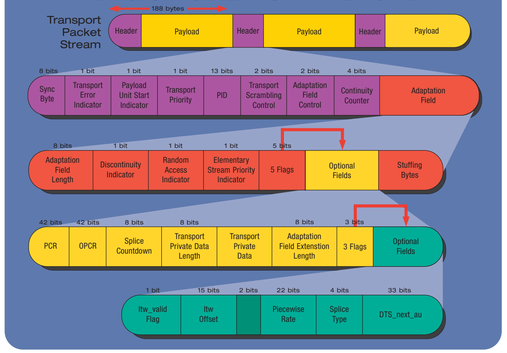
MPEG-2 Transport Stream

ISO/IEC 13818-1 International Standard

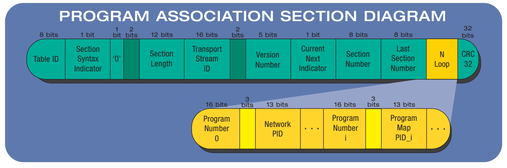
ISO/IEC 13818-1 transport packet

Syntax	No. of bits
transport_packet(){	
sync_byte	8
transport_error_indicator	1
payload_unit_start_indicator	1
transport_priority	1
PID	13
transport_scrambling_control	2
adaptation_field_control	2
continuity_counter	4
if(adaptation_field_control=='10' || adaptation_field_control=='11'){	
adaptation_field()	
}	
if(adaptation_field_control=='01' || adaptation_field_control=='11'){	
for (i=0;i<N;i++){	
data_byte	8
}	
}	
}	

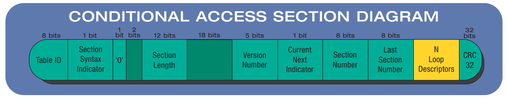
TRANSPORT STREAM SYNTAX DIAGRAM



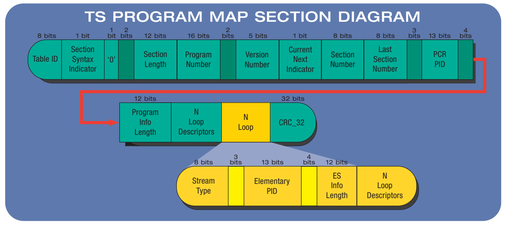
PROGRAM ASSOCIATION SECTION DIAGRAM



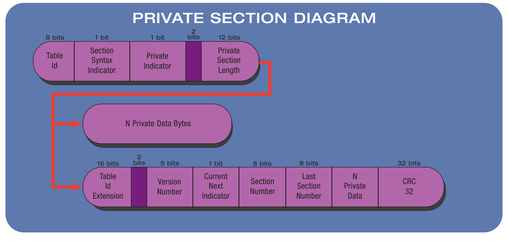
CONDITIONAL ACCESS SECTION DIAGRAM



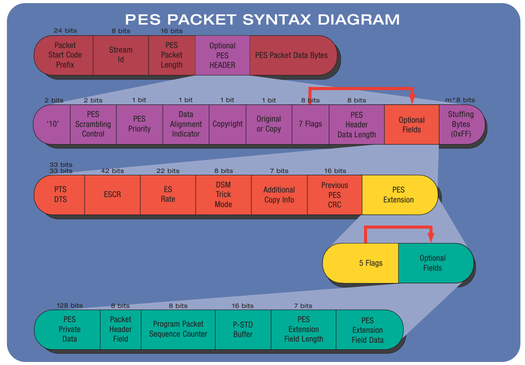
TS PROGRAM MAP SECTION DIAGRAM



PRIVATE SECTION DIAGRAM



PES PACKET SYNTAX DIAGRAM



Program association section (PAT)

Syntax	No. of bits
program_association_section(){	
table_id	8
section_syntax_indicator	1
'0'	1
reserved	2
section_length	12
transport_stream_id	16
reserved	2
version_number	5
current_next_indicator	1
section_number	8
last_section number	8
for (j=0;j<N;j++) {	
program_number	16
reserved	3
if(program_number=='0') {	
network_PID	13
}	
else {	
program_map_PID	13
}	
}	
CRC_32	32
}	

Conditional access section (CAT)

Syntax	No. of bits
CA_section() {	
table_id	8
section_syntax_indicator	1
'0'	1
reserved	2
section_length	12
reserved	18
version_number	5
current_next_indicator	1
section_number	8
last_section number	8
for (i=0;i<N;i++) {	
descriptor()	
}	
CRC_32	32
}	

Transport Stream Description Section (TSDT)

Syntax	No. of bits
TS_Description_section() {	
table_id	8
section_syntax_indicator	1
'0'	1
reserved	2
section_length	12
reserved	18
version_number	5
current_next_indicator	1
section_number	8
last_section number	8
for (i=0;i<N;i++) {	
descriptor()	
}	
CRC_32	32
}	

Transport Stream program map section (PMT)

Syntax	No. of bits
TS_program_map_section() {	
table_id	8
section_syntax_indicator	1
'0'	1
reserved	2
section_length	12
program_number	16
reserved	2
version_number	5
current_next_indicator	1
section_number	8
last_section number	8
reserved	3
PCR_PID	13
reserved	4
program_info_length	12
for (i=0;i<N1;i++) {	
descriptor()	
}	
for (i=0;i<N1;i++) {	
stream_type	8
reserved	3
elementary_PID	13
reserved	4
ES_info_length	12
for (j=0;j<N2;j++) {	
descriptor()	
}	
}	
CRC_32	32
}	

Private Section

Syntax	No. of bits
private_section() {	
table_id	8
section_syntax_indicator	1
private_indicator	1
reserved	2
private_section_length	12
if(section_syntax_indicator== '0'){	
for(i=0; i<N; i++) {	
private_data_byte	8
}	
}	
else {	
table_id_extension	16
reserved	2
version_number	5
current_next_indicator	1
section_number	8
last_section_number	8
for(i=0;i<private_section_length-9;i++) {	
private_data_byte	8
}	
CRC_32	32
}	
}	

MPEG-2 / DVB PID assignments

	MPEG-2 (Defined)	DVB (Mandatory)	DVB (Optional)	
	PID=0x0000	PID=0x0010	PID=0x0010	
	PAT	NIT Actual transport stream	NIT Other transport stream	Network Information
			PID=0x0011	
			BAT	Bouquet Association
	PID=0x0001	PID=0x0011	PID=0x0011	
	CAT	SDT Actual transport stream	SDT Other transport stream	Service Description
	PID=0x0002	PID=0x0012	PID=0x0012 PID=0x0012	
	TSDT	EIT Actual transport stream present/following	EIT Actual transport stream schedule / EIT Other transport stream present/following schedule	Event Information
			PID=0x0013	
			RST	Running Status
	PID=0x10 to 0x1FFE	PID=0x0014	PID=0x0014	
	PMT	TDT Time & Date	TOT	Time Offset
			PID=0x0010 to 0x0014	
			ST	Stuffing

Network Information section (NIT)

Syntax	No. of bits
network_information_section(){	
table_id	8
section_syntax_indicator	1
reserved_future_use	1
reserved	2
section_length	12
network_id	16
reserved	2
version_number	5
current_next_indicator	1
section_number	8
last_section number	8
reserved_future_use	4
network_descriptors_length	12
for(i=0;i<N;i++){	
descriptor()	
}	
reserved_future_use	4
transport_stream_loop_length	12
for(i=0;i<N;i++){	
transport_stream_id	16
original_network_id	16
reserved_future_use	4
transport_descriptors_length	12
for(j=0;j<N;j++){	
descriptor()	
}	
}	
CRC_32	32
}	

Service description section (SDT)

Syntax	No. of bits
service_description_section(){	
table_id	8
section_syntax_indicator	1
reserved_future_use	1
reserved	2
section_length	12
transport_stream_id	16
reserved	2
version_number	5
current_next_indicator	1
section_number	8
last_section number	8
original_network_id	16
reserved_future_use	8
for(i=0;i<N;i++){	
service_id	16
reserved_future_use	6
EIT_schedule_flag	1
EIT_present_following_flag	1
running_status	3
free_CA_mode	1
descriptors_loop_length	12
for(i=0;i<N;i++){	
descriptor()	
}	
}	
CRC_32	32
}	

Time and date section (TDT)

Syntax	No. of bits
time_date_section(){	
table_id	8
section_syntax_indicator	1
reserved_future_use	1
reserved	2
section_length	12
UTC_time	40
}	

Stuffing section (ST)

Syntax	No. of bits
stuffing_section(){	
table_id	8
section_syntax_indicator	1
reserved_future_use	1
reserved	2
section_length	12
for(i=0;i<N;i++){	
data_byte	8
}	
}	

Bouquet association section (BAT)

Syntax	No. of bits
bouquet_association_section(){	
table_id	8
section_syntax_indicator	1
reserved_future_use	1
reserved	2
section_length	12
bouquet_id	16
reserved	2
version_number	5
current_next_indicator	1
section_number	8
last_section number	8
reserved_future_use	4
bouquet_descriptors_length	12
for(i=0;i<N;i++){	
descriptor()	
}	
reserved_future_use	4
transport_stream_loop_length	12
for(i=0;i<N;i++){	
transport_stream_id	16
original_network_id	16
reserved_future_use	4
transport_descriptors_length	12
for(j=0;j<N;j++){	
descriptor()	
}	
}	
CRC_32	32
}	

Event Information Section (EIT)

Syntax	No. of bits
event_information_section(){	
table_id	8
section_syntax_indicator	1
reserved_future_use	1
reserved	2
section_length	12
service_id	16
reserved	2
version_number	5
current_next_indicator	1
section_number	8
last_section_number	8
transport_stream_id	16
original_network_id	16
segment_last_section_number	8
last_table_id	8
for(i=0;i<N;i++){	
event_id	16
start_time	40
duration	24
running_status	3
free_CA_mode	1
descriptors_loop_length	12
for(j=0;j<N;j++){	
descriptor()	
}	
}	
CRC_32	32
}	

Running status section (RST)

Syntax	No. of bits
running_status_section(){	
table_id	8
section_syntax_indicator	1
reserved_future_use	1
reserved	2
section_length	12
for(i=0;i<N;i++){	
transport_stream_id	16
original_network_id	16
service_id	16
event_id	16
reserved_future_use	5
running_status	3
}	
}	

Time offset section (TOT)

Syntax	No. of bits
time_offset_section(){	
table_id	8
section_syntax_indicator	1
reserved_future_use	1
reserved	2
section_length	12
UTC_time	40
reserved	4
descriptors_loop_length	12
for(i=0;i<N;i++){	
descriptor()	
}	
CRC_32	32
}	

Discontinuity Information Section (DIT)

Syntax	No. of bits
discontinuity_information_section() {	
table_id	8
section_syntax_indicator	1
reserved_future_use	1
reserved	2
section_length	12
transition_flag	1
reserved_future_use	7
}	

Selection Information Section (SIT)

Syntax	No. of bits
selection_information_section() {	
table_id	8
section_syntax_indicator	1
DVB_reserved_future_use	1
ISO_reserved	2
section_length	12
DVB_reserved_future_use	16
ISO_reserved	2
version_number	5
current_next_indicator	1
section_number	8
last_section_number	8
DVB_reserved_for_future_use	4
transmission_info_loop_length	12
for(i=0;i<N;i++) {	
descriptor()	
}	
for(i=0;i<N;i++) {	
service_id	16
DVB_reserved_future_use	1
running_status	3
service_loop_length	12
for(j=0;j<N;j++) {	
descriptor()	
}	
}	
CRC_32	32
}	

ETSI TR 101 290 -Table Timing Intervals

Table Type	PID	Max/Min
PAT	0x00	500 ms
TSDT	0x02	10000 ms [1]
NIT actual	0x10	10000 / 25 ms
NIT other	0x10	10000 / 25 ms
SDT actual	0x11	2000 / 25 ms
SDT other	0x11	10000 / 25 ms
BAT	0x11	10000 / 25 ms
EIT actual present-following	0x12	2000 / 25 ms [2]
EIT other present-following	0x12	10000 / 25 ms [2]
TOT	0x14	30000 / 25 ms
TDT	0x14	30000 / 25 ms
PMT	ALL	500 ms

[1] ETSI TR 101 211, TSDT interval defined in section 4.1.9
[2] ETSI TR 101 211, Additional EIT Actual/Other Schedule intervals defined for:
-DVB Satellite/Cable in section 4.4.1
-DVB Terrestrial in section 4.4.2

Stream Type Assignments

Value	Description
0x00	ITU-T I ISO/IEC reserved
0x01	ISO/IEC 11172-2 Video
0x02	ITU-T Rec. H.262 I ISO/IEC 13818-2 Video or ISO/IEC 11172-2 constrained parameter video stream
0x03	ISO/IEC 11172-3 Audio
0x04	ISO/IEC 13818-3 Audio
0x05	ITU-T Rec. H.222.0 I ISO/IEC 13818-1 private_sections
0x06	ITU-T Rec. H.222.0 I ISO/IEC 13818-1 PES packets containing private data
0x07	ISO/IEC 13522 MHEG
0x08	Annex A - DSM CC
0x09	ITU-T Rec. H.222.1
0x0A	ISO/IEC 13818-6 type A
0x0B	ISO/IEC 13818-6 type B
0x0C	ISO/IEC 13818-6 type C
0x0D	ISO/IEC 13818-6 type D
0x0E	ISO/IEC 13818-1 auxiliary
0x0F - 0x7F	ITU-T Rec. H.222.0 I ISO/IEC 13818-1 reserved
0x80 - 0xFF	User private

Allocation of table_id Values

Value	Description
0x00	program_association_section
0x01	conditional_access_section
0x02	program_map_section
0x03	transport_stream_description_section
0x04 to 0x3F	reserved
0x40	network_information_section - actual_network
0x41	network_information_section - other_network
0x42	service_description_section - actual_transport_stream
0x43 to 0x45	reserved for future use
0x46	service_description_section - other_transport_stream
0x47 to 0x49	reserved for future use
0x4A	bouquet_association_section
0x4B to 0x4D	reserved for future use
0x4E	event_information_section - actual_transport_stream, present/following
0x4F	event_information_section - other_transport_stream, present/following
0x50 to 0x5F	event_information_section - actual_transport_stream, schedule
0x60 to 0x6F	event_information_section - other_transport_stream, schedule
0x70	time_date_section
0x71	running_status_section
0x72	stuffing_section
0x73	time_offset_section
0x74 to 0x7D	reserved for future use
0x7E	discontinuity_information_section
0x7F	selection_information_section
0x80 to 0xFE	user defined
0xFF	reserved

PID Allocation for DVB SI

Table	PID Value
PAT	0x0000
CAT	0x0001
TSDT	0x0002
reserved	0x0003 to 0x000F
NIT,ST	0x0010
SDT, BAT, ST	0x0011
EIT, ST	0x0012
RST, ST	0x0013
TDT, TOT, ST	0x0014
network synchronization	0x0015
reserved for future use	0x0016 to 0x001B
inband signalling	0x001C
measurement	0x001D
DIT	0x001E
SIT	0x001F

Abbreviations

AC-3	Dolby AC-3 audio coding
	(ITU-R Recommendation BS1196 [19])
BAT	Bouquet Association Table
BCD	Binary Coded Decimal
bslbf	bit string, left bit first
CA	Conditional Access
CAT	Conditional Access Table
CLUT	Color Look-Up Table
CRC	Cyclic Redundancy Check
DAB	Digital Audio Broadcasting
DIT	Discontinuity Information Table
DVB	Digital Video Broadcasting
DVD	Digital Versatile Disc
EBU	European Broadcasting Union
EIT	Event Information Table
EMM	Entitlement Management Message
EPG	Electronic ProgramGuide
ETS	European Telecommunication Standard
FEC	Forward Error Correction
IEC	International Electrotechnical Commission
IRD	Integrated Receiver Decoder
ISO	International Organization for Standardization
LSB	Least Significant Bit
MJD	Modified Julian Date
MPEG	Moving Pictures Expert Group
NIT	Network Information Table
NVOD	Near Video On Demand
PAT	Program Association Table
PDC	ProgramDelivery Control
PID	Packet IDentifier
PMT	Program Map Table
PSI	Program Specific Information
PSTN	Public Switched Telephone Network
QAM	Quadrature Amplitude Modulation
QPSK	Quaternary Phase Shift Keying
rpchof	remainder polynomial coefficients, highest order first
RS	Reed-Solomon
RST	Running Status Table
SeF	Scale Factor
SDT	Service Description Table
SI	Service Information
SIT	Selection Information Table
SMI	Storage Media Interoperability
ST	Stuffing Table
TDT	Time and Date Table
TOT	Time Offset Table
TPS	Transmission Parameter Signaling
TS	Transport Stream
uimsbf	unsigned integer most significant bit first
UTC	Universal Time, Co-ordinated
VBI	Vertical Blanking Interval
VPS	Video Program System
WSS	Wide Screen Signaling

Profiles and Levels

Level \ Profile	Simple	Main	4:2:2 Profile	SNR	Spatial	High
High		4:2:0 1920x1152 80 Mb/s I,P,B	4:2:2 1920 x 1088 300 Mb/s I,P,B			4:2:0,4:2:2 1920 x 1152 100 Mb/s I,P,B
High-1440		4:2:0 1440x1152 60 Mb/s I,P,B			4:2:0 1440 x 1152 60 Mb/s I,P,B	4:2:0,4:2:2 1440 x 1152 80 Mb/s I,P,B
Main	4:2:0 720 x 576 15 Mb/s I,P	4:2:0 720 x 576 15 Mb/s I,P,B	4:2:2 720 x 608 50 Mb/s I,P,B	4:2:0 720 x 576 15 Mb/s I,P,B		4:2:0,4:2:2 720 x 576 20 Mb/s I,P,B
Low		4:2:0 352 x 288 4 Mb/s I,P,B		4:2:0 352 x 288 4 Mb/s I,P,B		

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