video Broadcasting. European consortium that has standardized digital TV broadcasting.
DVB-C	Digital Video Broadcasting - Cable
DVB-T	Digital Video Broadcasting - Terrestrial
DVB-S	Digital Video Broadcasting - Satellite
DVB-H	High Definition Television
DVB-M	Measurement Group
DVB-MC	Digital Video Broadcasting-Microwave Satellite Based
DVB-MS	Digital Video Broadcasting-Microwave Satellite Based
DVB-T2	Digital Terrestrial Television
CI	Carrier-to-Interference Ratio (dB)
CIF	Common Intermediate Format 360x288 @ 30 Hz
C/N	Carrier-to-Noise Ratio (dB)
COFDM	Coded Orthogonal Frequency-Division Multiplex
CRC	Cyclic Redundancy Check
CSA	Common Scrambling Algorithm
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DVB-T2	Digital Terrestrial Television
CI	Carrier-to-Interference Ratio (dB)

ETR-290/TR101-290 tables and timing measurement guideline:

Parameter	Value	Missing
PCR spacing:	2.3 40 ms	2 s
PCR continuity:	2.3 100 ms	2 s
PCR filter:	2.4 500 ms	8 s
PTS spacing:	2.5 700 ms	8 s
PCR Accuracy (13818-1):	± 500 ns	8 s
PCR Offset (13818-1):	± 810 Hz	8 s
PCR Drift (13818-1):	± 75 mHz/s	8 s
PAT:	1.3 0.5 s	2 s
PMT:	1.5 0.5 s	2 s
CAT:	2.6 2 s	8 s
NIT:	3.1 10 s	40 s
BAT:	10 s	40 s
Min. table spacing:	3.2 25 ms	8 s
SDT Actual:	3.5 2 s	8 s
SDT Other:	3.5 10 s	40 s
EIT P/F Actual:	3.6 2 s	8 s
EIT P/F Other:	3.6 10 s	40 s
EIT Schedule:	3.6 10-30 s	40-120 s



DVB-RCS Digital Video Broadcasting-Return Channel Satellite

DVB-S Digital Video Broadcasting - Satellite
 DVB-S2 Digital Video Broadcasting - Satellite
 DVB-SM2TV Satellite Master Antenna TV
 DVB-T Digital Video Broadcasting - Terrestrial
 Terrestrial broadcasting of TV signals to digital standard.
 E₁/N₁ Energy per Bit/Noise in 1 Hz Bandwidth
 EBU European Broadcast Union (UER)
 ECL Emitter Coupled Logic
 ECM Entitlement Control Message
 This control message transports a general key for Scrambling (Encryption).
 EDTV Enhanced Definition Television
 EIT Event Information Table, TV guide or EPG.
 EIT₁ EIT for present and following events
 EMM Entitlement Management Message
 This control message transports a personal key for Scrambling (Encryption).
 EPG Electronic Program Guide
 Broadcasting data structure that contains all the information describing the programs and their events.
 ES Elementary Stream. Data stream for video, audio or data.
 Preliminary stage to PES.
 ESCR Elementary Stream Clock Reference
 ETSI ETSI Technical Report
 ETR 290 ETSI recommendation regarding measurement of MPEG-2/DVB-TS
 ETSI European Telecommunication Standard Institute
 FEC Forward Error Correction
 Error control bits added to useful data in the QAM/PSK Modulation (errors may be detected and corrected)
 GIG Gigabit Ethernet
 GOP Group Of Pictures
 HDTV High Definition Television
 HEX HEXadecimal (16)
 HFC Hybrid Fiber Coax
 Typical Cat TV network infrastructure
 HTML Hypertext Markup Language
 IEC International Electrotechnical Commission
 IEEE Institute of Electrical and Electronics Engineers
 IF Intermediate Frequency. Generally 70 MHz for transmission. (950 to 1250 for the LNB)
 I, Q In phase and Quadrature signals (carrier digital modulation and amplitude)
 IRO Integrated Receiver Decoder. Receiver with MPEG-2 decoder (Set Top Box)
 IRE Institute of Radio Engineers
 IRT Institut für Rundfunktechnik
 IS International Standard
 ISDN Integrated Services Digital Network
 ISO International Standardization Organization
 ITU International Telecommunications Union
 OPCR Original Program Clock Reference
 Assists in the reconstruction of a SPTS from another Transport Stream.
 OSI Open Systems Interconnection
 PAL Phase Alternating Line
 Color TV System (Europe and 50 Hz countries)
 P-STD Program System Target Decoder
 Color TV System (France, Eastern European countries)
 List of all the programs contained in TS Multiplex with reference to PID of PMT.
 PCR Program Clock Reference
 Reference for the 27-MHz clock regeneration. Transmitted at least every 0.1 s.
 PES Packetized Elementary Stream
 Video and audio data packets and ancillary data of undefined length.
 PH PES Header
 PID Packet identification
 Identification of programs/services in the transport stream
 PLS Phase Lock Loop
 PMT Program Map Table
 Reference to packets with PCR, Name of programs, copyright, reference of the data streams with PIDs etc. Belonging to the relevant program.
 PRBS Pseudo-Random Binary Sequence
 PS Program System
 P-STD Program System Target Decoder
 PSI Program Specific Information
 MPEG-2 Data transmitted in TS for the de-multiplexer in the receiver (PAT/PMT/CAT)
 PTS Presentation Time Stamp
 Time stamp for vision and sound, transmitted at least every 0.7 s. Integrated into PES.
 MMS Multimedia Home Platform
 MIP Multiple Frequency Network (DVB-T)
 MHP Multimedia Home Platform
 MIP Multiple Frequency Network (DVB-T)
 MMS Multimedia Home Platform
 MIP Multiple Frequency Network (DVB-T)
 MHP Multimedia Home Platform
 MIP Multiple Frequency Network (DVB-T)
 MMS Multimedia Home Platform
 MIP Multiple Frequency Network (DVB-T)
 MHP Multimedia Home Platform
 MIP Multiple Frequency Network (DVB-T)

QAM Quadrature Amplitude Modulation

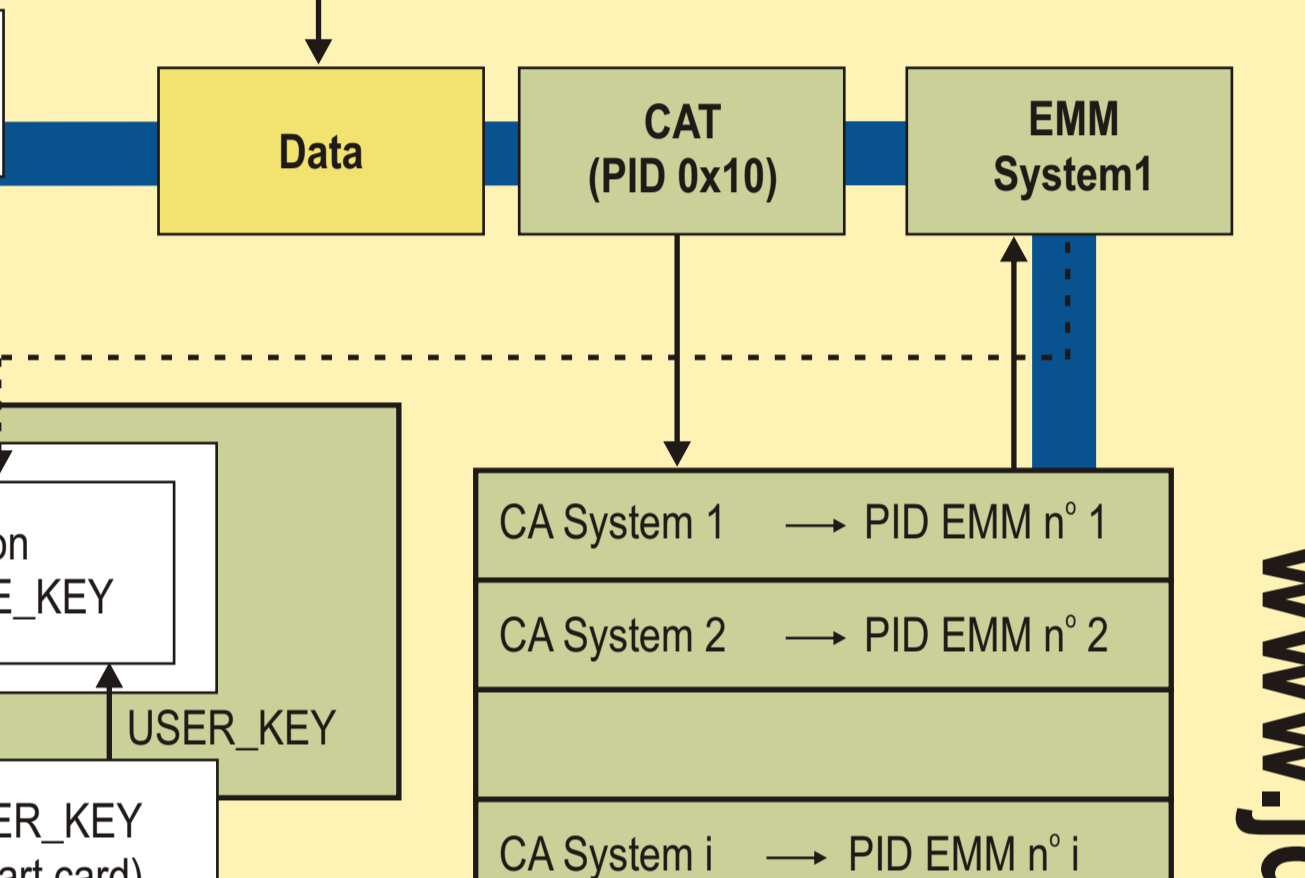
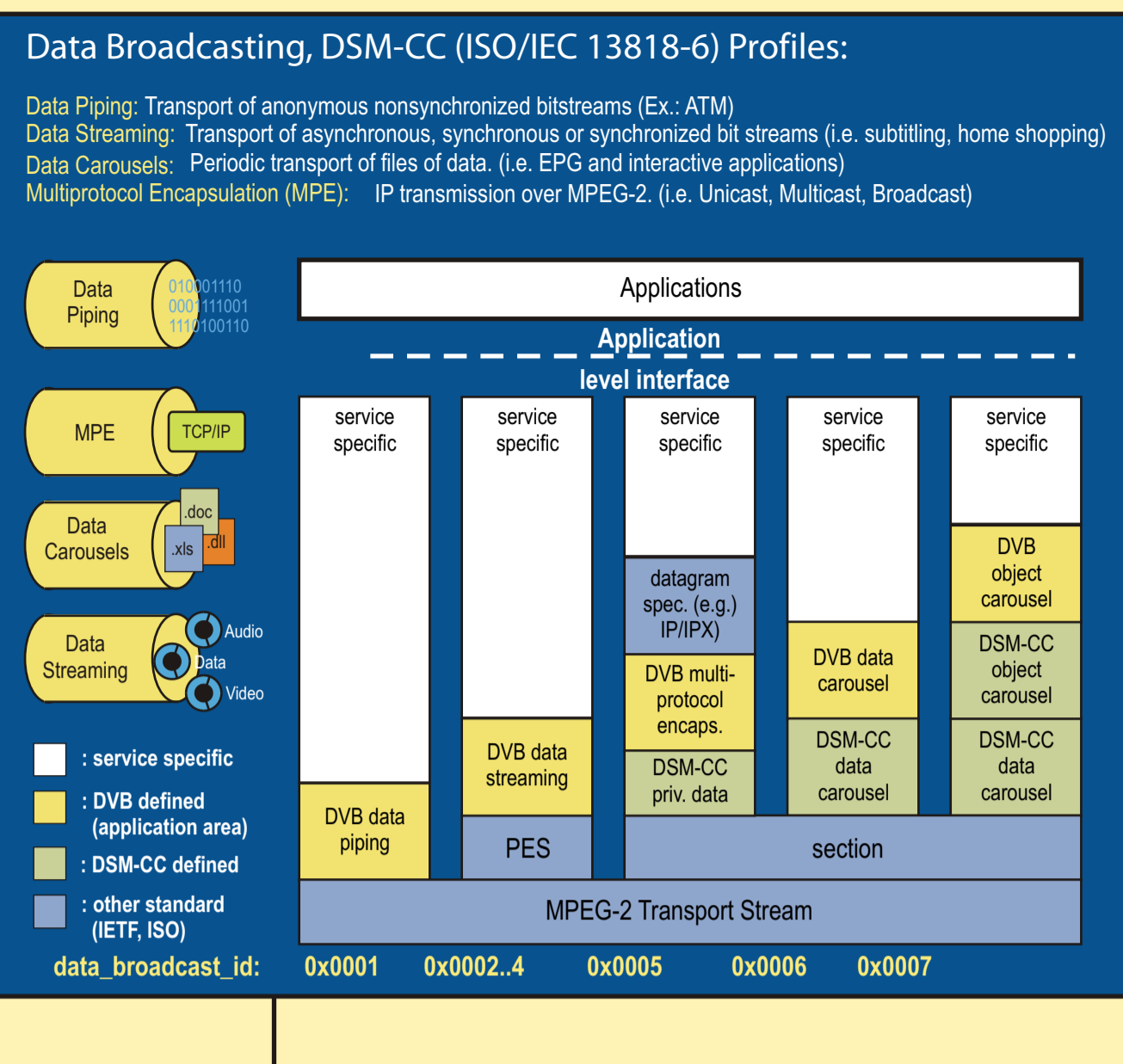
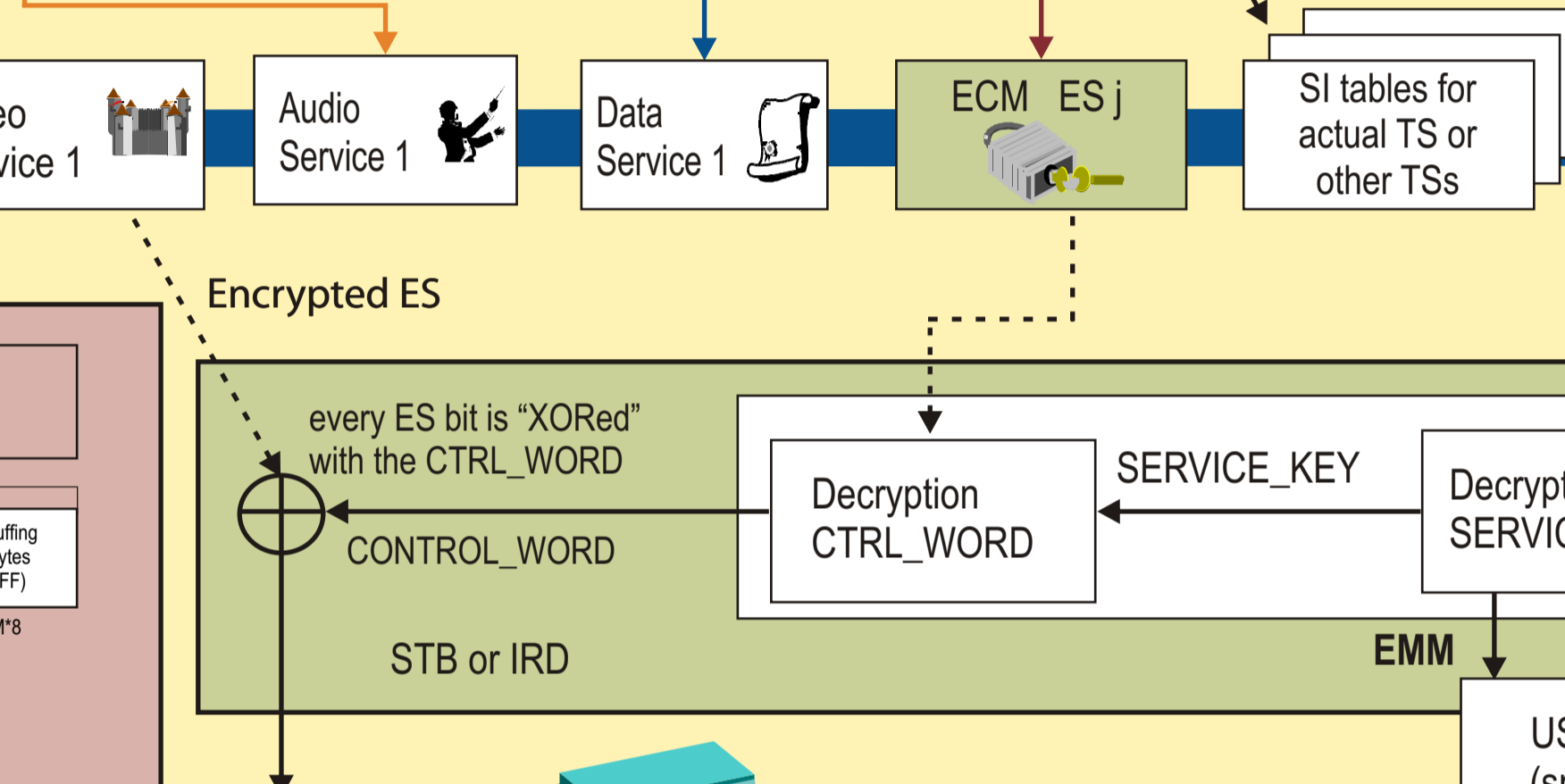
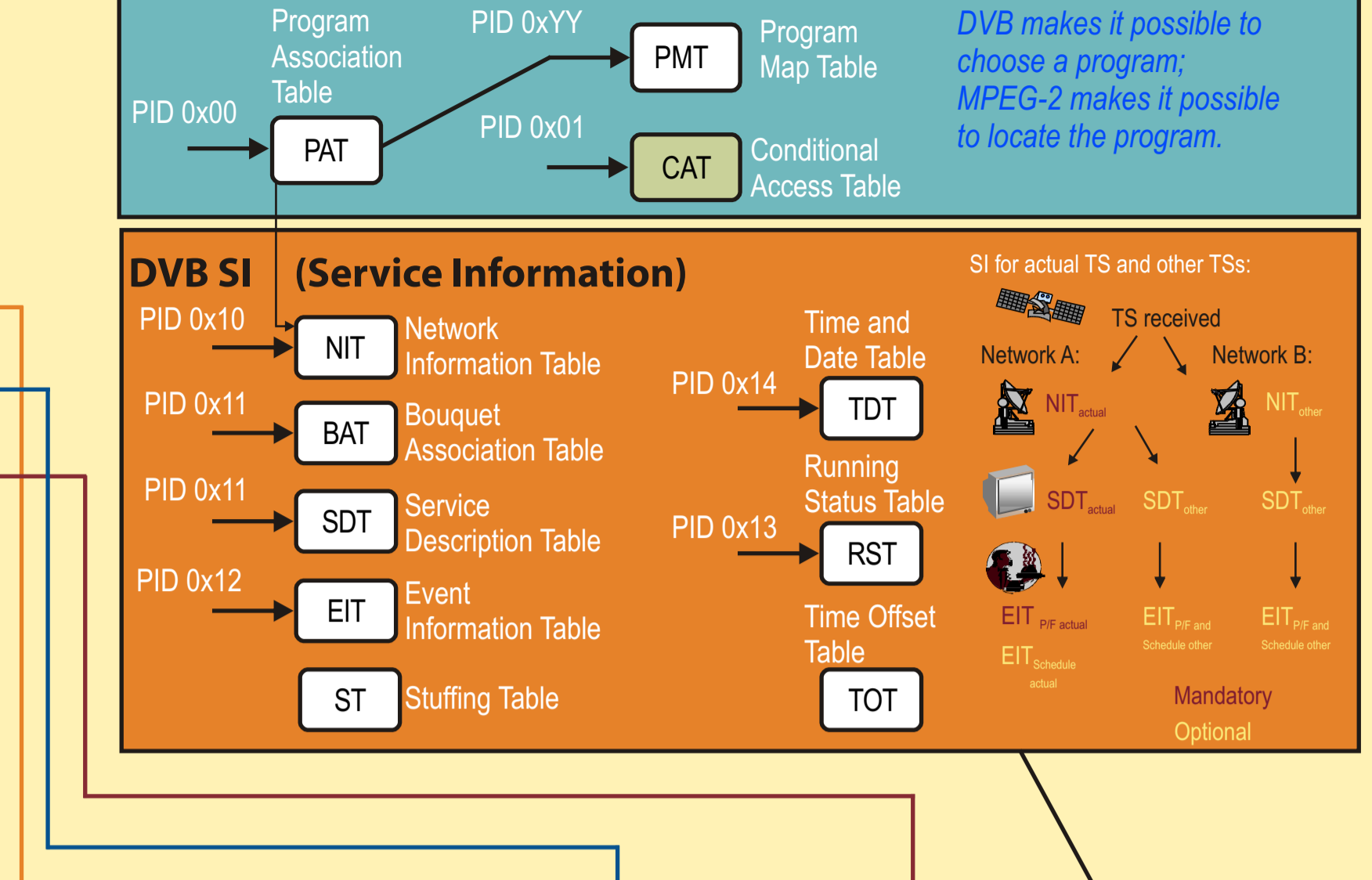
Type of modulation for digital signals used in CaTV transmission (DVB-C). Amplitude and phase of a carrier are modulated in order to carry information.
 QCIF Quarter Common Intermediate Format
 180x144@15 Hz (Video telephony)
 QEF Quasi Error-Free
 QPSK Quadrature Phase Shift Keying. Type of modulation for digital signals used in satellite transmission (DVB-S).
 RGB Red, Green, Blue
 RLC Run Length Coding
 Data compression method exploiting repetition
 RS Reed-Solomon. Protection Code 16-byte long error control packets in a TS.
 RST Running Status Table
 SAS Subscriber Authorization System CA/SMS
 SCPC Single Channel Per Carrier
 SDI Serial Digital Interface
 SDT Service Description Table
 SDTV Standard Definition Television
 SECAM Séquentiel Couleur à Mémoire
 Color TV System (France, Eastern European countries)
 SER Symbol Error Rate
 SFN Single Frequency Network (DVB-T)
 SFN Service Information. All the DVB data required by the receiver to demultiplex and decode the variety of programs in the TS.
 SIF Source Intermediate Format
 360x288@25 Hz or 360x240@30 Hz (MPEG-1)
 S-MATV Satellite Master Antenna TV
 SMPTE Society of Motion Picture and Television Engineers
 customer data
 SMS Subscriber Management System. In CA: storage for customer data
 SNG Satellite News Gathering. Retransmission of events using mobile equipment and satellite transmission (e.g. sports).
 SNR or S/N Signal-to-Noise Ratio
 SPI Synchronous Parallel Interface. Standard DVB interface for TS.
 SPTS Single Program Transport Stream
 TS that contains one unique program.
 Statistical Multiplexer A device which combines a number of time-varying bit streams into a single bit stream for transmission.
 ST Stuffing Table
 STB Set Top Box. Digital TV receiver (IRD)

Reception (STB or IRD)

- Tuner, Demodulator, Equalizer
- FEC (Common for Cable/Satellite/Terrestrial):
 - 1) Inner Decoding (Viterbi): Satellite only
 - 2) De-interleaving
 - 3) Outer Decoding RS (204, 188, 8)
 - 4) Descrambling
- Demux → Transport Stream
- MPEG Decoder → TV

Transmission (modulation)

- FEC (Forward Error Correction)
 (Common for Cable/Satellite/Terrestrial):
 - 1) Energy dispersal
 - 2) Outer Coding RS (204, 188, 8)
 - 3) Forney Interleaving
 - 4) Inner Coding (Viterbi): Satellite only
- Formatting, filtering, DAC (I,Q)
- QAM/QPSK/OFDM Modulation; If Up-conversion; Amplification; or GigE transport



General Standard:

ISO/IEC 13818-4 and 6: Information Technology - Generic coding of moving pictures and associated audio information: Part 1: Systems (ITU-T H.222.0), Part 2: Video (Rec. ITU-T H.262), Part 3: Audio: Audio for surround sound: Layer L1, L2 (DVB, DAB, DVD), L3 (MPEG-2 AAC, Advanced Audio Codec); Surround Sound (Digital AM), Part 4: Conformance test, Part 6: Extension for DSM-CC

ISO 15938: Information Technology (MPEG-4). Very low bit rate audio-visual coding

ISO 15938: Information Technology (MPEG-7)

TR 101 202: Implementation Guidelines for Data Broadcasting

TR 101 812: DVB Multimedia Home Platform (MHP) Specification

EN 301 958: DVB-RCS.1. Interaction channel for DTT incorporating Multiple Access OFDM

EN 300 421: DVB-S. channel coding and modulation for 11/12 GHz satellite services

ETS 300 429: DVB-C. channel coding and modulation for cable systems

ETS 300 743: DVB-T. digital system

ETS 300 744: DVB-T. Digital Terrestrial Transmission Systems

TR 101 191: DVB-T. mega-frame for Single Frequency Network (SFN) synchronization

ETS 300 468: Specification for Service Information (SI) in DVB systems

ETS 300 472: Specification for conveying ITU-R System B Telex in DVB bit streams

EN 301 958: DVB-RCS.1. Interaction channel for DTT incorporating Multiple Access OFDM

EN 300 802: DVB Network. Interaction channel for Cable TV distribution systems (CATV)

ETS 301 790: Guidelines for the use of EN 301 790

EN 301 958: DVB-RCS.1. Interaction channel for DTT incorporating Multiple Access OFDM

ETS 200 800: DVB-RCS.2. Interaction channel for Cable TV distribution systems (CATV)

ETS 301 790: Guidelines for the use of EN 301 790

ETS 301 958: DVB-RCS.1. Interaction channel for DTT incorporating Multiple Access OFDM

ETS 301 790: Guidelines for the use of EN 301 790

TR 101 290: Measurement guidelines for DVB systems

Conditional Access:

System	Company
Irdeto	Mindport
BetaCrypt	BetaResearch
Mediaguard	SECA, Société Europ. de CA
Viacos	France Telecom
Cryptoworks	Philips
Nagra	Nagravision
NDS (Murdoch)	NDS (Murdoch)
Conax	Teleor
MediaCipher	Motorola