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MAINTENANCE: TELECOMMUNICATIONS MANAGEMENT NETWORK

GENERIC NETWORK INFORMATION MODEL

Recommendation M.3100

FOREWORD

The CCITT (the International Telegraph and Telephone Consultative Committee) is a permanent organ of the International Telecommunication Union (ITU). CCITT is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

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CCITT NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized private operating agency.

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Recommendation M.3100

GENERIC NETWORK INFORMATION MODEL

(1992)

Abstract

This Recommendation provides a generic network information model. The model describes managed object classes and their properties that are generic and useful to describe information exchanged across all interfaces defined in Recommendation M.3010 TMN architecture. These generic managed object classes are intended to be applicable across different technologies, architectures and services. The managed object classes in this Recommendations may be specialized to support the management of various telecommunications networks.

Keywords

– Actions;

– ASN.1;

– Attributes;

– Generic Network Information Model;

– Managed Object Class;

– Notifications.

1 Scope, purpose, and field of application

1.1 *Scope*

This Recommendation provides a generic network information model. It identifies TMN object classes that are common to managed telecommunications networks; or are of a generic type that can be used to manage a network at a technology-independent level; or are super-classes of technology-specific managed objects in a telecommuni-cations network; or management support objects that are required for the management of the telecommunications network. These objects are relevant to information exchanged across standardized interfaces defined in Recommen-dation M.3010 [1], Principles for a Telecommunications Management Network.

Recommendation M.3100 addresses generically the abstractions of those aspects of telecommunication resources (e.g. equipment, telecommunication services) required to manage the network. It also includes the abstractions related to the management services.

Recommendation M.3100 does not address abstractions relevant to technology-specific areas or implemen-tation-specific details.

1.2 *Purpose*

1.2.1 *Interoperability*

There will be a variety of TMN conformant management systems and managed systems concerning many technology-specific areas, such as switching and transmission. One purpose of this Recommendation is to provide a vehicle for management interoperability between such systems.

1.2.2 *Technology-independent-management*

By introducing the concept of technology-independent-management, it is possible to perform management of diverse equipment using common communications interfaces. In this manner, an “abstract” view over a set of Network Elements can be achieved.

1.2.3 *Facilitating information model development*

This Recommendation also provides a framework from which technology-specific information models may be developed using the modeling principles defined in Recommendation X.720 [2].

1.3 *Field of application*

This Recommendation captures the generally applicable requirements of the technology-independent and technology-specific information models as well as information relating to TMN management services.

Through specialization, this Recommendation is applicable to technology-specific TMN information models. The mechanism for specialization is inheritance.

Even though technology-specific models may be derived from this Recommendation, some of the generic managed object classes in this Recommendation are instantiable (i.e. instances of the classes may be created) in order to provide interoperability between equipment supporting information models derived from this Recommendation and equipment that only supports the information model in this Recommendation.

1.4 *Structure of this Recommendation*

Section 2 (of this Recommendation) provides an overview of the Generic Network Information Model. The definition of management information in §§ 3 to 8, describing information model is documented using the notational mechanisms defined in Recommendation X.722 [3]. The relationships between the managed object classes for the different fragments of the model in § 3 are depicted using entity relationship diagrams. Section 9 contains the syntax definitions of the information carried in the protocol. The notation used is Abstract Syntax Notation One (ASN.1) defined in Recommendation X.208 [4].

When referencing the definitions for the templates in this Recommendation by other documents, the prefix “Recommendation M.3100”: is recommended to identify the sources for the definitions.

2 Overview of the Generic Network Information Model

A Generic Network Information Model is essential to the generation of uniform fault, configuration, performance, security, and accounting management standards. A common network model, identifying the generic resources that exist in a network and their associated attribute types, events, actions, and behaviour, provides a foundation for understanding the interrelationships between these resources and attributes, and may, in turn, promote uniformity in dealing with the various aspects of managing these resources and attributes.

Network resources may be customer- or provider-owned; the latter includes portions that may be assigned for exclusive use by specific customers. Resources may be physical or logical in nature. Physical resources include customer (e.g. PBXs) or provider (e.g. digital cross connect systems) systems, their associated subsystems (e.g. a line card within a PBX) and also the links that interconnect these systems. Such systems are generally known as Network Elements (NEs). Logical resources include communication protocols, application programs, logs, and network services.

There may also exist (separate or integrated) TMN resources involved in operating a telecommunication network. These resources include the OSs closely associated with managing specific NEs, and OSs that have network-wide responsibilities.

Resources have attributes which allow the user to control and/or observe the behaviour of the resource. Attributes may also allow the user to control and/or observe the relationships between resources.

There is a need to represent the way resources, or entities can be combined and interrelated (relationships). In this version, Entity-Relationship (E-R) diagram techniques have been used to represent inter-object relationships. As these tools are improved, newer ones may be used in future issues.

These E-R diagrams result in a high-level view (schema) of the Generic Network Information Model. This view can be used to derive information related to naming, to verify consistency, and to ensure completeness. For example, it ensures that sufficient information (i.e. relationships) is provided from a physical resource to identify the services that are dependent on that resource.

The information exchanged at the management interface is modelled using design principles outlined in Recommendation X.720 [2], Management Information Model. Resources are modelled as objects, and the manage-ment view of a resource is called a managed object. Additional objects, called support managed objects, are defined to support the functions of managing a telecommunication network.

Objects with similar attributes and behaviours may be grouped into object classes. An object is characterized by its object class and object instance, and may possess multiple attribute types and associated values. Similarly, the terms managed object class and managed object instance apply specifically to objects that are being managed. This Recommendation specifies the properties of the resource (i.e. managed object) visible for management.

An object class may be a subclass of another object class. A subclass inherits attribute types and behaviours of its super-class, in addition to possessing its own specific attributes and properties.

Object classes and attribute types are defined only for the purpose of communicating network management messages between systems, and need not be related to the structuring of data within these systems. Some object classes defined in this issues (and future issues) of the model apply to many management functional areas, while others support specific functional areas.

This version of the Generic Network Information Model contains common object classes and attribute types as well as those particular to alarm surveillance. Subsequent issues of this Recommendation will augment the list of object classes, attribute types, and operations in order to further accommodate other functional areas.

Annex A contains an index of managed object classes, packages, attributes, notifications and actions defined in this Recommendation.

There are several different viewpoints of management information which may be defined for management purposes, with the NE level viewpoint, the network level viewpoint and the service level viewpoint defined below. These viewpoints are not restrictive but define the levels of abstraction of particular types of interfaces. That is, object class definitions are not forced into this categorization but are constructed to meet the needs of exchanging management information across TMN interfaces. Objects defined for a given viewpoint may be used in others, and any object may be used by any interface which requires it. The definition of viewpoint is a means of generating requirements, hence there is no implicit definition of interfaces or storage requirements. This information is defined for the purpose of management via an open interface.

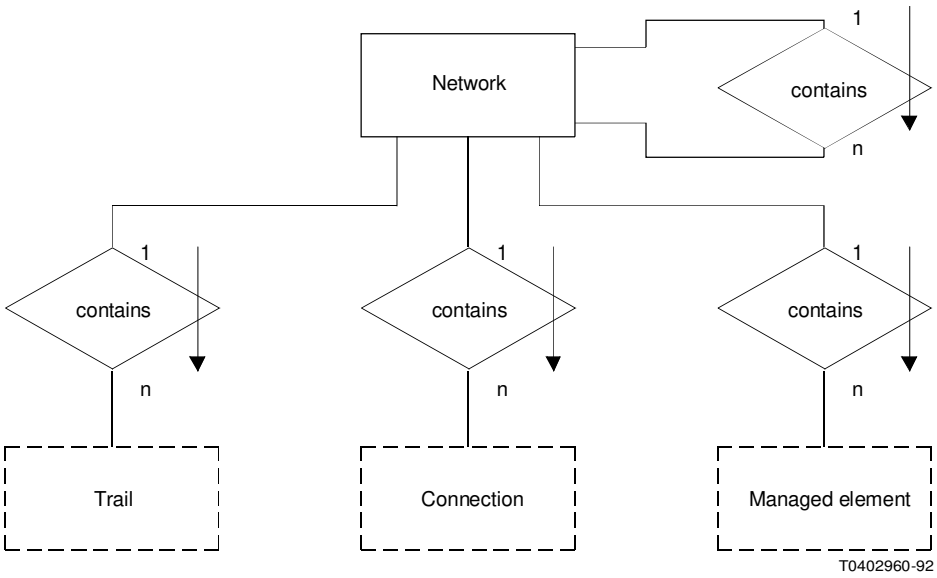
The NE level viewpoint is concerned with the information that is required to manage an NE. This refers to the information required to manage the Network Element Function (NEF) and the physical aspects of the NE. The information may be derived from open systems other than the NE.

The network level viewpoint is concerned with the information representing the network, both physically and logically. It is concerned with how network element entities are related, topographically interconnected, and configured to provide and maintain end-to-end connectivity.

The service level viewpoint is concerned with how network level aspects (such as an end-to-end path) are utilized to provide a network service, and as such is concerned with the requirements of a network service (e.g. availability, cost, etc.) and how these requirements are met through the use of the network, and all related customer information.

3 Object Classes

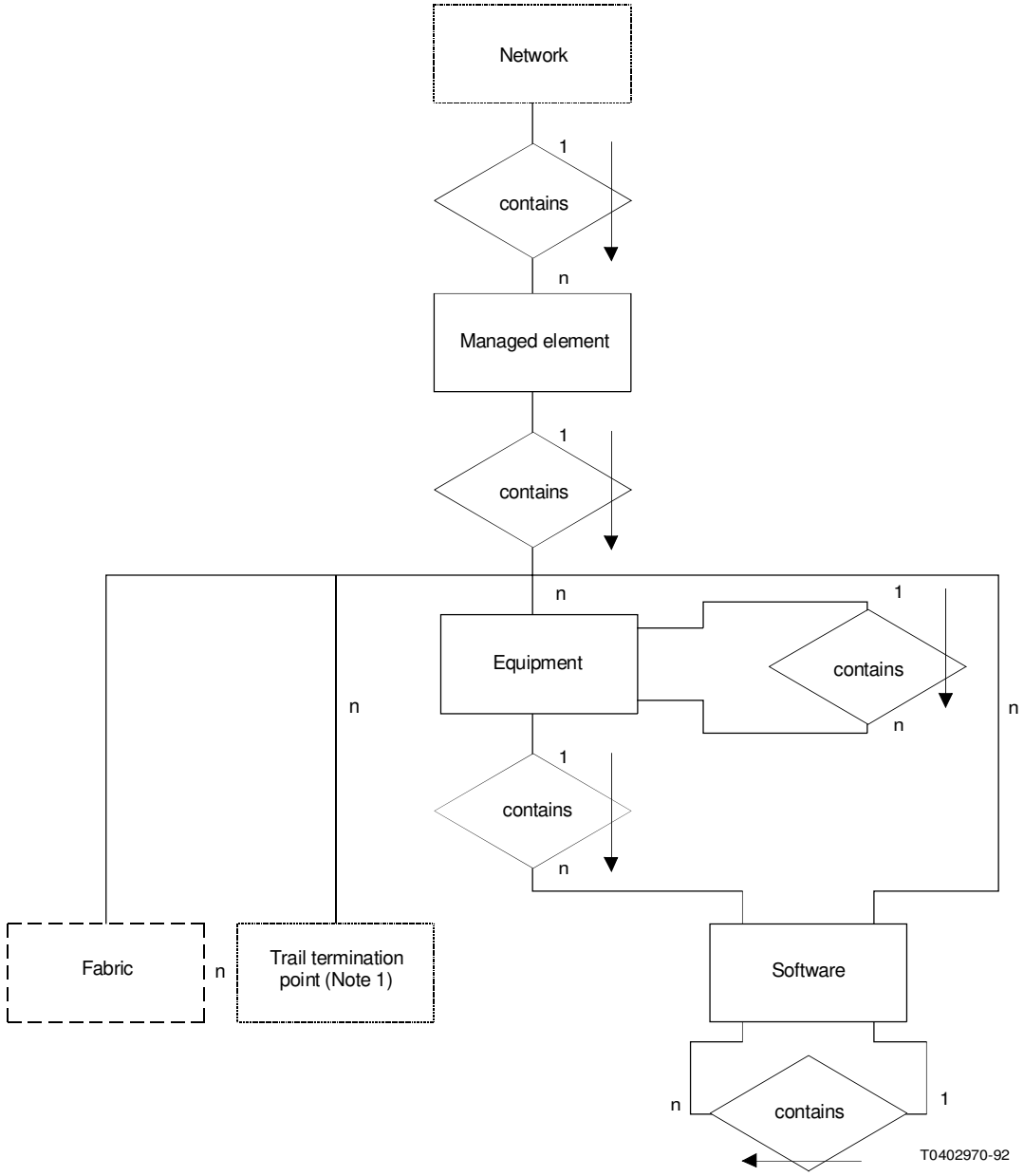
This section contains the definitions of the object classes that form the basis for the Generic Network Information Model. These object classes are grouped into 6 fragments and they are depicted in Figures 1/M.3100 to 6/M.3100. These fragments show all related object classes from different perspectives. Additional fragments and object classes for each fragment are for further study. The inheritance hierarchy of this model is presented in Figure 7/M.3100.



Note – Object classes contained in dotted boxes may be found in other views.

FIGURE 1/M.3100

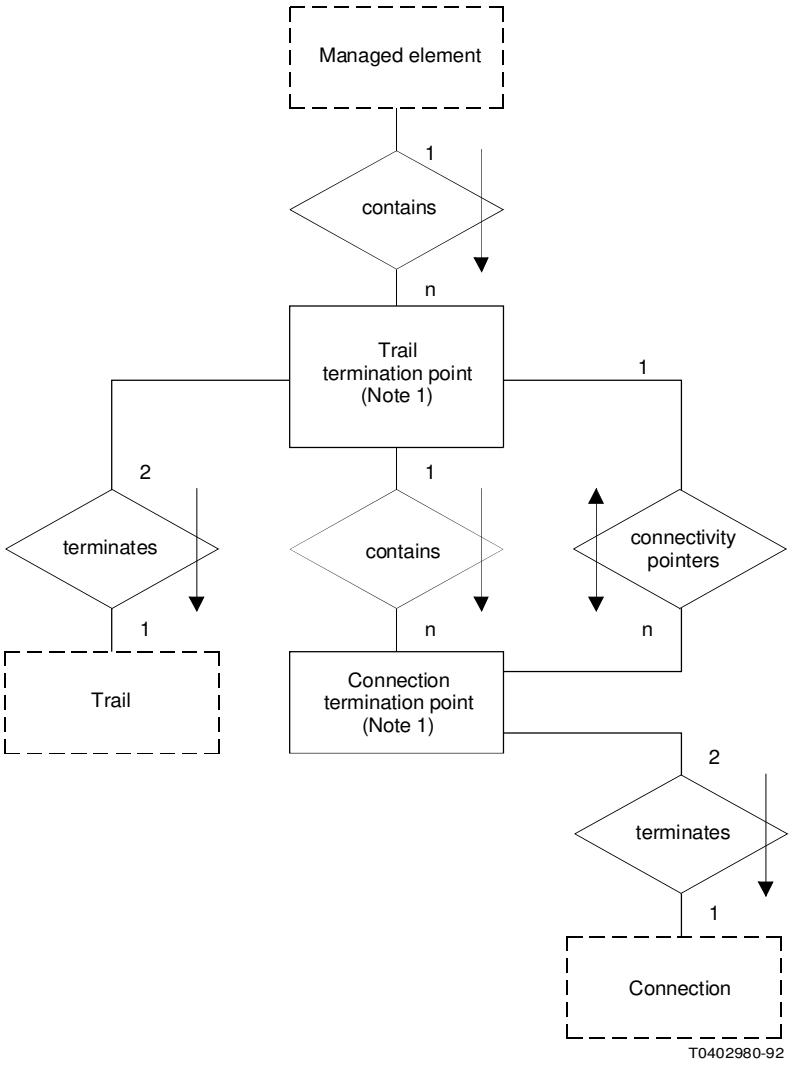
Entity-relationship depiction of the Network Fragment



Note 1 – Represents source, sink and bidirectional object classes.
Note 2 – Object classes contained in dotted boxes may be found in other views.

FIGURE 2/M.3100

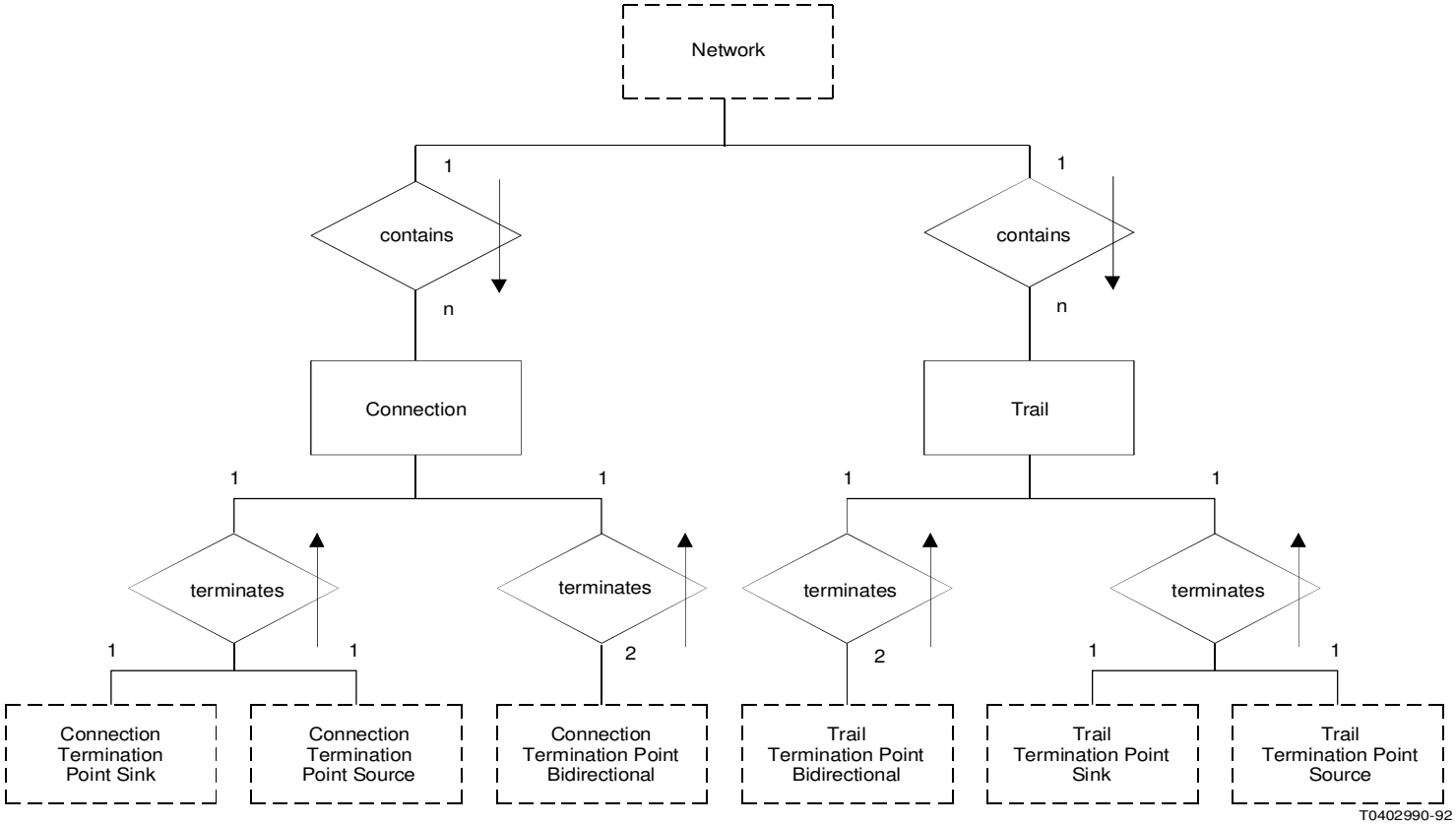
Entity-relationship depiction of the Managed Element Fragment



Note 1 – Represents source, sink and bidirectional classes.
Note 2 – Object classes contained in dotted boxes may be found in other views.

FIGURE 3/M.3100

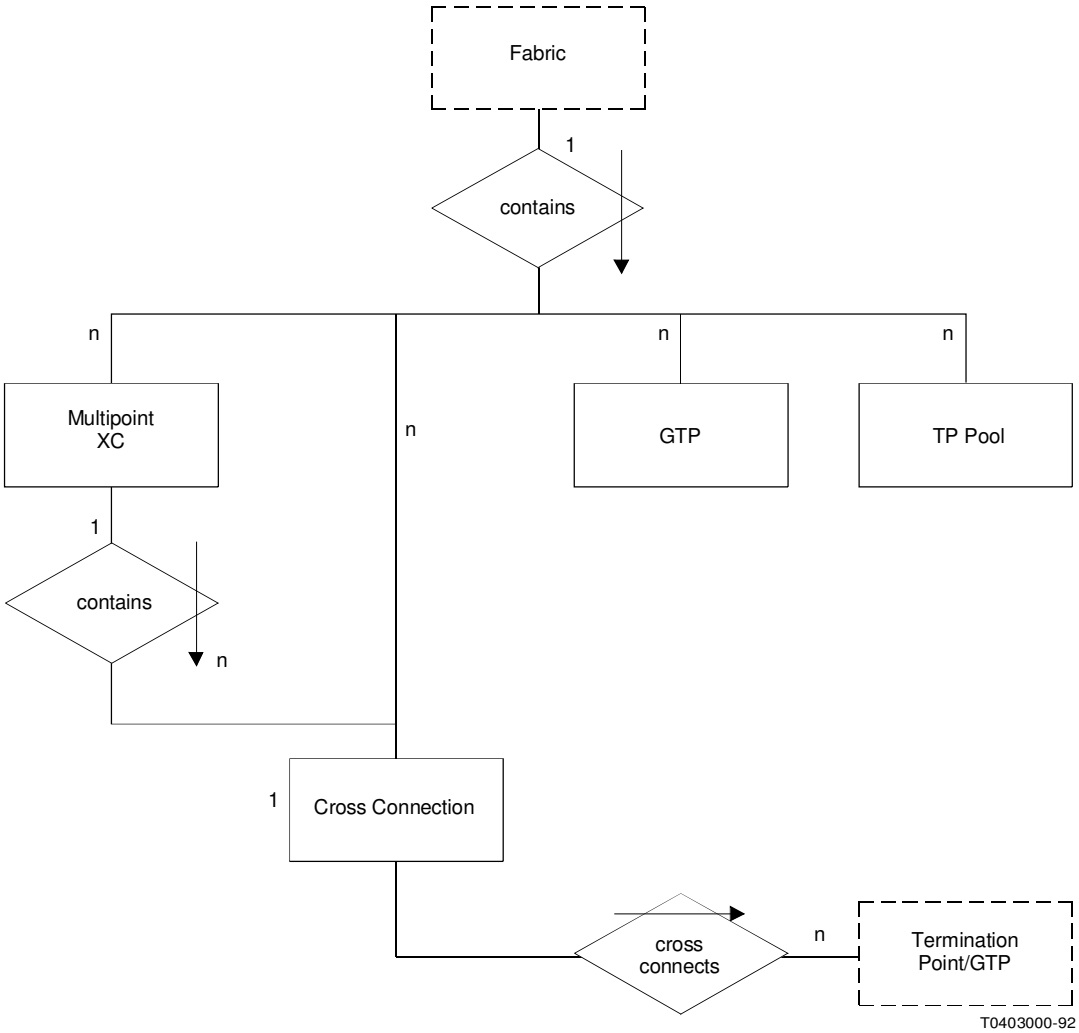
Entity-relationship depiction of Termination Point Fragment



Note – Object classes contained in dotted boxes may be found in other views.

FIGURE 4/M.3100

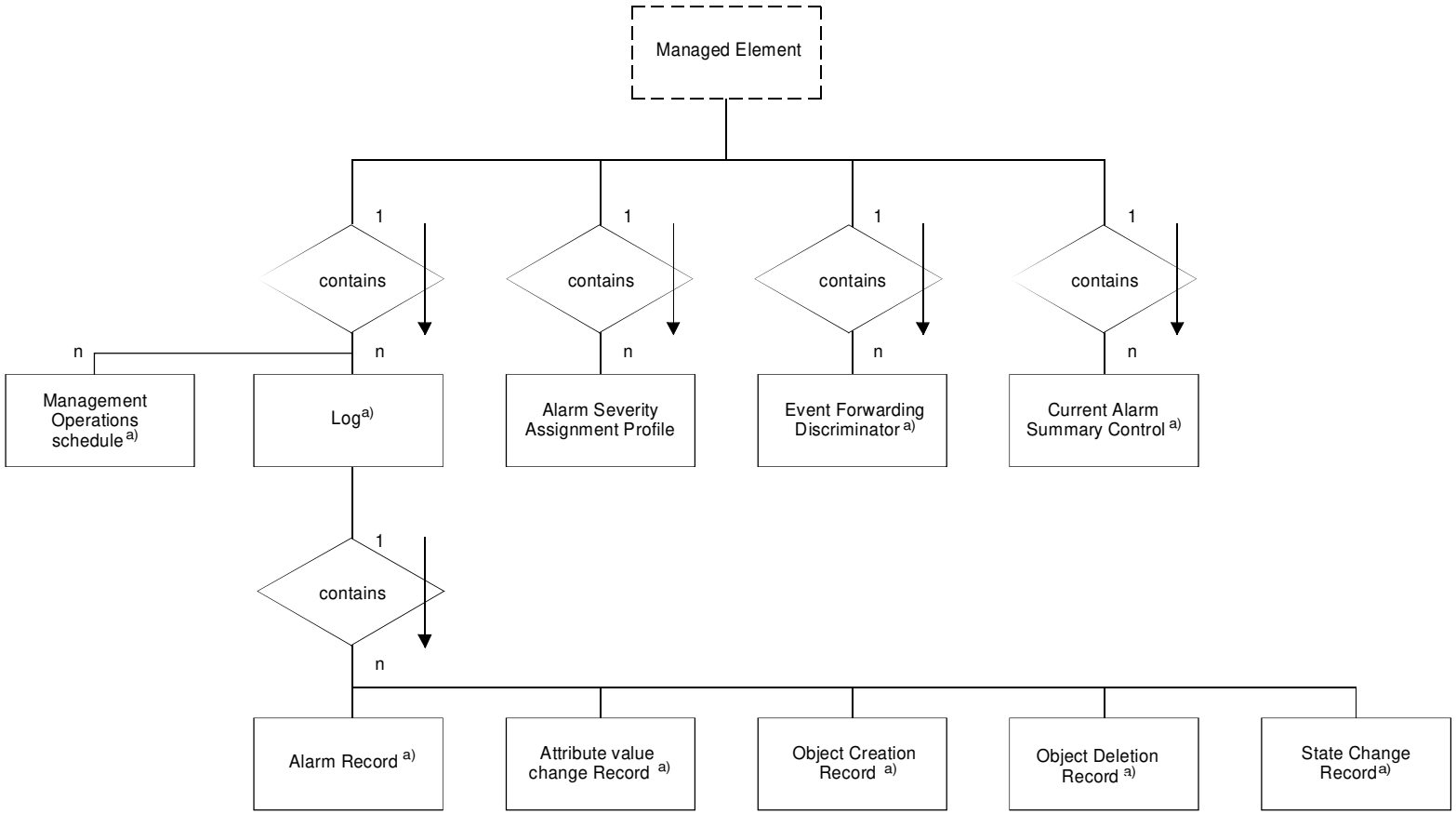
Entity-relationship depiction of Transmission Fragment



Note – Object classes (Termination point subclasses or GTP) contained in dotted boxes may be found in other views.

FIGURE 5/M.3100

Entity-Relationship depiction of Cross Connection Fragment

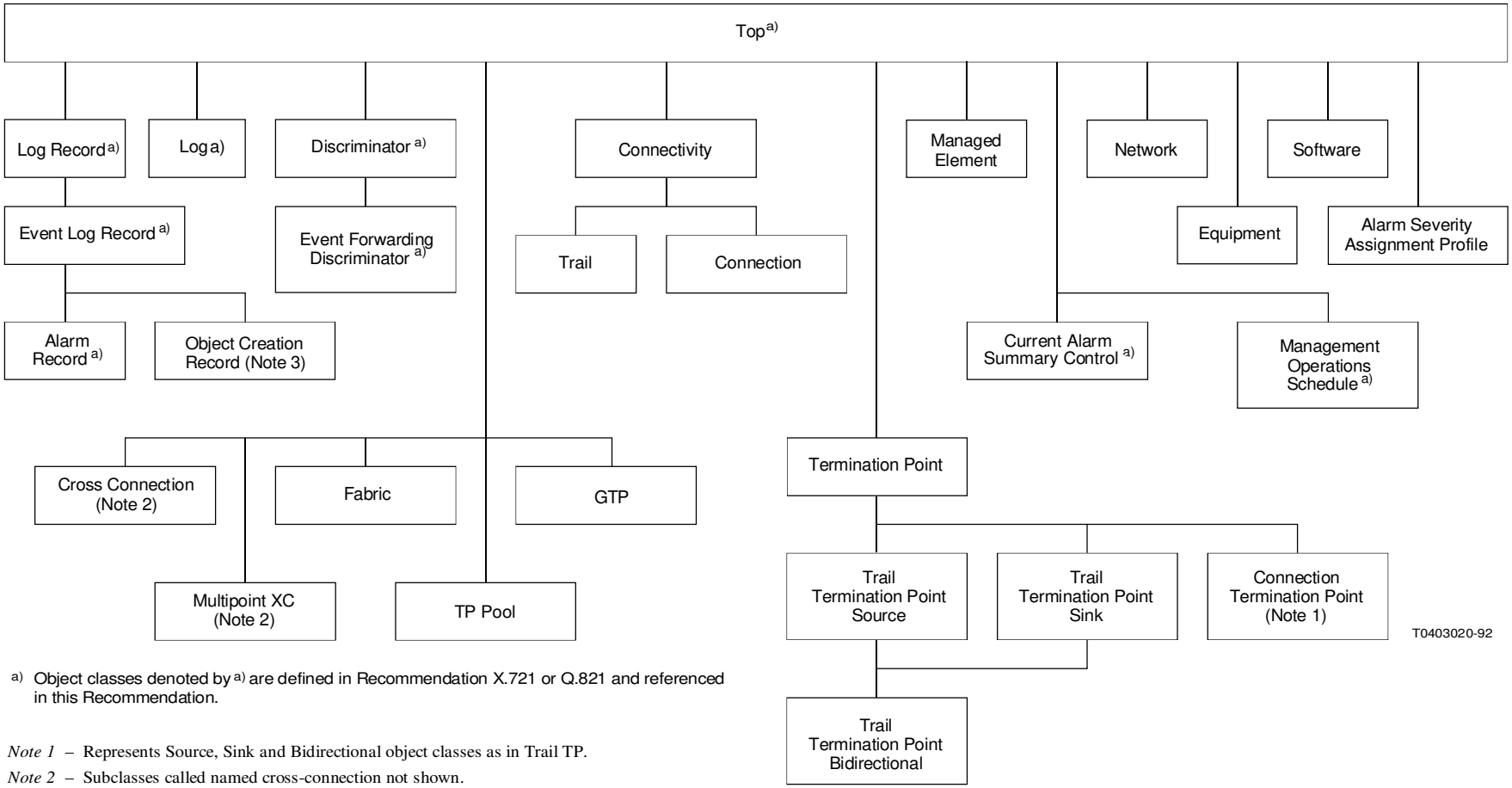


a) Object classes denoted by a) are defined in Recommendation X.721 or Q.821 and referenced in this Recommendation.

Note – Object classes contained in dotted boxes may be found in other views.

FIGURE 6/M.3100

Entity-Relationship depiction of the Functional Area Fragment



a) Object classes denoted by a) are defined in Recommendation X.721 or Q.821 and referenced in this Recommendation.

Note 1 – Represents Source, Sink and Bidirectional object classes as in Trail TP.

Note 2 – Subclasses called named cross-connection not shown.

Note 3 – Other Records not shown.

FIGURE 7/M.3100

Inheritance hierarchy

The purpose of defining fragments is only to have a document that is easier to read by grouping a limited number of object class definitions. Each fragment deals with a particular subject (e.g. network, managed element, transmission, support objects) but object classes of each fragment will be usable in various models depending on the functional area managed and/or on the level viewpoint considered.

Table 1/M.3100 lists the object classes defined or referenced in this Recommendation.

TABLE 1/M.3100

Managed Object Classes

Object Classes
Alarm Record[a)]
Alarm Severity Assignment Profile
Attribute Value Change Record[a)]
Connection
Connection Termination Point Bidirectional
Connection Termination Point Sink
Connection Termination Point Source
Connectivity
Cross-Connection
Current Alarm Summary Control[a)]
Discriminator[a)]
Equipment
Event Forwarding Discriminator[a)]
Event Log Record[a)]
Fabric
Group Termination Point
Log[a)]
Log Record[a)]
Managed Element
Management Operations Scheduler[a)]
Multipoint Cross-Connection
Named Cross-Connection
Named Multipoint Cross-ConnectionNetwork
Network
Object Creation Record[a)]
Object Delection Record[a)]
Software
State Change Record[a)]
Termination Point
TP Pool
Trail
Trail Termination Point Bidirectional
Trail Termination Point Sink
Trail Termination Point Source

Note – Object classes denoted by [a)] are defined in other Recommendations and referenced in this Recommendation.

3.1 *Network Fragment*

Managed object classes in network fragment are presented in Figure 1/M.3100. The definition(s) of the managed object class(es) are specified as follows:

3.1.1 *Network*

network MANAGED OBJECT CLASS

DERIVED FROM "Recommendation X.721: 1992":top;

CHARACTERIZED BY

networkPackage PACKAGE

BEHAVIOUR

networkDefinition;

ATTRIBUTES

networkId GET;;;

CONDITIONAL PACKAGES

userLabelPackage PRESENT IF "an instance supports it";

REGISTERED AS { m3100ObjectClass 1 };

networkDefinition BEHAVIOUR

DEFINED AS

"The Network object class is a class of managed objects that are collections of interconnected telecommunications and management objects (logical or physical) capable of exchanging information. These objects have one or more common characteristics, for example they may be owned by a single customer or provider, or associated with a specific service network. A network may be nested within another (larger) network, thereby forming a containment relationship. An example of a network that is contained in another network is a transmission sub-network. It is owned by a single administration and can only perform trans-mission functions.";

3.2 *Managed Element Fragment*

Managed object classes in managed element fragment are presented in Figure 2/M.3100. The definition(s) of the managed object class(es) are specified as follows:

3.2.1 *Equipment*

equipment MANAGED OBJECT CLASS

DERIVED FROM "Recommendation X.721: 1992":top;

CHARACTERIZED BY

equipmentPackage PACKAGE

BEHAVIOUR

equipmentBehaviour BEHAVIOUR
DEFINED AS

"The Equipment object class is a class of managed objects that represents physical components of a managed element, including replaceable components. An instance of this object class is present in a single geographic location. An equipment may be nested within another equipment, thereby creating a containment relationship. The equipment type shall be identified by sub-classing this object class. Either the name of the sub-class or an attribute may be used for identifying the equipment type.

When the attribute value change notification package is present, the attributeValueChange notification defined in Recommendation X.721 shall be emitted when the value of one of the following atrributes changes: alarm status, affected object list, user label, version, location name and current problem list. Because the above attributes are all in conditional packages, the behaviour for emitting the attribute

value change notification applies only when the corresponding conditional packages are present in the managed object. When the state change notification package is present, the stateChangeNotification defined in Recommendation X.721 shall be emitted if the value of administrative state or operational state changes (when the administrativeOperationalStates conditional package is present).";;

ATTRIBUTES

equipmentId GET,

replaceable GET;

;;

CONDITIONAL PACKAGES

createDeleteNotificationsPackage PRESENT IF "the objectCreation and objectDeletion notifications defined in Recommendation X.721 are supported by an instance of this class.",

attributeValueChangeNotificationPackage PRESENT IF "the attributeValueChange notification defined in Recommendation X.721 is supported by an instance of this class.",

stateChangeNotificationPackage PRESENT IF "the stateChange notification defined in Recommendation X.721 is supported by an instance of this class.",

administrativeOperationalStatesPackage PRESENT IF "an instance supports it.",

affectedObjectListPackage PRESENT IF "an instance supports it.",

equipmentEquipmentAlarmPackage PRESENT IF "the equipmentAlarm notification defined in Recommendation X.721 is supported by an instance of this class.",

environmentalAlarmPackage PRESENT IF "the environmentalAlarm notification defined in Recommendation X.721 is supported by an instance of this class.",

tmnCommunicationsAlarmInformationPackage PRESENT IF "the communicationsAlarm notification defined in Recommendation X.721 is supported by an instance of this class.",

processingErrorAlarmPackage PRESENT IF "the processingErrorAlarm notification defined in Recommendation X.721 is supported by an instance of this class.",

userLabelPackage PRESENT IF "an instance supports it",

vendorNamePackage PRESENT IF "an instance supports it",

versionPackage PRESENT IF "an instance supports it",

locationNamePackage PRESENT IF "an instance supports it",

currentProblemListPackage PRESENT IF "an instance supports it";

REGISTERED AS { m3100ObjectClass 2 };

3.2.2 *Managed Element*

managedElement MANAGED OBJECT CLASS

DERIVED FROM "Recommendation X.721: 1992":top;

CHARACTERIZED BY

managedElementPackage PACKAGE

BEHAVIOUR

managedElementBehaviour BEHAVIOUR

DEFINED AS

"The Managed Element object class is a class of managed objects representing telecommuni-cations equipment or TMN entities (either groups or parts) within the telecommunications network that performs managed element functions, i.e. provides support and/or service to the subscriber. Managed elements may or may not additionally perform mediation/OS functions. A managed element communicates with the manager over one or more standard Q-interfaces for the purpose of being monitored and/or controlled. A managed element contains equipment that may or may not be geographically distributed.

When the attribute value change notification package is present, the attributeValueChange notification defined in Recommendation X.721 shall be emitted when the value of one of the following attributes changes: alarm status, user label, version, location name and current problem list. For the above attributes that are in conditional packages, the behaviour for emitting the

attribute value change notification applies only when the corresponding conditional packages are present in the managed object. When the state change notification package is present, the stateChangeNotification defined in Recommendation X.721 shall be emitted if the value of administrative state or operational state or usage state changes."

; ;

ATTRIBUTES

managedElementId GET,

"Recommendation X.721: 1992":systemTitle GET-REPLACE,

alarmStatus GET,

"Recommendation X.721: 1992":administrativeState GET-REPLACE,

"Recommendation X.721: 1992":operationalState GET,

"Recommendation X.721: 1992":usageState GET;

NOTIFICATIONS

"Recommendation X.721: 1992":environmentalAlarm,

"Recommendation X.721: 1992":equipmentAlarm,

"Recommendation X.721: 1992":communicationsAlarm,

"Recommendation X.721: 1992":processingErrorAlarm;;;

CONDITIONAL PACKAGES

createDeleteNotificationsPackage PRESENT IF "the objectCreation and objectDeletion notifications defined in Recommendation X.721 are supported by an instance of this class.",

attributeValueChangeNotificationPackage PRESENT IF "the attributeValueChange notification defined in Recommendation X.721 is supported by an instance of this class.",

stateChangeNotificationPackage PRESENT IF "the stateChange notification defined in Recommendation X.721 is supported by an instance of this class.",

audibleVisualLocalAlarmPackage PRESENT IF "an instance supports it",

resetAudibleAlarmPackage PRESENT IF "an instance supports it",

userLabelPackage PRESENT IF "an instance supports it",

vendorNamePackage PRESENT IF "an instance supports it",

versionPackage PRESENT IF "an instance supports it",

locationNamePackage PRESENT IF "an instance supports it",

currentProblemListPackage PRESENT IF "an instance supports it",

externalTimePackage PRESENT IF "an instance supports it",

systemTimingSourcePackage PRESENT IF "an instance supports it";

REGISTERED AS { m3100ObjectClass 3 };

3.2.3 *Software*

software MANAGED OBJECT CLASS

DERIVED FROM "Recommendation X.721: 1992":top;

CHARACTERIZED BY

softwarePackage PACKAGE

BEHAVIOUR

softwareBehaviour BEHAVIOUR

DEFINED AS

"The Software object class is a class of managed objects that represent logical information stored in equipment, including programs and data tables. Software may be nested within other software, thereby creating a containment relationship.

When the attribute value change notification package is present, the attributeValueChange notification defined in Recommendation X.721 shall be emitted when the value of one of the following atrributes changes: alarm status, affected object list, user label, version, and current problem list. Because the above attributes are all in conditional packages, the behaviour for emitting the attribute value change notification applies only when the corresponding conditional

packages are present in the managed object. When the state change notification package is present, the stateChangeNotification defined in Recommendation X.721 shall be emitted if the value of administrative state or operational state changes (when the administrativeOpera-tionalStates conditional package is present).”

;;

ATTRIBUTES

softwareId GET;

;;

CONDITIONAL PACKAGES

createDeleteNotificationsPackage PRESENT IF "the objectCreation and objectDeletion notifications defined in Recommendation X.721 are supported by an instance of this class.",

attributeValueChangeNotificationPackage PRESENT IF "the attributeValueChange notification defined in Recommendation X.721 is supported by an instance of this class.",

stateChangeNotificationPackage PRESENT IF "the stateChange notification defined in Recommendation X.721 is supported by an instance of this class.",

administrativeOperationalStatesPackage PRESENT IF "an instance supports it.",

affectedObjectListPackage PRESENT IF "an instance supports it.",

softwareProcessingErrorAlarmPackage PRESENT IF "an instance supports it.",

userLabelPackage PRESENT IF "an instance supports it",

vendorNamePackage PRESENT IF "an instance supports it",

versionPackage PRESENT IF "an instance supports it",

currentProblemListPackage PRESENT IF "an instance supports it";

REGISTERED AS { m3100ObjectClass 4 };

3.3 *Termination Point Fragment*

Managed object classes in termination point fragment are presented in Figure 3/M.3100. The behaviour definition(s) of the managed object class(es) are specified as follows:

3.3.1 *Connection Termination Point Bidirectional*

The Connection Termination Point Bidirectional object class is a class of managed objects that originates a link connection and terminates a link connection. Technology specific connection termination bidirectional sub-classes are derived by multiple inheritance from this object class and corresponding technology specific source and sink object classes.

connectionTerminationPointBidirectional MANAGED OBJECT CLASS

DERIVED FROM

connectionTerminationPointSource,

connectionTerminationPointSink;

REGISTERED AS { m3100ObjectClass 5 };

3.3.2 *Connection Termination Point Sink*

The Connection Termination Point Sink object class is a class of managed objects that terminates a link connection.

connectionTerminationPointSink MANAGED OBJECT CLASS

DERIVED FROM terminationPoint;

CHARACTERIZED BY

connectionTerminationPointSinkPackage PACKAGE

BEHAVIOUR

connectionTerminationPointSinkBehaviour BEHAVIOUR

DEFINED AS

“This managed object terminates a link connection. The downstream connectivity pointer attribute points to the termination point managed object, within the same managed element, that receives information (traffic) from this termination point at the same layer, or is null. The referenced object shall be an instance of one of the following classes or its sub-classes: Trail

Termination Point Sink, Trail Termination Point Bidirectional, Connection Termination Point Source, Connection Termination Point Bidirectional. The downstream connectivity pointer may identify one or more objects depending on whether the signal is connected to one or more termination point objects."

;;

ATTRIBUTES

downstreamConnectivityPointer PERMITTED VALUES

-- The allowed choices for the syntax of this attribute are restricted in the subtype

-- CTPDownstreamPointer

ASN1DefinedTypesModule.CTPDownstreamPointer GET;;;

CONDITIONAL PACKAGES

ctpInstancePackage PRESENT IF "the name binding used to create an instance of this object class requires this attribute.",

channelNumberPackage PRESENT IF "an instance supports it";

REGISTERED AS { m3100ObjectClass 6 };

3.3.3 *Connection Termination Point Source*

The Connection Termination Point Source object class is a class of managed objects that originates a link connection.

connectionTerminationPointSource MANAGED OBJECT CLASS

DERIVED FROM terminationPoint;

CHARACTERIZED BY

connectionTerminationPointSourcePackage PACKAGE

BEHAVIOUR

connectionTerminationPointSourceBehaviour BEHAVIOUR

DEFINED AS

"This managed object originates a link connection. The upstream connectivity pointer attribute points to the termination point managed object, within the same managed element, that sends information (traffic) to this termination point at the same layer, or is null. The referenced object shall be an instance of one of the following classes or its sub-classes: Trail Termination Point Source, Trail Termination Point Bidirectional, Connection Termination Point Sink, Connection Termination Point Bidirectional."

;;

ATTRIBUTES

upstreamConnectivityPointer PERMITTED VALUES

-- The allowed choices for the syntax of this attribute are restricted in the subtype

-- CTPUpstreamPointer

ASN1DefinedTypesModule.CTPUpstreamPointer GET

;;;

CONDITIONAL PACKAGES

ctpInstancePackage PRESENT IF "the name binding used to create an instance of this object class requires this attribute.",

channelNumberPackage PRESENT IF "an instance supports it";

REGISTERED AS { m3100ObjectClass 7 };

3.3.4 *Termination Point*

The Termination Point object class is a class of managed objects that terminates transport entities, such as trails and connections. This object class is a basic object class from which sub-classes, such as trail termination and connection termination point are derived. The use of operational state is further refined in sub-classes of this class. This is an uninstantiable managed object class.

terminationPoint MANAGED OBJECT CLASS

DERIVED FROM "Recommendation X.721: 1992":top;

CHARACTERIZED BY

terminationPointPackage PACKAGE

BEHAVIOUR

terminationPointBehaviour BEHAVIOUR

DEFINED AS

"This managed object represents the termination of a transport entity, such as a trail or a connection. The characteristic information attribute is used to identify equivalence between sub-classes of termination points in order to determine whether cross connection or connectivity is possible. The operational state reflects the perceived ability to generate and/or receive a valid signal. Sub-classes of termination point shall specify the attributes and states for which attribute value change and state change notifications will be generated."

;;

ATTRIBUTES

supportedByObjectList GET;;;

CONDITIONAL PACKAGES

createDeleteNotificationsPackage PRESENT IF

"the objectCreation and objectDeletion notifications defined in Recommendation X.721 are supported by an instance of this managed object class",

attributeValueChangeNotificationPackage PRESENT IF

"the attributeValueChange notification defined in Recommendation X.721 is supported by an instance of this managed object class",

stateChangeNotificationPackage PRESENT IF

"the stateChange notification defined in Recommendation X.721 is supported by an instance of this managed object class",

operationalStatePackage PRESENT IF

"the resource represented by this managed object is capable of assessing the ability to generate and/or receive a valid signal.",

crossConnectionPointerPackage PRESENT IF

"the termination point can be flexibly assigned, (i.e. cross connected).",

characteristicInformationPackage PRESENT IF

"an instance supports it.",

networkLevelPackage PRESENT IF "an instance supports it",

tmnCommunicationsAlarmInformationPackage PRESENT IF

"the communicationsAlarm notification (as defined in Recommendation X.721) is supported by this managed object",

alarmSeverityAssignmentPointerPackage PRESENT IF

"the tmnCommunicationsAlarmInformationPackage package is present AND the managed object supports configuration of alarm severities";

REGISTERED AS { m3100ObjectClass 8 };

3.3.5 *Trail Termination Point Bidirectional*

The Trail Termination Point Bidirectional object class is a class of managed objects representing a termination point where one trail is originated and another trail is terminated. It represents the access point in a layer network which is a focus for both the trail relationship and the client/server relationship. These concepts are defined in Recommendation G.803 [6]. Sub-classes of this generic super-class include in addition the overhead interpretation aspects of trail termination function described in Recommendation G.803 [6]. Technology specific (e.g. PDH, SDH) trail termination bidirectional object classes may be defined directly as sub-classes of this class and corresponding source and sink object classes using multiple inheritance.

trailTerminationPointBidirectional MANAGED OBJECT CLASS

DERIVED FROM trailTerminationPointSource, trailTerminationPointSink;

CHARACTERIZED BY

trailTerminationPointBidirectionalPackage PACKAGE

BEHAVIOUR

trailTerminationPointBidirectionalBehaviour BEHAVIOUR

DEFINED AS

"The operational state is disabled if either the sink or source part of the termination point is disabled."

;;;;

REGISTERED AS { m3100ObjectClass 9 };

3.3.6 *Trail Termination Point Sink*

The Trail Termination Point Sink object class is a class of managed objects representing a termination point where a trail is terminated. It represents the access point in a layer network which is a focus for both the trail relationship and the client/server relationship. These concepts are defined in Recommendation G.803 [6]. Sub-classes of this generic superclass include in addition the overhead interpretation aspects of the trail termination function described in Recommendation G.803 [6].

trailTerminationPointSink MANAGED OBJECT CLASS

DERIVED FROM terminationPoint;

CHARACTERIZED BY

operationalStatePackage,

trailTerminationPointSinkPackage PACKAGE

BEHAVIOUR

trailTerminationPointSinkBehaviour BEHAVIOUR

DEFINED AS

"This managed object represents a termination point where a trail is terminated. It represents the access point in a layer network which is a focus for both the trail relationship and the client/server relationship.

The operational state reflects the perceived ability to receive a valid signal. If the termination point detects that a signal received has failed or it is unable to process the incoming signal, then the operational state will have the value disabled.

When the administrative state is locked, the termination point is administratively removed from service. When the administrative state is unlocked, the termination point is administratively in service. Changes to administrative state have no effect on the connectivity pointer.

A change in the operational state shall cause a state change notification. If administrative state is present in an instance of trail termination point sink class, it shall not emit a state change notification. However, sub-classes of trail termination point sink class may modify this behaviour to require this notification. Sub-classes of trail termination point sink shall specify the attributes for which attribute value change notifications should be generated.

The upstream connectivity pointer attribute points to the termination point managed object, within the same managed element, that sends information (traffic) to this termination point at the same layer, or is null. The referenced object shall be an instance of one of the following classes or its sub-classes: Connection Termination Point Sink or Bidirectional (single or a concatenated sequence) or Trail Termination Point Source or Bidirectional."

;;

ATTRIBUTES

upstreamConnectivityPointer GET ;;;

CONDITIONAL PACKAGES

"Recommendation X.721: 1992":administrativeStatePackage PRESENT IF

"the resource represented by the managed object is capable of being administratively placed in and out of service",

supportableClientListPackage PRESENT IF

"the object class can support more than one type of client",

ttpInstancePackage PRESENT IF

"the name binding used to create an instance of this object class requires this attribute.";

REGISTERED AS { m3100ObjectClass 10 };

3.3.7 *Trail Termination Point Source*

The Trail Termination Point Source object class is a class of managed objects representing a termination point where a trail is originated. It represents the access point in a layer network which is a focus for both the trail relationship and the client/server relationship. These concepts are defined in Recommendation G.803 [6].

trailTerminationPointSource MANAGED OBJECT CLASS

DERIVED FROM terminationPoint;

CHARACTERIZED BY

operationalStatePackage,

trailTerminationPointSourcePackage PACKAGE

BEHAVIOUR

trailTerminationPointSourceBehaviour BEHAVIOUR

DEFINED AS

"This managed object represents a termination point where a trail is originated. It represents the access point in a layer network which is a focus for both the trail relationship and the client/server relationship.

The operational state reflects the perceived ability to generate a valid signal. If the termination point detects that a valid signal can not be generated, then the operational state will have the value disabled.

When the administrative state is locked, the termination point is administratively removed from service. When the administrative state is unlocked, the termination point is administratively in service. Changes to administrative state have no effect on the connectivity pointer.

A change in the operational state shall cause a state change notification. If administrative state is present in an instance of trail termination point source class, it shall not emit a state change notification. However, sub-classes of trail termination point source class may modify this behaviour to require this notification. Sub-classes of trail termination point source shall specify the attributes for which attribute value change notifications should be generated.

The downstream connectivity pointer attribute points to the termination point managed object, within the same managed element, that receives information (traffic) from this termination point at the same layer, or is null. The referenced object shall be an instance of one of the following

classes or its sub-classes: Connection Termination Point Source or Bidirectional (single or a concatenated sequence or a set if connected to more than one connection termination point source objects) or Trail Termination Point Sink or Bidirectional (single or a set if connected to more than one trail termination point sink objects)."

;;

ATTRIBUTES

downstreamConnectivityPointer GET;;;

CONDITIONAL PACKAGES

"Recommendation X.721: 1992":administrativeStatePackage PRESENT IF

"the resource represented by the managed object is capable of being administratively placed in and out of service",

supportableClientListPackage PRESENT IF

"the object class can support more than one type of client",

ttpInstancePackage PRESENT IF

"the name binding used to create an instance of this object class requires this attribute.";

REGISTERED AS { m3100ObjectClass 11 };

3.4 *Transmission Fragment*

Object classes in transmission fragment are presented in Figure 4/M.3100. The behavior definition(s) of the object class(es) are specified as follows:

3.4.1 *Connection*

connection MANAGED OBJECT CLASS

DERIVED FROM connectivity;

CHARACTERIZED BY

connectionPackage PACKAGE

BEHAVIOUR

connectionBehaviour BEHAVIOUR

DEFINED AS

"The Connection object class is a class of managed objects responsible for the transparent transfer of information between connection termination points. A connection is a component of a trail.

Several connections can be bundled into a higher rate trail. A sequence of one or more connections are linked together to form a trail. A connection may be either uni- or bi-directional."

;;

ATTRIBUTES

connectionId GET;;;

CONDITIONAL PACKAGES

serverTrailListPackage PRESENT IF "an instance supports it",

clientTrailPackage PRESENT IF "an instance supports it";

REGISTERED AS { m3100ObjectClass 12 };

3.4.2 *Connectivity*

connectivity MANAGED OBJECT CLASS

DERIVED FROM "Recommendation X.721: 1992":top;

CHARACTERIZED BY

connectivityPackage PACKAGE

BEHAVIOUR

connectivityBehaviour BEHAVIOUR

DEFINED AS

"The Connectivity object class is a class of managed objects which ensures the transfer of information between two termination points. It is not instantiable because the transfer is effected via the client-server relationship of trail and connection. Connectivity direction is determined by the directionality of the a and z termination points.

If an instance of this class is bidirectional, the a and z termination points shall also be bidirectional. If an instance of this class is unidirectional, the a point shall be the source TP and the z-termination point shall be the sink TP.

The operational state indicates the capability to carry a signal."

;;

ATTRIBUTES

directionality GET,

"Recommendation X.721: 1992":administrativeState GET-REPLACE,

"Recommendation X.721: 1992":operationalState GET,

a-TPInstance GET,

z-TPInstance GET

;;;

CONDITIONAL PACKAGES

createDeleteNotificationsPackage PRESENT IF

"the objectCreation and objectDeletion notifications defined in Recommendation X.721 are supported by an instance of this managed object class",

attributeValueChangeNotificationPackage PRESENT IF

"the attributeValueChange notification defined in Recommendation X.721 is supported by an instance of this managed object class",

stateChangeNotificationPackage PRESENT IF

"the stateChange notification defined in Recommendation X.721 is supported by an instance of this managed object class",

characteristicInformationPackage PRESENT IF

"an instance supports it.",

protectedPackage PRESENT IF

"an instance supports it.",

tmnCommunicationsAlarmInformationPackage PRESENT IF

"the communicationsAlarm notification (as defined in Recommendation X.721) is supported by this managed object",

alarmSeverityAssignmentPointerPackage PRESENT IF

"the tmnCommunicationsAlarmInformationPackage package is present AND the managed object supports configuration of alarm severities";

REGISTERED AS { m3100ObjectClass 13 };

3.4.3 *Trail*

trail MANAGED OBJECT CLASS

DERIVED FROM connectivity;

CHARACTERIZED BY

trailPackage PACKAGE

BEHAVIOUR

trailBehaviour BEHAVIOUR

DEFINED AS

"Trail is a class of managed objects in layer networks which is responsible for the integrity of transfer of characteristic information from one or more other layer networks. A trail is composed of two or more Trail Termination Points and one or more connection and associated connection termination points."

;;

ATTRIBUTES

trailId GET;;;

CONDITIONAL PACKAGES

serverConnectionListPackage PRESENT IF "an instance supports it",

clientConnectionPackage PRESENT IF "an instance supports it";

REGISTERED AS { m3100ObjectClass 14 };

3.5 *Cross Connection Fragment*

Object classes in Cross Connection Fragment are presented in Figure 5/M.3100. The behaviour definition(s) of that object class(es) are specified as follows:

3.5.1 *Cross-Connection*

crossConnection MANAGED OBJECT CLASS

DERIVED FROM "Recommendation X.721: 1992":top;

CHARACTERIZED BY

crossConnectionPackage PACKAGE

BEHAVIOUR

crossConnectionBehaviour BEHAVIOUR

DEFINED AS

"A managed object of this class represents an assignment relationship between the termination point or GTP object listed in the From Termination attribute and the termination point or GTP objects listed in the To Termination attribute of this managed object.

The To Termination attribute will always be non-NULL. The From Termination attribute will only be NULL in the case of point-to-multipoint configurations. If the From Termination attribute has a value of NULL, the assignment relationship is between the termination point object or the GTP object listed in the From Termination attribute of the containing Multipoint Cross-Connection managed object and the termination point object or GTP object listed in the To Termination attribute of this managed object.

A point to point cross-connection can be established between: one of CTP Sink, CTP Bidirectional, TTP Source, TTP Bidirectional, or GTP; and one of CTP Source, CTP Bidirectional, TTP Sink, TTP Bidirectional, or GTP.

In a unidirectional cross-connection, the termination or GTP object pointed to by the From Termination and the termination point or GTP object pointed to by the To Termination attribute (in this object or the containing mpCrossConnection) are related in such a way that traffic can flow between the termination points represented by these managed objects. In a bidirectional cross-connection, information flows in both directions.

If the objects listed in the From Termination and To Termination attributes are GTPs, the *n*th element of the From Termination GTP is related to the *n*th element of the To Termination GTP (for every n).

If the fromTermination attribute has a value of NULL, the directionality attribute must have the value "unidirectional".

The total rate of the From Terminations must be equal to the total rate of To Terminations.

The attribute Signal Type describes the signal that is cross-connected. The termination points or GTPs that are cross-connected must have signal types that are compatible.

If an instance of this object class is contained in a multipoint cross-connection and the operational state of the containing multipoint cross-connection is "disabled", the operational state of this object will also be "disabled".

The following are the definitions of the administrative state and the operational state attributes:

Administrative State:

– Unlocked: The Cross-Connection object is administratively unlocked. Traffic is allowed to pass through the connection.

– Locked: No traffic is allowed to pass through the Cross-Connection. The connectivity pointers in the cross-connected termination points is NULL.

Operational State:

– Enabled: The Cross-Connection is performing its normal function.
– Disabled: The Cross-Connection is incapable of performing its normal cross-connection function."

;;

ATTRIBUTES

crossConnectionId GET,
"Recommendation X.721: 1992":administrativeState GET-REPLACE,
"Recommendation X.721: 1992":operationalState GET,
signalType GET,
fromTermination GET,
toTermination GET,
directionality GET;

;;

REGISTERED AS { m3100ObjectClass 15 };

3.5.2 *Fabric*

fabric MANAGED OBJECT CLASS
DERIVED FROM "Recommendation X.721: 1992":top;
CHARACTERIZED BY
fabricPackage PACKAGE
BEHAVIOUR
fabricBehaviour BEHAVIOUR
DEFINED AS

"The Fabric object represents the function of managing the establishment and release of cross-connections. It also manages the assignment of termination points to TP Pools and GTPs.

Administrative State:

– Unlocked: The Fabric is allowed to perform its normal functions. ACTIONS will be accepted to setup or remove cross-connections, to rearrange TP Pools, to add/remove termination points to/from GTPs.
– Locked: The Fabric is not allowed to perform its normal functions. No ACTIONS will be accepted. No new cross-connection can be setup or removed, no TP Pool can be rearranged, and no termination points can be added/removed to/from GTPs.

Operational State:

– Enabled: When the Fabric is in the enabled operational state, it may be fully operational or partially operational (partially operational is indicated by the availability status attribute).
– Disabled: The Fabric is incapable of performing its normal function. For instance, the managing system will not be able to
1) setup or remove any cross-connection,
2) rearrange TP Pools, and
3) add/remove termination points to/from GTPs.

Availability Status:

The supported values for this attribute are:

– Degraded: The Fabric is degraded in some respect. For instance, the Fabric cannot perform the function of establishing new cross-connections while it can still accept ACTIONS to re-arrange TP Pools. The Fabric remains available for service (i.e. its operational state is enabled) while it is degraded.
– Empty SET."

```
        ;;
        ATTRIBUTES
            fabricId                                    GET,
            "Recommendation X.721: 1992":administrativeState   GET-REPLACE,
            "Recommendation X.721: 1992":operationalState      GET,
            "Recommendation X.721: 1992":availabilityStatus    GET,
            listOfCharacteristicInfo                    GET,
            supportedByObjectList                  GET-REPLACE  ADD-REMOVE;
        ACTIONS
            addTpsToGTP,
            removeTpsFromGTP,
            addTpsToTpPool,
            removeTpsFromTpPool,
            connect,
            disconnect;
    ;;

REGISTERED AS { m3100ObjectClass 16 };
```

3.5.3 *Group Termination Point*

```
gtp MANAGED OBJECT CLASS
    DERIVED FROM   "Recommendation X.721: 1992": top;
    CHARACTERIZED BY
        gtpPackage PACKAGE
            BEHAVIOUR
                gtpBehaviour BEHAVIOUR
                DEFINED AS
```

"This object class represents a group of termination points treated as a single unit for management purposes such as cross-connections. The signalType attribute describes the composition of the GTP. When a termination point is involved in a GTP, it cannot be cross-connected independently of that GTP."

```
            ;;
            ATTRIBUTES
                gtpId                       GET,
                crossConnectionObjectPointer   GET,
                signalType                  GET,
                tpsInGtpList                GET;
    ;;

REGISTERED AS { m3100ObjectClass 17 };
```

3.5.4 *Multipoint Cross-Connection*

```
mpCrossConnection MANAGED OBJECT CLASS
    DERIVED FROM "Recommendation X.721: 1992":top;
    CHARACTERIZED BY
        mpCrossConnectionPackage PACKAGE
        BEHAVIOUR
            mpCrossConnectionBehaviour BEHAVIOUR
            DEFINED AS
```

"This class represents an assignment relationship between the termination point or GTP object listed in the From Termination attribute and the termination point or GTP objects listed in the To Termination attributes of the contained crossConnection managed objects.

A multipoint cross-connection can be established between one of CTP Sink, CTP Bidirectional, TTP Source, TTP Bidirectional, or GTP; and a set whose members are CTP Source, CTP Bidirectional, TTP Sink, TTP Bidirectional, or GTP.

The From Termination attribute will always be non-NULL. The termination point or GTP object pointed to by the From Termination attribute is related to all the termination point or GTP objects pointed to by the To Termination attribute of the contained crossConnection managed objects in such a way that traffic can flow between the termination points represented by these managed objects.

Information flows from the From Termination to the To Termination of the contained cross-connection objects.

If the objects listed in the From Termination attribute and in the To Termination attribute of the contained crossConnection objects are GTPs, the *n*th element of the From Termination GTP is related to the *n*th element of the To Termination GTP (for every n).

The total rate of the From Terminations must be equal to the total rate of To Terminations in each contained crossConnection object.

The attribute Signal Type describes the signal that is cross-connected. The termination points or GTPs that are cross-connected must have signal types that are compatible.

The following are the definitions of the administrative state and the operational state attributes:

Administrative State:

– Unlocked: The mpCrossConnection object is administratively unlocked. It allows traffic to pass through each contained connection depending on its administrative state.
– Locked: No traffic is allowed to pass through the Cross-Connection between the cross-connected termination points. The effect of this value overrides the effect of the administrative state of each contained cross-connection.

Operational State:

The operational state of a Multipoint Cross-Connection object reflects the overall health of the cross-connection including all the cross-connection objects contained in the Multipoint Cross-Connection.

– Enabled: The Cross-Connection is performing its normal function. Note that some (but not all) of the cross-connection objects contained in the Multipoint Cross-Connection may be disabled.
– Disabled: The Cross-Connection is incapable of performing its normal cross-connection function. All the cross-connection objects contained in the Multipoint Cross-Connection are disabled.

Availability Status:

The supported values for this attribute are:

– In test
– Degraded: The Multipoint Cross-Connection is degraded in some respect. For instance, if one or more (but not all) cross-connection objects contained in the Multipoint Cross-Connection are disabled, the Multipoint Cross-Connection will be considered as degraded. The Multipoint Cross-Connection remains available for service (i.e. its operational state is enabled) while it is degraded.
– Empty SET."

;;

ATTRIBUTES

mpCrossConnectionId GET,
"Recommendation X.721: 1992":administrativeState GET-REPLACE,
"Recommendation X.721: 1992":operationalState GET,
"Recommendation X.721: 1992":availabilityStatus GET,
signalType GET,
fromTermination GET;

;;

REGISTERED AS { m3100ObjectClass 18 };

3.5.5 *Named Cross-Connection*

```
namedCrossConnection MANAGED OBJECT CLASS
        DERIVED FROM crossConnection;
        CHARACTERIZED BY
                namedCrossConnectionPackage;

REGISTERED AS { m3100ObjectClass 19 };
```

3.5.6 *Named Multi-Point Cross-Connection*

```
namedMpCrossConnection MANAGED OBJECT CLASS
        DERIVED FROM mpCrossConnection;
        CHARACTERIZED BY
                namedCrossConnectionPackage;

REGISTERED AS { m3100ObjectClass 20 };
```

3.5.7 *TP Pool*

```
tpPool MANAGED OBJECT CLASS
        DERIVED FROM "Recommendation X.721: 1992":top;
        CHARACTERIZED BY
                tpPoolPackage PACKAGE
                        BEHAVIOUR
                                tpPoolBehaviour BEHAVIOUR
                                        DEFINED AS
                                        "The tpPool object represents a set of termination points or GTPs that are used for
                                        some management purpose, such as routing. A termination point that is a member of
                                        a GTP cannot be a member of a tpPool independent of the remainder of the GTP."
                                ;;
                                ATTRIBUTES
                                        tpPoolId                GET,
                                        tpsInTpPoolList         GET,
                                        totalTpCount            GET,
                                        connectedTpCount        GET,
                                        idleTpCount             GET;
                                ;;

REGISTERED AS { m3100ObjectClass 21 };
```

3.6 *Functional Area Fragment*

Object classes in functional area fragment are presented in Figure 6/M.3100. The references/definitions of the object classes are given below:

3.6.1 *Alarm Record*

The Alarm Record object class is defined in Recommendation X.721 [5].

3.6.2 *Alarm Severity Assignment Profile*

```
alarmSeverityAssignmentProfile  MANAGED OBJECT CLASS
        DERIVED FROM      "Recommendation X.721: 1992":top;
        CHARACTERIZED BY
        alarmSeverityAssignmentProfilePackage  PACKAGE
                BEHAVIOUR
                alarmSeverityAssignmentProfileBehaviour  BEHAVIOUR
                        DEFINED AS
```

"The alarm severity assignment profile object class is a class of management support object that specifies the alarm severity assignment for managed objects. Instances of this object are referenced by the alarmSeverityAssignmentProfilePointer attribute in the managed objects."

;;

ATTRIBUTES

alarmSeverityAssignmentProfileId GET,

alarmSeverityAssignmentList GET-REPLACE ADD-REMOVE ;

;;

CONDITIONAL PACKAGES

objectManagementNotificationsPackage PRESENT IF "an instance supports it";

REGISTERED AS { m3100ObjectClass 22 };

3.6.3 *Attribute Value Change Record*

The Attribute Value Change Record object class is defined in Recommendation X.721 [5].

3.6.4 *Current Alarm Summary Control*

The Current Alarm Summary Control object class is defined in Recommendation Q.821 [7].

3.6.5 *Discriminator*

The Discriminator object class is defined in Recommendation X.721 [5].

3.6.6 *Event Forwarding Discriminator*

The Event Forwarding Discriminator object class is defined in Recommendation X.721 [5].

3.6.7 *Event Log Record*

The Event Log Record object class is defined in Recommendation X.721 [5].

3.6.8 *Log*

The Log object class is defined in Recommendation X.721 [5].

3.6.9 *Log Record*

The Log Record object class is defined in Recommendation X.721 [5].

3.6.10 *Management Operations Schedule*

The Management Operations Schedule object class is defined in Recommendation Q.821 [7].

3.6.11 *Object Creation Record*

The Object Creation Record object class is defined in Recommendation X.721 [5].

3.6.12 *Object Deletion Record*

The Object Deletion Record object class is defined in Recommendation X.721 [5].

3.6.13 *State Change Record*

The State Change Record object class is defined in Recommendation X.721 [5].

4 Packages

4.1 *Administrative Operational States*

```
administrativeOperationalStatesPackage PACKAGE
    ATTRIBUTES
        "Recommendation X.721: 1992":administrativeState   GET-REPLACE,
        "Recommendation X.721: 1992":operationalState      GET;

REGISTERED AS { m3100Package 1 };
```

4.2 *Affected Object List*

```
affectedObjectListPackagePACKAGE
    ATTRIBUTES
        affectedObjectList GET;

REGISTERED AS  { m3100Package 2 };
```

4.3 *Alarm Severity Assignment Pointer*

```
alarmSeverityAssignmentPointerPackage          PACKAGE
    BEHAVIOUR
        alarmSeverityAssignmentPointerPackageBehaviour   BEHAVIOUR
        DEFINED AS
        "If the alarm severity assignment profile pointer is NULL, then one of the following two choices applies
         when reporting alarms:
        a) agent assigns the severity; or
        b) the value "indeterminate" is used."
        ;;
    ATTRIBUTES
        alarmSeverityAssignmentProfilePointer GET-REPLACE ;

REGISTERED AS  { m3100Package 3 };
```

4.4 *Attribute Value Change Notification*

```
attributeValueChangeNotificationPackage PACKAGE
    NOTIFICATIONS
        "Recommendation X.721: 1992":attributeValueChange;

REGISTERED AS { m3100Package 4 };
```

4.5 *Audible Visual Local Alarm*

```
audibleVisualLocalAlarmPackage PACKAGE
    ACTIONS
        allowAudibleVisualLocalAlarm,
        inhibitAudibleVisualLocalAlarm;

REGISTERED AS { m3100Package 5 };
```

4.6 *Channel Number*

```
channelNumberPackage            PACKAGE
        ATTRIBUTES
                channelNumber       GET;

REGISTERED AS  { m3100Package 6 };
```

4.7 *Characteristic Information*

```
characteristicInformationPackage        PACKAGE
        ATTRIBUTES
                characteristicInformation   GET;

REGISTERED AS  { m3100Package 7 };
```

4.8 *Client Connection*

```
clientConnectionPackage         PACKAGE
        ATTRIBUTES
                clientConnection    GET;

REGISTERED AS  { m3100Package 8 };
```

4.9 *Client Trail*

```
clientTrailPackage          PACKAGE
        ATTRIBUTES
                clientTrail     GET;

REGISTERED AS  { m3100Package 9 };
```

4.10 *Create Delete Notifications*

```
createDeleteNotificationsPackage PACKAGE
        NOTIFICATIONS
                "Recommendation X.721: 1992":objectCreation,
                "Recommendation X.721: 1992":objectDeletion;

REGISTERED AS { m3100Package 10 };
```

4.11 *Cross Connection Pointer*

```
crossConnectionPointerPackage  PACKAGE
        ATTRIBUTES
        crossConnectionObjectPointer    GET;

REGISTERED AS  { m3100Package 11 };
```

4.12 *CTP Instance*

```
ctpInstancePackagePACKAGE
        ATTRIBUTES
                cTPId           GET;

REGISTERED AS  { m3100Package 12 };
```

4.13 *Current Problem List*

```
currentProblemListPackage  PACKAGE
        ATTRIBUTES
                currentProblemList GET;

REGISTERED AS { m3100Package 13 };
```

4.14 *Environmental Alarm*

```
environmentalAlarmPackage PACKAGE
        NOTIFICATIONS
                "Recommendation X.721: 1992":environmentalAlarm;

REGISTERED AS { m3100Package 14 };
```

4.15 *Equipment Equipment Alarm*

```
equipmentEquipmentAlarmPackage PACKAGE
        ATTRIBUTES
                alarmStatus             GET;
        NOTIFICATIONS
                "Recommendation X.721: 1992":equipmentAlarm;

REGISTERED AS { m3100Package 15 };
```

4.16 *External Time*

```
externalTimePackage  PACKAGE
        ATTRIBUTES
                externalTime            GET-REPLACE;

REGISTERED AS { m3100Package 16 };
```

4.17 *Location Name*

```
locationNamePackage  PACKAGE
        ATTRIBUTES
                locationName GET-REPLACE;

REGISTERED AS { m3100Package 17 };
```

4.18 *Named Cross-Connection*

```
namedCrossConnectionPackage PACKAGE
        ATTRIBUTES
                redline                 GET-REPLACE,
                crossConnectionName     GET-REPLACE;;
-- The above package is not registered because it is used as a mandatory package in the current
-- document.
```

4.19 *Network Level*

```
networkLevelPackage       PACKAGE
        BEHAVIOUR
                networkLevelPackageBehaviour            BEHAVIOUR
                DEFINED AS
                "The network level pointer identifies a network level object.  The value of the network level pointer shall
                only be modified by the managing system."
                ;;
        ATTRIBUTES
                networkLevelPointer         GET-REPLACE;

REGISTERED AS  { m3100Package 18 };
```

4.20 *Operational State*

```
operationalStatePackage   PACKAGE
        ATTRIBUTES
                "Recommendation X.721: 1992":operationalState GET;

REGISTERED AS  { m3100Package 19 };
```

4.21 *Object Management Notifications*

```
objectManagementNotificationsPackage PACKAGE
        NOTIFICATIONS
                "Recommendation X.721: 1992":objectCreation,
                "Recommendation X.721: 1992":objectDeletion,
                "Recommendation X.721: 1992":attributeValueChange;

REGISTERED AS  { m3100Package 20 };
```

4.22 *Processing Error Alarm*

```
processingErrorAlarmPackage PACKAGE
        NOTIFICATIONS
                "Recommendation X.721: 1992":processingErrorAlarm;

REGISTERED AS { m3100Package 21 };
```

4.23 *Protected*

```
protectedPackage          PACKAGE
        ATTRIBUTES
                protected     GET;

REGISTERED AS  { m3100Package 22 };
```

4.24 *Reset Audible Alarm*

```
resetAudibleAlarmPackage PACKAGE
        ACTIONS
                "Recommendation Q.821: 1992":resetAudibleAlarm;

REGISTERED AS { m3100Package 23 };
```

4.25 *Server Connection List*

```
serverConnectionListPackage             PACKAGE
        ATTRIBUTES
                serverConnectionList       GET;

REGISTERED AS  { m3100Package 24 };
```

4.26 *Server Trail List*

```
serverTrailListPackage            PACKAGE
        ATTRIBUTES
                serverTrailList       GET;

REGISTERED AS  { m3100Package 25 };
```

4.27 *Software Processing Error Alarm*

```
softwareProcessingErrorAlarmPackage PACKAGE
        ATTRIBUTES
                alarmStatus          GET;
        NOTIFICATIONS
                "Recommendation X.721: 1992":processingErrorAlarm;

REGISTERED AS { m3100Package 26 };
```

4.28 *Supportable Client List*

```
supportableClientListPackage          PACKAGE
        ATTRIBUTES
                supportableClientList      GET;

REGISTERED AS  { m3100Package 27 };
```

4.29 *State Change Notification*

```
stateChangeNotificationPackage PACKAGE
        NOTIFICATIONS
                "Recommendation X.721: 1992":stateChange;

REGISTERED AS { m3100Package 28 };
```

4.30 *System Timing Source*

```
systemTimingSourcePackage             PACKAGE
        ATTRIBUTES
                systemTimingSource      GET-REPLACE;

REGISTERED AS  { m3100Package 29 };
```

4.31 *TMN Communications Alarm Information*

```
tmnCommunicationsAlarmInformationPackage        PACKAGE
        BEHAVIOUR
                tmnCommunicationsAlarmInformationBehaviour;
        ATTRIBUTES
                alarmStatus          GET,
                currentProblemList GET;
        NOTIFICATIONS
                "Recommendation X.721: 1992":communicationsAlarm
                        "Recommendation Q.821:1992":logRecordIdParameter
                        "Recommendation Q.821:1992":correlatedRecordNameParameter
                        "Recommendation Q.821:1992":suspectObjectListParameter;

REGISTERED AS  { m3100Package 30 };

tmnCommunicationsAlarmInformationBehaviour      BEHAVIOUR
```

-- The following behaviour text is taken directly from Recommendation Q.821, § 5.3.1.1

DEFINED AS

"An alarm report which contains a Perceived Severity parameter with a value of "cleared" and a Correlated Notifications parameter shall only indicate the clearing of those alarms whose Notification Identifiers are included in the set of Correlated Notifications. An alarm report which contains a Perceived Severity parameter with a value of "cleared", but no Correlated Notifications parameter, shall indicate the clearing of alarms based on the value of the Alarm Type, Probable Cause, and Specific Problems parameters.

The parameters that are associated with the communications alarm, if present, are placed in individual elements of the SET OF ManagementExtension in the additionalInformation field of the notification.";

4.32 *TTP Instance*

ttpInstancePackage PACKAGE

ATTRIBUTES

tTPId GET;

REGISTERED AS { m3100Package 31 };

4.33 *User Label*

userLabelPackage PACKAGE

ATTRIBUTES

userLabel GET-REPLACE;

REGISTERED AS { m3100Package 32 };

4.34 *Vendor Name*

vendorNamePackage PACKAGE

ATTRIBUTES

vendorName GET-REPLACE;

REGISTERED AS { m3100Package 33 };

4.35 *Version*

versionPackage PACKAGE

ATTRIBUTES

version GET-REPLACE;

REGISTERED AS { m3100Package 34 };

5 Attributes

5.1 *A-Termination Point Instance*

a-TPInstance ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.RelatedObjectInstance;

MATCHES FOR EQUALITY;

BEHAVIOUR

aTPInstanceBehaviour BEHAVIOUR

DEFINED AS

"The A-Termination Point Instance attribute type identifies one of the two termination points of an instance of the connectivity object class or one of its sub-classes.";;

REGISTERED AS { m3100Attribute 1 };

5.2 *Administrative State*

The Administrative State attribute is defined in Recommendation X.721 [5].

5.3 *Affected Object List*

affectedObjectList ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.ObjectList;

MATCHES FOR EQUALITY, SET-COMPARISON, SET-INTERSECTION;

BEHAVIOUR

affectedObjectListBehaviour BEHAVIOUR

DEFINED AS

"The Affected Object List attribute type specifies the object instances which can be directly affected by a change in state or deletion of a given managed object. The attribute does not force internal details to be specified, but only the necessary level of detail required for management.";;

REGISTERED AS { m3100Attribute 2 };

5.4 *Alarm Severity Assignment List*

alarmSeverityAssignmentList ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.AlarmSeverityAssignmentList;

BEHAVIOUR

alarmSeverityAssignmentListBehaviour BEHAVIOUR

DEFINED AS

"The Alarm Severity Assignment List is an attribute type whose value provides a listing of all abnormal conditions that may exist in instances of an object class, and shows the assigned alarm severity information (minor, major etc.) for each condition.";;

REGISTERED AS { m3100Attribute 3 };

5.5 *Alarm Severity Assignment Profile Id*

alarmSeverityAssignmentProfileId ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.NameType;

MATCHES FOR EQUALITY;

BEHAVIOUR

alarmSeverityAssignmentProfileIdBehaviour BEHAVIOUR

DEFINED AS

"The Alarm Severity AssignmentProfile Id is an attribute type whose distinguished value can be used as an RDN when naming an instance of the Alarm SeverityAssignment Profile object class.";;

REGISTERED AS { m3100Attribute 4 };

5.6 *Alarm Severity Assignment Profile Pointer*

alarmSeverityAssignmentProfilePointer ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.PointerOrNull;

MATCHES FOR EQUALITY;

BEHAVIOUR

alarmSeverityAssignmentProfilePointerBehaviour BEHAVIOUR

DEFINED AS

"This attribute identifies an Alarm Severity Assignment Profile object.";;

REGISTERED AS { m3100Attribute 5 };

5.7 *Alarm Status*

alarmStatus ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.AlarmStatus;

MATCHES FOR EQUALITY;

BEHAVIOUR

alarmStatusBehaviour BEHAVIOUR

DEFINED AS

"The Alarm Status attribute type indicates the occurrence of an abnormal condition relating to an object. This attribute may also function as a summary indicator of alarm conditions associated with a specific resource. It is used to indicate the existence of an alarm condition, a pending alarm condition such as threshold situations, or (when used as a summary indicator) the highest severity of active alarm conditions. When used as a summary indicator, the order of severity (from highest to lowest) is:

activeReportable-Critical

activeReportable-Major

activeReportable-Minor

activeReportable-Indeterminate

activeReportable-Warning

activePending

cleared";;

REGISTERED AS { m3100Attribute 6 };

5.8 *Channel Number*

channelNumber ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.ChannelNumber;

MATCHES FOR EQUALITY, ORDERING;

REGISTERED AS { m3100Attribute 7 };

5.9 *Characteristic Information*

characteristicInformation ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.CharacteristicInformation;

MATCHES FOR EQUALITY;

BEHAVIOUR

characteristicInformationBehaviour BEHAVIOUR

DEFINED AS

"The value of this attribute is used to verify the connectability of instances of the termination point sub-classes";;

REGISTERED AS { m3100Attribute 8 };

5.10 *Client Connection*

clientConnection ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.ObjectInstance;

MATCHES FOR EQUALITY;

BEHAVIOUR

clientConnectionBehaviour BEHAVIOUR

DEFINED AS

"The value of this attribute identifies the client object instance that is served by a trail at a higher order network layer.";;

REGISTERED AS { m3100Attribute 9 };

5.11 *Client Trail*

clientTrail ATTRIBUTE
WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.ObjectInstance;
MATCHES FOR EQUALITY;
BEHAVIOUR
clientTrailBehaviour BEHAVIOUR
DEFINED AS
"The value of this attribute identifies the trail object instance in the same network layer as the connection served by a connection object.";;

REGISTERED AS { m3100Attribute 10 };

5.12 *Connected Termination Point Count*

connectedTpCount ATTRIBUTE
WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.Count;
MATCHES FOR EQUALITY, ORDERING;
BEHAVIOUR
connectedTpCountBehaviour BEHAVIOUR
DEFINED AS
"This attribute indicates the total number of termination points associated with a tpPool that have been connected.";;

REGISTERED AS { m3100Attribute 11 };

5.13 *Connection Id*

connectionId ATTRIBUTE
WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.NameType;
MATCHES FOR EQUALITY;
BEHAVIOUR
connectionIdBehaviour BEHAVIOUR
DEFINED AS
"The Connection Id is an attribute type whose distinguished value can be used as an RDN when naming an instance of the Connection object class.";;

REGISTERED AS { m3100Attribute 12 };

5.14 *Connection Termination Point Id*

cTPId ATTRIBUTE
WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.NameType;
MATCHES FOR EQUALITY;

REGISTERED AS { m3100Attribute 13 };

5.15 *Cross-Connection Id*

crossConnectionId ATTRIBUTE
WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.NameType;
MATCHES FOR EQUALITY;
BEHAVIOUR
crossConnectionIdBehaviour BEHAVIOUR
DEFINED AS
"The Cross-Connection Id is an attribute type whose distinguished value can be used as an RDN when naming an instance of the crossConnection object class.";;

REGISTERED AS { m3100Attribute 14 };

5.16 *Cross-Connection Name*

crossConnectionName ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.CrossConnectionName;

MATCHES FOR EQUALITY, SUBSTRINGS;

BEHAVIOUR

crossConnectionNameBehaviour BEHAVIOUR

DEFINED AS

"This attribute is a descriptive name for a cross-connection or multipoint cross-connection managed object.";;

REGISTERED AS { m3100Attribute 15 };

5.17 *Cross-Connection Object Pointer*

crossConnectionObjectPointer ATTRIBUTE

WITH ATTRIBUTE SYNTAX

ASN1DefinedTypesModule.CrossConnectionObjectPointer;

MATCHES FOR EQUALITY;

BEHAVIOUR

crossConnectionObjectPointerBehaviour BEHAVIOUR

DEFINED AS

"This attribute points to a managed object such as a Cross-connection, a GTP or a Fabric.

When a termination point is neither connected nor reserved for connection, its

crossConnectionObjectPointer points to the Fabric object responsible for its connection.";;

REGISTERED AS { m3100Attribute 16 };

5.18 *Current Problem List*

currentProblemList ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.CurrentProblemList;

BEHAVIOUR

currentProblemListBehaviour BEHAVIOUR

DEFINED AS

"The Current Problem List attribute type identifies the current existing problems, with severity, associated with the managed object.";;

REGISTERED AS { m3100Attribute 17 };

5.19 *Directionality*

directionality ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.Directionality;

MATCHES FOR EQUALITY;

BEHAVIOUR

directionalityBehaviour BEHAVIOUR

DEFINED AS

"The Directionality attribute type specifies whether the associated managed object is uni- or bi-directional.";;

REGISTERED AS { m3100Attribute 18 };

5.20 *Downstream Connectivity Pointer*

downstreamConnectivityPointer ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.DownstreamConnectivityPointer;

MATCHES FOR EQUALITY, SET-COMPARISON, SET-INTERSECTION;

BEHAVIOUR

downstreamConnectivityPointerBehaviour BEHAVIOUR

DEFINED AS

"The matching for equality is applicable for all choices of the syntax. The set operations are permitted only when the choice of the syntax correspond to either broadcast or concatenated broadcast.";;

REGISTERED AS { m3100Attribute 19 };

5.21 *Equipment Id*

equipmentId ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.NameType;

MATCHES FOR EQUALITY;

BEHAVIOUR

equipmentIdBehaviour BEHAVIOUR

DEFINED AS

"The Equipment Id is an attribute type whose distinguished value can be used as an RDN when naming an instance of the Equipment object class.";;

REGISTERED AS { m3100Attribute 20 };

5.22 *External Time*

externalTime ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.ExternalTime;

MATCHES FOR EQUALITY;

BEHAVIOUR

externalTimeBehaviour BEHAVIOUR

DEFINED AS

"The External time attribute provides time-of-day system time. The attribute functions as a reference for all time stamp activities in the managed element.";;

REGISTERED AS { m3100Attribute 21 };

5.23 *Fabric Id*

fabricId ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.NameType;

MATCHES FOR EQUALITY;

BEHAVIOUR

fabricIdBehaviour BEHAVIOUR

DEFINED AS

"The Fabric Id is an attribute type whose distinguished value can be used as an RDN when naming an instance of the Fabric object class.";;

REGISTERED AS { m3100Attribute 22 };

5.24 *From Termination*

fromTermination ATTRIBUTE
WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.PointerOrNull;
MATCHES FOR EQUALITY;
BEHAVIOUR
fromTerminationBehaviour BEHAVIOUR
DEFINED AS
"This attribute identifies a TTP (source or bidirectional), a CTP (sink or bidirectional) or a GTP composed of members of one of these categories.";;

REGISTERED AS { m3100Attribute 23 };

5.25 *Group Termination Point Id*

gtpId ATTRIBUTE
WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.NameType;
MATCHES FOR EQUALITY;
BEHAVIOUR
gtpIdBehaviour BEHAVIOUR
DEFINED AS
"The gtp Id is an attribute type whose distinguished value can be used as an RDN when naming an instance of the gtp object class.";;

REGISTERED AS { m3100Attribute 24 };

5.26 *Idle TP Count*

idleTpCount ATTRIBUTE
WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.Count;
MATCHES FOR EQUALITY, ORDERING;
BEHAVIOUR
idleTpCountBehaviour BEHAVIOUR
DEFINED AS
"This attribute indicates the total number of termination points associated with a tpPool that are in an operational state of enabled and that are available for Cross-Connection.";;

REGISTERED AS { m3100Attribute 25 };

5.27 *List of Characteristic Info*

listOfCharacteristicInfo ATTRIBUTE
WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.ListOfCharacteristicInformation;
MATCHES FOR EQUALITY;
BEHAVIOUR
listOfCharacteristicInfoBehaviour BEHAVIOUR
DEFINED AS
"This attribute lists the characteristic information types that can be cross-connected by a Fabric.";;

REGISTERED AS { m3100Attribute 26 };

5.28 *Location Name*

locationName ATTRIBUTE
WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.LocationName;
MATCHES FOR EQUALITY, SUBSTRINGS;
BEHAVIOUR
locationNameBehaviour BEHAVIOUR
DEFINED AS
"The Location Name attribute type identifies a location.";;

REGISTERED AS { m3100Attribute 27 };

5.29 *Managed Element Id*

managedElementId ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.NameType;

MATCHES FOR EQUALITY;

BEHAVIOUR

managedElementIdBehaviour BEHAVIOUR

DEFINED AS

"The Managed Element Id is an attribute type whose distinguished value can be used as an RDN when naming an instance of the Managed Element object class.";;

REGISTERED AS { m3100Attribute 28 };

5.30 *Multi-Point Cross-Connection Id*

mpCrossConnectionId ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.NameType;

MATCHES FOR EQUALITY;

BEHAVIOUR

mpCrossConnectionIdBehaviour BEHAVIOUR

DEFINED AS

"The mp Cross-Connection Id is an attribute type whose distinguished value can be used as an RDN when naming an instance of the mpCrossConnection object class.";;

REGISTERED AS { m3100Attribute 29 };

5.31 *Network Id*

networkId ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.NameType;

MATCHES FOR EQUALITY;

BEHAVIOUR

networkIdBehaviour BEHAVIOUR

DEFINED AS

"The Network Id is an attribute type whose distinguished value can be used as an RDN when naming an instance of the Network object class.";;

REGISTERED AS { m3100Attribute 30 };

5.32 *Network Level Pointer*

networkLevelPointer ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.ObjectInstance;

MATCHES FOR EQUALITY;

REGISTERED AS { m3100Attribute 31 };

5.33 *Operational State*

The Operational State attribute is defined in Recommendation X.721 [5].

5.34 *Protected*

protected ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.Boolean;

MATCHES FOR EQUALITY;

BEHAVIOUR

protectedBehaviour BEHAVIOUR

DEFINED AS

"This attribute identifies whether the associated managed object is protected or not. The value TRUE implies it is protected.";;

REGISTERED AS { m3100Attribute 32 };

5.35 *Redline*

redline ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.Boolean;

MATCHES FOR EQUALITY;

BEHAVIOUR

redlineBehaviour BEHAVIOUR

DEFINED AS

"This attribute identifies whether the associated managed object is red lined, e.g. identified as being part of a sensitive circuit.";;

REGISTERED AS { m3100Attribute 33 };

5.36 *Replaceable*

replaceable ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.Replaceable;

MATCHES FOR EQUALITY;

BEHAVIOUR

replaceableBehaviour BEHAVIOUR

DEFINED AS

"The Replaceable attribute type indicates whether the associated managed object is replaceable or non-replaceable.";;

REGISTERED AS { m3100Attribute 34 };

5.37 *Server Connection List*

serverConnectionList ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.SequenceOfObjectInstance;

MATCHES FOR EQUALITY;

BEHAVIOUR

serverConnectionListBehaviour BEHAVIOUR

DEFINED AS

"The value of this attribute identifies one or more connection objects within the same network layer as the trail that are connected in series to constitute the trail.";;

REGISTERED AS { m3100Attribute 35 };

5.38 *Server Trail List*

serverTrailList ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.ObjectList;

MATCHES FOR EQUALITY;

BEHAVIOUR

serverTrailListBehaviour BEHAVIOUR

DEFINED AS

"The value of this attribute identifies the trail objects (in most cases one) in a lower order network layer which may be used in parallel to serve a conection object.";;

REGISTERED AS { m3100Attribute 36 };

5.39 *Signal Type*

signalType ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.SignalType;

MATCHES FOR EQUALITY;

BEHAVIOUR

signalTypeBehaviour BEHAVIOUR

DEFINED AS

"This attribute uniquely identifies the signal type of a cross-connection, TP Pool or GTP. The signal type can either be simple, bundle, or complex. If the signal type is simple, it consists of a single type of characteristic information. If the signal type is bundle, it is made up of a number of signal types all of the same characteristic information. If the signal type is complex, it consists of a sequence of bundle signal type. The order in the complex signal type represents the actual composition of the signal.";;

REGISTERED AS { m3100Attribute 37 };

5.40 *Software Id*

softwareId ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.NameType;

MATCHES FOR EQUALITY;

BEHAVIOUR

softwareIdBehaviour BEHAVIOUR

DEFINED AS

"The Software Id is an attribute type whose distinguished value can be used as an RDN when naming an instance of the Software object class.";;

REGISTERED AS { m3100Attribute 38 };

5.41 *Supportable Client List*

supportableClientList ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.SupportableClientList;

MATCHES FOR EQUALITY, SET-COMPARISON, SET-INTERSECTION;

BEHAVIOUR

supportableClientListBehaviour BEHAVIOUR

DEFINED AS

"The value of this attribute is the list of object classes representing the clients which the particular managed object is capable of supporting. This may be a subset of the client layers identified in Recommendation G.803 by the particular server layer managed object.";;

REGISTERED AS { m3100Attribute 39 };

5.42 *Supported By Object List*

supportedByObjectList ATTRIBUTE
WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.ObjectList;
MATCHES FOR EQUALITY, SET-COMPARISON, SET-INTERSECTION;
BEHAVIOUR
supportedByListBehaviour BEHAVIOUR
DEFINED AS
"The Supported By List is an attribute type whose value identifies a set of object instances which are capable of directly affecting a given managed object. The object instances include both physical and logical objects. This attribute does not force internal details to be specified, but only the necessary level of detail required for management. If the object instances supporting the managed object are unknown to that object, then this attribute is an empty set.";;

REGISTERED AS { m3100Attribute 40 };

5.43 *System Timing Source*

systemTimingSource ATTRIBUTE
WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.SystemTimingSource;
MATCHES FOR EQUALITY;
BEHAVIOUR
systemTimingSourceBehaviour BEHAVIOUR
DEFINED AS
"The System Timing Source attribute is used to specify the primary and secondary managed element timing source for synchronization.";;

REGISTERED AS { m3100Attribute 41 };

5.44 *System Title*

This attribute is defined in Recommendation X.721 [5].

5.45 *Total TP Count*

totalTpCount ATTRIBUTE
WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.Count;
MATCHES FOR EQUALITY, ORDERING;
BEHAVIOUR
totalTpCountBehaviour BEHAVIOUR
DEFINED AS
"This attribute indicates the total number of termination points associated with a tpPool.";;

REGISTERED AS { m3100Attribute 42 };

5.46 *To Termination*

toTermination ATTRIBUTE
WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.Pointer;
MATCHES FOR EQUALITY;
BEHAVIOUR
toTerminationBehaviour BEHAVIOUR
DEFINED AS
"This attribute identifies a CTP (source or bidirectional), a TTP (sink or bidirectional) or a GTP composed of members of one of these categories.";;

REGISTERED AS { m3100Attribute 43 };

5.47 *TP Pool Id*

tpPoolId ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.NameType;
MATCHES FOR EQUALITY;

BEHAVIOUR

tpPoolIdBehaviour BEHAVIOUR

DEFINED AS

"The TP Pool Id is an attribute type whose distinguished value can be used as an RDN when naming an instance of the tpPool object class.";;

REGISTERED AS { m3100Attribute 44 };

5.48 *TPs In GTP List*

tpsInGtpList ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.TpsInGtpList;

MATCHES FOR EQUALITY;

BEHAVIOUR

tpsInGtpListBehaviour BEHAVIOUR

DEFINED AS

"This attribute list the termination points that are represented by a GTP.";;

REGISTERED AS { m3100Attribute 45 };

5.49 *TPs In TP Pool List*

tpsInTpPoolList ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.ListOfTPs;

MATCHES FOR EQUALITY;

BEHAVIOUR

tpsInTpPoolListBehaviour BEHAVIOUR

DEFINED AS

"This attribute list the termination points that are represented by a TP Pool.";;

REGISTERED AS { m3100Attribute 46 };

5.50 *Trail Id*

trailId ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.NameType;

MATCHES FOR EQUALITY;

BEHAVIOUR

trailIdBehaviour BEHAVIOUR

DEFINED AS

"The Trail Id is an attribute type whose distinguished value can be used as an RDN when naming an instance of the Trail object class.";;

REGISTERED AS { m3100Attribute 47 };

5.51 *Trail Termination Point Id*

tTPId ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.NameType;

MATCHES FOR EQUALITY;

BEHAVIOUR

ttpIdBehaviour BEHAVIOUR

DEFINED AS

"The Trail Termination Point Id is an attribute type whose distinguished value can be used as an RDN when naming an instance of the Trail Termination Point object class.";;

REGISTERED AS { m3100Attribute 48 };

5.52 *Upstream Connectivity Pointer*

upstreamConnectivityPointer ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.ConnectivityPointer;

MATCHES FOR EQUALITY;

BEHAVIOUR

upstreamConnectivityPointerBehaviour BEHAVIOUR

DEFINED AS

"The matching for equality is applicable for all the choices of the syntax.";;

REGISTERED AS { m3100Attribute 49 };

5.53 *Usage State*

The Usage State attribute is defined in Recommendation X.721 [5].

5.54 *User Label*

userLabel ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.UserLabel;

MATCHES FOR EQUALITY, SUBSTRINGS;

BEHAVIOUR

userLabelBehaviour BEHAVIOUR

DEFINED AS

"The User Label attribute type assigns a user friendly name to the associated object.";;

REGISTERED AS { m3100Attribute 50 };

5.55 *Vendor Name*

vendorName ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.VendorName;

MATCHES FOR EQUALITY, SUBSTRINGS;

BEHAVIOUR

vendorNameBehaviour BEHAVIOUR

DEFINED AS

"The Vendor Name attribute type identifies the vendor of the associated managed object.";;

REGISTERED AS { m3100Attribute 51 };

5.56 *Version*

```
version  ATTRIBUTE
        WITH ATTRIBUTE SYNTAX  ASN1DefinedTypesModule.Version;
        MATCHES FOR EQUALITY, SUBSTRINGS;
        BEHAVIOUR
        versionBehaviour    BEHAVIOUR
        DEFINED AS
        "The Version attribute type identifies the version of the associated managed object.";;

REGISTERED AS { m3100Attribute 52 };
```

5.57 *Z-Termination Point Instance*

```
z-TPInstance  ATTRIBUTE
        WITH ATTRIBUTE SYNTAX  ASN1DefinedTypesModule.RelatedObjectInstance;
        MATCHES FOR EQUALITY;
        BEHAVIOUR
        z-TPInstanceBehaviour      BEHAVIOUR
        DEFINED AS
        "The Z-Termination Point Instance attribute type identifies one of the two termination points of an
        instance of the connectivity object class.";;

REGISTERED AS { m3100Attribute 55 };
```

6 Name Bindings

The naming hierarchy of the model is presented in Figure 8/M.3100. The arrows are used to point from the subordinate object classes to the superior object classes. Each arrow represents a name binding defined in this Recommendation.

6.1 *Alarm Record*

The name binding for alarm record is the same as that defined for log record in Recommendation X.721.

6.2 *Alarm Severity Assignment Profile*

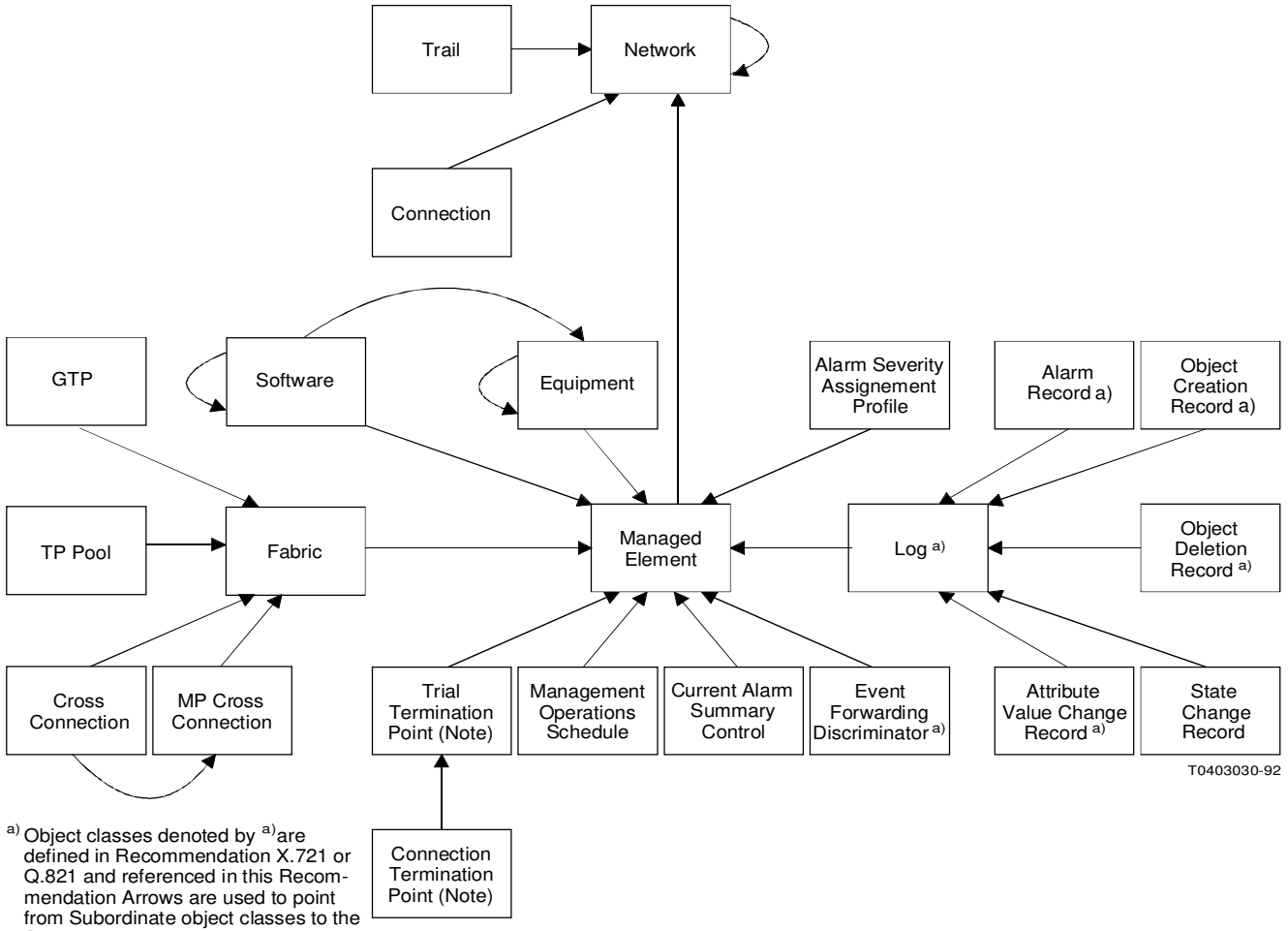
```
alarmSeverityAssignment-managedElement  NAME BINDING
    SUBORDINATE OBJECT CLASS  alarmSeverityAssignmentProfile  AND SUBCLASSES;
    NAMED BY
    SUPERIOR OBJECT CLASS       managedElement  AND SUBCLASSES;
    WITH ATTRIBUTE          alarmSeverityAssignmentProfileId;
    CREATE
        WITH-REFERENCE-OBJECT,
        WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
        ONLY-IF-NO-CONTAINED-OBJECTS;

REGISTERED AS { m3100NameBinding 1 };
```

6.3 *Connection*

```
connection-network  NAME BINDING
    SUBORDINATE OBJECT CLASS  connection;
    NAMED BY
    SUPERIOR OBJECT CLASS       network;
    WITH ATTRIBUTE          connectionId;
    CREATE;
    DELETE;

REGISTERED AS { m3100NameBinding 2 };
```



a) Object classes denoted by a) are defined in Recommendation X.721 or Q.821 and referenced in this Recommendation Arrows are used to point from Subordinate object classes to the Superior object classes.

Note – Represents source and sink classes.

FIGURE 8/M.3100

Naming hierarchy

6.4 *Connection Termination Point Source*

connectionTerminationPointSource-trailTerminationPointSource NAME BINDING
SUBORDINATE OBJECT CLASS
connectionTerminationPointSource;
NAMED BY
SUPERIOR OBJECT CLASS trailTerminationPointSource AND SUBCLASSES;
WITH ATTRIBUTE cTPId;
BEHAVIOUR
cTPSource-TTPBehaviour;
CREATE
WITH-REFERENCE-OBJECT,
WITH-AUTOMATIC-INSTANCE-NAMING;
DELETE
ONLY-IF-NO-CONTAINED-OBJECTS;

REGISTERED AS { m3100NameBinding 3 };

connectionTerminationPointSource-trailTerminationPointBidirectional NAME BINDING
SUBORDINATE OBJECT CLASS
connectionTerminationPointSource;
NAMED BY
SUPERIOR OBJECT CLASS trailTerminationPointBidirectional
AND SUBCLASSES;
WITH ATTRIBUTE cTPId;
BEHAVIOUR
cTPSource-TTPBehaviour;
CREATE
WITH-REFERENCE-OBJECT,
WITH-AUTOMATIC-INSTANCE-NAMING;
DELETE
ONLY-IF-NO-CONTAINED-OBJECTS;

REGISTERED AS { m3100NameBinding 4 };

cTPSource-TTPBehaviour BEHAVIOUR
DEFINED AS
"The name binding represents a relationship in which a TTP receives information (traffic) from a source CTP.

When automatic instance naming is used, the choice of name binding is left as a local matter.";

6.5 *Connection Termination Point Sink*

connectionTerminationPointSink-trailTerminationPointSink
NAME BINDING
SUBORDINATE OBJECT CLASS connectionTerminationPointSink;
NAMED BY
SUPERIOR OBJECT CLASS trailTerminationPointSink AND SUBCLASSES;
WITH ATTRIBUTE cTPId;
BEHAVIOUR
cTPSink-TTPBehaviour;
CREATE
WITH-REFERENCE-OBJECT,
WITH-AUTOMATIC-INSTANCE-NAMING;
DELETE
ONLY-IF-NO-CONTAINED-OBJECTS;
REGISTERED AS { m3100NameBinding 5 };

connectionTerminationPointSink-trailTerminationPointBidirectional NAME BINDING

SUBORDINATE OBJECT CLASS connectionTerminationPointSink;
NAMED BY
SUPERIOR OBJECT CLASS trailTerminationPointBidirectional
AND SUBCLASSES;
WITH ATTRIBUTE cTPId;
BEHAVIOUR
cTPSink-TTPBehaviour;
CREATE
WITH-REFERENCE-OBJECT,
WITH-AUTOMATIC-INSTANCE-NAMING;
DELETE
ONLY-IF-NO-CONTAINED-OBJECTS;

REGISTERED AS { m3100NameBinding 6 };

cTPSink-TTPBehaviour BEHAVIOUR
DEFINED AS
"The name binding represents a relationship in which a TTP sends information (traffic) to a sink CTP. When automatic instance naming is used, the choice of name binding is left as a local matter.";

6.6 *Cross-Connection*

crossConnection-fabric NAME BINDING

SUBORDINATE OBJECT CLASS crossConnection
AND SUBCLASSES;
NAMED BY
SUPERIOR OBJECT CLASS fabric
AND SUBCLASSES;
WITH ATTRIBUTE crossConnectionId;
BEHAVIOUR
crossConnection-fabricBehaviour BEHAVIOUR
DEFINED AS
"The value of the FromTermination attribute in the Cross-Connection object shall not be NULL.
When an instance of cross-connection is deleted, the following attributes will be affected. The crossConnectionObjectPointer attribute in the termination point objects or in the GTP objects that were pointing to the deleted cross-connection instance shall be set to point to the Fabric responsible for the connection of the termination points.
The counters in the appropriate TP Pool objects (if applicable) shall be updated. The connectivityPointer attributes in the disconnected termination points shall be set to NULL. Deleting a cross-connection object instance has no effect on the composition of any GTP."
;;
DELETE
ONLY-IF-NO-CONTAINED-OBJECTS;

REGISTERED AS { m3100NameBinding 7 };

crossConnection-mpCrossConnection NAME BINDING

SUBORDINATE OBJECT CLASS crossConnection
AND SUBCLASSES;
NAMED BY
SUPERIOR OBJECT CLASS mpCrossConnection
AND SUBCLASSES;
WITH ATTRIBUTE crossConnectionId;
BEHAVIOUR
crossConnection-mpCrossConnectionBehaviour BEHAVIOUR
DEFINED AS

"The value of the FromTermination attribute in the Cross-Connection object must be NULL.

When an instance of cross-connection is deleted, the following attributes will be affected. The crossConnectionObjectPointer attribute in the termination point object or in the GTP object that was pointing to the deleted cross-connection instance shall be set to point to the Fabric responsible for the connection of the termination points. The counters in the appropriate TP Pool objects (if applicable) shall be updated. The connectivity pointers in the disconnected termination point shall be set to NULL.

Deleting the last cross-connection contained in a multipoint cross-connection object instance has the effect of also deleting the multipoint cross-connect object instance (and updating the appropriate pointers). Deleting a cross-connection object instance has no effect on the composition of any GTP.";;

DELETE

ONLY-IF-NO-CONTAINED-OBJECTS;

REGISTERED AS { m3100NameBinding 8 };

6.7 *Equipment*

equipment-managedElement NAME BINDING

SUBORDINATE OBJECT CLASS equipment AND SUBCLASSES;

NAMED BY

SUPERIOR OBJECT CLASS managedElement AND SUBCLASSES;

WITH ATTRIBUTE equipmentId;

BEHAVIOUR

equipmentNameBindingBehaviour;

CREATE

WITH-REFERENCE-OBJECT,

WITH-AUTOMATIC-INSTANCE-NAMING;

DELETE

ONLY-IF-NO-CONTAINED-OBJECTS;

REGISTERED AS { m3100NameBinding 9 };

equipment-equipment NAME BINDING

SUBORDINATE OBJECT CLASS equipment AND SUBCLASSES;

NAMED BY

SUPERIOR OBJECT CLASS equipment AND SUBCLASSES;

WITH ATTRIBUTE equipmentId;

BEHAVIOUR

equipmentNameBindingBehaviour;

CREATE

WITH-REFERENCE-OBJECT,

WITH-AUTOMATIC-INSTANCE-NAMING;

DELETE

ONLY-IF-NO-CONTAINED-OBJECTS;

REGISTERED AS { m3100NameBinding 10 };

equipmentNameBindingBehaviour

BEHAVIOUR

DEFINED AS

"When automatic instance naming is used, the choice of name binding is left as a local matter.";

6.8 *Event Forwarding Discriminator*

```
eventForwardingDiscriminator-managedElement  NAME BINDING
        SUBORDINATE OBJECT CLASS  "Recommendation X.721: 1992":eventForwardingDiscriminator;
        NAMED BY
        SUPERIOR OBJECT CLASS        managedElement  AND SUBCLASSES;
        WITH ATTRIBUTE               "Recommendation X.721: 1992":discriminatorId;
        CREATE
                WITH-REFERENCE-OBJECT,
                WITH-AUTOMATIC-INSTANCE-NAMING;
        DELETE
                ONLY-IF-NO-CONTAINED-OBJECTS;

REGISTERED AS { m3100NameBinding 11 };
```

6.9 *Fabric*

```
fabric-managedElement NAME BINDING
        SUBORDINATE OBJECT CLASS  fabric
                AND SUBCLASSES;
        NAMED BY
        SUPERIOR OBJECT CLASS        managedElement AND SUBCLASSES;
        WITH ATTRIBUTE               fabricId;
        DELETE
                ONLY-IF-NO-CONTAINED-OBJECTS;

REGISTERED AS { m3100NameBinding 12 };
```

6.10 *GTP*

```
gtp-fabric NAME BINDING
        SUBORDINATE OBJECT CLASS  gtp;
        NAMED BY
        SUPERIOR OBJECT CLASS        fabric
                AND SUBCLASSES;
        WITH ATTRIBUTE               gtpId;

REGISTERED AS { m3100NameBinding 13 };
```

6.11 *Log*

```
log-managedElement  NAME BINDING
        SUBORDINATE OBJECT CLASS  "Recommendation X.721: 1992":log;
        NAMED BY
        SUPERIOR OBJECT CLASS        managedElement  AND SUBCLASSES;
        WITH ATTRIBUTE               "Recommendation X.721: 1992":logId;
        CREATE
                WITH-REFERENCE-OBJECT,
                WITH-AUTOMATIC-INSTANCE-NAMING;
        DELETE
                ONLY-IF-NO-CONTAINED-OBJECTS;

REGISTERED AS { m3100NameBinding 14 };
```

6.12 *Managed Element*

managedElement-network NAME BINDING
SUBORDINATE OBJECT CLASS managedElement AND SUBCLASSES;
NAMED BY
SUPERIOR OBJECT CLASS network;
WITH ATTRIBUTE managedElementId;
BEHAVIOUR
managedElementCreateBehaviour BEHAVIOUR
DEFINED AS
"Managed Element object is not created or deleted by system management protocol. The object is created when initializing the managed element.";;

REGISTERED AS { m3100NameBinding 15 };

6.13 *Multi-Point Cross-Connection*

mpCrossConnection-fabric NAME BINDING
SUBORDINATE OBJECT CLASS mpCrossConnection
AND SUBCLASSES;
NAMED BY
SUPERIOR OBJECT CLASS fabric
AND SUBCLASSES;
WITH ATTRIBUTE mpCrossConnectionId;

REGISTERED AS { m3100NameBinding 16 };

6.14 *Network*

network-network NAME BINDING
SUBORDINATE OBJECT CLASS network AND SUBCLASSES;
NAMED BY
SUPERIOR OBJECT CLASS network AND SUBCLASSES;
WITH ATTRIBUTE networkId;
BEHAVIOUR
networkCreateBehaviour BEHAVIOUR
DEFINED AS
"Network object is not created or deleted by system management protocol. The object is created when initializing the network.";;

REGISTERED AS { m3100NameBinding 17 };

6.15 *Software*

software-equipment NAME BINDING
SUBORDINATE OBJECT CLASS software AND SUBCLASSES;
NAMED BY
SUPERIOR OBJECT CLASS equipment AND SUBCLASSES;
WITH ATTRIBUTE softwareId;
BEHAVIOUR
softwareNameBindingBehaviour;
CREATE
WITH-REFERENCE-OBJECT,
WITH-AUTOMATIC-INSTANCE-NAMING;
DELETE
ONLY-IF-NO-CONTAINED-OBJECTS;

REGISTERED AS { m3100NameBinding 18 };

software-software NAME BINDING
SUBORDINATE OBJECT CLASS software AND SUBCLASSES;
NAMED BY
SUPERIOR OBJECT CLASS software AND SUBCLASSES;
WITH ATTRIBUTE softwareId;
BEHAVIOUR
softwareNameBindingBehaviour;
CREATE
WITH-REFERENCE-OBJECT,
WITH-AUTOMATIC-INSTANCE-NAMING;
DELETE
ONLY-IF-NO-CONTAINED-OBJECTS;

REGISTERED AS { m3100NameBinding 19 };

software-managedElement NAME BINDING
SUBORDINATE OBJECT CLASS software AND SUBCLASSES;
NAMED BY
SUPERIOR OBJECT CLASS managedElement AND SUBCLASSES;
WITH ATTRIBUTE softwareId;
BEHAVIOUR
softwareNameBindingBehaviour;
CREATE
WITH-REFERENCE-OBJECT,
WITH-AUTOMATIC-INSTANCE-NAMING;
DELETE
ONLY-IF-NO-CONTAINED-OBJECTS;

REGISTERED AS { m3100NameBinding 20 };

softwareNameBindingBehaviour
BEHAVIOUR
DEFINED AS
"When automatic instance naming is used, the choice of name binding is left as a local matter.";

6.16 *TP Pool*

tpPool-fabric NAME BINDING
SUBORDINATE OBJECT CLASS tpPool;
NAMED BY
SUPERIOR OBJECT CLASS fabric
AND SUBCLASSES;
WITH ATTRIBUTE tpPoolId;

REGISTERED AS { m3100NameBinding 21 };

6.17 *Trail*

trail-network NAME BINDING
SUBORDINATE OBJECT CLASS trail;
NAMED BY
SUPERIOR OBJECT CLASS network;
WITH ATTRIBUTE trailId;
CREATE
WITH-REFERENCE-OBJECT,
WITH-AUTOMATIC-INSTANCE-NAMING;
DELETE
ONLY-IF-NO-CONTAINED-OBJECTS;

REGISTERED AS { m3100NameBinding 22 };

6.18 *Trail Termination Point Source*

trailTerminationPointSource-managedElement NAME BINDING

SUBORDINATE OBJECT CLASS trailTerminationPointSource AND SUBCLASSES;

NAMED BY

SUPERIOR OBJECT CLASS managedElement AND SUBCLASSES;

WITH ATTRIBUTE tTPId;

BEHAVIOUR

trailTerminationPointNameBindingBehaviour;

CREATE

WITH-REFERENCE-OBJECT,

WITH-AUTOMATIC-INSTANCE-NAMING;

DELETE

ONLY-IF-NO-CONTAINED-OBJECTS;

REGISTERED AS { m3100NameBinding 23 };

trailTerminationPointNameBindingBehaviour

BEHAVIOUR

DEFINED AS

"When automatic instance naming is used, the choice of name binding is left as a local matter.";

6.19 *Trail Termination Point Sink*

trailTerminationPointSink-managedElement NAME BINDING

SUBORDINATE OBJECT CLASS trailTerminationPointSink AND SUBCLASSES;

NAMED BY

SUPERIOR OBJECT CLASS managedElement AND SUBCLASSES;

WITH ATTRIBUTE tTPId;

BEHAVIOUR

trailTerminationPointNameBindingBehaviour;

CREATE

WITH-REFERENCE-OBJECT,

WITH-AUTOMATIC-INSTANCE-NAMING;

DELETE

ONLY-IF-NO-CONTAINED-OBJECTS;

REGISTERED AS { m3100NameBinding 24 };

7 Actions

7.1 *Add TPs To GTP*

addTpsToGTP ACTION

BEHAVIOUR

addTpsToGtpBehaviour BEHAVIOUR

DEFINED AS

"This action is used to arrange termination points into GTPs. If the group termination point instance does not exist then a new one is automatically created and its identity returned in the result. Otherwise the termination points are added to those already in the GTP. Termination points may be members of zero or one GTP. This action will fail if the GTP is involved in a cross-connection, if the GTP is a member of a TP pool or if the termination point is already a member of a GTP. A bidirectional termination point that can provide independent unidirectional connectivity may be a member of zero or one GTP for each direction of connectivity.";;

MODE CONFIRMED;

WITH INFORMATION SYNTAX ASN1DefinedTypesModule.AddTpsToGtpInformation;

WITH REPLY SYNTAX ASN1DefinedTypesModule.AddTpsToGtpResult;

REGISTERED AS { m3100Action 1 };

7.2 *Add TPs To TP Pool*

addTpsToTpPool ACTION

BEHAVIOUR

addTpsToTpPoolBehaviour BEHAVIOUR

DEFINED AS

"This action is used to arrange termination points or GTPs into pools of termination points or GTPs that are all equivalent for some management purpose such as routing. If the tpPool instance does not exist then a new one is automatically created and its identity returned in the result. Otherwise the termination points or GTPs are added to those already in the tpPool. If an Indirect Adaptor is specified, a GTP representing the CTPs contained from the Indirect Adaptor will be created and it will be added to the tpPool.";;

MODE CONFIRMED;

WITH INFORMATION SYNTAX ASN1DefinedTypesModule.AddTpsToTpPoolInformation;

WITH REPLY SYNTAX ASN1DefinedTypesModule.AddTpsToTpPoolResult;

REGISTERED AS { m3100Action 2 };

7.3 *Allow Audible Visual Local Alarm*

allowAudibleVisualLocalAlarm ACTION

BEHAVIOUR allowAudibleVisualLocalAlarmBehaviour;

REGISTERED AS { m3100Action 3 };

allowAudibleVisualLocalAlarmBehaviour BEHAVIOUR

DEFINED AS "The allow Audible Visual Local Alarm action allows a managed system to present audible and/or visual indications.",

connect ACTION

BEHAVIOUR

connectBehaviour BEHAVIOUR

DEFINED AS

"This action is used to establish a connection between termination points or GTPs. The termination points to be connected can be specified in one of two ways: 1) by explicitly identifying the two termination points or GTPs, 2) by specifying one termination point or GTP, and specifying a tpPool from which any idle termination point/GTP may be used. The result, if successful, always returns an explicit list of termination points or GTP.

There are two basic forms of cross-connection arrangement: point to point and point to multipoint (broadcast). A single cross-connection is created if either the explicitPtoP or ptoTpPool option is selected in this action. This cross-connection object points to the termination points or GTPs involved in the cross-connection. Connections are indicated in termination points by the connectivityPointer attribute. If the administrativeState in the crossConnection object is unlocked, this attribute is set, as a result of this action, to the local name of the termination point to which it is connected. Also, the crossConnectionObjectPointer in the termination points or GTPs points to the cross-connection object.

For point to multipoint cross-connection (indicated by choosing the explicitPtoMp or ptoMPools option), one multi-point cross-connection object will be created containing one crossConnection object for each termination point specified in the toTps parameter. In the source TP the crossConnectionObjectPointer will point at the newly created Multi-point cross-connect object. In each Tp named in the toTPs list (possibly selected from a specified tpPool), the CrossConnectionObject pointer will point at the corresponding cross-connection object. The connectivity pointers in the connected termination points will be updated to reflect the new connectivity.

The idleTPcount and the connectedTPcount attributes in the tpPool object (if any) are updated as a result of the action. If a GTP is implicitly defined by specifying several termination points to be connected together, the GTP object will be automatically created and its id will be returned in the action reply.

If an Indirect Adaptor is specified, a GTP representing the CTPs contained from the Indirect Adaptor will be created and it will be connected.

The administrative state of the created cross-connection or multipoint cross-connection objects is specified as an optional parameter of this action. If this parameter is omitted, the administrative state will be set to "unlocked" (unless the addLegs parameter is specified).

This action will fail if any of the termination points specified are already involved in a cross-connection or if part of an existing GTP is specified.

If the addLeg parameter is specified, one or more Legs will be added to an existing multipoint cross-connection arrangement. Selected termination points or GTPs must support a similar signal type to that of the termination points already connected to the arrangement. The result, if successful, always returns the termination points or GTPs involved in the multipoint cross-connection. A cross-connection object is created as a result of this action. This object will be named from the specified mpCrossConnection object instance.

The administrative state of the created cross-connection object will be the same as that of the containing multipoint cross-connection object unless otherwise specified in the action parameters." ;;

MODE CONFIRMED;

WITH INFORMATION SYNTAX ASN1DefinedTypesModule.ConnectInformation;

WITH REPLY SYNTAX ASN1DefinedTypesModule.ConnectResult;

REGISTERED AS { m3100Action 4 };

7.5 *Disconnect*

disconnect ACTION

BEHAVIOUR

disconnectBehaviour BEHAVIOUR

DEFINED AS

"This action is used to take down a cross-connection. The connection to be taken down is specified by identifying termination point(s) (or GTP(s)) of the connection. If the connection was point to point then the other termination point or GTP is implicitly disconnected as well and the cross-connection object is deleted. If the connection was point to multipoint and the action referred to the master, all the termination points or GTPs that are legs are implicitly disconnected as well and the multipoint cross-connection and cross-connection objects are deleted.

If the connection was point to multipoint and the action referred to a leg, then just that leg is disconnected, unless it is the last leg, in which case the master termination point is also implicitly disconnected and the multipoint cross-connection and cross-connection objects are deleted. The idleTPcount and the connectedTPcount attributes in the tpPool objects (if any) are updated as a result of the action. The connectivity pointers in the disconnected termination points will be set to NULL as a result of this action.

This action has no effect on the composition of GTPs and GTPs are not deleted as a result of this action. This action will fail if part of a GTP is specified.";;

MODE CONFIRMED;

WITH INFORMATION SYNTAX ASN1DefinedTypesModule.DisconnectInformation;

WITH REPLY SYNTAX ASN1DefinedTypesModule.DisconnectResult;

REGISTERED AS { m3100Action 5 };

7.6 *Inhibit Audible Visual Local Alarm*

inhibitAudibleVisualLocalAlarm ACTION

BEHAVIOUR inhibitAudibleVisualLocalAlarmBehaviour;

REGISTERED AS { m3100Action 6 };

inhibitAudibleVisualLocalAlarmBehaviour BEHAVIOUR

DEFINED AS

"The Inhibit Audible/Visual Local Alarm action inhibits a managed system from presenting audible and/or visual indications";

7.7 *Remove TPs From GTP*

removeTpsFromGTP ACTION

BEHAVIOUR

removeTpsFromGtpBehaviour BEHAVIOUR

DEFINED AS

"This action is used to remove termination points from GTPs. This action will fail if the GTP is involved in a cross-connection or if it is a member of a TP pool. Removing the last termination point from a GTP has the effect of deleting the GTP object. If the GTP is deleted, the name of the GTP will be sent back in the ACTION reply.";;

MODE CONFIRMED;

WITH INFORMATION SYNTAX ASN1DefinedTypesModule.RemoveTpsFromGtpInformation;

WITH REPLY SYNTAX ASN1DefinedTypesModule.RemoveTpsFromGtpResult;

REGISTERED AS { m3100Action 7 };

7.8 *Remove TPs From TP Pool*

removeTpsFromTpPool ACTION
BEHAVIOUR
removeTpsFromTpPoolBehaviour BEHAVIOUR
DEFINED AS
"This action is used to remove termination points from termination point pools. Removing the last termination point from a pool has the effect of deleting the TP Pool object. If the TP pool is deleted, the name of the TP Pool will be sent back in the ACTION reply.";;

MODE CONFIRMED;
WITH INFORMATION SYNTAX ASN1DefinedTypesModule.RemoveTpsFromTpPoolInformation;
WITH REPLY SYNTAX ASN1DefinedTypesModule.RemoveTpsFromTpPoolResult;

REGISTERED AS { m3100Action 8 };

7.9 *Reset Audible Alarm*

This action is defined in Recommendation Q.821 [7].

8 Notifications

8.1 *Attribute Value Change*

This notification type is used to report when there is a change in some of the attribute values of a managed object. It is defined in Recommendation X.721 [5].

8.2 *Communications Alarm*

This notification type is used to report when the managed object detects a communication error. It is defined in Recommendation X.721 [5].

8.3 *Environmental Alarm*

This notification type is used to report when the managed object detects a problem in the environment. It is defined in Recommendation X.721 [5].

8.4 *Equipment Alarm*

This notification type is used to report a failure in the equipment. It is defined in Recommendation X.721 [5].

8.5 *Object Creation*

This notification type is used to report the creation of a managed object if defined in the managed object class specification. It is defined in Recommendation X.721 [5].

8.6 *Object Deletion*

This notification type is used to report the deletion of a managed object if defined in the managed object class specification. It is defined in Recommendation X.721 [5].

8.7 *Processing Error Alarm*

This notification type is used to report a processing failure in a managed object. It is defined in Recommendation X.721 [5].

8.8 *State Change*

This notification type is used to report when there is a change in some of the state values of a managed object. It is defined in Recommendation X.721 [5].

9 ASN.1 Defined Types Module

```
ASN1DefinedTypesModule { ccitt recommendation m gnm(3100) informationModel(0) asn1Modules(2)
asn1DefinedTypesModule(0) }

DEFINITIONS IMPLICIT TAGS ::=

BEGIN

-- EXPORTS everything

IMPORTS
RDNSequence
        FROM InformationFramework { joint-iso-ccitt ds(5) modules(1) informationFramework(1) }
ObjectInstance,ObjectClass FROM CMIP-1 { joint-iso-ccitt ms(9)  cmip(1) modules(0) protocol(3) }
ProbableCause, AdministrativeState FROM Attribute-ASN1Module { joint-iso-ccitt ms(9) smi(3) part2(2)
asn1Module (2) 1 } ;

m3100InformationModel OBJECT IDENTIFIER ::= { ccitt recommendation m gnm(3100) informationModel(0) }
m3100standardSpecificExtension OBJECT IDENTIFIER ::= { m3100InformationModel standardSpecificExtension(0)
}
m3100ObjectClass OBJECT IDENTIFIER ::= { m3100InformationModel managedObjectClass(3) }
m3100Package OBJECT IDENTIFIER ::= { m3100InformationModel package(4) }
m3100Attribute OBJECT IDENTIFIER ::= { m3100InformationModel attribute(7) }
m3100NameBinding OBJECT IDENTIFIER ::= { m3100InformationModel nameBinding(6) }
m3100Action OBJECT IDENTIFIER ::= { m3100InformationModel action(9) }
m3100Notification OBJECT IDENTIFIER ::= { m3100InformationModel  notification(10) }
-- Reserved arcs below m3100InformationModel are (5) for parameters, (8) for attribute groups

characteristicInfo OBJECT IDENTIFIER ::= { m3100standardSpecificExtension 0 }

opticalSTM1SPICI      CharacteristicInformation ::= { characteristicInfo 1 }
-- opticalSPITTP* object instances with stmLevel attribute = 1

opticalSTM4SPICI      CharacteristicInformation ::= { characteristicInfo 2 }
-- opticalSPITTP* object instances with stmLevel attribute = 4

opticalSTM16SPICI     CharacteristicInformation ::= { characteristicInfo 3 }
-- opticalSPITTP*object instances with stmLevel attribute = 16

electricalSTM1SPICI  CharacteristicInformation ::= { characteristicInfo 4 }
-- opticalSPITTP* object instances with stmLevel attribute = 1

rsSTM1SPICI  CharacteristicInformation ::= { characteristicInfo 5 }
-- rsCTP* object instances with stmLevel attribute = 1

rsSTM4SPICI  CharacteristicInformation ::= { characteristicInfo 6 }
-- rsCTP* object instances with stmLevel attribute = 4

rsSTM16SPICI CharacteristicInformation ::= { characteristicInfo 7 }
-- rsCTP* object instances with stmLevel attribute = 16

msSTM1SPICI  CharacteristicInformation ::= { characteristicInfo 8 }
-- rsCTP* object instances with stmLevel attribute = 1

msSTM4SPICI  CharacteristicInformation ::= { characteristicInfo 9 }
-- rsCTP* object instances with stmLevel attribute = 4

msSTM16SPICI CharacteristicInformation ::= { characteristicInfo 10 }
-- rsCTP* object instances with stmLevel attribute = 16

au3TU3VC3CI CharacteristicInformation ::= { characteristicInfo 11 }

au4VC4CI CharacteristicInformation ::= { characteristicInfo 12 }

tu11VC11CI CharacteristicInformation ::= { characteristicInfo 13 }
```

tu12VC12CI CharacteristicInformation ::= { characteristicInfo 14 }

tu2VC2CI CharacteristicInformation ::= { characteristicInfo 15 }

tu12VC11CI CharacteristicInformation ::= { characteristicInfo 16 }

-- The following value assignments are for the Probable Cause when Integer Choice is used within the
-- TMN application context. These values shall always be assigned by this Recommendation in the context
-- of TMN.

indeterminate ProbableCause ::= localValue : 0

-- The following are used with communications alarm.

aIS ProbableCause ::= localValue : 1
callSetUpFailure ProbableCause ::= localValue : 2
degradedSignal ProbableCause ::= localValue : 3
farEndReceiverFailure ProbableCause ::= localValue : 4
framingError ProbableCause ::= localValue : 5
lossOfFrame ProbableCause ::= localValue : 6
lossOfPointer ProbableCause ::= localValue : 7
lossOfSignal ProbableCause ::= localValue : 8
payloadTypeMismatch ProbableCause ::= localValue : 9
transmissionError ProbableCause ::= localValue : 10
remoteAlarmInterface ProbableCause ::= localValue : 11
excessiveBER ProbableCause ::= localValue : 12
pathTraceMismatch ProbabaleCause ::= localValue13

-- Values 14 to 50 are reserved for communications alarm related probable causes

-- The following are used with equipment alarm.

backplaneFailure ProbableCause ::= localValue : 51
dataSetProblem ProbableCause ::= localValue : 52
equipmentIdentifierDuplication ProbableCause ::= localValue : 53
externalIFDeviceProblem ProbableCause ::= localValue : 54
lineCardProblem ProbableCause ::= localValue : 55
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timingProblem ProbableCause ::= localValue : 66
transmitterFailure ProbableCause ::= localValue : 67
trunkCardProblem ProbableCause ::= localValue : 68
replaceableUnitProblem ProbableCause ::= localValue : 69

-- Values 70 to 100 are reserved for equipment alarm related probable causes

-- The following are used with environmental alarm.

airCompressorFailure ProbableCause ::= localValue : 101
airConditioningFailure ProbableCause ::= localValue : 102
airDryerFailure ProbableCause ::= localValue : 103
batteryDischarging ProbableCause ::= localValue : 104
batteryFailure ProbableCause ::= localValue : 105
commercialPowerFailure ProbableCause ::= localValue : 106
coolingFanFailure ProbableCause ::= localValue : 107
engineFailure ProbableCause ::= localValue : 108
fireDetectorFailure ProbableCause ::= localValue : 109
fuseFailure ProbableCause ::= localValue : 110
generatorFailure ProbableCause ::= localValue : 111
lowBatteryThreshold ProbableCause ::= localValue : 112
pumpFailure ProbableCause ::= localValue : 113
rectifierFailure ProbableCause ::= localValue : 114
rectifierHighVoltage ProbableCause ::= localValue : 115

```
rectifierLowFVoltage ProbableCause ::= localValue : 116
ventilationsSystemFailure ProbableCause ::= localValue : 117
enclosureDoorOpen ProbableCause ::= localValue : 118
explosiveGas ProbableCause ::= localValue : 119
fire ProbableCause ::= localValue : 120
flood ProbableCause ::= localValue : 121
highHumidity ProbableCause ::= localValue : 122
highTemperature ProbableCause ::= localValue : 123
highWind ProbableCause ::= localValue : 124
iceBuildUp ProbableCause ::= localValue : 125
intrusionDetection ProbableCause ::= localValue : 126
lowFuel ProbableCause ::= localValue : 127
lowHumidity ProbableCause ::= localValue : 128
lowCablePressure ProbableCause ::= localValue : 129
lowTemperature ProbableCause ::= localValue : 130
lowWater ProbableCause ::= localValue : 131
smoke ProbableCause ::= localValue : 132
toxicGas ProbableCause ::= localValue : 133
-- Values 134 to 150 are reserved for environmental alarm related probable causes

-- The following are used with Processing error alarm.

storageCapacityProblem ProbableCause ::= localValue : 151
memoryMismatch ProbableCause ::= localValue : 152
corruptData ProbableCause ::= localValue : 153
outOfCPUCycles ProbableCause ::= localValue : 154
sfwrEnvironmentProblem  ProbableCause ::= localValue : 155
sfwrDownloadFailure ProbableCause ::= localValue : 156

-- Service ProblemType is for further study

AddedTps ::= SEQUENCE {
    gtp          ObjectInstance,
    tpsAdded    SEQUENCE OF ObjectInstance
    }

AddLeg ::= SEQUENCE {
    mpCrossConnection   ObjectInstance,
    legs                SET OF ToTermSpecifier
    }

AddTpsToGtpInformation ::= SEQUENCE OF SEQUENCE {
    tpsAdded    SEQUENCE OF TerminationPointInformation,
    gtp        ObjectInstance     OPTIONAL
    }

AddTpsToGtpResult ::= SEQUENCE OF CHOICE {
    failed        [0]  Failed,
    addedTps   [1]  AddedTps
    }
-- the nth element in the "SEQUENCE OF" is related to the nth element in the "SEQUENCE OF" of the
-- "AddTpsToGtpInformation" type.

AddTpsToTpPoolInformation  ::= SEQUENCE OF SEQUENCE {
    tps              SET OF TerminationPointInformation,
    toTpPool         ObjectInstance    OPTIONAL
    }

AddTpsToTpPoolResult  ::= SEQUENCE OF CHOICE {
    failed                  [0]    Failed,
    tpsAddedToTpPool  [1]    TpsAddedToTpPool
    }
 -- the nth element in the "SEQUENCE OF" is related to the nth element in the "SEQUENCE OF" of the
-- "AddTPsToTpPoolInformation" type.
```

```
AlarmSeverityAssignment ::= SEQUENCE  {
                        problem                     ProbableCause,
                        severityAssignedServiceAffecting      [0]  AlarmSeverityCode  OPTIONAL,
                        severityAssignedNonServiceAffecting   [1]  AlarmSeverityCode  OPTIONAL,
                        severityAssigned/ServiceIndependent   [2]  AlarmSeverityCode  OPTIONAL }

AlarmSeverityAssignmentList ::=  SET OF AlarmSeverityAssignment

AlarmSeverityCode ::= ENUMERATED {
                              non-alarmed (0),
                              minor (1),
                              major (2),
                              critical (3),
                              warning (4) }

AlarmStatus ::=      ENUMERATED {
                                 cleared (0),
                                 activeReportable-Indeterminate  (1),
                                 activeReportable-Warning (2),
                                 activeReportable-Minor (3),
                                 activeReportable-Major (4),
                                 activeReportable-Critical (5),
                                 activePending (6)
                                 }

Boolean ::= BOOLEAN

Bundle ::= SEQUENCE {
    characteristicInfoType      CharacteristicInformation,
    bundlingFactor              INTEGER
}

ChannelNumber ::= INTEGER

CharacteristicInformation  ::= OBJECT IDENTIFIER

Connected ::= CHOICE {
    pointToPoint            [0]   PointToPoint,
    pointToMultipoint       [1]   PointToMultipoint
    }

ConnectInformation ::= SEQUENCE OF SEQUENCE {
    CHOICE {
        unidirectional      [0]   ConnectionType,
        bidirectional       [1]   ConnectionTypeBi,
        addleg              [2]   AddLeg
    }
    administrativeState    AdministrativeState   OPTIONAL
}

ConnectivityPointer ::= CHOICE { none       NULL,
                              single      ObjectInstance,
                              concatenated        SEQUENCE OF ObjectInstance }

ConnectResult ::= SEQUENCE OF CHOICE {
    failed      Failed,
    connected     Connected
    }
-- the nth element in the "SEQUENCE OF" is related to the n-th element in the "SEQUENCE OF" of the
-- "ConnectInformation" type.

ConnectionType ::= CHOICE {
    explicitPToP            [0]   ExplicitPtoP,
    ptoTpPool               [1]   PtoTPPool,
    explicitPtoMP           [2]   ExplicitPtoMP,
    ptoMPools               [3]   PtoMPools
    }
```

```
ConnectionTypeBi ::= CHOICE {
    explicitPToP    [0]   ExplicitPtoP,
    ptoTpPool       [1]   PtoTPPool
    }

Count ::= INTEGER

CrossConnectionName ::= GraphicString

CrossConnectionObjectPointer ::= CHOICE {
                        notConnected    [0]     ObjectInstance,    -- Fabric object --
                        connected       [1]     ObjectInstance,    -- Cross-connection object --
                        multipleConnections     MultipleConnections
                        }

CTPUpstreamPointer ::= ConnectivityPointer(WITH COMPONENTS { ...,
                                                -- the other two choices are present
                                                        concatenated        ABSENT })
CTPDownstreamPointer ::= DownstreamConnectivityPointer (WITH COMPONENTS
                                                 {...,
                                                        concatenated        ABSENT,
                                                broadcastConcatenated       ABSENT
                                                        -- other choices are present
                                                })

CurrentProblem ::=  SEQUENCE {
        problem         [0]     ProbableCause,
        alarmStatus     [1]     AlarmStatus
        }

CurrentProblemList ::=  SET OF CurrentProblem

Directionality ::= ENUMERATED { unidirectional(0),
        bidirectional(1) }

DisconnectInformation ::= SEQUENCE OF ObjectInstance    -- tps

DisconnectResult ::= SEQUENCE OF CHOICE {
    failed          Failed,
    disconnected    ObjectInstance
    }
-- the nth element in the "SEQUENCE OF" is related to the nth element in the "SEQUENCE OF" of the
-- "DisconnectInformation" type.

DownstreamConnectivityPointer ::= CHOICE {
                                none        NULL,
                                single      ObjectInstance,
                                concatenated        SEQUENCE OF ObjectInstance,
                                broadcast           SET OF ObjectInstance,
                                broadcastConcatenated [1] SET OF SEQUENCE OF ObjectInstance }

ExplicitPtoMP ::= SEQUENCE {
    fromTp      ExplicitTP,
    toTPs       SET OF ExplicitTP
    }

ExplicitPtoP ::= SEQUENCE {
    fromTp          ExplicitTP,
    toTp            ExplicitTP
    }

ExplicitTP ::= CHOICE {
    oneTPorGTP   ObjectInstance,
    listofTPs  SEQUENCE OF ObjectInstance
    }
```

```
ExternalTime ::= GeneralizedTime

Failed ::= CHOICE {
                logicalProblem      LogicalProblem,
                resourceProblem     ResourceProblem }

ListOfCharacteristicInformation ::= SET OF CharacteristicInformation

ListOfTPs ::= SET OF ObjectInstance

LocationName ::= GraphicString

LogicalProblem ::= SEQUENCE {
                        problemCause            ProblemCause,
                        incorrectInstances      SET OF ObjectInstance    OPTIONAL }

MultipleConnections ::= SET OF CHOICE {
                        downstreamNotConnected  [0]  ObjectInstance,
                        downstreamConnected          [1]  ObjectInstance,
                        upstreamNotConnected         [2]  ObjectInstance,
                        upstreamConnected            [3]  ObjectInstance }

NameType ::=        CHOICE {
                                numericName    INTEGER,
                                pString    GraphicString
                                }

ObjectList ::=    SET OF ObjectInstance

Pointer ::= ObjectInstance

PointerOrNull ::= CHOICE {
                  pointer  ObjectInstance,
                  null     NULL }

PointToPoint ::= SEQUENCE {
    fromTp      ObjectInstance,
    to          TpObjectInstance,
    xCon        ObjectInstance
    }

PointToMultipoint ::= SEQUENCE {
    fromTp    ObjectInstance,
    toTps     SET OF SEQUENCE {
        tps           ObjectInstance,
        xConnections  ObjectInstance
        },
    mpXCon    ObjectInstance
    }

ProblemCause ::= CHOICE {
                  unknown       NULL,
                  integerValue  INTEGER }
-- The values of integer value for ProblemCause and integerValue for ResourceProblem shall always be
-- assigned by this Recommendation.  No values of integerValue for ResourceProblem have been assigned.
-- The following values are used for integerValue of ProblemCause.

noSuchTpInstance              ProblemCause ::= integerValue : 0
noSuchGtpInstance             ProblemCause ::= integerValue : 1
noSuchTpPoolInstance          ProblemCause ::= integerValue : 2
mismatchingTpInstance         ProblemCause ::= integerValue : 3
mismatchingGtpInstance        ProblemCause ::= integerValue : 4
partOfGtp                     ProblemCause ::= integerValue : 5
involvedInCrossConnection     ProblemCause ::= integerValue : 6
```

```
memberOfTpPool                  ProblemCause ::= integerValue : 7
alreadyMemberOfGtp              ProblemCause ::= integerValue : 8
noTpInTpPool                    ProblemCause ::= integerValue : 9
noMoreThanOneTpIsAllowed        ProblemCause ::= integerValue : 10
noMoreThanTwoTpsAreAllowed      ProblemCause ::= integerValue : 11

PtoMPools ::= SEQUENCE {
    fromTp        ExplicitTP,
    toTPPools     ToTPPools
    }

PtoTPPool  ::= SEQUENCE {
    fromTp        ExplicitTP,
    toTpPool      ObjectInstance
    }

RelatedObjectInstance ::= CHOICE {
                                    notAvailable   NULL,
                                    relatedObject ObjectInstance
                                    }

RemoveTpsFromGtpInformation ::= SEQUENCE OF SEQUENCE {
    fromGtp      ObjectInstance,
    tps          SET OF ObjectInstance
    }

RemoveTpsFromGtpResult ::= SEQUENCE OF CHOICE {
    failed         [0]  Failed,
    removed        [1]  RemoveTpsResultInformation
    }
-- the nth element in the "SEQUENCE OF" is related to the nth element in the "SEQUENCE OF" of the
-- "RemoveTPsFromGtpInformation" type.

RemoveTpsFromTpPoolInformation  ::= SEQUENCE OF SEQUENCE {
    fromTpPool              ObjectInstance,
    tps                     SET OF ObjectInstance
    }

RemoveTpsFromTpPoolResult ::= SEQUENCE OF CHOICE {
    failed                   [0]  Failed,
    removed                  [1]  RemoveTpsResultInformation
    }
-- the nth element in the "SEQUENCE OF" is related to the nth element in the "SEQUENCE OF" of the
-- "RemoveTPsFromTpPoolInformation" type.

RemoveTpsResultInformation ::= SEQUENCE {
                  deletedTpPoolOrGTP      ObjectInstance     OPTIONAL,
                  tps                     SET OF ObjectInstance }
-- If the TP Pool or GTP is deleted, the deleted TP Pool or GTP should be provided in the
-- RemoveTpsResultInformation

Replaceable ::=      ENUMERATED {
                                    yes (0),
                                    no (1),
                                    notapplicable (2)
                                    }

ResourceProblem::= CHOICE {
                    unknown         NULL,
                    integerValue    INTEGER }

SequenceOfObjectInstance ::= SEQUENCE OF ObjectInstance

SignalType ::= CHOICE {
    simple      CharacteristicInformation,
    bundle      Bundle,
    complex     [0] SEQUENCE OF Bundle
}
```

```
SupportableClientList ::= SET OF ObjectClass

SystemTiming ::= SEQUENCE {
                        sourceType    ENUMERATED { internalTimingSource(0),
                                      remoteTimingSource(1), slavedTimingTerminationSignal(2) },
                        sourceID      ObjectInstance    OPTIONAL -- not needed for internal source
                        }

SystemTimingSource ::= SEQUENCE {
                         primaryTimingSource      SystemTiming,
                         secondaryTimingSource    SystemTiming    OPTIONAL }

TerminationPointInformation ::= CHOICE {
                                tPOrGTP      [0]    ObjectInstance,
                                sourceTP     [1]    ObjectInstance,
                                sinkTP       [2]    ObjectInstance }

ToTermSpecifier ::= CHOICE {
    toTpOrGTP       [0]   ExplicitTP,
    toPool          [1]   ObjectInstance
}

ToTPPools ::= SET OF SEQUENCE {
    tpPoolId    ObjectInstance,
    numberOfTPs INTEGER
    }

TpsAddedToTpPool ::= SEQUENCE {
    tpPool          ObjectInstance,
    tps             SET OF ObjectInstance
    }

TpsInGtpList ::= SEQUENCE OF ObjectInstance

UserLabel ::= GraphicString

VendorName ::= GraphicString

Version ::= GraphicString

END -- end of ASN1DefinedTypesModule
```

10 TMN application context

The object identifier value

{ ccitt recommendation m(13) gnm(3100) protocolSupport(1) applicationContext(0) tmnApplicationContextOne(1) }

is assigned to the application context that has the same capabilities as the systems management application context defined in Recommendation X.701, but also supports the integer values for ProbableCause. These integer value assignments are specified in this Recommendation.

11 Entity – relationship diagrams

Figures 1/M.3100 to 8/M.3100 depict the various relationships between the managed object classes specified in this Recommendation. These figures are representative of the relationships and do not contain all the relationships. All the relationships can be determined from the templates in § 3.

ANNEX A

(to Recommendation M.3100)

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ANNEX B

(to Recommendation M.3100)

B.1 *Introduction*

This annex contains additional object classes that may be useful for technology independent management.

B.2 *Object classes*

B.2.1 *Circuit Trail Termination Point Bidirectional*

The Circuit Trail Termination Point Bidirectional object class is a class of managed objects that terminates a circuit in one direction and originates a circuit in the opposite direction. This object class is instantiated[1)] when technology-independent-management is required. Technology-specific subclasses should not be derived from this class.

```
circuitTrailTerminationPointBidirectional MANAGED OBJECT CLASS
    DERIVED FROM
        trailTerminationPointBidirectional,
        circuitTrailTerminationPointSource,
        circuitTrailTerminationPointSink;

REGISTERED AS { m3100ObjectClass 1001 };
```

1) i.e. instance(s) of the object class(es) is created.

B.2.2 *Circuit Trail Termination Point Sink*

The Circuit Trail Termination Point Sink object class is a class of managed objects that terminates a circuit which is concerned with the transfer of payload in direct support of telecommunication services. This object class is instantiated[2)] when technology-independent-management is required. Technology-specific subclasses should not be derived from this class.

```
circuitTrailTerminationPointSink MANAGED OBJECT CLASS
    DERIVED FROM        trailTerminationPointSink;
    CHARACTERIZED BY
    circuitTrailTerminationPointSinkPackage PACKAGE
        BEHAVIOUR
            circuitTrailTerminationPointSinkBehaviour;
        ATTRIBUTES
            circuitTTPId GET;;;

REGISTERED AS { m3100ObjectClass 1002 };

circuitTrailTerminationPointSinkBehaviour BEHAVIOUR
        DEFINED AS
        "This managed object terminates a circuit which is concerned with the transfer of payload in direct
        support of telecommunication services.";
```

B.2.3 *Circuit Trail Termination Point Source*

The Circuit Trail Termination Point Source object class is a class of managed objects that originates a circuit which is concerned with the transfer of payload in direct support of telecommunication services. This object class is instantiated[2)] when technology-independent-management is required. Technology-specific subclasses should not be derived from this class.

```
circuitTrailTerminationPointSource MANAGED OBJECT CLASS
    DERIVED FROM        trailTerminationPointSource;
    CHARACTERIZED BY
    circuitTrailTerminationPointSourcePackage PACKAGE
        BEHAVIOUR
            circuitTrailTerminationPointSourceBehaviour;
        ATTRIBUTES
            circuitTTPId GET;;;

REGISTERED AS { m3100ObjectClass 1003 };

circuitTrailTerminationPointSourceBehaviour BEHAVIOUR
        DEFINED AS
        "This managed object originates a circuit which is concerned with the transfer of payload in direct
        support of telecommunication services.";
```

B.2.4 *Media Trail Termination Point Bidirectional*

The Media Trail Termination Point Bidirectional object class is a class of managed objects that generates and detects the carrier mechanism which is dependent on the physical media (e.g. for radio, the carrier wave is generated in one direction and detected in the opposite direction). This object class is instantiated[2)] when management at a technology-independent level is required. Technology-specific subclasses should not be derived from this class.

```
mediaTrailTerminationPointBidirectional MANAGED OBJECT CLASS
    DERIVED FROM
        trailTerminationPointBidirectional,
        mediaTrailTerminationPointSource,
        mediaTrailTerminationPointSink;

REGISTERED AS { m3100ObjectClass 1004 };
```

2) i.e. instance(s) of the object class(es) is created.

B.2.5 *Media Trail Termination Point Sink*

The Media Trail Termination Point Sink object class is a class of managed objects that detects the carrier mechanism which is dependent on the physical media (e.g. for radio, the carrier wave is detected). This object class is instantiated[3)] when management at a technology-independent level is required. Technology-specific subclasses should not be derived from this class.

```
mediaTrailTerminationPointSink MANAGED OBJECT CLASS
    DERIVED FROM        trailTerminationPointSink;
    CHARACTERIZED BY
    mediaTrailTerminationSinkPackage PACKAGE
        BEHAVIOUR
            mediaTrailTerminationSinkBehaviour;
        ATTRIBUTES
            mediaTTPId GET,
            mediaType GET;;;

REGISTERED AS { m3100ObjectClass 1005 };

mediaTrailTerminationSinkBehaviour BEHAVIOUR
        DEFINED AS
        "This managed object detects the carrier mechanism which is dependent on the physical media (e.g. for
        radio, the carrier wave is detected).";
```

B.2.6 *Media Trail Termination Point Source*

The Media Trail Termination Point Source object class is a class of managed objects that originates the carrier mechanism which is dependent on the physical media (e.g. for radio, the carrier wave is generated). This object class is instantiated[3)] when management at a technology-independent level is required. Technology-specific subclasses should not be derived from this class.

```
mediaTrailTerminationPointSource MANAGED OBJECT CLASS
    DERIVED FROM        trailTerminationPointSource;
    CHARACTERIZED BY
    mediaTrailTerminationSourcePackage PACKAGE
        BEHAVIOUR
            mediaTrailTerminationSourceBehaviour;
        ATTRIBUTES
            mediaTTPId GET,
            mediaType GET;;;

REGISTERED AS { m3100ObjectClass 1006 };

mediaTrailTerminationSourceBehaviour BEHAVIOUR
        DEFINED AS
        "This managed object originates the carrier mechanism which is dependent on the physical media (e.g.
        for radio the carrier wave is generated).";
```

B.2.7 *Overhead and Adaptation Trail Termination Point Bidirectional*

The Overhead and Adaptation Trail Termination Point Bidirectional object class is a class of managed objects that terminates an overhead and adaptation trail in one direction and originates an overhead and adaptation trail in the opposite direction. This object class is instantiated[3)] when management at a technology-independent level is required. Technology-specific subclasses should not be derived from this class.

---

3) i.e. instance (s) of the object class(es) is created.

```
overheadAndAdaptationTrailTerminationPointBidirectional MANAGED OBJECT CLASS
    DERIVED FROM
        trailTerminationPointBidirectional,
        overheadAndAdaptationTrailTerminationPointSource,
        overheadAndAdaptationTrailTerminationPointSink;

REGISTERED AS { m3100ObjectClass 1007 };
```

B.2.8 *Overhead and Adaptation Trail Termination Point Sink*

The Overhead and Adaptation Trail Termination Point Sink object class is a class of managed objects that terminates an overhead and adaptation trail. At this point the overhead is extracted from the payload. The extracted information may be used to collect end-to-end error information, perform error correction and end-to-end protection switching. This object class is instantiated[4)] when management at a technology-independent level is required. Technology-specific subclasses should not be derived from this class.

```
overheadAndAdaptationTrailTerminationPointSink MANAGED OBJECT CLASS
    DERIVED FROM        trailTerminationPointSink;
    CHARACTERIZED BY
    overheadAndAdaptationTrailTerminationPointSinkPackage PACKAGE
        BEHAVIOUR
            overheadAndAdaptationTrailTerminationPointSinkBehaviour;
        ATTRIBUTES
            oAndATTPId GET,
            informationRate GET;;;

REGISTERED AS { m3100ObjectClass 1008 };

overheadAndAdaptationTrailTerminationPointSinkBehaviour BEHAVIOUR
        DEFINED AS
        "This managed object terminates an overhead and adaptation trail. At this point the overhead is extracted
        from the payload.";
```

B.2.9 *Overhead and Adaptation Trail Termination Point Source*

The Overhead and Adaptation Trail Termination Point Source object class is a class of managed objects that originates an overhead and adaptation trail. At this point the overhead is generated and added to the payload. This object class is instantiated[4)] when management at a technology-independent level is required. Technology-specific subclasses should not be derived from this class.

```
overheadAndAdaptationTrailTerminationPointSource MANAGED OBJECT CLASS
    DERIVED FROM        trailTerminationPointSource;
    CHARACTERIZED BY
    overheadAndAdaptationTrailTerminationPointSourcePackage PACKAGE
        BEHAVIOUR
            overheadAndAdaptationTrailTerminationPointSourceBehaviour;
        ATTRIBUTES
            oAndATTPId  GET,
            informationRate GET;;;

REGISTERED AS { m3100ObjectClass 1009 };

overheadAndAdaptationTrailTerminationPointSourceBehaviour BEHAVIOUR
        DEFINED AS
        "This managed object originates an overhead and adaptation trail. At this point the overhead is generated and
        added to the payload.";
```

4) i.e. instance(s) of the object class(es) is created.

B.2.10 *Signal Trail Termination Point Bidirectional*

The Signal Trail Termination Point Bidirectional object class is a class of managed objects that terminates a modulated/encoded signal in one direction and generates a modulated/encoded signal in the opposite direction. This object class is instantiated[5)] when management at a technology-independent level is required. Technology-specific subclasses should not be derived from this class.

```
signalTrailTerminationPointBidirectional MANAGED OBJECT CLASS
    DERIVED FROM
        trailTerminationPointBidirectional,
        signalTrailTerminationPointSource,
        signalTrailTerminationPointSink;

REGISTERED AS { m3100ObjectClass 1010 };
```

B.2.11 *Signal Trail Termination Point Sink*

The Signal Trail Termination Point Sink object class is a class of managed objects that terminates a modulated/encoded signal. This object class is instantiated[5)] when management at a technology-independent level is required. Technology-specific subclasses should not be derived from this class.

```
signalTrailTerminationPointSink MANAGED OBJECT CLASS
    DERIVED FROM        trailTerminationPointSink;
    CHARACTERIZED BY
    signalTrailTerminationPointSinkPackage PACKAGE
        BEHAVIOUR
            signalTrailTerminationPointSinkBehaviour;
        ATTRIBUTES
            signalTTPId GET,
            lineCoding GET;;;

REGISTERED AS { cm3100ObjectClass 1011 };

signalTrailTerminationPointSinkBehaviour  BEHAVIOUR
        DEFINED AS
        "This managed object terminates a modulated/encoded signal.";
```

B.2.12 *Signal Trail Termination Point Source*

The Signal Trail Termination Point Source object class is a class of managed objects that creates a modulated/encoded signal ready for transmission. This object class is instantiated[5)] when management at a technology-independent level is required. Technology-specific subclasses should not be derived from this class.

```
signalTrailTerminationPointSource  MANAGED OBJECT CLASS
    DERIVED FROM        trailTerminationPointSource;
    CHARACTERIZED BY
    signalTrailTerminationPointSourcePackage PACKAGE
        BEHAVIOUR
            signalTrailTerminationPointSourceBehaviour;
        ATTRIBUTES
            signalTTPId  GET,
            lineCoding  GET;;;

REGISTERED AS { m3100ObjectClass 1012 };

signalTrailTerminationPointSourceBehaviour  BEHAVIOUR
        DEFINED AS
        "This managed object creates a modulated/encoded signal ready for transmission.";
```

5) i.e. instance(s) of the object class(es) is created.

B.3 *Definition of attributes*

B.3.1 *Circuit TTP Id*

```
circuitTTPId ATTRIBUTE
    WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.NameType;
    MATCHES FOR EQUALITY;

REGISTERED AS { m3100Attribute 1001 };
```

B.3.2 *Information Rate*

```
informationRate ATTRIBUTE
    WITH ATTRIBUTE SYNTAX MODULE.InformationRate;
    MATCHES FOR EQUALITY;

REGISTERED AS { m3100Attribute 1002 };
```

B.3.3 *Line Coding*

```
lineCoding  ATTRIBUTE
    WITH ATTRIBUTE SYNTAX MODULE.LineCoding;
    MATCHES FOR EQUALITY;

REGISTERED AS { m3100Attribute 1003 };
```

B.3.4 *Media TTP Id*

```
mediaTTPId ATTRIBUTE
    WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.NameType;
    MATCHES FOR EQUALITY;

REGISTERED AS { m3100Attribute 1004 };
```

B.3.5 *Media Type*

```
mediaType ATTRIBUTE
    WITH ATTRIBUTE SYNTAX MODULE.MediaType;
    MATCHES FOR EQUALITY;

REGISTERED AS { m3100Attribute 1005 };
```

B.3.6 *O and A TTP Id*

```
oAndATTPId ATTRIBUTE
    WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.NameType;
    MATCHES FOR EQUALITY;

REGISTERED AS { m3100Attribute 1006 };
```

B.3.7 *Signal TTP Id*

```
signalTTPId ATTRIBUTE
    WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.NameType;
    MATCHES FOR EQUALITY;

REGISTERED AS { m3100Attribute 1007 };
```

B.4 *Name Bindings*

B.4.1 *Circuit Termination Point Bidirectional*

```
circuitTerminationPointBidirectional-managedElement NAME BINDING
    SUBORDINATE OBJECT CLASS circuitTrailTerminationPointBidirectional;
    NAMED BY
    SUPERIOR OBJECT CLASS managedElement AND SUBCLASSES;
    WITH ATTRIBUTE circuitTTPId;
    BEHAVIOUR
        automaticInstanceNamingBehaviour;
```

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

REGISTERED AS { m3100NameBinding 1001 };

circuitTerminationPointBidirectional-equipment NAME BINDING
    SUBORDINATE OBJECT CLASS circuitTrailTerminationPointBidirectional;
    NAMED BY
    SUPERIOR OBJECT CLASS equipment  AND SUBCLASSES;
    WITH ATTRIBUTE circuitTTPId;
    BEHAVIOUR
        automaticInstanceNamingBehaviour;
    CREATE
        WITH-REFERENCE-OBJECT,
        WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
       ONLY-IF-NO-CONTAINED-OBJECTS;

REGISTERED AS { m3100NameBinding 1002 };
```

B.4.2 *Circuit Termination Point Sink*

```
circuitTerminationPointSink-managedElement NAME BINDING
    SUBORDINATE OBJECT CLASS circuitTrailTerminationPointSink;
    NAMED BY
    SUPERIOR OBJECT CLASS managedElement AND SUBCLASSES;
    WITH ATTRIBUTE circuitTTPId;
    BEHAVIOUR
        automaticInstanceNamingBehaviour;
    CREATE
        WITH-REFERENCE-OBJECT,
        WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
        ONLY-IF-NO-CONTAINED-OBJECTS;

REGISTERED AS { m3100NameBinding 1003 };

circuitTerminationPointSink-equipment NAME BINDING
    SUBORDINATE OBJECT CLASS circuitTrailTerminationPointSink;
    NAMED BY
    SUPERIOR OBJECT CLASS equipment AND SUBCLASSES;
    WITH ATTRIBUTE circuitTTPId;
    BEHAVIOUR
        automaticInstanceNamingBehaviour;
    CREATE
        WITH-REFERENCE-OBJECT,
        WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
        ONLY-IF-NO-CONTAINED-OBJECTS;

REGISTERED AS { m3100NameBinding 1004 };
```

B.4.3 *Circuit Termination Point Source*

```
circuitTerminationPointSource-managedElement NAME BINDING
    SUBORDINATE OBJECT CLASS circuitTrailTerminationPointSource;
    NAMED BY
    SUPERIOR OBJECT CLASS managedElement AND SUBCLASSES;
    WITH ATTRIBUTE circuitTTPId;
    BEHAVIOUR
        automaticInstanceNamingBehaviour;
    CREATE
        WITH-REFERENCE-OBJECT,
        WITH-AUTOMATIC-INSTANCE-NAMING;
```

```
    DELETE
        ONLY-IF-NO-CONTAINED-OBJECTS;

REGISTERED AS { m3100NameBinding 1005 };

circuitTerminationPointSource-equipment  NAME BINDING
    SUBORDINATE OBJECT CLASS circuitTrailTerminationPointSource;
    NAMED BY
    SUPERIOR OBJECT CLASS equipment AND SUBCLASSES;
    WITH ATTRIBUTE          circuitTTPId;
    BEHAVIOUR
        automaticInstanceNamingBehaviour;
    CREATE
        WITH-REFERENCE-OBJECT,
        WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
        ONLY-IF-NO-CONTAINED-OBJECTS;

REGISTERED AS { m3100NameBinding 1006 };
```

B.4.4 *Media Termination Point Bidirectional*

```
mediaTerminationPointBidirectional-managedElement NAME BINDING
    SUBORDINATE OBJECT CLASS mediaTrailTerminationPointBidirectional;
    NAMED BY
    SUPERIOR OBJECT CLASS managedElement AND SUBCLASSES;
    WITH ATTRIBUTE mediaTTPId;
    BEHAVIOUR
        automaticInstanceNamingBehaviour;
    CREATE
        WITH-REFERENCE-OBJECT,
        WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
        ONLY-IF-NO-CONTAINED-OBJECTS;

REGISTERED AS { m3100NameBinding 1007 };

mediaTerminationPointBidirectional-equipment NAME BINDING
    SUBORDINATE OBJECT CLASS            mediaTrailTerminationPointBidirectional;
    NAMED BY
    SUPERIOR OBJECT CLASS             equipment  AND SUBCLASSES;
    WITH ATTRIBUTE       mediaTTPId;
    BEHAVIOUR
        automaticInstanceNamingBehaviour;
    CREATE
        WITH-REFERENCE-OBJECT,
        WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
        ONLY-IF-NO-CONTAINED-OBJECTS;

REGISTERED AS { m3100NameBinding 1008 };
```

B.4.5 *Media Termination Point Sink*

```
mediaTerminationPointSink-managedElement NAME BINDING
    SUBORDINATE OBJECT CLASS mediaTrailTerminationPointSink;
    NAMED BY
    SUPERIOR OBJECT CLASS managedElement AND SUBCLASSES;
    WITH ATTRIBUTE mediaTTPId;
    BEHAVIOUR
        automaticInstanceNamingBehaviour;
    CREATE
        WITH-REFERENCE-OBJECT,
        WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
        ONLY-IF-NO-CONTAINED-OBJECTS;
```

```
REGISTERED AS { m3100NameBinding 1009 };

mediaTerminationPointSink-equipment  NAME BINDING
    SUBORDINATE OBJECT CLASS mediaTrailTerminationPointSink;
    NAMED BY
    SUPERIOR OBJECT CLASS equipment AND SUBCLASSES;
    WITH ATTRIBUTE mediaTTPId;
    BEHAVIOUR
        automaticInstanceNamingBehaviour;
    CREATE
        WITH-REFERENCE-OBJECT,
        WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
        ONLY-IF-NO-CONTAINED-OBJECTS;

REGISTERED AS { m3100NameBinding 1010 };
```

B.4.6 *Media Termination Point Source*

```
mediaTerminationPointSource-managedElement NAME BINDING
    SUBORDINATE OBJECT CLASS mediaTrailTerminationPointSource;
    NAMED BY
    SUPERIOR OBJECT CLASS managedElement AND SUBCLASSES;
    WITH ATTRIBUTE mediaTTPId;
    BEHAVIOUR
        automaticInstanceNamingBehaviour;
    CREATE
        WITH-REFERENCE-OBJECT,
        WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
        ONLY-IF-NO-CONTAINED-OBJECTS;

REGISTERED AS { m3100NameBinding 1011 };

mediaTerminationPointSource-equipment  NAME BINDING
    SUBORDINATE OBJECT CLASS mediaTrailTerminationPointSource;
    NAMED BY
    SUPERIOR OBJECT CLASS equipment AND SUBCLASSES;
    WITH ATTRIBUTE mediaTTPId;
    BEHAVIOUR
        automaticInstanceNamingBehaviour;
    CREATE
        WITH-REFERENCE-OBJECT,
        WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
        ONLY-IF-NO-CONTAINED-OBJECTS;

REGISTERED AS { m3100NameBinding 1012 };
```

B.4.7 *Overhead and Adaptation Termination Point Bidirectional*

```
overheadAndAdaptationTTPBidirectional-managedElement NAME BINDING
    SUBORDINATE OBJECT CLASS
        overheadAndAdaptationTrailTerminationPointBidirectional;
    NAMED BY
    SUPERIOR OBJECT CLASS          managedElement  AND SUBCLASSES;
    WITH ATTRIBUTE       oAndATTPId;
    BEHAVIOUR
        automaticInstanceNamingBehaviour;
    CREATE
        WITH-REFERENCE-OBJECT,
        WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
        ONLY-IF-NO-CONTAINED-OBJECTS;
```

```
REGISTERED AS { m3100NameBinding 1013 };

overheadAndAdaptationTTPBidirectional-equipment NAME BINDING
    SUBORDINATE OBJECT CLASS
        overheadAndAdaptationTrailTerminationPointBidirectional;
    NAMED BY
    SUPERIOR OBJECT CLASS              equipment  AND SUBCLASSES;
    WITH ATTRIBUTE        oAndATTPId;
    BEHAVIOUR
        automaticInstanceNamingBehaviour;
    CREATE
        WITH-REFERENCE-OBJECT,
        WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
        ONLY-IF-NO-CONTAINED-OBJECTS;

REGISTERED AS { m3100NameBinding 1014 };
```

B.4.8 *Overhead and Adaptation Termination Point Sink*

```
overheadAndAdaptationTTPSink-managedElement NAME BINDING
    SUBORDINATE OBJECT CLASS
        overheadAndAdaptationTrailTerminationPointSink;
    NAMED BY
    SUPERIOR OBJECT CLASS              managedElement  AND SUBCLASSES;
    WITH ATTRIBUTE        oAndATTPId;
    BEHAVIOUR
        automaticInstanceNamingBehaviour;
    CREATE
        WITH-REFERENCE-OBJECT,
        WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
        ONLY-IF-NO-CONTAINED-OBJECTS;

REGISTERED AS { m3100NameBinding 1015 };

overheadAndAdaptationTTPSink-equipment NAME BINDING
    SUBORDINATE OBJECT CLASS
        overheadAndAdaptationTrailTerminationPointSink ;
    NAMED BY
    SUPERIOR OBJECT CLASS              equipment  AND SUBCLASSES;
    WITH ATTRIBUTE        oAndATTPId;
    BEHAVIOUR
        automaticInstanceNamingBehaviour;
    CREATE
        WITH-REFERENCE-OBJECT,
        WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
        ONLY-IF-NO-CONTAINED-OBJECTS;

REGISTERED AS { m3100NameBinding 1016 };
```

B.4.9 *Overhead and Adaptation Termination Point Source*

```
overheadAndAdaptationTTPSource-managedElement NAME BINDING
    SUBORDINATE OBJECT CLASS
        overheadAndAdaptationTrailTerminationPointSource;
    NAMED BY
    SUPERIOR OBJECT CLASS              managedElement  AND SUBCLASSES;
    WITH ATTRIBUTE        oAndATTPId;
    BEHAVIOUR
        automaticInstanceNamingBehaviour;
    CREATE
        WITH-REFERENCE-OBJECT,
        WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
        ONLY-IF-NO-CONTAINED-OBJECTS;
```

```
REGISTERED AS { m3100NameBinding 1017 };

overheadAndAdaptationTTPSource-equipment NAME BINDING
        SUBORDINATE OBJECT CLASS
          overheadAndAdaptationTrailTerminationPointSource;
    NAMED BY
    SUPERIOR OBJECT CLASS             equipment  AND SUBCLASSES;
    WITH ATTRIBUTE        oAndATTPId;
    BEHAVIOUR
          automaticInstanceNamingBehaviour;
    CREATE
          WITH-REFERENCE-OBJECT,
          WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
          ONLY-IF-NO-CONTAINED-OBJECTS;

REGISTERED AS { m3100NameBinding 1018 };
```

B.4.10 *Signal Termination Point Bidirectional*

```
signalTerminationPointBidirectional-managedElement NAME BINDING
    SUBORDINATE OBJECT CLASS             signalTrailTerminationPointBidirectional;
    NAMED BY
    SUPERIOR OBJECT CLASS             managedElement AND SUBCLASSES;
    WITH ATTRIBUTE        signalTTPId;
    BEHAVIOUR
          automaticInstanceNamingBehaviour;
    CREATE
          WITH-REFERENCE-OBJECT,
          WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
          ONLY-IF-NO-CONTAINED-OBJECTS;

REGISTERED AS { m3100NameBinding 1019 };

signalTerminationPointBidirectional-equipment NAME BINDING
    SUBORDINATE OBJECT CLASS signalTrailTerminationPointBidirectional;
    NAMED BY
    SUPERIOR OBJECT CLASS         equipment  AND SUBCLASSES;
    WITH ATTRIBUTE        signalTTPId;
    BEHAVIOUR
          automaticInstanceNamingBehaviour;
    CREATE
          WITH-REFERENCE-OBJECT,
          WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
          ONLY-IF-NO-CONTAINED-OBJECTS;

REGISTERED AS { m3100NameBinding 1020 };
```

B.4.11 *Signal Termination Point Sink*

```
signalTerminationPointSink-managedElement NAME BINDING
    SUBORDINATE OBJECT CLASS             signalTrailTerminationPointSink;
    NAMED BY
    SUPERIOR OBJECT CLASS             managedElement AND SUBCLASSES;
    WITH ATTRIBUTE        signalTTPId;
    BEHAVIOUR
          automaticInstanceNamingBehaviour;
    CREATE
          WITH-REFERENCE-OBJECT,
          WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
          ONLY-IF-NO-CONTAINED-OBJECTS;

REGISTERED AS { m3100NameBinding 1021 };
```

```
signalTerminationPointSink-equipment NAME BINDING
    SUBORDINATE OBJECT CLASS          signalTrailTerminationPointSink;
    NAMED BY
    SUPERIOR OBJECT CLASS          equipment  AND SUBCLASSES;
    WITH ATTRIBUTE       signalTTPId;
    BEHAVIOUR
        automaticInstanceNamingBehaviour;
    CREATE
        WITH-REFERENCE-OBJECT,
        WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
        ONLY-IF-NO-CONTAINED-OBJECTS;

REGISTERED AS { m3100NameBinding 1022 };
```

B.4.12 *Signal Termination Point Source*

```
signalTerminationPointSource-managedElement NAME BINDING
    SUBORDINATE OBJECT CLASS          signalTrailTerminationPointSource;
    NAMED BY
    SUPERIOR OBJECT CLASS          managedElement  AND SUBCLASSES;
    WITH ATTRIBUTE       signalTTPId;
    BEHAVIOUR
        automaticInstanceNamingBehaviour;
    CREATE
        WITH-REFERENCE-OBJECT,
        WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
        ONLY-IF-NO-CONTAINED-OBJECTS;

REGISTERED AS { m3100NameBinding 1023 };

signalTerminationPointSource-equipment NAME BINDING
    SUBORDINATE OBJECT CLASS          signalTrailTerminationPointSource;
    NAMED BY
    SUPERIOR OBJECT CLASS     equipment  AND SUBCLASSES;
    WITH ATTRIBUTE       signalTTPId;
    BEHAVIOUR
        automaticInstanceNamingBehaviour;
    CREATE
        WITH-REFERENCE-OBJECT,
        WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
        ONLY-IF-NO-CONTAINED-OBJECTS;

REGISTERED AS { m3100NameBinding 1024 };
```

B.5 *Supporting Productions*

```
MediaType ::= INTEGER {
        twistedPairCopper   (0),
        coaxial             (1),
        singleModeFiber     (2),
        multiModeFiber      (3),
        radio               (4),
        satellite           (5)
}
```

```
LineCoding ::= INTEGER {
        nRZ         (0),
        rZ          (1),
        diphase     (2),
        bipolar     (3),
        b6ZS        (4),
        b8ZS        (5),
        b3ZS        (6),
        ami         (7),
        amizcs      (8),
        hDB2        (9),
        hDB3       (10),
        cchan      (11)
}

InformationRate ::= INTEGER {
        dS1sf(10), dS1esf(11), zbtsi(12), tidm(14),
        cept1(20),
        dS1C(25),
        dS2(30),
        cept2(40),
        dS3async(50), dS3sync(51), dS3cbit(52), dS3pbit(53),
        dS4(60),
        dS4e(65),
        cept3(70),
        vC11(80), vC12(85), vC2(90), vC3(95), vC4(100),
        sTM1(110), sTM4(120), sTM16(130)

}
```

APPENDIX I

(to Recommendation M.3100)

Candidates for Management Information

I.1 *Introduction*

This appendix proposes candidate object classes for further study.

I.2 *Object Classes*

I.2.1 *Organization*

The Organization object class is a class of managed objects characterized by a specific group of people or organizations (e.g. a vendor, a customer, an owner) as viewed from the agent.

```
organization      MANAGED OBJECT CLASS
        DERIVED FROM "Recommendation X.721": top;
        CHARACTERIZED BY
        organizationPackage      PACKAGE
          BEHAVIOUR
              organization Behaviour BEHAVIOUR
              DEFINED AS
              "An organization may be instantiated by the agent system as the result of the internal processing
              (initialization, request, etc.,) or by managing system issuing a CREATE operation to the agent
              system. The relationshipChange notification is used when the contactNames and/or locationNames
              are changed.";
          ATTRIBUTES
              organization Id              GET,
              contactNames                 GET-REPLACE ADD-REMOVE,
              locationNames                GET-REPLACE ADD-REMOVE;
```

```
    ATTRIBUTE GROUP
        "Recommendation X.721":relationship;
        -- consists of contactNames and locationNames --
    NOTIFICATIONS
        "Recommendation X.721":relationshipChange,
        "Recommendation X.721":objectCreation,
        "Recommendation X.721":objectDeletion;;;

REGISTERED AS {ccittObjectClass  x };
```

I.2.2 *Location*

The Location object class is a class of managed objects characterized by a place that may be occupied by managed objects and has some address (e.g. geographic, postal, or telecommunications address).

```
Location      MANAGED OBJECT CLASS
        DERIVED FROM "Recommendation X.721":top;
        CHARACTERIZED BY
          BEHAVIOUR
              locationBehaviour  BEHAVIOUR
              DEFINED AS
              "A location may be instantiated by the agent system as the result of the internal processing
              (initialization, request, etc.) or by managing system issuing a CREATE operation to agent
              system.";
          ATTRIBUTES
              locationId                GET,
              organizationNames         GET-REPLACE ADD-REMOVE,
              objectAtLocation          GET-REPLACE ADD-REMOVE;
          ATTRIBUTE GROUP
              "Recommendation X.721":relationshipChange,
              -- contains organizationNames and objectsAtLocation --
          NOTIFICATIONS
              "Recommendation X.721":relationshipChange,
              "Recommendation X.721" objectCreation,
              "Recommendation X.721":objectDeletion;;;

REGISTERED AS { ccittObjectClass  x };
```

I.2.3 *Managed Function*

The Managed Function object class is a class of managed objects that characterize partitions of functions such as access side, truck side within a Network Element.

```
managedFunction       MANAGED OBJECT CLASS
        DERIVED FROM "Recommendation X.721":top;
        CHARACTERIZED BY
          BEHAVIOUR
              managedFunction  BEHAVIOUR
              DEFINED AS
              "The managed function object class is a class of managed objects that are contained within a
              managed element. Instances of this object class can be used to partition functions of a managed
              element.";
          ATTRIBUTES
              managedFunctionId         GET,
              affectedObjectList        GET;;;
        CONDITIONAL PACKAGES
          userLabelPackage     PRESENT IF "an instance supports it",
          locationNamePackage      PRESENT IF "an instance supports it",

REGISTERED AS { ccittObjectClass x };
```

I.3 *Attributes*

I.3.1 *Location Names*

This attribute provides the list of locations at which this object instance is located.

```
locationNames       ATTRIBUTE
        WITH ATTRIBUTE SYNTAX ASN1Module.LocationNames;
        MATCHES FOR Set Comparison Set Intersection;

REGISTERED AS { };
```

I.3.2 *Organization Names*

This attribute specifies the organizations that are located in the Location.

```
organizationNames    ATTRIBUTE
        WITH ATTRIBUTE SYNTAX ASN1Module.ObjectInstanceList;
        MATCHES FOR Set Comparison Set Intersection;

REGISTERED AS { };
```

I.3.3 *Object At Locations*

This attribute specifies the List of managed objects (e.g. equipment, circuits) that are located in the Location.

```
objectAtLocations     ATTRIBUTE
        WITH ATTRIBUTE SYNTAX       ASN1Module.ObjectInstanceList;
        MATCHES FOR Set Comparison  Set Intersection;

REGISTERED AS { };
```

I.3.4 *Vendor Name (to be replaced with the current definition)*

This attribute specifies the name of the vendor (i.e. an organization) which supplied this managed object.

```
vendorName    ATTRIBUTE
        WITH ATTRIBUTE SYNTAX ASN1Module.VendorName;
        MATCHES FOR Equality;

REGISTERED AS { };
```

I.3.5 *Organization Id*

This attribute identifies the organization managed object instance.

```
organizationId    ATTRIBUTE
        WITH ATTRIBUTE SYNTAX ASN1Module.Pstring;
        MATCHES FOR Equality;

REGISTERED AS { };
```

I.3.6 *Location Id*

This attribute identifies the geographic location managed object instance.

```
locationId     ATTRIBUTE
        WITH ATTRIBUTE SYNTAX ASN1Module.Pstring;
        MATCHES FOR Equality;

REGISTERED AS { };
```

I.3.7 *Contact Names*

This attribute provides the list of names (e.g. a person, an office, or a department) that are main contacts of this organization.

```
contactNames      ATTRIBUTE
        WITH ATTRIBUTE SYNTAX       ASN1Module.ObjectInstanceList;
        MATCHES FOR Set Comparison Set Intersection;

REGISTERED AS { };
```

I.4 *ASN.1 Module*

```
LocationNames ::= SET OF {
                CHOICE { PrintableString,
                        ObjectInstance } }

VendorName  ::= SET OF {
                CHOICE { PrintableString,
                        ObjectInstance } }

Pstring ::= PrintableString
```

References

[1] CCITT Recommendation M.3010 *Principles for a Telecommunications Management Network, 1992*.

[2] CCITT Recommendation X.720 *Management Information Model, 1992*.

[3] CCITT Recommendation X.722 *Guidelines for Definition of Managed Objects, 1992*.

[4] CCITT Recommendation *Specification of abstract syntax notation one, (ASN.1), BLUE Book, Vol. VIII.4, Rec. X.208, ITU, Geneva 1989*.

[5] CCITT Recommendation X.721 *Definition of Management Information, 1992*.

[6] CCITT Recommendation G.803 (temporary number was G.sna1 *Architectures of transport network based on the synchronous digital hierarchy (SDH), 1992*.

[7] CCITT Recommendation Q.821 *Stage 2 and Stage 3 Description for the Q3 Interface, 1992*.