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Audio/Visual over ATM

A number of standards have been developed to assist in the transfer of audio and video signals over ATM. This chapter covers the following protocols:

- MPEG-2.
- DSM-CC.
- ATM-Circuit Emulation.

MPEG-2

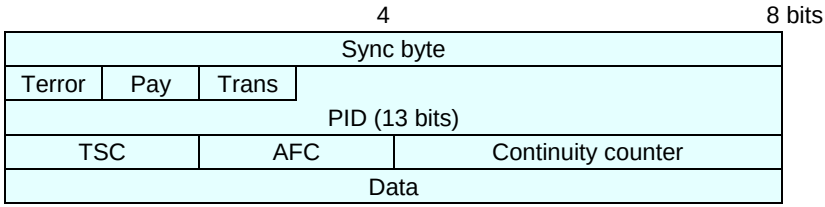
ISO 13818-1 30/10/94

MPEG-2 is a generic method for compressed representation of video and audio sequences using a common coding syntax defined in the document ISO/IEC 13818 by the International Organization for Standardization. The MPEG-2 Video Standard specifies the coded bit stream for high-quality digital video. As a compatible extension, MPEG-2 Video builds on the completed MPEG-1 Video Standard (ISO/IEC IS 11172-2), by supporting interlaced video formats and a number of other advanced features, including support for applications such as Direct Broadcast Satellite, Cable Television and HDTV.

The ability of ATM to support voice, video and data simultaneously, makes it an excellent candidate for MPEG implementations. In December 1995, the ATM forum issued the Video on Demand (VoD) Specification 1.0, which specifies the implementation of MPEG-2 over ATM. This implementation supports the transport stream MPEG coding, using AAL5 for user data and the Signalling 4.0 stack for call control.

MPEG-2 Transport Stream Header Structure

The structure of the MPEG-2 Transport Stream header is shown in the following illustration.



MPEG-2 Transport Stream header

Sync byte

Fixed 8-bit field with the value of 0100 0111.

TError

Transport error indicator. Indicates the presence of at least 1 uncorrectable bit error in the associated transport stream packet.

Pay
Payload unit start indicator. 1-bit flag with normative meaning for transport stream packets.

Trans
Transport priority. 1-bit priority of the packet compared to other packets of the same PID.

PID
13-bit field indicating the type of data stored in the packet payload.

TSC
Transport scrambling control. Indicates the scrambling mode of the Transport stream packet payload.

AFC
Adaptation field control. Indicates whether this transport stream packet header is followed by an adaptation field and/or payload.

Continuity counter
4-bit field incremented with each Transport Stream packet of the same PID.

Data byte
8-bit field containing data.

MPEG-2 Program Stream Header Structure

The structure of the MPEG-2 Program Stream header is shown in the following illustration:

Pack start code	32 bits
01	2 bits
System clock reference base	3 bits
Marker bit	1 bit
System clock reference base	15 bits
Marker bit	1 bit
System clock reference base	15 bits
Marker bit	1 bit
System clock reference	9 bits
Marker bit	1 bit
Program mux rate	22 bits
Marker bit	1 bit
Marker bit	1 bits
Reserved	5 bits
Pack stuffing length	3 bits
Stuffing byte	8 bits

MPEG-2 Program Stream header

Pack start code

The string 0X000001BA identifying the beginning of a pack.

System clock reference base

Indicates the intended time of arrival of the byte. Contains the last bit of the system clock reference base as the input of the program target decoder.

System clock reference extension field

Indicates the number of periods of a 27 MHz clock after a 90 kHz start.

Marker bit

1-bit field with the value 1.

Program mux rate

22 bit integer specifying the rate at which the P-STD receives the program stream during the pack in which it is included. This is measured in units of 50 bytes per second.

Pack stuffing rate
Number of stuff bytes following this field.

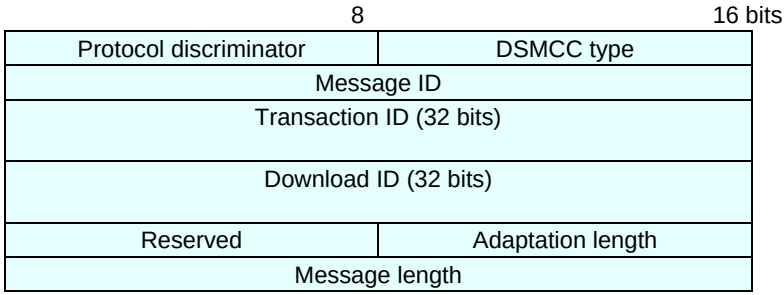
Stuffing byte
Fixed value that can be inserted by the encoder to meet the requirements of the channel (for example). It is discarded by the decoder.

DSM-CC

ISO 13818-6 6/12/96

The Digital Storage Media Command and Control (DSM-CC) specification is a set of protocols which provides the control functions and operations specific to managing ISO/IEC 11172 (MPEG-1) and ISO/IEC 13818 (MPEG-2) bit streams. The concepts and protocols are, however, considered to apply to more general applications.

The format of the header is shown in the following illustration:



DSM-CC header structure

Protocol discriminator
This field indicates that the message is an MPEG-2 message.

Dsmcc type
MPEG-2 DSMCC type. Possible types are:
UN configuration
UN primitive
UU configuration
UU primitive.

Message ID
The message type.

Transaction ID
A field used for session integrity and error processing.

Download ID
An optional field replacing the transaction ID fields if the message type is a download message.

Reserved
A reserved field, the value of which is always set to zero.

Adaptation length
This field indicates the length of the adaptation part.

Message length
The length of the message including the adaptation part.

ATM Circuit Emulation

Circuit Emulation was developed to facilitate the transmission of constant bit rate (CBR) traffic over ATM networks. Since ATM is a packet- rather than circuit-oriented transmission technology, it must emulate circuit characteristics in order to provide support for CBR traffic. The goal of Circuit Emulation is to connect between CBR equipment across an ATM network, without the CBR equipment realizing it.