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SERIES J: TRANSMISSION OF TELEVISION, SOUND
PROGRAMME AND OTHER MULTIMEDIA SIGNALS

Transport of MPEG-2 signals on packetised networks

Transport of MPEG-2 signals in PDH networks

ITU-T Recommendation J.131

(Previously CCITT Recommendation)



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ITU-T RECOMMENDATION J.131

TRANSPORT OF MPEG-2 SIGNALS IN PDH NETWORKS

Summary

This Recommendation provides the requirements for equipment called "PDH network adapter" for the transport of MPEG-2 signals over PDH networks. It describes the necessary operations to adapt the MPEG-2 Transport Stream into interfaces of PDH networks and the functional characteristics associated with this equipment.

Source

ITU-T Recommendation J.131 was prepared by ITU-T Study Group 9 (1997-2000) and was approved under the WTSC Resolution No. 1 procedure on the 18th of March 1998.

FOREWORD

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The World Telecommunication Standardization Conference (WTSC), which meets every four years, establishes the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

The approval of Recommendations by the Members of the ITU-T is covered by the procedure laid down in WTSC Resolution No. 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

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Recommendation J.131

TRANSPORT OF MPEG-2 SIGNALS IN PDH NETWORKS

(Geneva, 1998)

1 Scope

This Recommendation specifies the transmission of MPEG-2 transport streams within PDH networks working at the Recommendation G.702 [1] hierarchical bit rates of 1544 kbit/s, 2048 kbit/s, 6312 kbit/s, 34 368 kbit/s, 44 736 kbit/s and 139 264 kbit/s. The use of any of these bit rates is optional; if, however, one or more rates are selected, the complete specification applies. The definition of the network aspects of the transmission of MPEG-2 Transport Streams is based to the maximum extent on existing international standards.

The 8 Mbit/s frame structure for the support of ATM is not yet defined. Further study is required.

The equipment considered in this Recommendation is the Network Adapter performing the adaptation between MPEG-2 transport streams and the interfaces of PDH networks.

The application of this Recommendation is restricted to a physical layer point-to-point connection without ATM connection functionality at intermediate points.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated are valid. All Recommendations and other references are subject to revisions; all users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published.

- [1] CCITT Recommendation G.702 (1988), *Digital hierarchy bit rates*.
- [2] CCITT Recommendation G.703 (1991), *Physical/electrical characteristics of hierarchical digital interfaces*.
- [3] ITU-T Recommendation G.783 (1997), *Characteristics of Synchronous Digital Hierarchy (SDH) equipment functional blocks*.
- [4] ITU-T Recommendation G.804 (1998), *ATM cell mapping into Plesiochronous Digital Hierarchy (PDH)*.
- [5] ITU-T Recommendation G.826 (1996), *Error performance parameters and objectives for international, constant bit rate digital paths at or above the primary rate*.
- [6] ITU-T Recommendation G.832 (1995), *Transport of SDH elements on PDH networks – Frame and multiplexing structure*.
- [7] ITU-T Recommendation H.222.0 (1995) | ISO/IEC 13818-1:1996, *Information technology – Generic coding of moving pictures and associated audio information: Systems*.
- [8] ITU-T Recommendation I.361 (1995), *B-ISDN ATM layer specification*.
- [9] ITU-T Recommendation I.363.1 (1996), *B-ISDN ATM adaptation layer (AAL) specification – Type 1 AAL*.
- [10] ITU-T Recommendation I.432 (1993), *B-ISDN user-network interface – Physical layer specification*.
- [11] ITU-T Recommendation I.732 (1996), *Functional characteristics of ATM equipment*.



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- [12] ITU-T Recommendation J.82 (1996), *Transport of MPEG-2 constant bit rate television signals in B-ISDN*.
- [13] ITU-T Recommendation J.83 (1997), *Digital multi-programme systems for television, sound and data services for cable distribution*.
- [14] ITU-T Recommendation M.2120 (1997), *Digital paths, section and transmission system fault detection and localization procedures*.
- [15] ITU-T Recommendation Q.822 (1994), *Stage 1, stage 2 and stage 3 description for the Q3 interface – Performance management*.
- [16] ETS 300 417-2-1 (1997), *Transmission and Multiplexing (TM), Generic requirements of transport functionality of equipment; Part 2-1: Synchronous Digital Hierarchy (SDH) and Plesiochronous Digital Hierarchy (PDH) physical section layer functions*.
- [17] ETS 300 417-5-1 (1998), *Transmission and Multiplexing (TM), Generic requirements of transport functionality of equipment; Part 5-1: PDH path layer functions*.
- [18] ETR 290 (1997), *Digital Video Broadcasting (DVB); Measurement guidelines for DVB systems*.
- [19] EN 50083-9 (1998), *Cabled distribution systems for television, sound and interactive multimedia signals; Part 9: Interfaces for CATV/SMATV headends and similar professional equipment for DVB/MPEG-2 transport streams*.
- [20] ANSI T1.102 (1993), *Telecommunications – Digital Hierarchy – Electrical Interfaces*.
- [21] ITU-T Recommendation G.704 (1995), *Synchronous frame structures used at 1544, 6312, 2048, 8448 and 44 736 kbit/s hierarchical levels*.

3 Terms and definitions

This Recommendation defines the following terms.

3.1 fixed stuff: Bytes that are used to fill up unused data positions.

3.2 MPEG-2 Transport Stream (TS) packet: A data packet possessing a length of 188 bytes including 4 bytes of header information. The header contains MPEG-related data.

3.3 RS-coded MPEG-2 Transport Stream (TS) packet: A data packet possessing a length of 204 bytes. Bytes 1 to 188 contain an MPEG-2 transport stream packet. Bytes 189 to 204 contain the parity-check bytes for the error correction of the preceding bytes of this packet. These parity-check bytes are generated using a shortened Reed Solomon Code RS (204, 188), as specified in Annex A/J.83 [13].

4 Acronyms and abbreviations

This Recommendation uses the following abbreviations:

AAL	ATM Adaptation Layer
ASI	Asynchronous Serial Interface
ATM	Asynchronous Transfer Mode
BER	Bit Error Rate
CRC	Cyclic Redundancy Check
CS	Convergence Sublayer
DVB	Digital Video Broadcasting

EMF	Equipment Management Function
FAS	Frame Alignment Signal
FEC	Forward Error Correction
LOF	Loss of Frame
LOS	Loss of Signal
MAA	MPEG/ATM Adaptation
MON	Monitoring
MPEG	Moving Pictures Experts Group
MPEG-2-TS	MPEG-2 Transport Stream
MPI	MPEG Physical Interface
NE	Network Element
PDH	Plesiochronous Digital Hierarchy
PDU	Protocol Data Unit
PL	Path Layer
PPI	PDH Physical Interface
PPT	PDH Path Termination
PSL	Physical Section Layer
RDI	Remote Defect Indication
RS	Reed Solomon
SAP	Service Access Point
SAR	Segmentation and Reassembly sublayer
SN	Sequence Number
SPI	Synchronous Parallel Interface
SSI	Synchronous Serial Interface
TS	Transport Stream
VP	Virtual Path
VPE	Virtual Path Entity
VPME	Virtual Path Multiplexing Entity

5 Conventions

Unless otherwise mentioned, in this Recommendation the following conventions hold true:

- The order of transmission of information in all diagrams is first from left to right and then from top to bottom. Within each byte or octet the most significant bit is transmitted first.

6 Network adapter overview

6.1 Functional description

The Network Adapter is an equipment which performs the adaptation of data structured as an MPEG-2 Transport Stream to the characteristics of a PDH link. The solution selected for the transmission of MPEG-2-TS packets, or optionally for the transmission of RS-coded MPEG-2-TS packets, over PDH links is based on the use of ATM cells. Therefore, the adaptation of the transport of an MPEG-2-TS basically consists in:

- adaptation of MPEG-2-TS packets or RS-coded MPEG-2-TS packets to ATM cells;
- adaptation of ATM cells to PDH framing.

NOTE – The processing of ATM VC level is not performed.

The normative references applicable to the adaptation unless specifically mentioned are given here below:

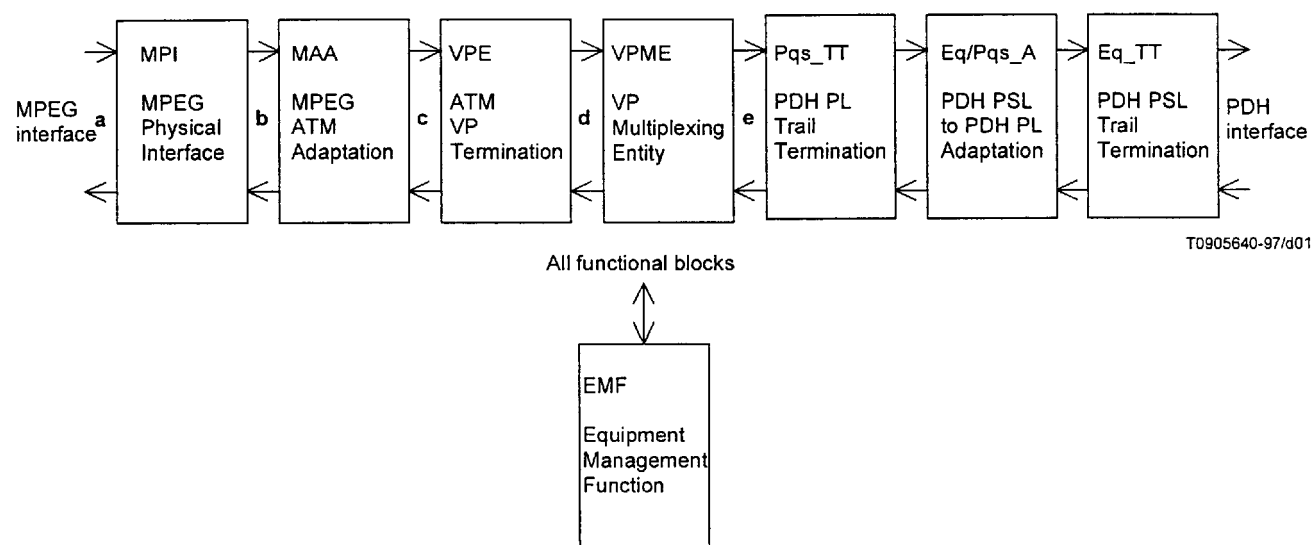
- the adaptation of MPEG-2-TS packets into ATM cells using an AAL type 1 shall be performed as described in Recommendation J.82 [12]. AAL type 1 is specified in Recommendation I.363.1 [9], the ATM layer is specified in Recommendation I.361 [8];
- the adaptation of ATM cells into PDH framing shall be performed as described in Recommendation G.804 [4].

There is no normative reference for the adaptation of RS-coded MPEG-2-TS packets to ATM cells. This adaptation shall be performed as described in Recommendation J.82 [12] for MPEG-2-TS packets, with the only exception that the RS-coded MPEG-2-TS packets are not aligned with the structure of the AAL1 interleaving matrix.

The Network Adapter is described as a group of functional blocks. The partitioning into functional blocks is based on existing Recommendations on SDH equipment (Recommendation G.783 [3]) and ATM equipment (Recommendation I.732 [11]). The equipment consists of the following blocks (see also Figure 1):

- MPEG Physical Interface (MPI);
- MPEG/ATM Adaptation (MAA);
- Virtual Path Entity (VPE);
- VP Multiplexing Entity (VPME);
- PDH Path Layer Trail Termination (Pqs_TT);
- PDH Physical Section Layer to PDH Path Layer Adaptation (Eq/Pqs_A);
- PDH Physical Section Layer Trail Termination (Eq_TT); and
- Equipment Management Function (EMF).

The present description is a functional description and does not imply any specific equipment implementation but it allows for the implementation of a separate transmitter and receiver as well as a combined transmitter/receiver.



NOTE – Synchronization functions are for further study.

Figure 1/J.131 – Functional blocks for the Network Adapter