

SMPTE STANDARD

for Digital Television — Opportunistic Data Broadcast Flow Control



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1 Scope

This standard defines the flow control protocol to be used between an emission multiplexer and data server for opportunistic data broadcast. Opportunistic data broadcast inserts data packets into the output multiplex to fill any available free bandwidth. The emission multiplexer maintains a buffer from which it draws data to be inserted. The multiplexer will request additional MPEG-2 transport packets from the data server as its buffer becomes depleted. The number of packets requested depends upon the implementation, with the most stringent requirement being requesting a single MPEG-2 transport packet where the request and delivery can occur in less than the emission time of an MPEG-2 transport packet from the multiplexer. This protocol is designed to be extensible and provide a basis for low-latency, real-time backchannel communications from the emission multiplexer.

Encapsulated in MPEG-2 transport packets, the messages of the flow control protocol are transmitted via MPEG-2 DSM-CC sections, following the message format defined in ISO/IEC 13818-6, chapter 2. Such sections provide the capability to support error correction or error detection (or to ignore either).

2 Normative references

The following standards contain provisions, which 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 parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent edition of the standards indicated below.

ISO/IEC 13818-1:1996, Information Technology — Generic Coding of Moving Pictures and Associated Audio Information: Systems

ISO/IEC 13818-6:1998, Information Technology — Generic Coding of Moving Pictures and Associated Audio Information — Part 6: Extensions for DSM-CC [digital storage media command and control]

3 Mnemonics

bslbf: Bit string, left bit first, where left is the order in which bit strings are written in this standard. Bit strings are written as a string of 1s and 0s within single quote marks; e.g., '1000 0001'. Blanks within a bit string are for ease of reading and have no significance.

rpchof: Remainder polynomial coefficients, highest order first.

uimsbf: Unsigned integer, most significant bit first.

4 Flow control protocol

The first message defined in the flow control protocol is the FCPacketRequest() message. The FCPacketRequest() message allows the multiplexer to request the data server to send a specified number of packets associated with an opportunistic data service in order to maintain buffer fullness. The FCPacketRequest() messages shall be packaged in 188-byte MPEG-2 transport packets. The space remaining in the packet after the message shall be filled with 0xFF.

4.1 Transport packet

The MPEG-2 transport packet as defined in ISO/IEC 13818-1, clauses 2.4.3.2 and 2.4.3.3, shall be used with the following constraints as defined below (see table 1):

Table 1 – Transport packet

Syntax	No. of bits	Mnemonic
Transport_packet () {		
sync_byte	8	0x47
transport_error_indicator	1	'0'
payload_unit_start_indicator	1	'1'
transport_priority	1	'0'
PID	13	uimsbf
transport_scrambling_control	2	'00'
adaptation_field_control	2	'01'
continuity_counter	4	uimsbf
pointer_field	8	0x00
for (i = 0; i < N; i++) {		
data_byte	8	bslbf
}		
}		

4.1.1 Semantic definition of fields in transport packet

sync_byte: This field shall be set to 0x47.

transport_error_indicator: This field shall be set to '0'.

payload_unit_start_indicator: The payload_unit_start_indicator shall be set to a value of '1' to indicate the start of a private section within the current transport packet.

transport_priority: This field shall be set to '0.'

PID: The PID is a 13-bit field conveying the session number. The session number (PID) is mapped to the output service (a PID or aggregate of PIDs) during the provisioning process. The following PID ranges shall not be used: 0x0000-0x000F and 0x1FFB.

transport_scrambling_control: This field shall be set to '00.'

adaptation_field_control: This field shall be set to '01,' indicating no adaptation field, payload only.

continuity_counter: The continuity_counter is a 4-bit field that shall increment with each transport stream

packet with the same PID. The continuity_counter wraps around to 0 after its maximum value.

pointer_field: This is an 8-bit field whose value shall be the number of bytes, immediately following the pointer_field until the first byte of the first section that is present in the payload of the transport stream packet (so a value of 0x00 in the pointer_field indicates that the section starts immediately after the pointer_field). In this usage, sections may not overlap within packets — so the pointer_field always has a value of 0x00.

data_byte: Data_bytes shall be contiguous bytes of data from the DSM-CC section defined below. Any data_bytes remaining in the transport packet following the checksum or the CRC_32 field of the DSM-CC section structure shall be set to 0xFF. The total number of data_bytes, N, within the transport packet is 183.

4.2 DSM-CC section for encapsulation of flow control protocol in transport packets

Flow control messages shall be encapsulated in the DSM-CC section structure defined in clause 9.2.2 of ISO/IEC 13818-6. The stream_type value associated with this elementary stream shall be 0x0D (which per ISO/IEC 13818-6, clause 9.2.3, indicates that the elementary stream consists of DSM-CC sections). A table_id value of 0xD7 shall be used to