# INTERNATIONAL STANDARD



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Information technology — Telecommunications and information exchange between systems — Elements iTeh Sof management information related to OSI Data Link Layer standards

https://standards.iTechnologies de l'information — Télécommunications et échange d'information entre systèmes — Éléments de l'information de gestion liés aux normes de la couche de liaison de données OSI

ΗΝΙΓΠΙΝΑΙΙζΟΝΑΙ



Reference number ISO/IEC 10742:1994(E)

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## Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national

#### bodies casting a vote. iTeh S' PREVIEW IANDAKD

International Standard ISO/IEC 10742 was prepared by Joint Technical Committee SISO/IEC JTC 1, Information technology.

Annexes A and B form an integral part of this International Standard. Annexes C https://standards.iteland Dare for information only8d-32a2-43f8-b7da-

35e47b55625b/iso-iec-10742-1994

## Introduction

This document is intended to become one of a set of International Standards produced to facilitate the interconnection of open systems. The set of International Standards covers the services, protocols and management information required to achieve such interconnection.

This International Standard is positioned with respect to other related Specifications by the layers defined in the *Reference Model for Open System Interconnection* (ISO 7498). In particular, it is concerned with the definition of Data Link Layer management information.

# iTeh STANDARD PREVIEW (standards.iteh.ai)

<u>ISO/IEC 10742:1994</u> https://standards.iteh.ai/catalog/standards/sist/750d8f8d-32a2-43f8-b7da-35e47b55625b/iso-iec-10742-1994

# Information technology — Telecommunications and information exchange between systems — Elements of management information related to OSI Data Link Layer standards

## 1 Scope

This International Standard provides the specification of management information within an Open System related to those operations of the OSI Data Link Layer specified by the specifications in this document. Specifics on how Data Link layer management is accomplished is beyond the scope of this International Standard. Data Link Layer management is defined by specifying:

- the managed object class definition of Data Link Layer Managed Objects following guidelines put forth by the Structure of Management Information (ISO/IEC 10165)
- the relationship of the Managed Objects and attributes to both the operation of the layer and to other objects and attributes of the layer, and
- the action type operations on the attributes of Data Link Layer Managed Objects that are available to OSI Systems Management.

## (standards.iteh.ai)

## 2 Normative references

ISO/IEC 10742:1994

## https://standards.iteh.ai/catalog/standards/sist/750d8f8d-32a2-43f8-b7da-

The following Recommendations and International Standards contain provisions which, through reference in this text, constitute provisions of this Recommendation I International Standard. At the time of publication, the editions indicated were valid. All Recommendations and Standards are subject to revision, and parties to agreements based on this Recommendation I International Standard are encouraged to investigate the possibility of applying the most recent editions of the Recommendations and Standards listed below. Members of IEC and ISO maintain Registers of currently valid International Standards. The Telecommunication Standardization Bureau of the ITU maintains a list of the currently valid ITU-T Recommendations.

## 2.1 Identical Recommendations | International Standards

- ITU-T Recommendation X.200(1993) | ISO 7498-1: 1994, Information technology - Open Systems Interconnection Reference Model: Basic Reference Model.

- CCITT Recommendation X.701(1992) | ISO/IEC 10040: 1992, Information technology - Open Systems Interconnection - Systems management overview.

- CCITT Recommendation X.720(1992) | ISO/IEC 10165-1: 1993, Information technology - Open Systems Interconnection - Structure of management information: Management Information Model.

- CCITT Recommendation X.721(1992) | ISO/IEC 10165-2: 1992, Information technology - Open Systems Interconnection - Structure of management information: Definition of Management Information.

- CCITT Recommendation X.722(1992) | ISO/IEC 10165-4: 1992, Information technology - Open Systems Interconnection - Structure of management information: Guidelines for the definition of managed objects.

- ITU-T Recommendation X.723(1993) | ISO/IEC 10165-5:1994, Information technology - Open Systems Interconnection -Structure of Management Information: Generic management information.

- CCITT Recommendation X.730(1992) | ISO/IEC 10164-1: 1993, Information technology - Open Systems Interconnection - Systems management: Object management function.

- CCITT Recommendation X.731(1992) | ISO/IEC 10164-2: 1993, Information technology - Open Systems Interconnection - Systems management: State management function.

- CCITT Recommendation X.732(1992) | ISO/IEC 10164-3: 1993, Information technology - Open Systems Interconnection - Systems management: Attributes for representing relationships.

- CCITT Recommendation X.733(1992) | ISO/IEC /10164-4: 1992, Information technology - Open Systems Interconnection - Systems management: Alarm reporting function.

- CCITT Recommendation X.734(1992) | ISO/IEC 10164-5: 1993, Information technology - Open Systems Interconnection - Systems management: Event report management function.

- CCITT Recommendation X.735(1992) | ISO/IEC 10164-6: 1993, Information technology -Open Systems Interconnection - Systems management: Log control function.

## 2.2 Paired Recommendations | International Standards equivalent in technical content

- CCITT Recommendation X.700 (1992), Management Framework for Open Systems Interconnection (OSI) for CCITT Applications.

ISO 7498 - 4: 1989, Information Processing Systems - Open Systems Interconnection - Basic Reference Model - Management framework.

- CCITT Recommendation X.212(1988), Data link service definition for open systems interconnection for CCITT applications.

ISO/IEC 8886: 1992, Information technology - Telecommunications and information exchange between systems - Data link service definition for Open Systems Interconnection.

- CCITT Recommendation X.208(1988), Specification of abstract syntax notation one (ASN.1).

ISO/IEC 8824:1990, Information technology - Open Systems Interconnection - Specification of the Abstract Syntax Notation One (ASN.1).

- CCITT Recommendation X.710 (1991), Common Management Information Service Definition for CCITT Applications.

ISO/IEC 9595:1991, Information technology - Open Systems Interconnection - Common management information service definition.

- CCITT Recommendation X.711 (1991), Common Management Information Protocol Specification for CCITT Applications.

ISO/IEC 9596-1:1991, Information technology - Open Systems Interconnection - Common management information protocol - Part 1: Specification.

## 2.3 Additional references

- ITU-T Recommendation X.25 (1993), Interface between data terminal equipment (DTE) and data circuitterminating equipment (DCE) for terminals operating in the packet mode and connected to public data networks by dedicated circuit. ISO 7776: 1986, Information processing Systems - Data communications - High-level data link control procedures - Description of the X.25 LAPB-compatible DTE data link procedures.

- ISO 8802-2: 1989, Information processing systems - Local area networks - Logical link control.

- ISO/IEC 8802-3: 1993, Information technology - Local and metropolitan area networks - Carrier Sence multiple access with collision detection (CSMA/CD) access method and physical layer specifications.

- ISO/IEC 11575, Information Technology - Telecommunications and Information Exchange Between Systems - Protocol Mappings for the OSI Data Link Service.

## **3 Definitions**

## 3.1 Basic reference model

This International Standard makes use of the following terms defined in ITU-T Rec X.200 | ISO/IEC 7498-1

- a) Data Link Layer
- b) open system
- c) (N)-entity
- d) (N)-protocol
- e) (N)-service access point

#### **3.2 Management framework**

#### ISO/IEC 10742:1994

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This International Standard makes use of the following terms defined in CCITP Rec X 700 | ISO/IEC 7498-4 35e47b55625b/iso-iec-10742-1994

a) Managed object

## 3.3 Systems Management Overview

This International Standard makes use of the following terms defined in CCITT Rec X.701 | ISO/IEC 10040.

- a) Managed object class
- b) Notification

#### 3.4 Common Management Information Service Definition

This International Standard makes use of the following terms defined in CCITT Rec X.710 | ISO/IEC 9595.

a) Attribute

## 3.5 Information Model

This International Standard makes use of the following terms defined in CCITT Rec X.720 | ISO/IEC 10165-1.

- a) Attribute Type
- b) Behaviour
- c) Containment

- d) Distinguished Name
- e) Inheritance
- f) Name Binding
- g) Package
- h) Parameter
- i) Relative Distinguished Name
- j) Subclass
- k) Superclass

## 3.6 GDMO

This International Standard makes use of the following terms defined in CCITT Rec X.722 | ISO/IEC 10165-4

- a) Managed Object Class Definition
- b) Template

# 4 Abbreviations iTeh STANDARD PREVIEW

Within the Managed Object definitions and GDMO templates the following abbreviations are used in the standard-name element of a document-identifier when making references to other documents.

DMI	CCITT Rec. X.721   ISO/IEC 10165 2C 10742:1994
GMI	CCITT Rec: X:728 at Soviec q0165/5 and ards/sist/750d8f8d-32a2-43f8-b7da-
	35e47b55625b/iso-jec-10742-1994

This International Standard makes use of the following symbols and abbreviations.

CSMA/CD DL DLE DLL DLM DLSAP DMI EWMA GDMO GMI IVMO LLC MAC MLP MO NSAP PLE SAP	Carrier sense multiple access with collision detection Data Link Data Link Entity Data Link Entity Data Link Kayer Data Link Management Data Link Service Access Point Definition of Management Information Exponentially Weighted Moving Average Guidelines for the Definition of Managed Objects Generic Management Information Initial Value Managed Object Logical Link Control Media Access Control Multi Link Protocol Managed Object Network Service Access Point Packet Level Entity Service Access Point
SAP SLP	2
	-

## **5 Elements of Data Link Layer Management Information**

## 5.1 Managed Object Hierarchy

## 5.1.1 Summary of managed objects

The following set of common managed objects are defined in this International Standard for the OSI Data Link Layer:

- a) The Data Link Subsystem managed object (datalinkSubsystem) (see 5.3, page 9).
- b) The Data Link Entity managed object (datalinkEntity) (see 5.4, page 10). (This managed object is never instantiated.)
- c) The Data Link Service Access Point managed object (dLSAP) (see 5.5, page 11).
- d) The LAPB Data Link Entity managed object (IAPBDLE) (see 5.6, page 12).
- e) The LAPB Single Link Protocol Machine managed object (sLPPM) (see 5.7, page 14).
- f) The LAPB Single Link Protocol Connection managed object (sLPConnection) (see 5.8, page 15).
- g) The LAPB Single Link Protocol Connection Initial Values managed object (sLPConnectionIVMO) (see 5.9, page 22).
- h) The Mac Data Link Entity managed object (mACDLE) (see 5.10, page 23).
- i) The MAC managed object /mAC) (see 5.11, page 24). (This managed object is never instantiated.)
- j) The LLC Data Link Entity managed object (ILCDLE) (see 5.12, page 27).
- k) The LLC Connectionless Protocol Machine managed object (ILCCLPM)(see 5.13, page 28). (This managed object is never instantiated.)
- I) The LLC Connection-mode Protocol Machine managed object (ILCCOPM) (see 5.14, page 29). (This managed object is never instantiated.)
- m) The Resource Typeld managed object (resourceTypeld) (see annex B)
- n) The Scanner managed object (scanner) (see annex B)(This managed object is never instantiated.)
- o) The Exponentially Weighted Moving Average Metric Monitor managed object (eWMAMetricMonitor) (see annex B) (standards.iteh.ai)

These Managed Objects represent OSI Management's view of those elements of an Open System which support the OSI Data Link Service subject to OSI management operations. Other MOs may be defined under Data Link Subsystem using these generic specifications:log/standards/sist/750d8/8d-32a2-43/8-b7da-35e47b55625b/iso-iec-10742-1994

#### 5.1.2 Containment hierarchy

The containment hierarchy is illustrated in figure 1. Managed objects which can have multiple instances are illustrated by shadowed (multiple) boxes. These objects are defined in detail in the following clauses of this International Standard.

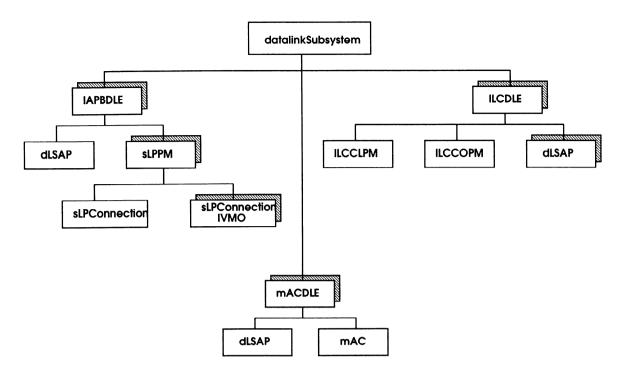


Figure 1 - Data Link Layer Containment Hierarchy

The datalink subsystem MO is subordinate to the system MO. The LAPB DLE, MAC DLE and LLC DLE MOs represent protocol- and media-specific communication entities.

The SLP PM MO represents the operation of the protocol machine for the single-link procedures specified in ISO 7776. The MAC, LLC CL PM and LLC CO PM MOs are generic managed objects from which MAC-specific and LLC-specific protocol machine managed objects can be derived, e.g. for CSMA/CD MAC specified in ISO/IEC 8802-3, and for LLC Type 1 and LLC Type 2 protocol operation specified in ISO 8802-2. The SLP Connection MO represent the management view of connections established using the SLP.

## 5.1.3 Relationships

## 5.1.3.1 General

The use of relationship attributes is illustrated by examples in annex D. The following describes the individual relationships in more detail.

## 5.1.3.2 DLE

There is a relationship between a 'DLE' MO (i.e. an LAPB, LLC and MAC DLE MO) and the MO representing the underlying service provider. This is represented by the attribute providerEntityNames inherited from the generic datalinkEntity MO. This is a read-write attribute which allows a manager to configure which entities are to be used to provide services to this entity. For example, a LAPB DLE MO might be configured with the local distinguished name of a Ph-Entity MO or an LLC DLE MO with the name of a MAC DLE MO (e.g. one containing a CSMA/CD MAC MO).

Additionally, a 'DLE' MO has a localSapNames attribute inherited from GMI:communicationsEntity. This is a readonly attribute which contains the local distinguished name(s) of SAP MO(s), representing the point at which services are provided to the entity. For example, in a LAPB DLE MO localSapNames might contain the name of a Ph-SAP MO or, in an LLC DLE MO, the name of a dLSAP MO contained in a MAC DLE MO.

The sN-ServiceProvider attribute of the Network layer Linkage and X25PLE-DTE MOs contains the local distinguished name of a 'DLE' MO.

#### 5.1.3.3 dISAP

There is a relationship between a dISAP MO and the managed objects that represent the (Network layer) user entities that are using the SAP. This is represented by the userEntityNames attribute inherited from GMI:sap1. For example, in an dISAP MO contained in an LAPB DLE MO, userEntityNames might contain the distinguished name of an X25PLE-DTE MO.

The sN-SAP attribute of the Network layer Linkage and X25PLE-DTE MOs contains the distinguished name of a dISAP MO.

#### 5.1.3.4 sLPConnection

There is a relationship between an sLPConnection MO and the MO representing the underlying Ph-Connection. This represented by the attribute underlyingConnectionNames inherited from GMI:singlePeerConnection.

#### 5.1.4 Minimum Event Filtering Capabilities

The Data Link Layer management definitions embodied in this International Standard imply the frequent, and possibly excessive, generation of notifications during regular layer operation. These notifications are especially useful for effective fault management, where they facilitate the tracing and pinpointing of error situations. To avoid the excessive dissemination of these event reports under normal operating conditions, it is advisable for a managed system to have, as a minimum, the capability to perform discrimination based upon:

- a) The source managed object class.
- b) The object identifier values in the probable cause and specific problems field of communication alarms.

#### 5.1.5 Use of Optional Fields

Where reference is made in this International Standard to ASN.1 syntax defined in DMI or GMI, only the following fields shall be employed.

1) Those which are not OPTIONAL in the ASN.1 syntax.

2) Those which are OPTIONAL but whose use is explicitly required by this International Standard.

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3) Those which are OPTIONAL, but whose ASN.1 type is SET OF ManagementExtension.

The use of any other fields is prohibited.

## 5.2 Common Data Link Layer GDMO definitions

#### -- Behaviours

commonCreationDeletion-B BEHAVIOUR

DEFINED AS

Managed object class imports the ISO/IEC 10165-2 objectCreation and/or objectDeletion notifications. Used as follows:

objectCreation - Generated whenever an instance of the managed object class is created. Implementations may optionally include the sourceIndicator parameter in the notification. If creation occured as a result of internal operation of the resource, the value 'resourceOperation' is used. If creation occured in response to a management operation, the value 'managementOperation' is used. A value of 'unknown' may be returned if it is not possible to determine the source of the operation. None of the other optional parameters are used.

objectDeletion - Generated whenever an instance of the managed object class is deleted. Implementations may optionally include the sourceIndicator parameter in the notification. If deletion occured as a result of internal operation of the resource, the value 'resourceOperation' is used. If deletion occured in response to a management operation, the value 'managementOperation' is used. A value of 'unknown' may be returned if it is not possible to determine the source of the operation. None of the other optional parameters are used.;

commonStateChange-B BEHAVIOUR

ISO/IEC 10742:1994

DEFINED AS https://standards.iteh.ai/catalog/standards/sist/750d8f8d-32a2-43f8-b7da-Managed object class imports the ISO/IEC\_10165-2\_stateChange12-1994 notification. Used to report the changes to the operationalState attribute, and where present, the administrativeState attribute. A single parameter set is included in the State change definition field. Only the (mandatory) attributeId and (optional) newAttributeValue parameters are used.;

#### -- Attribute Groups

timers ATTRIBUTE GROUP

-- Empty group definition. Timer attributes are added to the group in

-- package definitions.

DESCRIPTION The group of all timer attributes;

REGISTERED AS {DLM.agoi timers(1)};

## 5.3 The Data Link Subsystem managed object

-- There shall be exactly one of these managed objects within a system.

-- It exists to provide a container for all managed objects in a system

-- that relate to the operation of the Datalink layer.

--

-- The datalinkSubsystem managed object can not be created or deleted

-- explicitly by management operation. It exists inherently in a system;

-- created and deleted as part of system operation.

```
datalinkSubsystem MANAGED OBJECT CLASS
DERIVED FROM "GMI":subsystem;
CHARACTERIZED BY datalinkSubsystem-P PACKAGE
ATTRIBUTES
"GMI":subsystemId
INITIAL VALUE DLM.datalinkSubsystemId-Value
GET;;;
REGISTERED AS {DLM.moi datalinkSubsystem(1)};
```

-- Name Bindings

-- IMPORT "GMI":subsystem-system NAME BINDING

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## 5.4 The Data Link Entity managed object

-- The generic DLE MO from which protocol- and media-specific DLE MOs

-- may be derived.

```
datalinkEntity MANAGED OBJECT CLASS
DERIVED FROM "GMI":communicationsEntity;
CHARACTERIZED BY datalinkEntity-P PACKAGE
  BEHAVIOUR
    commonCreationDeletion-B,
    commonStateChange-B;
  ATTRIBUTES
    providerEntityNames REPLACE-WITH-DEFAULT
      GET-REPLACE:
  ATTRIBUTE GROUPS
    "DMI":state
      "DMI":operationalState;
  NOTIFICATIONS
    "DMI":objectCreation,
    "DMI":objectDeletion,
    "DMI":stateChange;;;
REGISTERED AS {DLM.moi datalinkEntity(2)};
```

#### -- Name Bindings

-- IMPORT "GMI":communicationsEntity-subsystem NAME BINDING

```
datalinkEntity-datalinkSubsystem-Management NAME BINDING PREVIEW
SUBORDINATE OBJECT CLASS datalinkEntity AND SUBCLASSES;
NAMED BY
SUPERIOR OBJECT CLASS datalinkSubsystem AND SUBCLASSES;
WITH ATTRIBUTE "GMI":communicationsEntityId;
BEHAVIOUR datalinkEntity-datalinkSubsystem-Management-BIBEHAVIOUR
DEFINED AS https://standards.itch.ai/catalog/standards/sist/750d8f8d-32a2-43f8-b7da-
The name binding which applies when a datalinkEntityimanaged object (or
an instance of a subclass of the datalinkEntity MO class) can be created by
management as a subordinate object of the datalinkSubsystem
managed object (or subclass), and deleted by management.;;
CREATE;
DELETE ONLY-IF-NO-CONTAINED-OBJECTS;
REGISTERED AS {DLM.nboi datalinkEntity-datalinkSubsystem-Management(1)};
-- Attributes
```

providerEntityNames ATTRIBUTE WITH ATTRIBUTE SYNTAX DLM.GroupObjects; MATCHES FOR EQUALITY, SET-COMPARISON, SET-INTERSECTION; BEHAVIOUR providerEntityNames-B BEHAVIOUR DEFINED AS The distinguished names of provider entity managed objects. The managed objects that represent the entities to be used to provide services to this entity.;; REGISTERED AS {DLM.aoi providerEntityNames(11)};

## 5.5 The Data Link Service Access Point managed object

-- The dLSAP managed object class is used to represent a service access

-- point at which services are provided by a DLE to the user entity.

- -- Instances of the dLSAP managed object class are contained within
- -- instances of subclasses derived from the datalinkEntity managed object
- -- class. Constraints on the number of contained dLSAP MOs and any
- -- specific semantics of the attributes are given as part of the definition
- -- of the containing DLE managed object class.

--

-- A dLSAP managed object may be created and deleted explicitly by

-- management operation or created and deleted automatically as part of

-- system operation, e.g. when a user of the Data Link layer service

-- requests and is granted use of the service. The mechanism by which

-- this happens is a local matter and not subject to OSI standardisation.

dLSAP MANAGED OBJECT CLASS DERIVED FROM "GMI":sap1; REGISTERED AS {DLM.moi dLSAP(13)};

#### -- Name Bindings

-- IMPORT "GMI":sap1-communicationsEntity NAME BINDING

dLSAP-datalinkEntity-Management NAME BINDING SUBORDINATE OBJECT CLASS dLSAP AND SUBCLASSES; NAMED BY SUPERIOR OBJECT CLASS datalinkEntity AND SUBCLASSES FOR WITH ATTRIBUTE "GMI":sapId; BEHAVIOUR dLSAP-datalinkEntity-Management-B BEHAVIOUR al) DEFINED AS The name binding which applies when a dLSAP managed object (or an instance of a subclass of the dLSAP MO class) can be created by management as a subordinate object of a datalinkEntity managed -43f8-b7daobject (or subclass), and deleted by management;:-10742-1994

CREATE;

DELETE ONLY-IF-NO-CONTAINED-OBJECTS; REGISTERED AS {DLM.nboi dLSAP-datalinkEntity-Management(2)};