

RECOMMENDATION ITU-R BT.1209-1

**SERVICE MULTIPLEX METHODS FOR DIGITAL TERRESTRIAL
TELEVISION BROADCASTING**

(Question ITU-R 121/11)

(1995-1997)

The ITU Radiocommunication Assembly,

considering

- a) that digital terrestrial television broadcasting (DTTB) will be introduced in the VHF/UHF bands by some administrations;
- b) that existing television broadcast systems are capable of transmitting video, sound and data services which can include multi-language services, teletext, Power Distribution Centres (PDC), etc.;
- c) that digital television broadcasting systems can provide for the simultaneous transmission of video, sound, data and control signals;
- d) that any service multiplex method should provide for the optional capability of multiple digital television programme services within an existing channel;
- e) that the service multiplex, for example, can be implemented using structured transmission (fixed assigned method), packet transmission (variable assigned method), or a combination of the two;
- f) that there are significant advantages in each of the above approaches depending upon the service requirements;
- g) that it may be desirable to support the transmission of a hierarchical video service (comprising HDTV, EDTV and SDTV) within a single channel;
- h) that it is desirable that the service multiplex be capable of flexible allocation of data to audio, video and data services, consistent with the data capacity required for the video;
- j) that multiple digital television programme satellite broadcasting systems are under development in some countries;
- k) that it is desirable to seek commonality between systems designed for different channel widths,

recommends

1 that DTTB systems should use the Transport Stream multiplexing methods specified in the International Organization for Standardization/International Electrotechnical Commission Standard 13818-1 (ISO/IEC Standard 13818-1). The outline of the specifications is shown in Annex 1.

ANNEX 1

1 Introduction

The multiplexing scheme specified by ISO/IEC Standard 13818-1 is based on a fixed packet length transport stream approach. The packet is called the Transport Stream Packet (TSP).

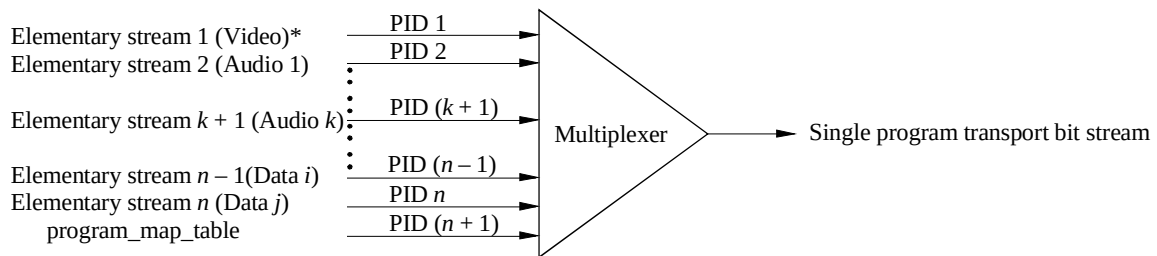
The overall system multiplexing approach can be thought of as a combination of multiplexing at two different layers. In the first layer, single program transport bit streams are formed by multiplexing transport packets from one or more elementary bit streams, and in the second layer, a number of single program transport bit streams are combined to form a system of programs. The function that contains both this program and system level multiplexing information is called the Program Specific Information (PSI).

1.1 Single program transport stream

A single program transport bit stream is formed by multiplexing individual transport packetized elementary bit streams (PESSs) sharing a common time-base, and a packetized control bit stream that describes the program. Individual bit streams are identified by their unique packet identifiers (PIDs). The organization of this multiplexing function is illustrated in Fig. 1. The control bit stream contains the program_map_table (PMT) that includes information about the PIDs of the transport streams that make up the program, the identification of the applications that are being transmitted on these bit streams and the relationship among these bit streams.

FIGURE 1

Illustration of the multiplex function to form a single program transport stream



* A single program could also contain multiple video streams.

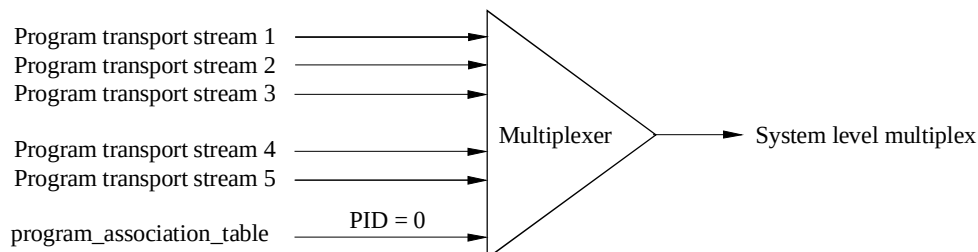
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1.2 System multiplex

The system layer of multiplexing is illustrated in Fig. 2. In addition to the single program transport bit streams (with the corresponding PIDs) that define the individual programs, a system level control bit stream with PID = 0 is defined. This bit stream carries the program_association_table (PAT) that maps program_identities to the PIDs of the bit streams containing the program_map_table for the particular program.

FIGURE 2

Illustration of the multiplex function to form the system level bit stream



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The packet on this system level multiplexing is called the TSP.

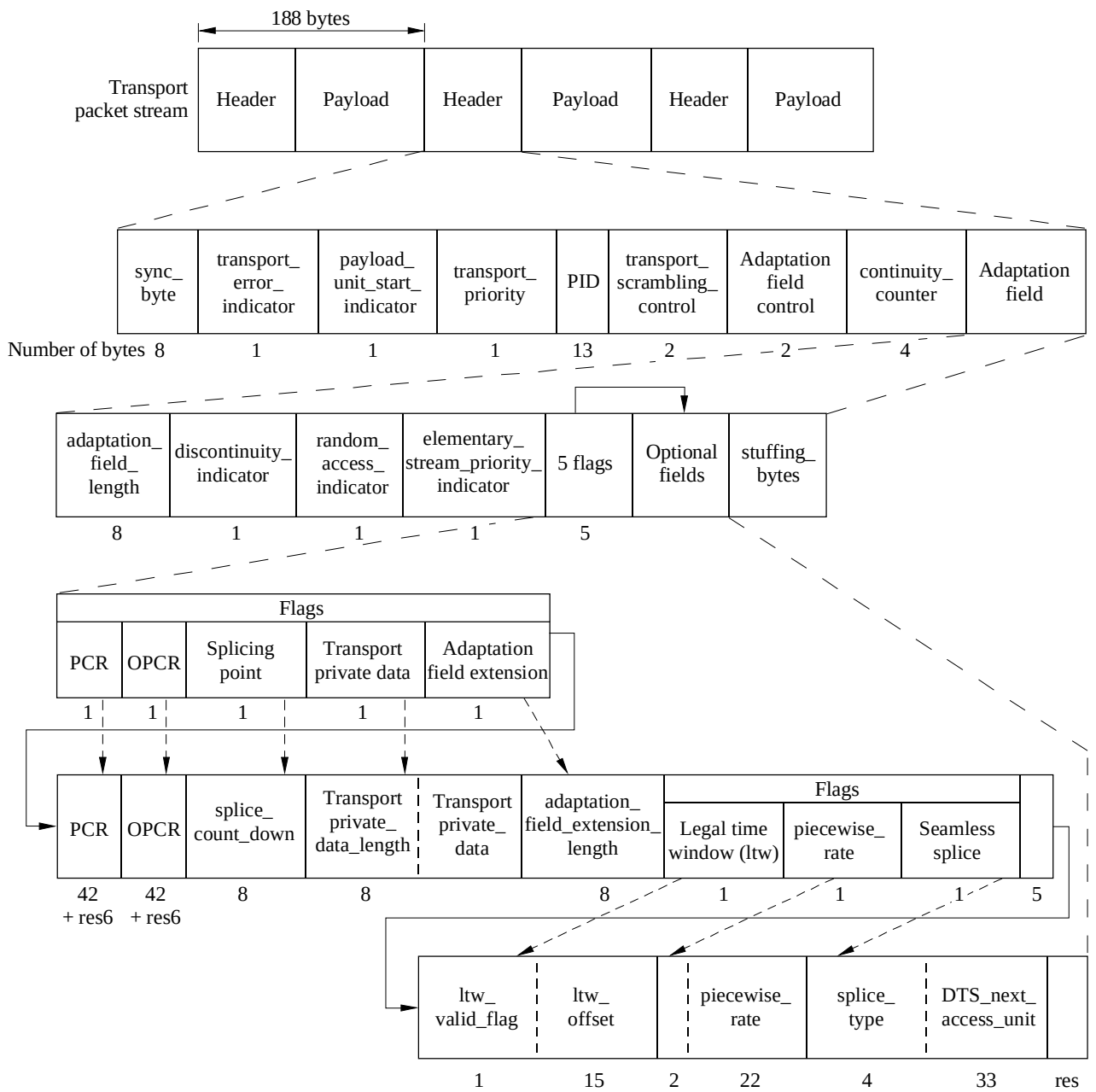
The TSP and PES are described in detail in § 2, and the actual ways to multiplex data services are shown in § 3.

2 Packet format

2.1 Transport packet

The transport packet format is shown in Fig. 3. Transport packets, 188-byte long, containing program transport streams, are generated and asynchronously multiplexed with a single bit stream channel. Each transport packet carries data belonging to one particular “data source” and these sources are identified from PIDs within the header (which are further specified using information in PSI tables). Data sources are either the applications generating the PESs, or the types of PSI information being transmitted.

FIGURE 3
Structure of the transport stream



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2.1.1 Header

sync_byte (8 bits):

it is for packet synchronization, and sent in every packet.

transport_error_indicator (1 bit):

a flag to show if the packet contains error bits or not. This field can be used for error handling.