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**Digital Video Service Multiplex
and Transport System Standard
for Cable Television**

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DIGITAL VIDEO SERVICE MULTIPLEX AND TRANSPORT SUBSYSTEM STANDARD FOR CABLE TELEVISION

Table of Contents

1.	SCOPE	1
2.	NORMATIVE REFERENCES.....	1
3.	DEFINITIONS	2
3.1	Compliance notation	2
3.2	Acronyms and Abbreviations	2
4.	SYSTEM OVERVIEW.....	3
5.	SPECIFICATION	4
5.1	MPEG-2 Systems standard	4
5.1.1	Video T-STD	4
5.1.2	Audio T-STD	5
5.2	Identification of MPEG-2 Private Ranges	5
5.2.1	MPEG-2 Registration Descriptor	5
5.2.2	Program Identifier	5
5.2.3	Audio Elementary Stream Identifier	5
5.2.4	Other Program Element Identifiers	6
5.3	Audio Constraints	6
5.4	Video Constraints	6
5.5	Constraints on PSI	6
5.6	PES constraints	7
5.6.1	Audio PES constraints	7
5.7	Services and features	8
5.7.1	System information and program guide	8
5.7.2	Emergency alerts	10
5.7.3	Specification of private data services	10
5.7.4	MPEG-2 Still Pictures	10
5.8	Assignment of identifiers	10
5.8.1	Table IDs	10
5.8.2	Stream Types	11
5.8.3	Descriptors	12
5.9	Extensions to the MPEG-2 Systems specification	17
5.9.1	Scrambling control	17
5.10	Service Acquisition Considerations (Informative)	17

6.	FEATURES OF ISO/IEC 13818-1 NOT SUPPORTED BY THIS STANDARD.....	18
6.1	Program streams	18
7.	TRANSPORT ENCODER OUTPUT BIT RATES.....	18

List of Figures

Figure 4.1	Sample organization of functionality in a transmitter-receiver pair for a single program.	4
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List of Tables

Table 5.1	Maximum cycle time for the STT, MGT, CVCT and RRT	9
Table 5.2	Maximum rate for each PSIP packet stream	9
Table 5.3	Table ID Ranges and Values (Informative)	11
Table 5.4	Stream Type Codes	12
Table 5.5	Descriptors	13
Table 5.6	– ATSC Private Information Descriptor	16
Table 5.7	PID Assignment	17
Table 5.8	Transport Scrambling Control Field	17

DIGITAL VIDEO SERVICE MULTIPLEX AND TRANSPORT SUBSYSTEM STANDARD FOR CABLE TELEVISION

1. SCOPE

This document describes the transport subsystem characteristics and normative specifications of the in-band Service Multiplex and Transport Subsystem Standard for Cable Television.¹

2. NORMATIVE REFERENCES

The following documents contain provisions which in whole or in part, through reference in this text, constitute provisions of this Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and amendment, and parties to agreements based on this Standard are encouraged to investigate the possibility of applying the most recent editions of the documents listed below.

1. ANSI/SCTE 07 2006 , Digital Video Transmission Standard for Cable Television.
2. ATSC A/52A (2001), Digital Audio Compression (AC-3).
3. ATSC A/53B (2001), ATSC Digital Television Standard.
4. ATSC A/65A (2000), Program and System Information Protocol (PSIP) for Terrestrial Broadcast and Cable.
5. ATSC A/90 Data Broadcast Standard (2000).
6. CEA-708-B, Digital Television (DTV) Closed Captioning (1999)
7. EIA/CEA-766-A (2000), U.S. and Canadian Rating Region Tables (RRT) and Content Advisory Descriptors for Transport of Content Advisory Information Using ATSC A/65A Program and System Information Protocol (PSIP).
8. ISO/IEC IS 13818-1, (2000), “Information Technology—Generic coding of moving pictures and associated audio—Part 1: Systems.”
9. ISO/IEC IS 13818-2, (2000), “Information Technology—Generic coding of moving pictures and associated audio—Part 2: Video.”
10. ISO/IEC 13818-6, (1998), “Information Technology—Generic coding of moving pictures and associated audio—Part 6: Digital Storage Media Command & Control,” Chapter 2, 4-7, 9, 11.
11. ANSI-J-STD-042-2002, Emergency Alert Message for Cable.
12. ANSI/SCTE 19 2006 , Standard Methods for Isochronous Data Services Transport.
13. ANSI/SCTE 27 2003 , Subtitling Methods for Broadcast Cable.

¹ Informative note: This standard applies only to Transport Streams transmitted on cable using 64- or 256-QAM modulation in accordance with ANSI/SCTE 07 2000 *Digital Video Transmission Standard for Cable Television*.

14. ANSI/SCTE 53 2008 , Methods for Asynchronous Data Services Transport.
15. ANSI/SCTE 42 2008, IP Multicast for Digital MPEG Networks.

3. DEFINITIONS

3.1 Compliance notation

As used in this document, “*shall*” denotes a mandatory provision of the standard. “*Should*” denotes a provision that is recommended but not mandatory. “*May*” denotes a feature whose presence does not preclude compliance that may or may not be present at the option of the implementer.

3.2 Acronyms and Abbreviations

The following acronyms and abbreviations are used within this specification:

ASTD	Ancillary Service Target Decoder
ATSC	Advanced Television Systems Committee
CA	Conditional Access
CAT	Conditional Access Table
CRC	Cyclic Redundancy Check
CVCT	Cable Virtual Channel Table
DET	Data Event Table
DOCSIS	Data Over Cable Service Interface Specification ²
DSM-CC	Digital Storage Media Command and Control
DST	Data Service Table
DTS	Decoding Time Stamp
DVB	Digital Video Broadcasting
DVS	Digital Video Subcommittee
EA	Emergency Alert
ECM	Entitlement Control Message
EIT	Event Information Table
ES	Elementary Stream
ETT	Extended Text Table
IEC	International Electrotechnical Commission
ISO	International Organization for Standardization
MGT	Master Guide Table
MPEG	Moving Picture Experts Group
MRD	MPEG-2 Registration Descriptor
PAT	Program Association Table
PES	Packetized Elementary Stream
PID	Packet Identifier
PMT	Program Map Table

² See <http://www.cablemodem.com/> or ANSI/SCTE 22-1 2002.

PSI	Program Specific Information
PSIP	Program and System Information Protocol
PTS	Presentation Time Stamp
QAM	Quadrature Amplitude Modulation
RRT	Rating Region Table
SI	Service Information
STT	System Time Table
TS	Transport Stream
T-STD	Transport Stream System Target Decoder
TVCT	Terrestrial Virtual Channel Table
VBV	Video Buffering Verifier

4. SYSTEM OVERVIEW

The transport format and protocol for the Service Multiplex and Transport Subsystem Standard for Cable Television is a compatible subset of the MPEG-2 Systems specification defined in ISO/IEC 13818-1. It is based on a fixed-length packet Transport Stream approach which has been defined and optimized for digital television delivery applications.

As illustrated in Figure 4.1, the transport function resides between the application (e.g., audio or video) encoding and decoding functions and the transmission subsystem. The encoder's transport subsystem is responsible for formatting the coded elementary streams and multiplexing the different components of the program for transmission. The receiver is responsible for recovering the elementary streams for the individual application decoders and for the corresponding error signaling. The transport subsystem also incorporates other higher protocol layer functionality related to synchronization of the receiver.

One approach to system multiplexing approach may be to consider it a combination of multiplexing at two different layers. In the first layer, single program Transport Streams are formed by multiplexing Transport Stream (TS) packets from one or more Packetized Elementary Stream (PES) and/or private section (ISO/IEC 13818-1 [8] Table 2-30) sources. In the second layer, a single program Transport Stream forms (or two or more may be combined to form) a service multiplex (also known as a multi-program Transport Stream in the MPEG-2 Systems standard, and a digital television standard multiplexed bit stream in this SCTE standard). Program Specific Information (PSI) identifies programs and the components of programs.

Not shown explicitly in Figure 4.1, but essential to the practical implementation of this Standard, is a control system that manages the transfer and processing of the elementary streams from the application encoders. The rules followed by this control system are not a part of this Standard. The output of the control system implementation shall conform to the MPEG-2 Transport Stream coding as specified in ISO/IEC 13818-1 [8] with the additional constraints specified in this Standard.