TECHNICAL REPORT

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1999-10

# Model and framework for standardization in multimedia equipment and systems

*Structure et modèle de normalisation des appareils et systèmes multimédia*



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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# MODEL AND FRAMEWORK FOR STANDARDIZATION IN MULTIMEDIA EQUIPMENT AND SYSTEMS

## FOREWORD

1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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Technical reports do not necessarily have to be reviewed until the data they provide are considered to be no longer valid or useful by the maintenance team.

IEC 61998, which is a technical report, has been prepared by IEC technical committee 100: Audio, video and multimedia systems and equipment.

The text of this technical report is based on the following documents:

| Enquiry draft | Report on voting |
|---|---|
| 100/90/CDV | 100/101/RVC |

Full information on the voting for the approval of this technical report can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 3.

This document which is purely informative is not to be regarded as an International Standard.

A bilingual version of this technical report may be issued at a later date.

# INTRODUCTION

Multimedia technology covers a wide range of technical areas and involves a number of technical elements. Most of the technical elements for multimedia are now being developed and updated. IEC standardization activities on multimedia technology should, therefore, be carried out with enough discussions and clarification on the

- position and relationship of the technology to be standardized among the collection of related technologies,
- scope and framework/guideline of the standardization,
- appropriate standardization organization having the responsibility,
- schedule of the standardization,
- relationship between new work items and the existing standards on multimedia or single-medium technology.

These discussions should be based on appropriate multimedia technology models in order to create a framework for multimedia standardization. This technical report is a reflection of those discussions in IEC/TC100 and is expected to contribute as a guideline for IEC standardization experts and National Committees interested in multimedia equipment and systems, and is also expected to contribute to strategic discussions in IEC/TC100 Advisory Group on Strategy.

# MODEL AND FRAMEWORK FOR STANDARDIZATION IN MULTIMEDIA EQUIPMENT AND SYSTEMS

## 1 Scope

This technical report provides models and frameworks for the standardization of multimedia technology, being undertaken or to be undertaken by the IEC.

In general, multimedia technology covers

a) system interface:
- inter-system connection
- intra-system connection
- homebus interface
- LAN interface
- etc.

b) user interface:
- pictogram
- gesture
- etc.

c) interchange and distribution:
- interchange format
- protocol
- abstract service
- etc.

d) measurements and management:
- colour management
- data distribution management
- security
- etc.

e) multimedia data and contents:
- authoring
- manipulation
- etc.

This technical report focuses on the areas of IEC responsibility and items based on general discussions of modelling for multimedia equipment and systems.

## 2 Reference documents

ISO/IEC 7498-1, *Information technology – Open Systems Interconnection – Basic Reference Model – Part 1: The Basic Model*

ISO/IEC 9316-2, *Information technology – Small Computer System Interface – 2(SCSI2) – Part 2: Common Access Method (CAM) – Transport and SCSI interface module*[1)]

ISO/IEC 11585, *Operational model for document description and processing languages*

ISO/IEC 14542, *Information technology – Multimedia and hypermedia: Model and framework*

IEEE 1394:1995, *IEEE standard for a high-performance serial bus* (description)

DAVIC 1.0 specification, *Part 2: System reference models and scenarios*

## 3 Definitions

For the purpose of this technical report, the following definitions apply.

**3.1**
**originator**
entity, system or device that provides information or service, or container which includes information or service

**3.2**
**recipient**
entity, system, operator or device that receives information or service, or container which includes information or service

**3.3**
**multimedia technology**
a systematic coordination of different single-medium technologies

NOTE Multimedia indicates an integration of any information that can be represented, stored, transmitted and processed digitally, including text, graphics, still and moving images, audio, video, animation data and sound.

Abbreviations of multimedia technology are explained in annex J.

## 4 Generic model

The generic model clarifies multimedia technology and its boundaries.

Standardization is, in general, required to obtain the following:

- physical and logical connectivity,
- easy operation,
- safety and security,
- easy implementation, and
- environmental safeguards.

1) To be published.

The major purposes of multimedia standardization are:

- physical and logical connectivity

  Multimedia data interchange and distribution are based on reliable and wide-band communication media such as ISDN and interchangeable storage media such as CD-ROM. Protocols, formats, interfaces, and other data structures of the media are required to be standardized. The features of multimedia data, in particular, make those standards more complicated than in the case of a single medium.

- easy operation

  Multimedia systems contain a number of basic single-medium parts, each of which requires appropriate interaction with users or other systems. In order to realise feasible and human-recognizable operation for the multimedia systems, simplified and standardized user-system interfaces are essential.

- safety and security

  Multimedia equipment and systems form or will form a basic and important infrastructure of national and international activity. Some multimedia data are required to be highly secured. Some systems are required to be strongly protected and besides their operation should be comfortable and safe for operators whose sense organs need to access concurrently to their corresponding media; visible, audible, and other sensible media. Safe and secured environments should be implemented by being based on some guideline and standards.

All the subjects to be standardized for the purpose can be modelled by the relationship between an originator and a recipient.


**Figure 1 – Generic model**



Each multimedia technology for the relationship should be discussed along with appropriate axes defined to describe corresponding features of the relationship.

### 4.1 Physical and logical connectivity

When considering physical and logical connectivity, an originator is positioned to be an entity, system or device which provides information, and a recipient is positioned to be an entity, system or device which receives the information. They are reconnected with each other by a relationship: information transfer. The information transfer can be carried out by different types of information transfer media. Another aspect of the information transfer is a structure of data to be transferred by the medium.

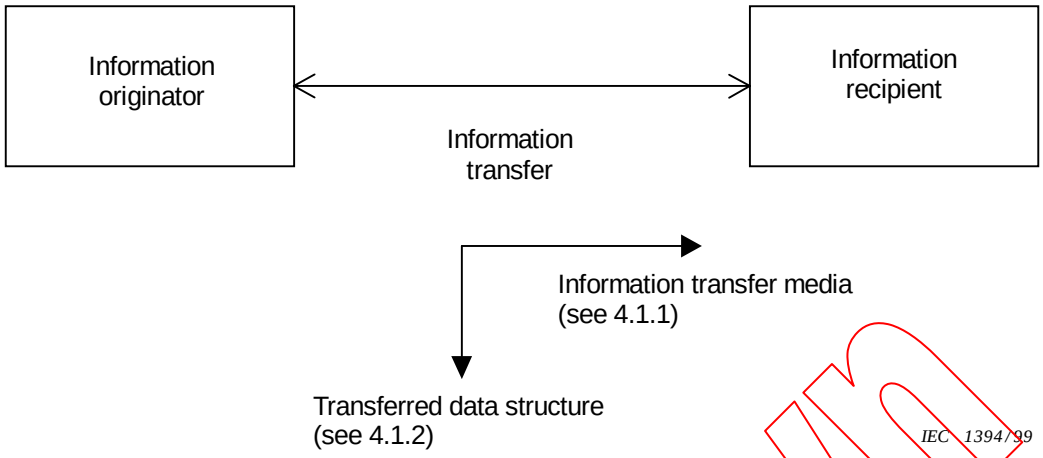


**Figure 2 – Model of physical and logical connectivity**

### 4.1.1 Information transfer media

#### 4.1.1.1 Inter-system model

The physical media for information transfer between systems are classified into

- Broadcasting media

  Broadcasting media support simultaneous information transfer to a number of recipients. Existing commercial examples of the wireless broadcasting media are BS, CS and terrestrial. As far as low-level protocols are concerned, CSMA (carrier sense multiple access) media like Ethernet are broadcasting media.

- Intercommunication media

  Telecommunication media support information transfer between two or more systems at a time. Existing commercial examples of telecommunication media are PSTN (public switched telephone network), CSDN (circuit switched data network) and PSDN (packet switched data network). Their areas of information transfer differentiates the media, for example, between

  - local area network,
  - metropolitan area network, and
  - wide area network.

- Interchangeable storage media

  Interchangeable storage media (ISM), for example optical disks or magnetic tapes, facilitate data transfer by allowing the physical movement of the ISM from system to system. Large amounts of data transfer can inexpensively and quickly be realized by using interchangeable storage media.

  IC card, SmartMedia, Flash memory card and some PC cards are classified as ISM.

They associate open systems as described in figure 3.

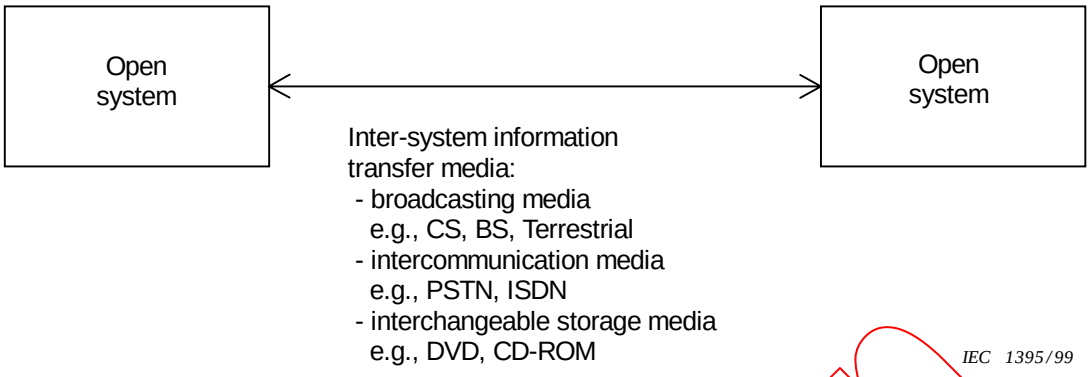


**Figure 3 – Inter-system model**

#### 4.1.1.2 Inter-device (intra-system) model

Mechanisms for information interchange between devices or subsystems within a larger system are referred to as interfaces. Examples of the interfaces are:

- computer interface such as SCSI (small computer small interface, ISO/IEC 9316-2) and IEEE 1394 (high-speed serial interface),
- display unit interface,
- keyboard interface, and
- consumer equipment interface employed, for instance, between a television receiver and its remote control unit.

Devices or subsystems interact as shown in figure 4.

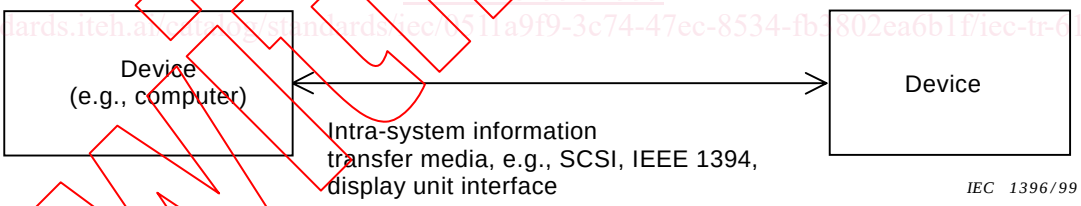


**Figure 4 – Inter-device (intra-system) model**

#### 4.1.1.3 Boundary model

Some information transfer media can be used both between systems and between devices/subsystems. Examples are:

- fibre channel,
- infra-red communication, and
- IEEE 1394.

### 4.1.2 Transferred data structure

#### 4.1.2.1 Data structure in inter-system/intercommunication media

Transferred data structures employed in inter-system/intercommunication environments may be represented by the OSI layered model which was standardized by ISO/IEC JTC 1/SC 21. The data structure consists of seven layered protocols, each of which is treated as corresponding peer-to-peer entities within communicating open systems.

The top layer entities for application protocols provide services to their application itself within an open system. Application data which are outside the scope of the OSI model can be considered from the following points of view.

- Contents

  A major feature of multimedia systems is that multiple types of content data are supported by the systems.

- Structure

  Multiple types of content data are integrated into a structure which is appropriate for the application. An instance of multimedia data structure modelling is shown in 5.1.

- Creation

  The structured application data are sometimes created step by step. The data from each step can be transferred between corresponding applications. Instances of modelling of multimedia data creation are shown in 5.2.



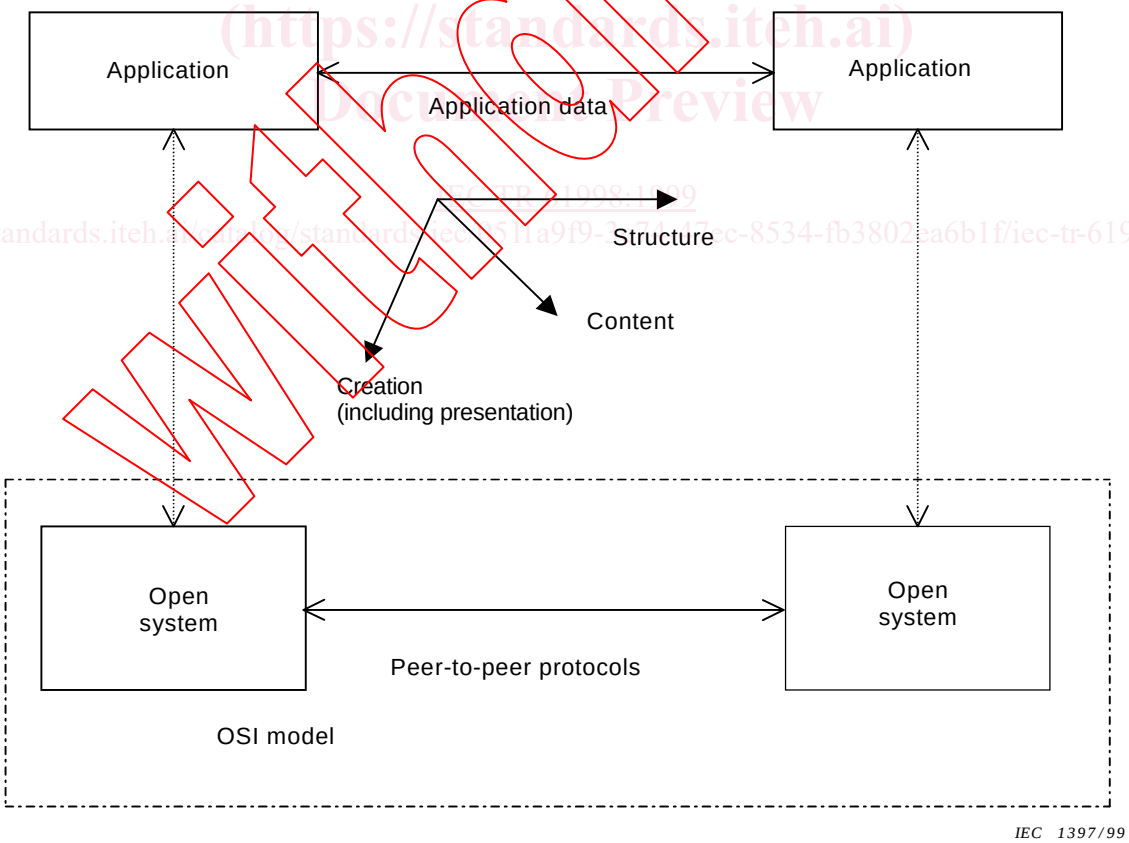


**Figure 5 – Data structure in inter-system/intercommunication media including OSI data structure and application data**