ATIS-0100519.1999(R2013)

Specifications for Transport of Generic Packets (including MPEG-2) Transport Packets over the DS Hierarchy

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ATIS-0100519.1999(R2013), *Specifications for Transport of Generic Packets (including MPEG-2) Transport Packets Over the DS Hierarchy*

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Specifications for Transport of Generic Packets (including MPEG-2 Transport Packets) Over the DS Hierarchy

Secretariat

Alliance for Telecommunications Industry Solutions

Approved April 14, 1999

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Contents

Foreword (This foreword is not part of American National Standard T1.519-1999.)

This American National Standard was developed by Technical Subcommittee T1A1 of Accredited Standards Committee T1, Telecommunications. Committee T1 standards serve the public through improved understanding between carriers, end-users, and manufacturers.

This standard will be useful to anyone engaged in the design, provisioning or operation of telecommunications equipment or services that provide DS1, DS2 or DS3 digital transmission technology for the purpose of transport of generic packets defined in this standard. MPEG-2 transport packets are included as a special form and implementation of the generic packets.

Conformance to the standard should provide interface compatibility in most installations, but the standard does not guarantee compatibility or acceptable performance under all operating conditions.

Suggestions for improvement of this standard are welcome. They should be sent to the Alliance for Telecommunications Industry Solutions, 1200 G Street, NW, Suite 500, Washington, DC 20005.

This Standard was processed and approved for submittal to ANSI by Accredited Standards Committee on Telecommunications, T1. Committee approval of the standard does not necessarily imply that all members voted for approval. At the time it approved this standard, the T1 Committee had the following members:

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American National Standard for Telecommunications – Specifications for Transport of Generic Packets (including MPEG-2 Transport Packets) Over the DS Hierarchy

1 Scope

This standard describes the methods and practices for the transmission of a type of generic packet data over the digital hierarchy described in ANSI T1.107-1995.

2 Normative References

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

ANSI T1.102-1993, *Telecommunications - Digital Hierarchy – Electrical Interfaces*

ANSI T1.107-1995, *Telecommunications - Digital Hierarchy – Formats Specifications*

ANSI T1.231-1997, *Telecommunications - Digital Hierarchy – Layer 1 In-Service Digital Transmission Performance Monitoring*

ANSI T1.403-1995, *Telecommunications - Network-to-Customer Installation – DS1 Metallic Interface*

ANSI T1.404-1994, *Network-to-Customer Installation – DS3 Metallic Interface Specification* (includes supplement ANSI T1.404a-1996)

ISO/IEC 13818-1, *Information Technology - Generic Coding of Moving Pictures and Associated Audio Information - Part 1 : Systems*[1)]

3 Definitions

3.1 Adaptation Packet: A packet that is used to carry a Generic Packet as its payload and is mapped directly into the payload of a DS frame. This term is used in the context of this document.

3.2 Alarm Indication Signal: A signal that has replaced the normal traffic signal when a maintenance alarm indication has been activated.

3.3 Generic Packet: A packet of 188 bytes. The first byte of a generic packet has a hexadecimal value of 0 x 47. This term is used in the context of this document.

3.4 Program Clock Reference: A time stamp in an MPEG-2 Transport Stream from which decoder timing is derived.

[1)] Available from the American National Standards Institute, 11 West 42nd Street, New York, NY 10036.

4 Acronyms

AIC	Application Identification Code
ANSI	American National Standards Institute
AP	Adaptation Packet
DS	Digital Signal
FEAC	Far End Alarm & Control
FEC	Forward Error Correction
GP	Generic Packet
GPS	Generic Packet Stream
IEC	International Electrotechnical Commission
ISO	International Organization for Standardization
Mb/s	Megabits per second
MPEG	Moving Pictures Experts Group
PCR	Program Clock Reference
RS	Reed-Solomon Code
T1AP	Type 1 Adaptation Packet
T2AP	Type 2 Adaptation Packet
TS	MPEG-2 Transport Stream

5 General Description

This standard describes a method of delivering one or more independent Generic Packet streams (GPS) over a single DS hierarchy network channel. It is understood that a GPS may be an MPEG-2 transport stream (TS), which includes the concept of multiple packetized elementary streams (MPTS – Multi-Program Transport Stream) within one stream (see figure 1).

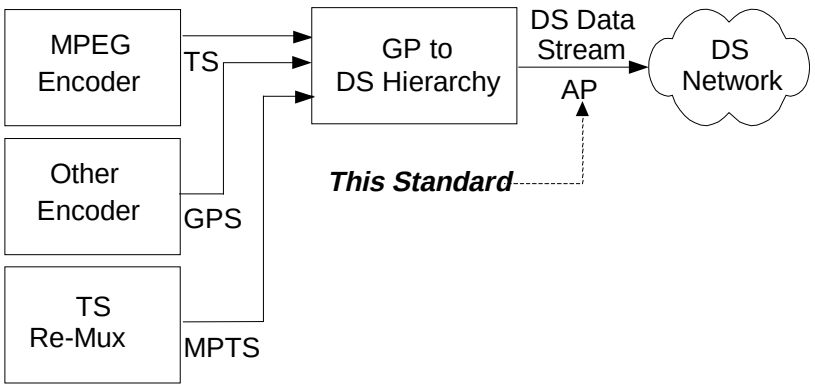

Figure 1 - Standard Coverage

6 Generic Packet

A Generic Packet (GP) has the packet structure shown in figure 2.

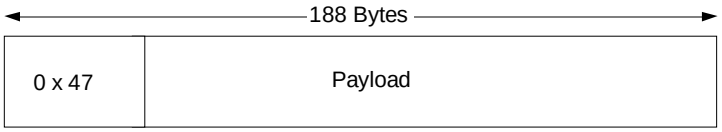

Figure 2 - Generic Packet Structure

A GP has a header byte with a hexadecimal value of 0x47. The header byte is followed by 187 bytes of information payload.

7 Generic Packet Adaptation to DS Frame

Generic Packet streams mapped into a DS compliant interface shall be composed of digitally multiplexed GPS through a Generic Packet adaptation as described in figure 3 or figure 4.

On a single DS interface, only one of the two types of AP is allowed to be mapped into the DS frame payload at one time.

7.1 Adaptation Packet Format

Two types of adaptation packet are defined as follows:

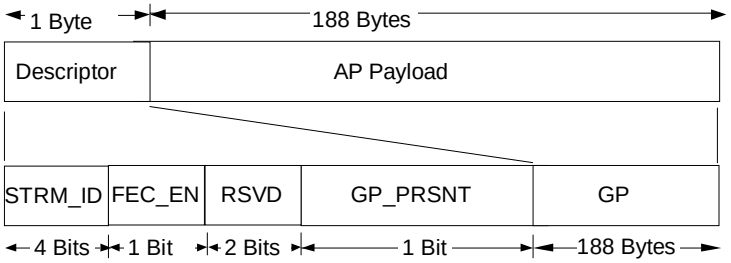

Figure 3 - Type 1 Adaptation Packet

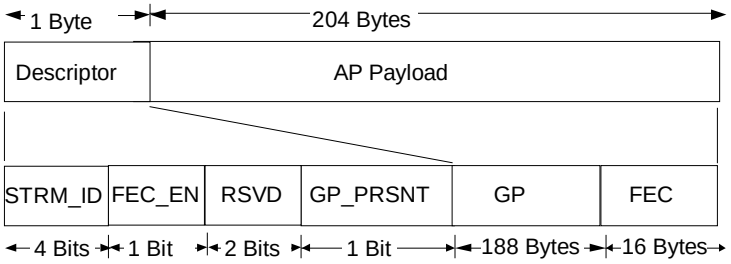

Figure 4 - Type 2 Adaptation Packet

***STRM_ID [3:0]* – Stream Id field:**

This field designates the Generic Packet stream identification for the associated payload field. It may have a value of 0 to 15. It is a "don't-care" when the associated packet is a null Adaptation Packet.

***FEC_EN* – FEC Enable field:**

In a Type 1 Adaptation Packet, this field is set to ‘0’ by a transmitter, and ignored by a receiver.

In a Type 2 Adaptation Packet, this field indicates whether the 16 bytes of the FEC field following the GP information contains valid FEC information.

It shall be set to ‘1’ by a transmitter if the 16-byte FEC field contains a valid FEC parity code. It shall be set to ‘0’ by a transmitter if the 16-byte FEC field does not contain a valid FEC parity code.

***RSVD[1:0]* – Reserved field:**

This field is reserved for future use. Until a definition is specified, it shall be set to ‘00’ by a transmitter and ignored by a receiver.

***GP_PRSNT* – Generic Packet Present field:**

This field indicates whether the AP contains a valid GP packet. When it is a ‘1’, the AP contains a valid Generic Packet; when it is a ‘0’, the AP does not contain a valid Generic Packet (i.e., it contains a null AP).

***FEC* – Forward Error Correction field:**

In a Type 2 Adaptation Packet, this field is for an optional 16-byte FEC code used for Adaptation Packet protection over a noisy DS link.

7.2 Forward error correction coding

When the “*FEC_EN*” field is set to ‘1’ in an AP descriptor byte, the “*FEC*” field of the AP shall contain 16 bytes of RS parity code. The RS parity code shall be generated by applying RS(205, 189, $t = 8$) to the AP descriptor byte and the 188 bytes of GP. The byte order, when the RS algorithm is applied to a GP, shall be the same as that of the AP transmission, i.e., AP descriptor byte first followed by AP payload bytes.

The Field Generator Polynomial is:

$$P(x) = x^8 + x^7 + x^2 + x + 1$$

The Code Generator Polynomial is:

$$G(x) = \prod_{i=120}^{135} \left(x - a^i\right)$$

With this RS code, up to eight random erroneous bytes in a T2AP can be corrected.

7.3 AP to DS Payload Rate Adaptation

When no GP packets are to be transmitted over the DS payload, due to either idle GP inputs or low GP input data rates, null APs are inserted into the DS payload instead (by a transmitter). A null AP is indicated by a ‘0’ at the “*GP_PRSNT*” bit in the descriptor byte of an AP. The first byte that follows a null AP descriptor byte shall be set to a hexadecimal value of 0 x 47.

The resultant AP stream data rate shall be equal to that of the payload of the encapsulating DS channel. The total data rate of the GP streams carried by the AP stream shall not exceed the maximum payload rate of the DS interface (less the descriptor and any FEC bytes of the APs), such that DS overhead bits are not relied upon to carry any AP or GP information.

7.4 AP Transmission Order

On a DS interface, the first byte of an Adaptation Packet (T1AP or T2AP) is transmitted first. The most significant bit of an Adaptation Packet byte is transmitted first.

The first bit of an AP is not required to be in a fixed position relative to the DS framing structure in which it is carried. No byte or nibble alignment with DS framing is required.

8 DS1

8.1 Interface

The DS1 interface shall conform to the DS1 interface specification as defined in ANSI T1.102 to ensure compatibility with existing DS1 transport equipment.

The DS1 interface shall conform to the unchannelized DS1 application as specified in ANSI T1.107. Applications for both Superframe (SF) and Extended SF (ESF) are supported as defined in ANSI T1.107.

DS1 frame overhead bits shall be used as specified in ANSI T1.107 and ANSI T1.403. Performance monitoring and alarm/status monitoring for DS1 shall be supported in accordance with ANSI T1.231.

9 DS2

9.1 Interface

The DS2 interface shall conform to the DS2 interface specification as defined in ANSI T1.102 to ensure compatibility with existing DS2 transport equipment.

DS2 frame overhead bits shall be used as specified in ANSI T1.107.

10 DS3

10.1 Interface

The DS3 interface shall conform to the DS3 interface specification as defined in ANSI T1.102 to ensure compatibility with existing DS3 transport equipment.

The DS3 interface shall conform to the unchannelized DS3 application as specified in ANSI T1.107.

DS3 frame overhead bits shall be used as specified in ANSI T1.107 and ANSI T1.404. Performance monitoring and alarm/status monitoring for DS3 shall be supported in accordance with ANSI T1.231.