



Recommendation ITU-R BT.1869
(03/2010)

**Multiplexing scheme for variable-length
packets in digital multimedia
broadcasting systems**

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Broadcasting service
(television)



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Note: This ITU-R Recommendation was approved in English under the procedure detailed in Resolution ITU-R 1.

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RECOMMENDATION ITU-R BT.1869

Multiplexing scheme for variable-length packets in digital multimedia broadcasting systems*

(Question ITU-R 45/6)

(2010)

Scope

This Recommendation deals with multiplexing schemes for variable-length packets over broadcasting channels. Specifications are given for schemes for transporting IP packets over broadcasting channels: encapsulation format, header compressed IP packet format, and transmission control signals.

The ITU Radiocommunication Assembly,

considering

- a) that various kinds of signals for multimedia services may be delivered in digital broadcasting;
- b) that multimedia services have also been introduced in telecommunication networks where IP packets including IPv4 and IPv6 packets are used;
- c) that those IP packets are variable-length in essence with a maximum length of 65 535 bytes;
- d) that an IP-friendly transport mechanism is desirable for multimedia broadcasting services to enable harmonization between broadcasting services and telecommunication services;
- e) that an MPEG-2 transport stream has been adopted for digital broadcasting as a means of transporting various kinds of signals;
- f) that the MPEG-2 transport stream consists of short fixed-length packets of 188 bytes including a 184-byte payload;
- g) that a multiplexing scheme which enables more efficient transport and less complex reception of variable-length packets is desired for multimedia broadcasting,

recommends

- 1 that for transport of variable-length packets in digital multimedia broadcasting systems, the multiplexing scheme described in Annex 1 should be used;
- 2 that compliance with this Recommendation is voluntary. However, the Recommendation may contain certain mandatory provisions (to ensure e.g. interoperability or applicability) and compliance with the Recommendation is achieved when all of these mandatory provisions are met. The words “shall” or some other obligatory language such as “must” and the negative equivalents are used to express requirements. The use of such words shall in no way be construed to imply partial or total compliance with this Recommendation.

* This Recommendation should be brought to the attention of ITU-T Study Groups 9 and 16.

Annex 1

Multiplexing scheme for variable-length packets

References

Normative references

- [1] IETF RFC 791: Internet Protocol.
This IETF standard is available at the following address. <http://www.ietf.org/rfc/rfc791.txt>
- [2] IETF RFC 2460: Internet Protocol, Version 6 (IPv6) Specification.
This IETF standard is available at the following address. <http://www.ietf.org/rfc/rfc2460.txt>
- [3] IETF RFC 768: User Datagram Protocol.
This IETF standard is available at the following address. <http://www.ietf.org/rfc/rfc768.txt>
- [4] ETSI TS 102 606 v1.1.1(2007-10): Digital Video Broadcasting (DVB); Generic Stream Encapsulation (GSE) Protocol.
- [5] ETSI EN 301 192 v1.4.2(2008-04): Digital Video Broadcasting (DVB); DVB specification for data broadcasting.

Informative references

- [6] ITU-T Recommendation H.222.0, 2006: Information technology – Generic coding of moving pictures and associated audio information: Systems.

Abbreviations

ACM	adaptive coding and modulation
AMT	address map table
ATM	asynchronous transfer mode
CID	context identification
CRC	cyclic redundancy check
DVB	digital video broadcast
ETSI	European Telecommunications Standards Institute
GSE	generic stream encapsulation
IETF	Internet Engineering Task Force
IGMP	Internet Group Management Protocol
INT	IP/MAC notification table
IP	internet protocol
MAC	media access control

MLD	multicast listener discovery
MPE	multi protocol encapsulation
MPEG	Moving Pictures Experts Group
NIT	network information table
ONU	optical network unit
PES	packetized elementary stream
RFC	Request For Comment (IETF standard)
SN	sequence number
TLV	type length value
TS	transport stream
UDP	user datagram protocol
VCM	variable coding and modulation

1 Introduction

Various multimedia broadcasting services are expected to be made possible by adopting the multiplexing schemes for fixed-length MPEG-2 TS packets and that for variable-length packets as depicted in Fig. 1.

FIGURE 1
Protocol stack

Multimedia broadcasting					
Real-time services		IP-based services			
Video and audio	Data and control	A/V file	Control		
PES	Section	IP packet	Signalling packet		
MPEG-2 TS		Multiplexing scheme for variable- length packets			
Transmission slot (channel coding and modulation)					
Physical layer (terrestrial/satellite)					

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2 Requirements for multiplexing scheme for variable-length packets

Because broadcasting services use radio spectrum, which is a finite resource, and similar services using the Internet have been launched, a multiplexing scheme for variable-length packets should support the following requirements:

- variable-length packets of various formats including IPv4 and IPv6 packets can be multiplexed;
- a maximum 65 535-byte-long packet can be multiplexed without fragmentation;
- the overhead needed to transmit packets should be small;
- the receiving process should be simple enough to process received packets at a high packet rate.

3 Encapsulation scheme for variable-length packets

3.1 Format of type-length-value container

The type-length-value (TLV) multiplexing scheme is shown in Fig. 2 and Table 1. This scheme can multiplex variable-length packets of any format unless packet filtering and fragmentation are needed. The type of packet is indicated by the packet_type field, and the length of the packet is indicated by the length field. Header compressed IP packets and transmission control signals can also be encapsulated into TLV containers. This scheme enables multiplexing a maximum 65 535-byte-long packet without fragmentation. The transmission overhead is small and the TLV multiplexing scheme efficiently uses transmission capacity.

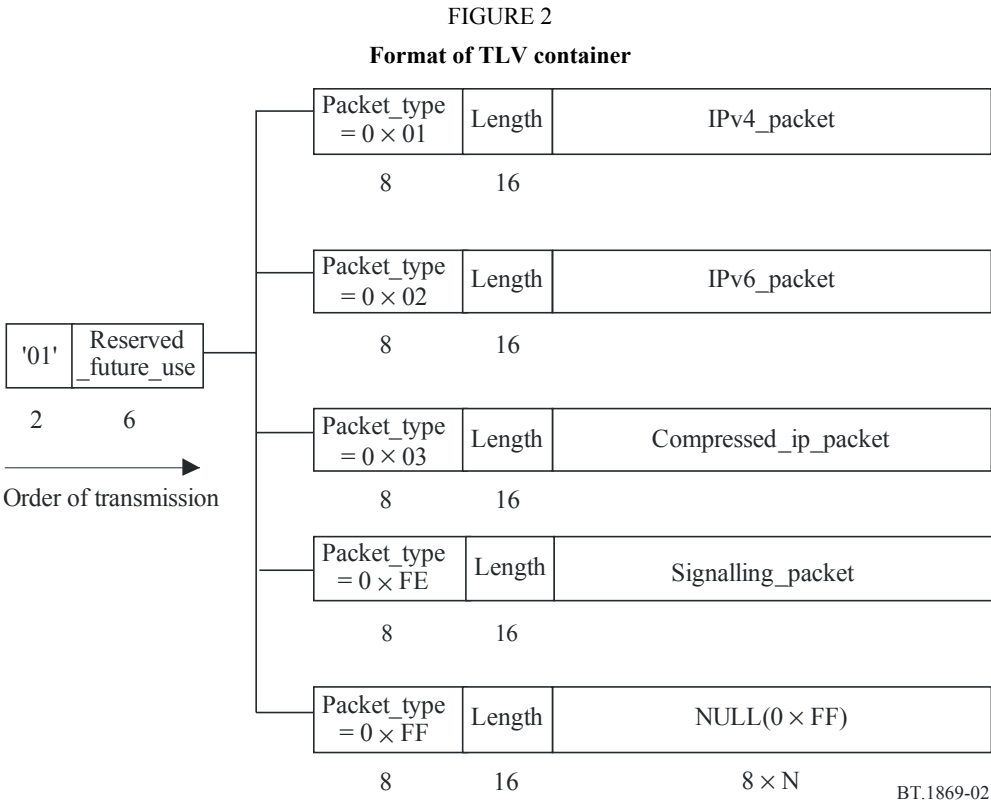


TABLE 1
TLV container

Syntax	No. of bits	Mnemonic
TLV {		
'01'	2	bslbf
reserved_future_use	6	bslbf
packet_type	8	bslbf
length	16	uimsbf
if (packet_type==0x01)		
IPv4_packet ()		