



Recommendation ITU-R BT.2074-1
(12/2017)

**Service configuration, media transport
protocol, and signalling information
for MMT-based broadcasting systems**

BT Series
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.2074-1

**Service configuration, media transport protocol, and signalling information
for MMT-based broadcasting systems**

(2015-2017)

Scope

This Recommendation defines the service configuration, media transport protocol, and signalling information required for broadcasting systems using ISO/IEC 23008-1 (MPEG Media Transport). It specifies the constraints to ISO/IEC 23008-1 for MMT-based broadcasting systems.

Keywords

transport, MMT, multiplexing, IP-based broadcasting, hybrid delivery, UHDTV

The ITU Radiocommunication Assembly,

considering

- a) that multimedia services consist of various media components such as audio, video, closed captions, and other data;
- b) that various media components for multimedia services may be delivered in broadcasting channels and broadband networks;
- c) that multimedia services have also been introduced in broadband networks where IP packets are used;
- d) that an IP-friendly media transport protocol is desirable for multimedia broadcasting systems to enable harmonization of broadcasting and broadband;
- e) that synchronized presentation of various media components over various delivery channels is required for multimedia broadcasting applications;
- f) that efficient and reliable transport of various media components is required over broadcasting channels;
- g) that ISO/IEC 23008-1 “MPEG Media Transport (MMT)” specifies an encapsulation format of media components, delivery protocol, and signalling information for various applications including broadcasting applications;
- h) that a common MMT protocol packet syntax has been specified in ISO/IEC 23008-1;
- i) that practical implementation of broadcasting systems may require certain constraints on ISO/IEC 23008-1;
- j) that it is desirable for such constraints to be in common with MMT-based broadcasting systems for development and deployment of systems including receiver terminals,

recommends

- 1 that broadcasting systems using MPEG Media Transport as per ISO/IEC 23008-1 should be designed on the basis of the system structure and service configuration described in Annex 1;
- 2 that the broadcasting systems using MPEG Media Transport should comply with the media transport protocol and signalling information described in Annex 2.

NOTE – Attachment 1 shows additional signalling information specified in ARIB systems.

References

Normative references:

- ISO/IEC 23008-1:2014: Information technology – High efficiency coding and media delivery in heterogeneous environments – Part 1: MPEG media transport (MMT).

Informative references:

- Recommendation ITU-T H.222.0 | ISO/IEC 13818-1:2013: Information technology – Generic coding of moving pictures and associated audio information: Systems.
- IETF RFC 768: User Datagram Protocol, Aug. 1980.
- IETF RFC 791: Internet Protocol, Sep. 1981.
- IETF RFC 2460: Internet Protocol, Version 6 (IPv6) Specification, Dec. 1998.
- IETF RFC 5905: Network Time Protocol Version 4: Protocol and Algorithms Specification, June 2010.
- Recommendation ITU-R BT.1869-0 (2010) – Multiplexing scheme for variable-length packets in digital multimedia broadcasting systems.
- Recommendation ITU-T H.265 | ISO/IEC 23008-2 (2013) – Information technology – High efficiency coding and media delivery in heterogeneous environments – Part 2: High efficiency video coding.

Abbreviations

AAC	Advanced audio coding
AIT	Application information table
AL-FEC	Application layer forward error correction
ALS	Audio lossless coding
AMT	Address map table
BIT	Broadcaster information table
CA	Conditional access
CAS	Conditional access system
CDT	Common data table
CRI	Clock relation information
DCI	Device capability information
DCM	Download control message
DMM	Download management message
ECM	Entitlement control message
EIT	Event information table
EMM	Entitlement management message
EPG	Electronic programme guide
GFD	Generic file delivery
GOP	Group of pictures

HEVC	High efficiency video coding
HRBM	Hypothetical receiver buffer model
IP	Internet Protocol
IRAP	Intra random access point
LAOS	Low overhead audio stream
LATM	Low overhead audio transport multiplex
LCT	Layout configuration table
LDT	Linked description table
MFU	Media fragment unit
MMT	MPEG media transport
MMTP	MMT protocol
MPI	MMT presentation information
MPT	MMT package table
MPU	Media processing unit
NIT	Network information table
NPT	Normal play time
NTP	Network time protocol
PA	Package access
PLT	Package list table
SDT	Service description table
SDTT	Software download trigger table
TLV	Type length value
UDP	User datagram protocol

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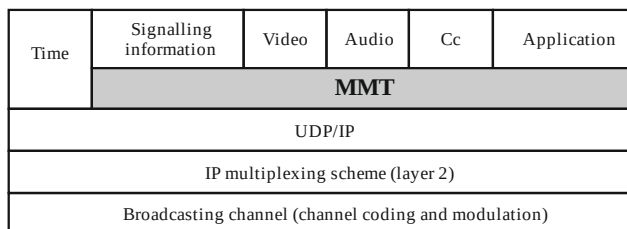
Annex 1

System structure and service configuration

1 System structure

This section describes the general structure of MMT-based broadcasting systems. Figure 1 shows the protocol stack of MMT-based broadcasting systems.

FIGURE 1
Protocol stack of MMT-based broadcasting systems



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In these systems, media components, such as video, audio, and closed captions (cc), constituting a TV programme are encapsulated into media fragment units (MFUs)/media processing units (MPUs). They are carried as MMT protocol (MMTP) payloads of MMTP packets and delivered in IP packets. Data applications that are related to a TV programme are also encapsulated into MFUs/MPUs, carried in MMTP packets, and delivered in IP packets.

IP packets generated like this are multiplexed over broadcasting channels with an IP multiplexing scheme, also referred to as a layer 2 (L2) protocol, e.g. the TLV multiplexing scheme described in Recommendation ITU-R BT.1869.

The systems also have MMT signalling information (MMT-SI). MMT-SI is signalling information on the structure of a TV programme and associated information on TV services like the electronic programme guide (EPG). MMT-SI is carried in MMTP packets and delivered in IP packets.

In order to provide Coordinated Universal Time (UTC) in broadcasting systems for receiver terminals to synchronize with broadcast station, time information is also delivered in IP packets.

2 Service configuration

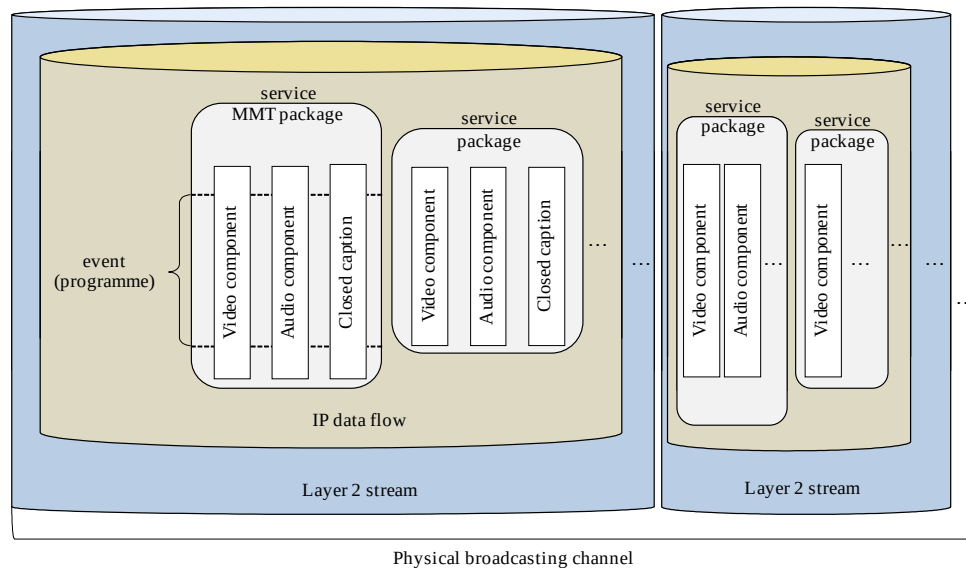
2.1 Services in a broadcasting channel

ISO/IEC 23008-1 specifies the MMT package as a logical structure of content. The MMT package includes presentation information and associated Assets that constitute content.

A broadcasting service is generally a series of TV programmes. In MMT-based broadcasting systems, one MMT package corresponds to one broadcasting service. The relationship between the broadcasting service and the MMT package is shown in Fig. 2. As shown in the Figure, one TV programme is distinguished from the rest of the service by its start and end times and corresponds to one event.

FIGURE 2

Relationship between a broadcasting service and MMT package in a broadcasting channel



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In ISO/IEC 23008-1, an Asset is defined as a media component. An Asset is equivalent to a series of MPUs. In MMT-based broadcasting systems, one TV programme is an MMT package including one or more Assets and signalling information. A package access (PA) Message is an MMT-SI, and the MMT package table (MPT) carried in the PA message identifies Assets constituting the TV programme.

Multiple MMT packages can be delivered in one IP data flow, as shown in Fig. 2. Here, an IP data flow is defined as a sequence of IP packets of which the source IP address, destination IP address, protocol, source port number, and destination port number are the same combination. There may be other IP data flows carrying content for download services or extended services in addition to IP data flows carrying MMT packages.

Multiple IP data flows might be multiplexed into one layer 2 stream. The layer 2 stream includes signalling information for demultiplexing IP packets from broadcasting signals.

2.2 Services in broadcasting channels and broadband networks

ISO/IEC 23008-1 has been developed to support delivery of media data over heterogeneous networks including broadcasting channels and broadband networks. In the MMT specifications, broadcasting channels and broadband networks can be treated in the same way for delivery of content. Figure 3 shows a service configuration using both broadcasting channels and broadband networks.

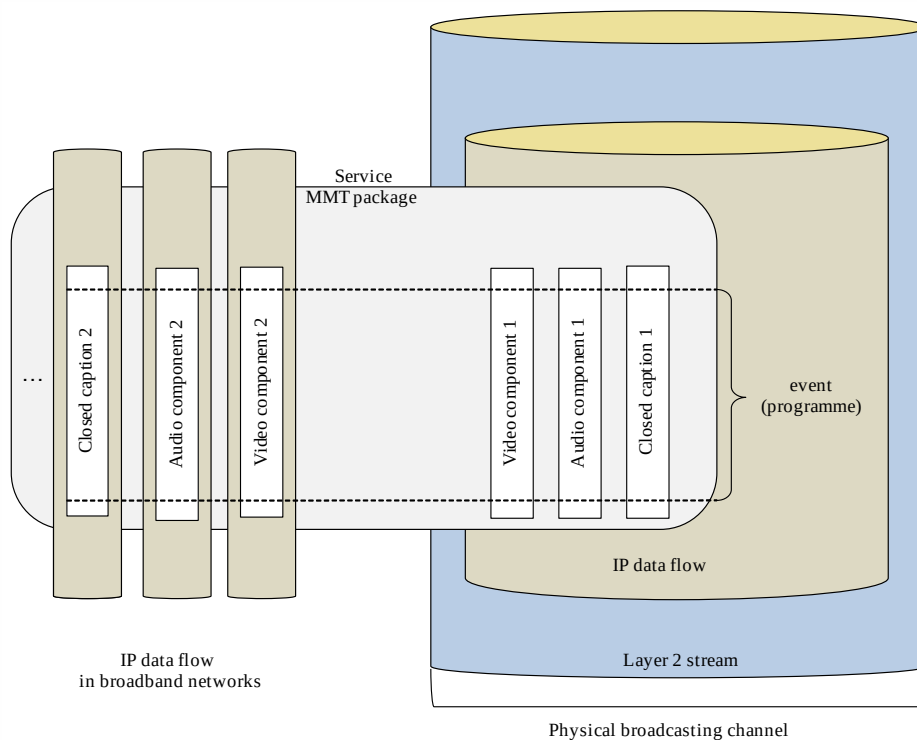
In Fig. 3, video component 1, audio component 1, and closed caption 1 are delivered on broadcasting channels. In addition to these components, video component 2, audio component 2, and closed caption 2 are delivered on broadband networks.

In the broadcasting channels, the three components are multiplexed into one IP data flow and delivered in one layer 2 stream, since all transmitted information is delivered to all receiver terminals. On the other hand, in the broadband networks, components are delivered as a separate IP data flow, since each component is delivered to the receiver terminal requesting it.

In MMT-based broadcasting systems, media components delivered in different channels can easily be included in one MMT package. MMT-based broadcasting systems support hybrid delivery of multimedia content.

FIGURE 3

Service configuration over both broadcasting channels and broadband networks



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Annex 2

Media transport protocol and signalling information

1 Media transport protocol

1.1 Introduction

MMT-based broadcasting systems use the syntax and semantics of the MMTP payload and MMTP packet specified in ISO/IEC 23008-1. The extensions described below are intended for broadcast applications.

1.2 Header extension of MMTP packets

ISO/IEC 23008-1 specifies a header extension in the MMTP packet. The header extension has three fields: `extension_type`, `extension_length`, and `header_extension_value`. Although the header extension can be used for various purposes, it contains only one piece of information. The multi-type header extension described below enables it to contain multiple pieces of information.

header_extension_value – When the `extension_type` field is set to 0x0000, this field has the structure shown in Table 1.