

INTERNATIONAL
STANDARD

ISO/IEC
10164-4

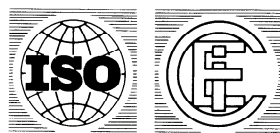
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**Information technology – Open Systems
Interconnection – Systems Management: Alarm
reporting function**

iTeh *Technologies de l'information – Interconnexion de systèmes ouverts –
Gestion-système: Fonction de compte rendu d'alarme*
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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.

International Standard ISO 10164-4 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, in collaboration with the CCITT. The identical text is published as CCITT Recommendation X.733.

ISO/IEC 10164 consists of the following parts, under the general title *Information technology – Open Systems Interconnection – Systems Management*:

- Part 1: Object management function
- Part 2: State management function
- Part 3: Attributes for representing relationships
- Part 4: Alarm reporting function
- Part 5: Event report management function
- Part 6: Log control function
- Part 7: Security alarm reporting function
- Part 8: Security audit trail function
- Part 9: Objects and attributes for access control
- Part 10: Accounting meter function
- Part 11: Workload monitoring function
- Part 12: Test management function
- Part 13: Summarization function
- Part 14: Confidence and diagnostic test categories

Introduction

ISO/IEC 10164 is a multipart standard developed according to ISO 7498 and ISO/IEC 7498-4. ISO/IEC 10164 is related to the following International Standards:

- ISO/IEC 9595 : 1990, *Information technology - Open Systems Interconnection - Common management information service definition*;
- ISO/IEC 9596 : 1990, *Information technology - Open Systems Interconnection - Common management information protocol*;
- ISO/IEC 10040 : 1992, *Information technology - Open Systems Interconnection - Systems management overview*;
- ISO/IEC 10165 : 1992, *Information technology - Open Systems Interconnection - Structure of management information*.

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INTERNATIONAL STANDARD

CCITT RECOMMENDATION

**INFORMATION TECHNOLOGY – OPEN SYSTEMS INTERCONNECTION –
SYSTEMS MANAGEMENT: ALARM REPORTING FUNCTION**

1 Scope

This Recommendation | International Standard defines a Systems Management Function that may be used by an application process in a centralized or decentralized management environment to interact for the purpose of systems management, as defined by CCITT Rec. X.700 | ISO/IEC 7498-4. This Recommendation | International Standard defines a function which consists of generic definitions, services and functional units. This function is positioned in the application layer of the OSI reference model (CCITT Rec. X.200 | ISO 7498) and is defined according to the model provided by ISO/IEC 9545. The role of systems management functions is described by CCITT Rec. X.701 | ISO/IEC 10040. The alarm notifications defined by this function provides information that a manager may need to act upon pertaining to a system's operational condition and quality of service.

This Recommendation | International Standard

- establishes user requirements for the alarm reporting function;
- establishes a model that relates the service and generic definitions provided by this function to user requirements;
- defines the service provided by the function;
- defines generic notification types and parameters documented in accordance with CCITT Rec. X.722 | ISO/IEC 10165-4;
- specifies the protocol that is necessary in order to provide the service;
- specifies the abstract syntax necessary to identify and negotiate the functional unit in protocol;
- defines the relationship between this service and SMI notifications;
- specifies compliance requirements placed on other standards that make use of these generic definitions;
- defines relationships with other systems management functions;
- specifies conformance requirements.

This Recommendation | International Standard does not

- define the nature of any implementation intended to provide the Alarm Reporting function;
- specify the manner in which management is accomplished by the user of the Alarm Reporting function;
- define the nature of any interactions which result in the use of the Alarm Reporting function;
- specify the services necessary for the establishment, normal and abnormal release of a management association;
- preclude the definition of further notification types;
- define managed objects.

2 Normative references

The following CCITT Recommendations and International Standards contain provisions which, through reference in this text, constitute provisions of this Recommendation | 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 | International Standard are encouraged to investigate the possibility of applying the most recent editions of the Recommendations and Standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards. The CCITT Secretariat maintains a list of the currently valid CCITT Recommendations.

2.1 Identical CCITT Recommendations | International Standards

- CCITT Recommendation X.701 (1992) | ISO/IEC 10040 : 1992, *Information technology – Open Systems Interconnection – Systems management overview.*
- CCITT Recommendation X.731 (1992) | ISO/IEC 10164-2 : 1992, *Information technology – Open Systems Interconnection – Systems Management – State management function.*
- CCITT Recommendation X.732 (1992) | ISO/IEC 10164-3 : 1992, *Information technology – Open Systems Interconnection – Systems Management – Attributes for representing relationships.*
- CCITT Recommendation X.734¹⁾ | ISO/IEC 10164-5 : 1992, *Information technology – Open Systems Interconnection – Systems Management – Event report management function.*
- CCITT Recommendation X.720 (1992) | ISO/IEC 10165-1 : 1992, *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.*

2.2 Paired CCITT Recommendations | International Standards equivalent in technical content

- CCITT Recommendation X.700¹⁾, *Management framework for Open systems Interconnection (OSI) for CCITT applications.*
ISO/IEC 7498-4 : 1989, *Information processing systems – Open Systems Interconnection – Basic Reference Model – Part 4 : Management framework.*
- CCITT Recommendation X.200 (1988), *Reference Model of Open Systems Interconnection for CCITT Applications.*
ISO 7498 : 1984, *Information processing systems – Open Systems Interconnection – Basic Reference Model.*
- CCITT Recommendation X.208 (1988), *Specification of abstract syntax notation one (ASN.1).*
ISO/IEC 8824 : 1990, *Information technology – Open Systems Interconnection – Specification of Abstract Syntax Notation One (ASN.1).*
- CCITT Recommendation X.210 (1988), *Reference Model of Open Systems Interconnection (OSI) Layer Service Definition Conventions for CCITT Applications.*
ISO/TR 8509 : 1987, *Information processing systems – Open Systems Interconnection – Service conventions.*
- 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.*

¹⁾ Presently at state of draft Recommendation.

- CCITT Recommendation X.290 (1992), *OSI Conformance Testing Methodology and Framework for Protocol Recommendations for CCITT Applications – General Concepts*.
- ISO/IEC 9646-1 : 1991, *Information technology – Open Systems Interconnection conformance testing methodology and framework – Part 1: General concepts*.

2.3 Additional references

- ISO/IEC 9545 : 1989, *Information processing systems – Open Systems Interconnection – Application Layer structure*.

3 Definitions

For the purposes of this Recommendation | International Standard, the following definitions apply.

3.1 Basic reference model definitions

This Recommendation | International Standard makes use of the following terms defined in CCITT Rec. X.200 | ISO 7498.

- a) open system;
- b) systems management.

3.2 Management framework definitions

This Recommendation | International Standard makes use of the following terms defined in CCITT Rec. X.700 | ISO/IEC 7498-4.

managed object

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3.3 CMIS definitions

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

attribute

3.4 Systems management overview definitions

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

- a) agent;
- b) agent role;
- c) dependent conformance;
- d) general conformance;
- e) generic definitions;
- f) manager;
- g) manager role;
- h) notification;
- i) systems management application protocol;
- j) systems management functional unit.

3.5 Event report management function definitions

This Recommendation | International Standard makes use of the following terms defined in CCITT Rec. X.734 | ISO/IEC 10164-5.

event forwarding discriminator

3.6 OSI conformance testing definitions

This Recommendation | International Standard makes use of the following terms defined in CCITT Rec. X.290 | ISO/IEC 9646-1.

system conformance statement

3.7 Additional definitions

For the purposes of this Recommendation | International Standard, the following definitions apply.

3.7.1 **error:** A deviation of a system from normal operation.

3.7.2 **fault:** The physical or algorithmic cause of a malfunction. Faults manifest themselves as errors.

3.7.3 **alarm:** A notification, of the form defined by this function, of a specific event. An alarm may or may not represent an error.

3.7.4 **alarm report:** A specific type of event report used to convey alarm information.

4 Abbreviations

ASN.1	Abstract Syntax Notation One
CMIS	Common Management Information Service
Conf	Confirm
Ind	Indication
MAPDU	Management Application Protocol Data Unit
Req	Request
Rsp	Response
SMAPM	Systems Management Application Protocol Machine

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5 Conventions

This Recommendation | International Standard defines services following the descriptive conventions defined in CCITT Rec. X.210 | ISO/TR 8509. In clause 9, the definition of each service includes a table that lists the parameters of its primitives. For a given primitive, the presence of each parameter is described by one of the following values

M	the parameter is mandatory
(=)	the value of the parameter is equal to the value of the parameter in the column to the left
U	the use of the parameter is a service-user option.
–	the parameter is not present in the interaction described by the primitive concerned.
C	the parameter is conditional. The condition(s) are defined by the text which describes the parameter.
P	subject to the constraints imposed on the parameter by CCITT Rec. X.710 ISO/IEC 9595.

NOTE – The parameters which are marked “P” in service tables of this Recommendation | International Standard are mapped directly onto the corresponding parameters of the CMIS service primitive, without changing the semantics or syntax of the parameters. The remaining parameters are used to construct an MAPDU.

6 Requirements

The requirements satisfied by this function are the reporting of alarms, errors and related information, in a standard fashion.

7 Model

Early detection of faults before significant effects have been felt by the user is a desirable requirement of communicating systems. Degradation of service may be detected by monitoring of error rates. Threshold mechanisms on counters and gauges are a method of detecting such trends and providing a warning to managers when the rate becomes high.

An important criterion by which failures of communications resources are to be reported is the level to which the fault degrades the quality of the service that was originally requested by (or promised to) the service user. Malfunctions will range in severity from Warning, where there is no impact upon the quality of service offered to the user, to Critical, where it is no longer possible to provide the service requested by (or promised to) the service user. The level of severity can be described generically and criteria specified based upon the level of degradation that the fault causes to the service: Critical, Major, Minor or Warning.

Alarms are specific types of notifications concerning detected faults or abnormal conditions. Managed object definers are encouraged to include in alarms information that will help with understanding the cause of the potentially abnormal situation, and other information related to side effects. An example of such diagnostic information is the current and past values of the configuration management state of the object.

A single incident may cause the generation of several notifications; it is important to be able to specify in a notification some correlation with other notifications. However, the mechanism, if any, for determining the relationship between notifications resulting from a single incident is outside the scope of this function.

It is considered important in some circumstances to provide alarm reports with a standardized style, using a common set of notification types, with standardized parameters and parameter definitions, independent of particular managed objects. The notification types specified in this function are intended to be generally applicable and can be imported into the definition of any managed object.

Control of notifications, e.g. whether a notification results in an event report, may be accomplished by use of the Event Report management function defined in CCITT Rec. X.734 | ISO/IEC 10164-5.

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8 Generic definitions

ISO/IEC 10164-4:1992

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8.1 Generic notifications

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The set of generic notifications, parameters and semantics defined by this Recommendation | International Standard provide the detail for the following general parameters of the M-EVENT-REPORT service as defined by CCITT Rec. X.710 | ISO/IEC 9595

- event type;
- event information;
- event reply.

All notifications are potential entries in a systems management log and this Recommendation | International Standard defines a managed object class for this purpose. CCITT Rec. X.721 | ISO/IEC 10165-2 defines a generic event log record object class from which all entries are derived, the additional information being specified by the event information and event reply parameters.

8.1.1 Event type

This parameter categories the alarm. Five basic categories of alarm are specified. These are

- communications alarm type: An alarm of this type is principally associated with the procedures and/or processes required to convey information from one point to another;
- quality of service alarm type: An alarm of this type is principally associated with a degradation in the quality of a service;
- processing error alarm type: An alarm of this type is principally associated with a software or processing fault;
- equipment alarm type: An alarm of this type is principally associated with an equipment fault;
- environmental alarm type: An alarm of this type is principally associated with a condition relating to an enclosure in which the equipment resides.