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**Information technology — Open Systems
Interconnection — Structure of
management information: Definition of
management information**

*Technologies de l'information — Interconnexion de systèmes ouverts —
Structure des informations de gestion: Définition des informations de
gestion*



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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/IEC 10165-2 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, in collaboration with CCITT. The identical text is published as CCITT Recommendation X.721.

ISO/IEC 10165 consists of the following parts under the general title *Information technology – Open Systems Interconnection – Structure of management information*:

- Part 1: *Management information model*
- Part 2: *Definition of management information*
- Part 4: *Guidelines for the definition of managed objects*
- Part 5: *Generic management information*
- Part 6: *Requirements and guidelines for implementation conformance statement proformas associated with management information*

Annex A forms an integral part of this part of ISO/IEC 10165. Annexes B, C, D, E, F and G are for information only.

Introduction

ISO/IEC 10165 is a multipart standard developed according to ISO 7498 and ISO/IEC 7498-4. ISO/IEC 10165 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 10064:1992, *Information technology – Open Systems Interconnection – Systems Management*.

INTERNATIONAL STANDARD

CCITT RECOMMENDATION

INFORMATION TECHNOLOGY – OPEN SYSTEMS INTERCONNECTION – STRUCTURE OF MANAGEMENT INFORMATION: DEFINITION OF MANAGEMENT INFORMATION

1 Scope

This Recommendation | International Standard

- defines the managed object classes, attribute types, name bindings, packages, specific attributes, action types, parameter types and notification types documented in accordance with CCITT Rec. X.722 | ISO/IEC 10165-4;
- specifies compliance requirements placed on other CCITT Recommendations | International Standards that make use of these definitions.

This Recommendation | International Standard is applicable to the development of OSI managed object class specifications and provides generic definitions that support OSI systems management functions. These definitions may also be used in other Recommendations | International Standards specifying object classes, attributes, notifications and action types.

2 Normative references

The following CCITT Recommendations | 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 | Standards listed 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.720 (1992) | ISO/IEC 10165-1 : 1992, *Information technology - Open Systems Interconnection - Structure of management information: Management information model.*
- CCITT Recommendation X.722 (1992) | ISO/IEC 10165-4 : 1992, *Information technology - Open Systems Interconnection - Structure of management information: Guidelines for definition of managed objects.*
- CCITT Recommendation X.730 (1992) | ISO/IEC 10164-1 : 1992, *Information technology - Open Systems Interconnection - Systems Management: Object management function.*
- CCITT Recommendation X.731 (1992) | ISO/IEC 10164-2 : 1992, *Information technology - Open System 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.733 (1992) | ISO/IEC 10164-4 : 1992, *Information technology - Open Systems Interconnection - Systems Management: Alarm reporting function.*

- CCITT Recommendation X.734¹⁾ | ISO/IEC 10164-5 : 1992, *Information technology - Open Systems Interconnection - Systems Management Event report management function.*
- CCITT Recommendation X.735¹⁾ | ISO/IEC 10164-6 : 1992, *Information technology - Open Systems Interconnection - Systems Management: Log control function.*
- CCITT Recommendation X.736 (1992) | ISO/IEC 10164-7 : 1992, *Information technology - Open Systems Interconnection - Systems Management: Security alarm reporting function.*

2.2 Paired CCITT Recommendations | International Standards equivalent in technical content

- 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.501 (1988), *The Directory - Models.*
ISO/IEC 9594-2 : 1990 *Information technology - Open Systems Interconnection - The Directory - Part 2: The Models.*
- 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 specification - Part 1: Specification.*

3 Definitions

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

3.1 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:

- a) discriminator;
- b) event forwarding discriminator;
- c) potential event report.

3.2 Management information model definitions

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

- a) Attribute type;
- b) Distinguished name;
- c) Relative distinguished name.

¹⁾ Presently at state of draft Recommendation.

4 Abbreviations

ASN.1	Abstract Syntax Notation One
CMIS	Common Management Information Service
CMIP	Common Management Information Protocol
EFD	Event Forwarding Discriminator
Id	Identifier
PDU	Protocol Data Unit
RDN	Relative Distinguished Name

5 Notation

Attribute types and specific attributes are defined in this Recommendation | International Standard using the templates, defined in CCITT Rec. X.722 | ISO/IEC 10165-4.

The behavioural aspects of the specific attributes described here shall be incorporated into the definition of the managed object class importing these specific attributes.

6 Definition of managed object classes

This Recommendation | International Standard defines Managed Object classes which are referenced by the System Management Functions of CCITT Recs. in X.730 - X.736 | ISO/IEC 10164 parts 1 to 7, or which are intended to be used as superclasses for the purpose of inheritance in the definition of Managed Object classes in other standards. The syntax of the attributes referenced in the templates are defined in clause 13.

6.1 Alarm record

The **alarmRecord** managed object class is used to define the information stored in the log as a result of receiving alarm notifications or alarm reports. The semantics of the managed object class, namely its attributes and behaviour are derived from the Alarm notification described in CCITT Rec. X.733 | ISO/IEC 10164-4.

```
alarmRecord      MANAGED OBJECT CLASS
DERIVED FROM    eventLogRecord;
CHARACTERIZED BY
-- The appropriate object identifier values for the eventType attribute, inherited from eventLogRecord
-- managed object class are communicationAlarm, qualityofServiceAlarm, processingErrorAlarm,
-- equipmentAlarm and environmentalAlarm --
    alarmRecordPackage    PACKAGE
    BEHAVIOUR
    alarmRecordBehaviour  BEHAVIOUR
    DEFINED AS "This managed object is used to represent logged information that resulted from alarm
    notifications or event reports";;
    ATTRIBUTES
    probableCause    GET,
    perceivedSeverity GET;;;
CONDITIONAL PACKAGES
    specificProblemsPackage PACKAGE
    ATTRIBUTES
    specificProblems GET;
    REGISTERED AS {smi2Package 1}; PRESENT IF "the Specific problems parameter is present in the alarm
    notification or event report corresponding to the instance of alarm record",

    backedUpStatusPackage PACKAGE
    ATTRIBUTES
    backedUpStatus    GET;
    REGISTERED AS {smi2Package 2}; PRESENT IF "the backedUpStatus attribute has a value TRUE and the
    Backed up status parameter is present in the alarm notification or event report corresponding to the instance
    of alarm record",
```

backUpObjectPackage PACKAGE
 ATTRIBUTES
 backUpObject GET;
 REGISTERED AS {smi2Package 3}; PRESENT IF "Backup object parameter is present in the alarm notification or event report corresponding to the instance of alarm record",

trendIndicationPackage PACKAGE
 ATTRIBUTES
 trendIndication GET;
 REGISTERED AS {smi2Package 4}; PRESENT IF "the Trend indication parameter is present in the alarm notification or event report corresponding to the instance of alarm record",

thresholdInfoPackage PACKAGE
 ATTRIBUTES
 thresholdInfo GET;
 REGISTERED AS {smi2Package 5}; PRESENT IF "the value for probableCause attribute is thresholdCrossed",

stateChangeDefinitionPackage PACKAGE
 ATTRIBUTES
 stateChangeDefinition GET;
 REGISTERED AS {smi2Package 6}; PRESENT IF "there is a state transition for the states defined in State Management Function, corresponding to the alarm type specified in the alarm record",

monitoredAttributesPackage PACKAGE
 ATTRIBUTES
 monitoredAttributes GET;
 REGISTERED AS {smi2Package 7}; PRESENT IF "the monitoredAttributes parameter is present in the alarm notification or event report corresponding to the instance of alarm record",

proposedRepairActionsPackage PACKAGE
 ATTRIBUTES
 proposedRepairActions GET;
 REGISTERED AS {smi2Package 8}; PRESENT IF "the proposedRepairActions parameter is present in the alarm notification or event report corresponding to the instance of alarm record";

REGISTERED AS {smi2MObjectClass 1};

6.2 Attribute value change record

The **attributeValueChangeRecord** managed object class is used to define the information stored in the log as a result of receiving attribute value change notifications or attribute value change event reports. The semantics of the managed object class, namely its attributes and behaviour are derived from the Attribute Value Change notification described in CCITT Rec. X.730 | ISO/IEC 10164-1.

attributeValueChangeRecord MANAGED OBJECT CLASS
 DERIVED FROM eventLogRecord;
 CHARACTERIZED BY
 -- The appropriate object identifier values for the eventType attribute, inherited from eventLogRecord
 -- managed object class, is attributeValueChange
 attributeValueChangeRecordPackage PACKAGE
 BEHAVIOUR
 attributeValueChangeRecordBehaviour BEHAVIOUR
 DEFINED AS "This managed object is used to represent logged information that resulted from attribute value change notifications or event reports";
 ATTRIBUTES
 attributeValueChangeDefinition GET;;;

CONDITIONAL PACKAGES
 sourceIndicatorPackage PRESENT IF "the sourceIndicator parameter is present in the attributeValueChange notification or event report corresponding to the instance of attribute value change record",

attributeIdentifierListPackage PRESENT IF "the attributeIdentifierList parameter is present in the attributeValueChange notification or event report corresponding to the instance of attribute value change record";

REGISTERED AS {smi2MObjectClass 2};

6.3 Discriminator

The **discriminator** managed object class is used to define the criteria for controlling management services. The semantics of the managed object class, namely its attributes and behaviour are described in CCITT Rec. X.734 | ISO/IEC 10164-5.

```

discriminator      MANAGED OBJECT CLASS
DERIVED FROM top;
CHARACTERIZED BY
discriminatorPackage      PACKAGE
      BEHAVIOUR
discriminatorBehaviour    BEHAVIOUR
DEFINED AS "This managed object is used to represent the criteria for controlling management services.";;
ATTRIBUTES
discriminatorId      GET,
discriminatorConstruct
REPLACE-WITH-DEFAULT
DEFAULT VALUE Attribute-ASN1Module.defaultDiscriminatorConstruct      GET-REPLACE,
administrativeState      GET-REPLACE,
operationalState      GET;
NOTIFICATIONS
stateChange,
attributeValueChange,
objectCreation,
objectDeletion;;
-- the above events are defined in CCITT Rec. X.731 | ISO/IEC10164- 2, CCITT Rec. X.730 | ISO/IEC10164-1
CONDITIONAL PACKAGES
availabilityStatusPackage PRESENT IF "any of the scheduling packages, ( duration, weekly scheduling,
external) are present",

duration      PRESENT IF "the discriminator function is scheduled to start at a specified time and stop at
either a specified time or function continuously ",

dailyScheduling      PRESENT IF "both the weekly scheduling package and external scheduler packages
are not present in an instance and daily scheduling is supported by that instance",

weeklyScheduling PRESENT IF "both the daily scheduling package and external scheduler packages are not
present in an instance and weekly scheduling is supported by that instance",

externalSchedulerPRESENT IF "both the daily scheduling package and weekly scheduling packages are not
present in an instance and external scheduling is supported by that instance";
-- see CCITT Rec. X.734 | ISO/IEC 10164-5 for the description of this managed object class.

REGISTERED AS {smi2MObjectClass 3};

```

6.4 Event forwarding discriminator

The **eventForwardingDiscriminator** managed object class is used to define the conditions that shall be satisfied by potential event reports before the event report is forwarded to a particular destination. This managed object class is a subclass of **discriminator** managed object class. The semantics of the managed object class, namely its attributes, management operations and behaviour, are described in CCITT Rec. X. 734 | ISO/IEC 10164-5.

```

eventForwardingDiscriminator      MANAGED OBJECT CLASS
DERIVED FROM discriminator;
CHARACTERIZED BY
-- The value for the administrative state if not specified at initiation defaults to the value unlocked.
efdPackage      PACKAGE
      BEHAVIOUR
eventForwardingDiscriminatorBehaviour    BEHAVIOUR

```

DEFINED AS "This managed object is used to represent the criteria that shall be satisfied by potential event reports before the event report is forwarded to a particular destination.";;

ATTRIBUTES

destination GET-REPLACE;;;

-- discriminatorConstruct attribute is defined using the attributes of a potential event report object

-- described in CCITT Rec. X.734 | ISO/IEC 10164-5.

CONDITIONAL PACKAGES

backUpDestinationListPackage PACKAGE

ATTRIBUTES

activeDestination GET,

backUpDestinationList GET-REPLACE;

REGISTERED AS {smi2Package 9} ; PRESENT IF "the event forwarding discriminator is required to provide a backup for the destination",

modePackage PACKAGE

ATTRIBUTES

confirmedMode GET;

REGISTERED AS {smi2Package 10}; PRESENT IF "the event forwarding discriminator permits mode for reporting events to be specified by the managing system";

REGISTERED AS {smi2MObjectClass 4};

6.5 Event log record

The **eventLogRecord** managed object class is used to define the information stored in the log as a result of receiving notifications or event reports. This is a superclass from which records for specific event types are derived.

eventLogRecord MANAGED OBJECT CLASS

DERIVED FROM logRecord;

CHARACTERIZED BY

eventLogRecordPackage PACKAGE

BEHAVIOUR

eventLogRecordBehaviour BEHAVIOUR

DEFINED AS "This managed object represents the information stored in the log as a result of receiving notifications or incoming event reports.";;

ATTRIBUTES

managedObjectClass GET,

managedObjectInstance GET,

eventType GET;;;

CONDITIONAL PACKAGES

eventTimePackage PACKAGE

ATTRIBUTES

eventTime GET;

REGISTERED AS {smi2Package 11}; PRESENT IF "the event time parameter was present in the received event report",

notificationIdentifierPackage PRESENT IF "the notification Identifier parameter is present in the notification or event report corresponding to the instance of an event record or an instance of its subclasses",

correlatedNotificationsPackage PRESENT IF "the correlatedNotifications parameter is present in the notification or event report corresponding to the instance of an event record or an instance of its subclasses",

additionalTextPackage PRESENT IF "the Additional text parameter is present in the notification or report corresponding to the instance of event record or an instance of its subclasses",

additionalInformationPackage PRESENT IF "the Additional information parameter is present in the notification or report corresponding to the instance of event record or an instance of its subclasses";

REGISTERED AS {smi2MObjectClass 5};

6.6 Log

The **log** managed object class is used to define the criteria for controlling the logging of the information in an open system. The semantics of the managed object class, namely its attributes and behaviour are described in CCITT Rec. X.735 | ISO/IEC 10164-6.

```

log                MANAGED OBJECT CLASS
DERIVED FROM top;
CHARACTERIZED BY
-- see CCITT Rec. X.735 | ISO/IEC 10164-6 for the description of this managed object class.
logPackage        PACKAGE
    BEHAVIOUR
    logBehaviour    BEHAVIOUR
    DEFINED AS "This managed object is used to store incoming event reports and local system notifications.
    Additional details are defined in CCITT Rec. X. 735 | ISO/IEC 10164-6. ";
    ATTRIBUTES
    logId            GET,
    discriminatorConstruct GET-REPLACE ,
    administrativeState GET-REPLACE,
    operationalState GET,
    availabilityStatus PERMITTED VALUES Attribute-ASN1Module.LogAvailability
                                REQUIRED VALUES Attribute-ASN1Module.UnscheduledLogAvailability    GET,
    logFullAction    GET-REPLACE;
    NOTIFICATIONS
    objectCreation,
    objectDeletion,
    attributeValueChange,
    stateChange,
    processingErrorAlarm;;;

CONDITIONAL PACKAGES
    finiteLogSizePackage PACKAGE
    ATTRIBUTES
    maxLogSize        GET-REPLACE,
    currentLogSize    GET,
    numberOfRecords    GET;
    REGISTERED AS {smi2Package 12} ;    PRESENT IF "an instance supports it",

    logAlarmPackage PACKAGE
    ATTRIBUTES
    capacityAlarmThreshold GET-REPLACE ADD-REMOVE;
    REGISTERED AS {smi2Package 13} ;    PRESENT IF "a log is of finite size and halts logging when the
    availability status has the log full value.",

    availabilityStatusPackage    PRESENT IF "any of the scheduling packages, (duration, weekly
    scheduling, external) are present. The presence of this package makes available the off-duty value of the
    available status attribute to the object.",

    duration    PRESENT IF "the logging function is scheduled to start at a specified time
    and stop at either a specified time or function continuously.",

    dailyScheduling    PRESENT IF "both the weekly scheduling package and external
    scheduler packages are not present in an instance and daily scheduling is supported by that instance.",

    weeklyScheduling    PRESENT IF "both the daily scheduling package and external scheduler
    packages are not present in an instance and weekly scheduling is supported by that instance.",

    externalScheduler    PRESENT IF "both the daily scheduling package and weekly scheduling
    packages are not present in an instance and external scheduling is supported by that instance.";

REGISTERED AS {smi2MObjectClass 6};

```

6.7 Log record

The **logRecord** managed object class is used to define the records contained in a log managed object. The semantics of the managed object class, namely its attributes and behaviour are described in CCITT Rec. X.735 | ISO/IEC 10164-6.

```
logRecord      MANAGED OBJECT CLASS
DERIVED FROM  top;
CHARACTERIZED BY
logRecordPackage PACKAGE
    BEHAVIOUR
    logRecordBehaviour    BEHAVIOUR
    DEFINED AS "This managed object represents the information stored in the logs";
    ATTRIBUTES
    logRecordId           GET,
    loggingTime           GET;;;

REGISTERED AS {smi2MObjectClass 7};
```

6.8 Object creation record

The **objectCreationRecord** managed object class is used to define the information stored in the log as a result of receiving object creation notifications or Object Creation event reports. The semantics of the managed object class, namely its attributes and behaviour are derived from the Object Creation notification described in CCITT Rec. X.730 | ISO/IEC 10164-1.

```
objectCreationRecord    MANAGED OBJECT CLASS
DERIVED FROM  eventLogRecord;
CHARACTERIZED BY
-- The appropriate object identifier value for the eventType attribute, inherited from eventLogRecord
-- managed object class, is objectCreation
objectCreationRecordPackage PACKAGE
    BEHAVIOUR
    objectCreationRecordBehaviour    BEHAVIOUR
    DEFINED AS "This managed object is used to represent logged information that resulted from object creation
    notifications or event reports";;;;

CONDITIONAL PACKAGES
    sourceIndicatorPackage    PRESENT IF "the sourceIndicator parameter is present in the object creation
    notification or event report corresponding to the instance of object creation record",

    attributeListPackage      PRESENT IF "the attributeList parameter is present in the object creation notification
    or event report corresponding to the instance of object creation record";

REGISTERED AS {smi2MObjectClass 8};
```

6.9 Object deletion record

The **objectDeletionRecord** managed object class is used to define the information stored in the log as a result of receiving object deletion notifications or Object deletion event reports. The semantics of the managed object class, namely its attributes and behaviour are derived from the Object Deletion notification described in CCITT Rec. X.730 | ISO/IEC 10164-1.

```
objectDeletionRecord    MANAGED OBJECT CLASS
DERIVED FROM  eventLogRecord;
CHARACTERIZED BY
-- The appropriate object identifier value for the eventType attribute, inherited from eventLogRecord
-- managed object class, is objectDeletion
objectDeletionRecordPackage PACKAGE
    BEHAVIOUR
    objectDeletionRecordBehaviour    BEHAVIOUR
    DEFINED AS "This managed object is used to represent logged information that resulted from object deletion
    notifications or event reports";;;;

CONDITIONAL PACKAGES
```

sourceIndicatorPackage PRESENT IF "the sourceIndicator parameter is present in the object deletion notification or event report corresponding to the instance of object deletion record",

attributeListPackage PRESENT IF "the attributeList parameter is present in the object deletion notification or event report corresponding to the instance of object deletion record";

REGISTERED AS {smi2MObjectClass 9};

6.10 Relationship change record

The **relationshipChangeRecord** managed object class is used to define the information stored in the log as a result of receiving relationship change notifications or relationship change event reports. The semantics of the managed object class, namely its attributes and behaviour are derived from the Relationship Change notification described in CCITT Rec.X.732 | ISO/IEC 10164-3.

```
relationshipChangeRecord MANAGED OBJECT CLASS
DERIVED FROM eventLogRecord;
-- The appropriate object identifier value for the eventType attribute, inherited from eventLogRecord
-- managed object class, is relationshipChange
CHARACTERIZED BY
relationshipChangeRecordPackage PACKAGE
    BEHAVIOUR
    relationshipChangeRecordBehaviour BEHAVIOUR
    DEFINED AS "This managed object is used to represent logged information that resulted from
    relationship change notifications or event reports";;
    ATTRIBUTES
    relationshipChangeDefinition GET;;;

CONDITIONAL PACKAGES
    sourceIndicatorPackage PRESENT IF "the Source indicator parameter is present in the
    relationshipChange notification or event report corresponding to the instance of relationship change record",

    attributeIdentifierListPackage PRESENT IF "the Attribute identifier list parameter is present in the
    relationshipChange notification or event report corresponding to the instance of relationship change record";

REGISTERED AS {smi2MObjectClass 10};
```

6.11 Security alarm report record

The **securityAlarmReportRecord** managed object class is used to define the information stored in the log as a result of receiving security alarm notifications or security alarm event reports. The semantics of the managed object class, namely its attributes and behaviour are derived from the Security Alarm notification described in CCITT Rec. X.736 | ISO/IEC 10164-7.

```
securityAlarmReportRecord MANAGED OBJECT CLASS
DERIVED FROM eventLogRecord;
CHARACTERIZED BY
-- The appropriate object identifier values for the eventType attribute, inherited from eventLogRecord
-- managed object class, are integrityViolation, operationalViolation, physicalViolation,
-- securityServiceOrMechanismViolation and timeDomainViolation --
securityAlarmRecordPackage PACKAGE
    BEHAVIOUR
    securityAlarmReportRecordBehaviour BEHAVIOUR
    DEFINED AS "This managed object is used to represent logged information that resulted from security alarm
    notifications or event reports";;
    ATTRIBUTES
    securityAlarmCause GET,
    securityAlarmSeverity GET,
    securityAlarmDetector GET,
    serviceUser GET,
    serviceProvider GET;;;

REGISTERED AS {smi2MObjectClass 11};
```

6.12 State change record

The **stateChangeRecord** managed object class is used to define the information stored in the log as a result of receiving state change notifications or state change event reports. The semantics of the managed object class, namely its attributes and behaviour are derived from the State Change notification described in CCITT Rec. X.731 | ISO/IEC 10164-2.

```
stateChangeRecord      MANAGED OBJECT CLASS
DERIVED FROM  eventLogRecord;
-- The appropriate object identifier value for the eventType attribute, inherited from eventLogRecord
-- managed object class, is stateChange
CHARACTERIZED BY
stateChangeRecordPackage      PACKAGE
    BEHAVIOUR
stateChangeRecordBehaviour      BEHAVIOUR
DEFINED AS "This managed object is used to represent logged information that resulted from state change
notifications or event reports";
ATTRIBUTES
stateChangeDefinition      GET;;;

CONDITIONAL PACKAGES
sourceIndicatorPackage      PRESENT IF "the Source indicator parameter is present in the stateChange
notification or event report corresponding to the instance of state change record",

attributeIdentifierListPackage      PRESENT IF "the Attribute identifierList parameter is present in the
stateChange notification or event report corresponding to the instance of state change record";

REGISTERED AS {smi2MObjectClass 12};
```

6.13 System

The **system** managed object class is used to represent a set of hardware and software that forms an autonomous whole capable of performing information processing and/or information transfer.

The specification of the sequence of name bindings to be used in constructing the distinguished name for a system managed object is outside the scope of this Recommendation | International Standard . Examples of names for systems are specified in CCITT Rec. X.720 | ISO/IEC 10165-1.

NOTE- This definition does not correspond to real open system but corresponds to real systems in CCITT Rec. X.200 | ISO 7498.

An instance of this managed object class may be used as the superior in naming managed objects representing either information processing and or information transfer resources contained within this instance.

```
system      MANAGED OBJECT CLASS
DERIVED FROM  top;
CHARACTERIZED BY
systemPackage      PACKAGE
    ATTRIBUTES
systemId GET,
systemTitle      GET,
operationalState GET  usageState      GET;;;

CONDITIONAL PACKAGES
administrativeStatePackage      PACKAGE
ATTRIBUTES
administrativeState      GET-REPLACE ;
REGISTERED AS {smi2Package 14};      PRESENT IF "an instance supports it.",

supportedFeaturesPackage      PACKAGE
ATTRIBUTES
supportedFeatures      GET-REPLACE ADD-REMOVE;
REGISTERED AS {smi2Package 15}; PRESENT IF "an instance supports it.";

REGISTERED AS {smi2MObjectClass 13};
```

6.14 Top

The **top** managed object class, is that class of which every other managed object class is a subclass.

The semantics of the attributes `objectClass`, `packages`, `nameBindings`, and `allomorphs` are defined in CCITT Rec. X.720 I ISO/IEC 10165-1.

top **MANAGED OBJECT CLASS**

CHARACTERIZED BY

topPackage **PACKAGE**

BEHAVIOUR

topBehaviour;

ATTRIBUTES

objectClass **GET,**

nameBinding **GET ;;;**

CONDITIONAL PACKAGES

packagesPackage **PACKAGE**

ATTRIBUTES **packages** **GET;**

REGISTERED AS {smi2Package 16};

PRESENT IF "any registered package, other than this package has been instantiated",

allomorphicPackage **PACKAGE**

ATTRIBUTES

allomorphs **GET;**

REGISTERED AS {smi2Package 17};

PRESENT IF " if an object supports allomorphy" ;

REGISTERED AS {smi2ManagedObject 14};

topBehaviour **BEHAVIOUR**

DEFINED AS "This is the top level of managed object class hierarchy and every other managed object class is a specialization of either this generic class (top) or a specialization of subclass of top. The parameter `miscellaneousError` is to be used when a processing failure has occurred and the error condition encountered does not match any of object's defined specific error types.";

7 Name binding for managed object classes

This clause specifies name bindings for the managed object classes. Additional name bindings may be defined for these managed object classes and their subclasses.

7.1 Discriminator

discriminator-system **NAME BINDING**

SUBORDINATE OBJECT CLASS **discriminator** **AND SUBCLASSES;**

NAMED BY

SUPERIOR OBJECT CLASS **system** **AND SUBCLASSES ;**

WITH ATTRIBUTE **discriminatorId;**

CREATE

WITH-REFERENCE-OBJECT ,

WITH-AUTOMATIC-INSTANCE-NAMING;

DELETE

ONLY-IF-NO-CONTAINED-OBJECTS;

REGISTERED AS {smi2NameBinding 1};

7.2 Log

log-system **NAME BINDING**

SUBORDINATE OBJECT CLASS **log** **AND SUBCLASSES ;**

NAMED BY

SUPERIOR OBJECT CLASS **system** **AND SUBCLASSES ;**

WITH ATTRIBUTE logId;
CREATE
WITH-REFERENCE-OBJECT ,
WITH-AUTOMATIC-INSTANCE-NAMING;
DELETE
ONLY-IF-NO-CONTAINED-OBJECTS;

REGISTERED AS {smi2NameBinding 2};

7.3 Log record

logRecord-log NAME BINDING
SUBORDINATE OBJECT CLASS logRecord AND SUBCLASSES;
NAMED BY
SUPERIOR OBJECT CLASS log AND SUBCLASSES;
WITH ATTRIBUTE
logRecordId;
DELETE
only-if-no-contained-objects;

REGISTERED AS {smi2NameBinding 3};

8 Definition of packages

This Recommendation | International Standard defines a number of packages which are referenced by the System Management Functions of CCITT Recs.X.730 - 736 | ISO/IEC 10164 parts 1 to 7.

8.1 Additional information

The **additionalInformationPackage** package contains the additionalInformation attribute described in CCITT Rec. X.733 | ISO/IEC 10164-4.

additionalInformationPackage PACKAGE
ATTRIBUTES
additionalInformation GET;

REGISTERED AS {smi2Package 18};

8.2 Additional text

The **additionalTextPackage** package contains the additionalText attribute described in CCITT Rec. X.733 | ISO/IEC 10164-4.

additionalTextPackage PACKAGE
ATTRIBUTES
additionalText GET;

REGISTERED AS {smi2Package 19};

8.3 Attribute identifier list

The **attributeIdentifierListPackage** package contains the attributeIdentifierList attribute described in CCITT Rec. X.730 | ISO/IEC 10164-1, CCITT Rec. X.731 | ISO/IEC 10164-2, and CCITT Rec. X.732 | ISO/IEC 10164-3.

attributeIdentifierListPackage PACKAGE
ATTRIBUTES
attributeIdentifierList GET;

REGISTERED AS {smi2Package 20};

8.4 Attribute list

The **attributeListPackage** package contains the **attributeList** attribute described in CCITT Rec. X.730 | ISO/IEC 10164-1.

```
attributeListPackage    PACKAGE
                        ATTRIBUTES
                        attributeList    GET;
```

REGISTERED AS {smi2Package 21};

8.5 Availability status

The **availabilityStatusPackage** package contains the **availabilityStatus** attribute described in CCITT Rec. X.731 | ISO/IEC 10164-2.

```
availabilityStatusPackage PACKAGE
                        BEHAVIOUR
                        availabilityStatusBehaviour    BEHAVIOUR
                        DEFINED AS " This package is described in CCITT Rec. X.734,X.735 | ISO/IEC 10164-5, 10164-6. It is used
                        to indicate the availability of the resource according to a predetermined time schedule." ;;
                        ATTRIBUTES
                        availabilityStatus REQUIRED VALUES Attribute-ASN1Module.SchedulingAvailability    GET;
```

REGISTERED AS {smi2Package 22};

8.6 Correlated notifications

The **correlatedNotificationsPackage** package contains the **correlatedNotifications** attribute described in CCITT Rec. X.733 | ISO/IEC 10164-4.

```
correlatedNotificationsPackage PACKAGE
                        ATTRIBUTES
                        correlatedNotifications    GET;
```

REGISTERED AS {smi2Package 23};

8.7 Notification identifier

The **notificationIdentifierPackage** package contains the **notificationIdentifier** attribute described in CCITT Rec. X.733 | ISO/IEC 10164-4.

```
notificationIdentifierPackage PACKAGE
                        ATTRIBUTES
                        notificationIdentifier    GET;
```

REGISTERED AS {smi2Package 24};

8.8 Daily scheduling

The semantics of **dailyScheduling** package are described in CCITT Rec. X.734 | ISO/IEC 10164-5 and CCITT Rec. X.735 | ISO/IEC 10164-6.

```
dailyScheduling    PACKAGE
                        ATTRIBUTES
                        intervalsOfDay REPLACE-WITH-DEFAULT
                        DEFAULT VALUE Attribute-ASN1Module.defaultIntervalsOfDay
                        GET-REPLACE ADD-REMOVE;
```

REGISTERED AS {smi2Package 25};

8.9 Duration

The semantics of **duration** package are described in CCITT Rec.X.734 | ISO/IEC 10164-5 and CCITT Rec.X.735 | ISO/IEC 10164-6.

```
duration      PACKAGE
              ATTRIBUTES
startTime     GET-REPLACE,
stopTime      REPLACE-WITH-DEFAULT
              DEFAULT VALUE Attribute-ASN1Module.defaultStopTime
              GET-REPLACE;
```

REGISTERED AS {smi2Package 26};

8.10 External scheduler

The semantics of **externalScheduler** package are described in CCITT Rec. X.734 | ISO/IEC 10164-5 and CCITT Rec. X.735 | ISO/IEC 10164-6.

```
externalScheduler  PACKAGE
                  ATTRIBUTES
schedulerName      GET;
REGISTERED AS {smi2Package 27};
```

8.11 Source indicator

The **sourceIndicatorPackage** package contains the **sourceIndicator** attribute described in CCITT Rec. X.730 | ISO/IEC 10164-1, CCITT Rec. X.731 | ISO/IEC 10164-2, and CCITT Rec. X.732 | ISO/IEC 10164-3.

```
sourceIndicatorPackage  PACKAGE
                      ATTRIBUTES
sourceIndicator          GET;
```

REGISTERED AS {smi2Package 28};

8.12 Weekly scheduling

The semantics of **weeklyScheduling** package are described in CCITT Rec.X.734 | ISO/IEC 10164-5 and CCITT Rec.X.735 | ISO/IEC 10164-6.

```
weeklyScheduling  PACKAGE
                  ATTRIBUTES
weekMask          REPLACE-WITH-DEFAULT
                  DEFAULT VALUE Attribute-ASN1Module.defaultWeekMask
                  GET-REPLACE ADD-REMOVE;
```

REGISTERED AS {smi2Package 29};

9 Definition of generic attribute types

This Recommendation | International Standard defines a number of generic attribute types. These are intended to be used in the definition of specific attributes appearing in the definitions of Managed Object Classes.

Each attribute type definition comprises

- the structure of the attribute value;
- the inherent properties of the attribute in terms of its behaviour;
- the permitted matching operations that may be performed on an attribute having this type;
- the ways in which specific attributes having this type relate to other attributes.

An attribute type definition does not include an object identifier. This shall form part of the definition of each of the specific attributes of that type. Definitions of specific attributes may also refine the definition given in the type, for example

- to extend the behaviour definition to relate the behaviour to the operation of the resource represented by the managed object;
- parameters be associated with the attribute.

The template definitions are specified below for each attribute's type. The ASN.1 supporting productions are defined in 14.2.

9.1 Counter

The semantics of the **counter** attribute type are defined below.

Counters are a management abstraction of an underlying counting process. Two types of counters are modelled to meet different needs. The non-settable (or simple) counter is defined to operate autonomously, i.e. not subject to change by Management operation, in order to enable different managing stations to access its information without interference. The settable counter, in contrast, is defined to allow setting or resetting by Management operation, and therefore is more suited to use by a single managing station. Both types are defined as attributes.

A counter is regarded as associated with some internal event, which may be, but is not in general, a defined event represented in management information. The current value is incremented by 1 when this event occurs. It can take any values in its range. When a counter reaches its maximum value, it wraps around and counts upwards from 0; overflow information is not in general retained. An attribute value change notification may be defined for counters with wrap behaviour.

NOTE – The rule that the counter value can increase only in steps of 1 is a descriptive convention that simplifies the description of counter-threshold in 9.3.1. It does not imply that it will always be possible to observe each value in the counter's range, since the events counted may occur in rapid succession.

Not-settable counter-definition

attribute value

- single value.

inherent properties

- current value is a non-negative integer;
- it has a maximum value (see specification properties);
- the counting direction is up, with increment 1;
- the current value wraps around when it reaches its maximum;
- the initial value is 0.

permitted operations

- Get only.

implicit relations

- directly related to a single counter-threshold where applied;
- as an implementation option, may trigger a defined event when it wraps.

specification properties

- the internal event that is counted;
- maximum value;
- "estimated" wrap around period, to indicate necessary reading rate.

Settable counter definition

attribute value

- single value.

inherent properties

- current value is a non-negative integer;
- it has a maximum value (see specification properties);
- the counting direction is up, with increment 1;