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information model for the ATM crossconnect

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Contents

Foreword

This draft European Telecommunication Standard (ETS) has been produced by the Network Aspects (NA) Technical Committee of the European Telecommunications Standards Institute (ETSI), and is now submitted for the Public Enquiry phase of the ETSI standards approval procedure.

Proposed transposition dates	
Date of adoption of this ETS:	date of ETSI adoption
Date of latest announcement of this ETS (doa):	3 months after ETSI adoption
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Date of withdrawal of any conflicting National Standard (dow):	6 months after doa

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1   Scope

This draft European Telecommunication Standard (ETS) gives a network provider or service provider of an Asynchronous Transfer Mode (ATM) crossconnected network a means to:

-    get information about the configuration, the faults and the performance of the ATM network;

-    control the configuration, the faults and the performance of the ATM network.

Therefore, this ETS:

-    identifies the ATM Network Elements (NEs) and the functions within them, which are subject to management. Hereby, use is made of the TCR-TR 014 [5] for descriptions of the ATM transport network architecture and of the ETR 161 [4] for the descriptions of a functional model of an ATM cross-connected network;

-    identifies the management services and functions needed to manage these ATM network elements. For this purpose, use is made of CCITT Recommendation M.3020 [16];

-    defines the management architecture, to contain the management functions related to the network elements and the Network Management (NM) levels. For the definition of a management architecture use is made of CCITT Recommendation M.3010 [15], the Principles of the Telecommunications Management Network (TMN);

-    identifies what management information is available to the TMN by means of layer management OAM flows. This layer management mechanism is defined in ITU-T Recommendation I.610 [14], B-ISDN operation and maintenance principles and functions;

-    specifies the management information exchanged at the q3 reference point related to the network Element Management (EM) level.

This management information specification is done in a formal way using managed object classes, packages, attributes, notifications, actions and behaviour. For this purpose, use is made of the OSI management templates as a notation tool, defined in CCITT Recommendation X.722 [24], Guidelines for the Definition of Managed Objects (GDMO). For type definitions, Abstract Syntax Notation One (ASN.1) is used, as defined in CCITT Recommendation X.208 [21], Specification of ASN.1. Reuse of the following standards is performed:

-    CCITT Recommendation X.720 [22], for use of management information model concepts;

-    CCITT Recommendation X.721 [23], for reuse of the OSI Management mechanisms;

-    ITU-T Recommendation Q.822 [20], performance management, for reuse of the performance data collection mechanisms;

-    CCITT Recommendation M.3100 [17], generic network information model, for reuse of generic concepts, like trail, cross-connection, etc.

In this ETS it is assumed that the ATM crossconnected network is used as a backbone network for the B-ISDN, so it is related to the Customer Access (CA) and public part of the B-ISDN.

2   Normative references

This ETS incorporates by dated and undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this ETS only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

[1]   ETS 300 371: "Transmission and Multiplexing (TM); Plesiochronous Digital Hierarchy (PDH) information model for the Network Element (NE) view".

[2]   ETS 300 455: "Broadband Integrated Services Digital Network (B-ISDN); Virtual Path Service (VPS) for reserved and permanent communications".

[3]   ETR 047: "Network Aspects (NA); Telecommunications Management Network (TMN) Management services".

[4]   ETR 161: "Functional model of an ATM cross-connected network".

[5]   TCR-TR 014: "Transmission and Multiplexing (TM); Harmonization of transport network architecture and protocol reference model for the transport of Asynchronous Transfer Mode (ATM) cells".

[6]   CCITT Recommendation G.774: "Synchronous digital hierarchy (SDH) management information model for the network element view".

[7]   ITU-T Recommendation I.113: "Vocabulary of terms for broadband aspects of B-ISDN".

[8]   ITU-T Recommendation I.150: "B-ISDN asynchronous transfer mode functional characteristics".

[9]   ITU-T Recommendation I.311: "B-ISDN general network aspects".

[10]   ITU-T Recommendation I.356: "B-ISDN ATM layer cell transfer performance".

[11]   ITU-T Recommendation I.35BA: "B-ISDN semi-permanent connection availability".

[12]   ITU-T Recommendation I.361: "B-ISDN ATM layer specification".

[13]   ITU-T Recommendation I.371: "Traffic control and congestion control in B-ISDN".

[14]   ITU-T Recommendation I.610: "B-ISDN operation and maintenance principles and functions".

[15]   CCITT Recommendation M.3010: "Principles for a telecommunications management network".

[16]   CCITT Recommendation M.3020: "TMN interface specification methodology".

[17]   CCITT Recommendation M.3100: "Generic network information model".

[18]   ITU-T Recommendation Q.811: "Lower layer protocol profiles for the Q3 interface".

[19]   ITU-T Recommendation Q.812: "Upper layer protocol profiles for the Q3 interface".

[20]   ITU-T Recommendation Q.822: "Stage 1, stage 2 and stage 3 description for the Q3 interface - Performance management".

[21]   CCITT Recommendation X.208: "Specification of Abstract Syntax Notation One (ASN.1)".

[22]   CCITT Recommendation X.720: "Information technology - Open Systems Interconnection - Structure of management information: Management information model".

[23]   CCITT Recommendation X.721: "Information technology - Open Systems Interconnection - Structure of management information: Definition of management information".

[24]   CCITT Recommendation X.722: "Information technology - Open Systems Interconnection - Structure of management information: Guidelines for the definition of managed objects".

3   Abbreviations and symbols

For the purposes of this ETS, the following abbreviations apply:

AIS	Alarm Indication Signal
ATM	Asynchronous Transfer Mode
ATMNE	ATM Network Element
BM	Business Management
CA	Customer Access
CDV	Cell Delay Variation
CI	Customer Installation
CLP	Cell Loss Priority
CTP	Connection Termination Point
EM	Element Management
ET	Exchange Termination
FERF	Far End Received Failure (this term has been replaced by RDI)
GDMO	Guidelines for the Definition of Managed Objects
HEC	Header Error Control
ICI	Inter Carrier Interface
LOC	Loss Of Cell delineation
MIM	Management Information Model
MMC	element Management Management Center
MSP	Management Service Provider
NE	Network Element
NEF	Network Element Function
NM	Network Management
NMC	Network Management Center
NNI	Network-Network Interface
NT	Network Termination
OAM	Operation And Maintenance
OS	Operating System
OSF	Operating System Functions
OSI	Open Systems Interconnection
PDH	Plesiochronous Digital Hierarchy
PM	Performance Monitoring
QoS	Quality of Service
Q-type	TMN Interface
RDI	Remote Defect Indicator (this term is the preferred term for FERF)
SDH	Synchronous Digital Hierarchy
SECB	Severely Error Cell Block
SES	Severely Errored Second
SM	Service Management
TB	B-ISDN T-Type interface
TE	Terminal Equipment
TMN	Telecommunication Management Network
TP	Termination Point
TTP	Trail Termination Point
UNI	User-Network Interface

UPC/NPC	Usage/Network Parameter Control
VC	Virtual Channel
VP	Virtual Path
VPLC	VP Link Connection
VPNC	VP Network Connection
VPSC	VP Sub Network Connection
VPXC	VP Cross-Connect
WSF	Work Station Function
X-type	TMN interface

4 Definitions

For the purposes of this ETS, the following definitions apply:

link: A "topological component" which describes the fixed relationship between a "sub-network" and another "sub-network" or "access group".

sub-network: A "topological component" used to effect routeing and management. It describes the potential for "sub-network connections" across the "sub-network". It can be partitioned into interconnected "sub-networks" and "links". Each "sub-network" in turn can be partitioned into smaller "sub-networks "and "links" and so on. A "sub-network" may be contained within one physical node.

connection: A "transport entity" which is capable of transferring information transparently between "connection points". A "connection" defines the association between the "connection points" and the "connection points" delimit the "connection".

link connection: A "transport entity" provided by the "client/server" association. It is formed by a near-end "adaptation" function, a server "trail" and a far-end "adaptation" function between "connection points". It can be configured as part of the "trail management process" in the associated server layer.

network connection: A "transport entity" formed by the series of "connections" between "termination connection points".

sub-network connection: A "transport entity" formed by a "connection" across a "sub-network" between "connection points". It can be configured as part of the "trail management process".
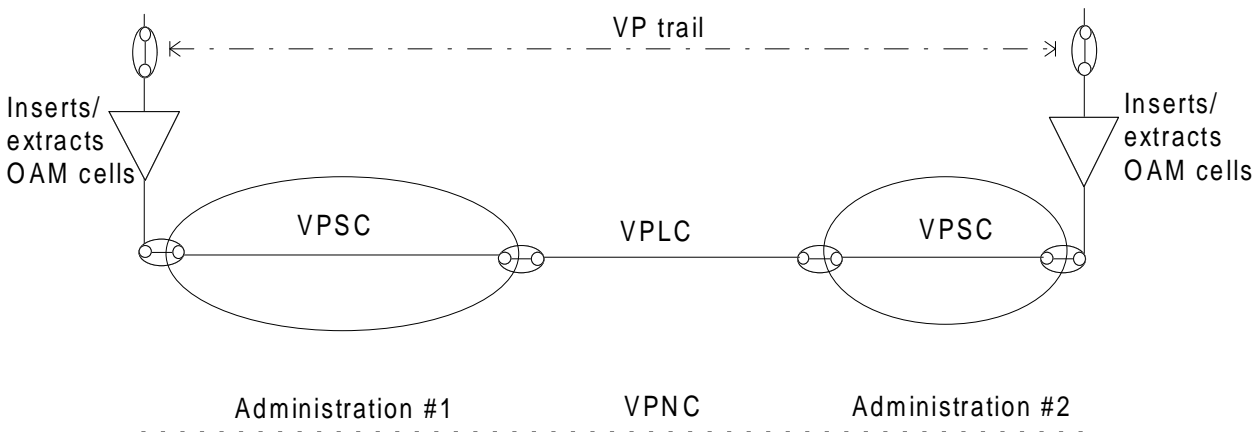
VPLC:	VP Link Connection.
VPNC:	VP Network Connection.
VPSC:	VP Sub network Connection.

Figure 1: Functional architecture of a VPC provided by two administrations

VP cross-connect (ITU-T Recommendation I.113 [12]) VC cross-connect (ITU-T Recommendation I.113 [12]) VP-VC cross-connect (ITU-T Recommendation I.113 [12]) ATM cross-connect: An ATM cross-connect is a VP-VC cross-connect.

5 B-ISDN management architecture

CCITT Recommendation M.3010 [15] introduces the TMN concepts and defines its functional and physical architectures. The TMN has been described to support the management requirements of Administrations to plan, provision, install, maintain, operate and administer telecommunications equipment, networks and services.

The basic concept behind a TMN is to provide an architecture to achieve the interconnection between Operation Systems (OS) and Network Elements (NEs) for the exchange of management information using standardized interfaces (Q interfaces) specified in terms of defined (OSI) protocols and messages. In particular, the message set is defined through the specification of the information model related to each management interface.

The TMN functional architecture is defined by a standard set of functional blocks and reference points. Pairs of TMN functional blocks that exchange management information (messages) are separated by reference points. A reference point becomes an interface (protocols + messages) when the related pair of functional blocks are allocated to separate physical systems.
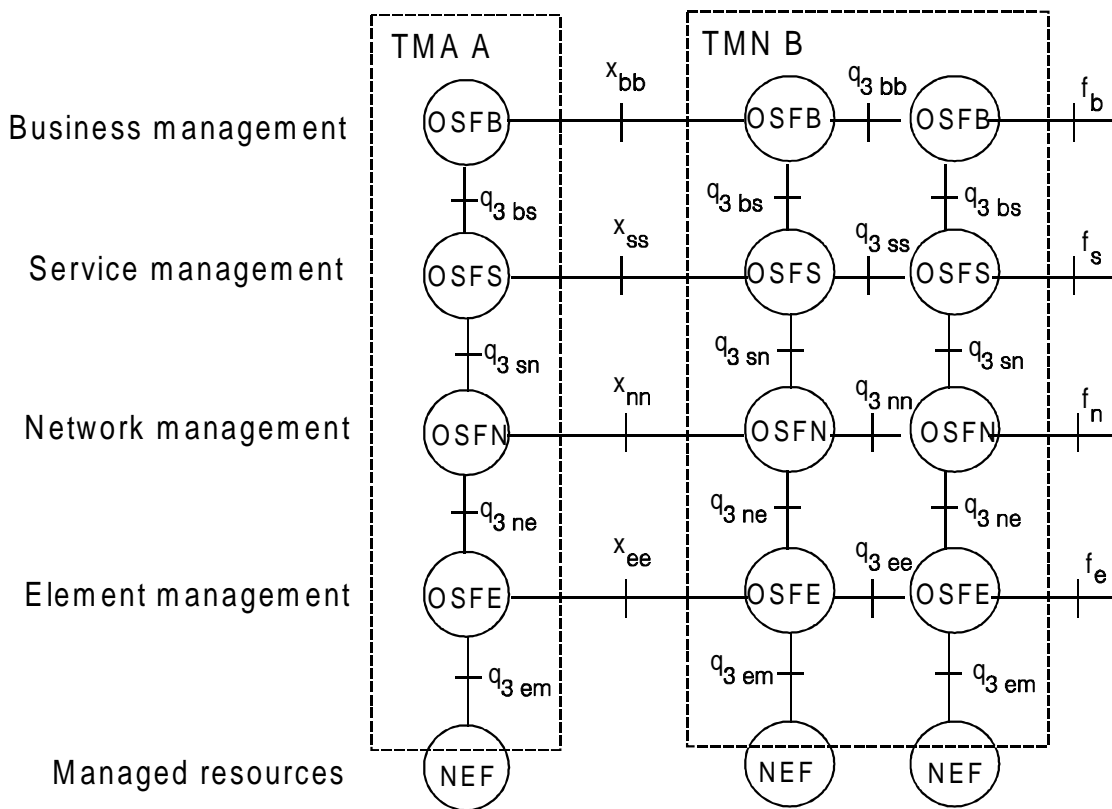
q3-em: between NE and EM level.   q3/x-nn: in between two NM levels.

q3-ne: between EM and NM level.   q3/x-ss: in between two SM levels.

q3-sn: between SM and NM level.   q3/x-bb: in between two BM levels.

q3-bs: between BM and SM level.   q3/x-ee: in between two EM levels.

f-e, f-n, f-s, f-b: between OS functionality and workstations.

Figure 2: TMN functional architecture

These generic concepts, described fully in CCITT Recommendation M.3010 [15], need to be specialized for each specific network environment where they apply. In particular, considered as illustration of the context of this ETS on the EM a physical example is included in subclause 5.2.

For operational purposes, the management functionality may be partitioned into layers. CCITT Recommendation M.3010 [15] proposes a categorization into four layers: EM, NM, Service Management (SM) and Business Management (BM). The resulting TMN hierarchical functional architecture is given in figure 2.

5.1   Functional B-ISDN management architecture

The functional B-ISDN management architecture considers three of the four generic management layers presented above: EM, NM and SM. The EM layer is composed of the functional blocks (OSF-E) that provide the management of each NE seen as a single entity. EM functions include e.g. equipment configuration, alarm surveillance, equipment maintenance, accounting data collection, performance data collection. OSF-E corresponds to the VP-VC network EM function block.

The NM layer is composed of the functional blocks (OSF-N) that provide the management of the network as a whole. NM functions include e.g. network configuration, alarms correlation, end-to-end performance analysis, traffic statistical analysis. OSF-N corresponds to the VP-VC NM function block.

The specific set of EM and NM functions for the VP/VC cross-connected network can be found in clause 6.

The q3-em reference point has been identified as having the highest priority to be standardized. It is defined in this ETS, others candidate reference points are for further study.

5.2   Physical B-ISDN management architecture

This subclause provides information about the physical B-ISDN management architecture.

The B-ISDN management functional architecture presented in figure 2 can be implemented in different physical architectures. In practice, VP-VC NM (OSF-N) and VP-VC EM (OSF-E) function blocks might be co-located in one system or distributed in two separate systems.

In the latter case, the q-type reference point between the two management function blocks becomes a Q3-type interface (ITU-T Recommendations Q.811 [18] and Q.812 [19]). In addition to the two information models, also two protocol stacks associated with the two "classes" of Q3 interfaces need to be defined. In principle, these two protocol stacks do not need to be different. An example of a physical architecture is shown in figure 3.
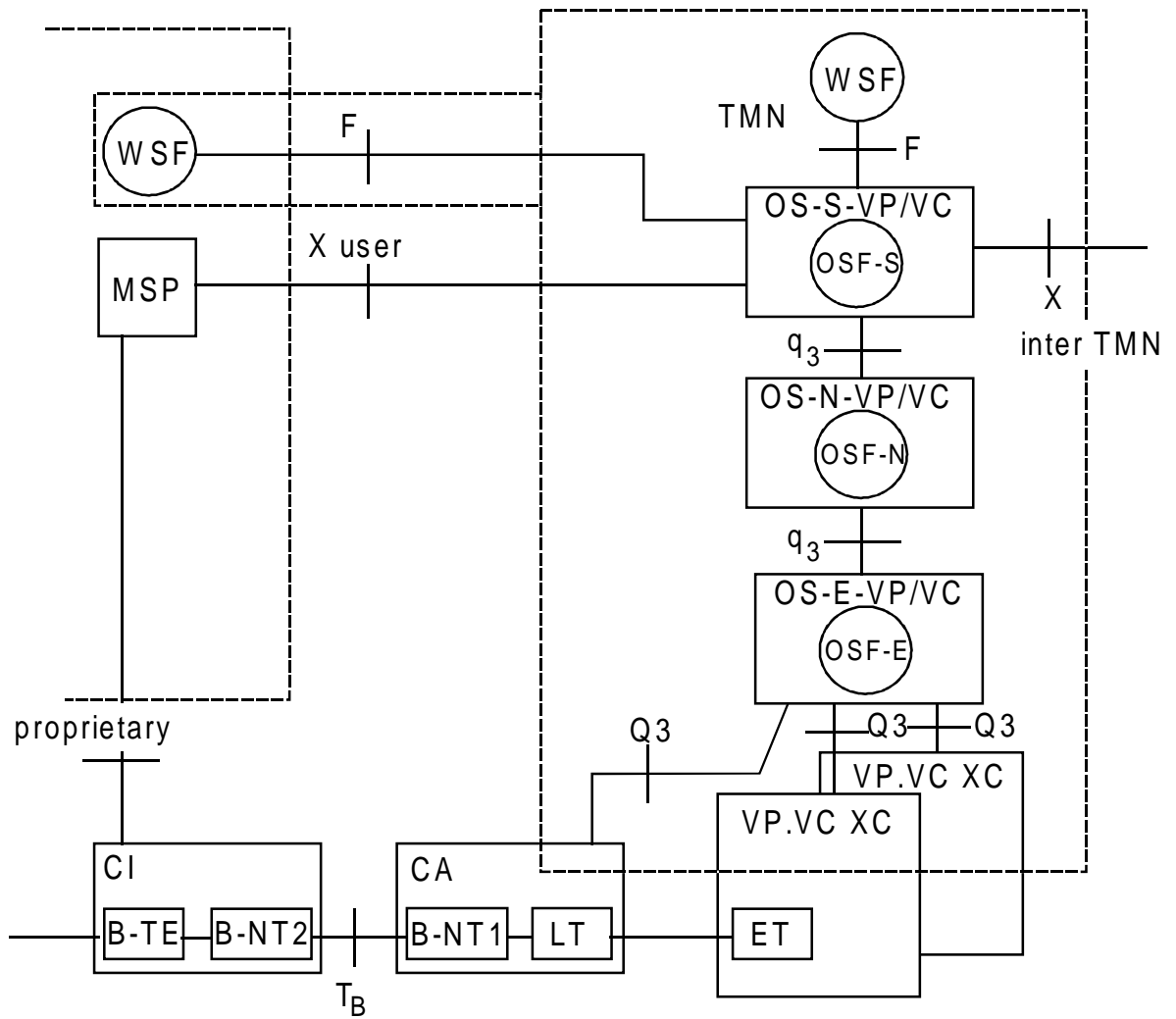
MSP:	Management Service Provider	Q:	Q-type TMN interface
NT:	Network Termination	X:	X-type TMN interface
LT:	Line Termination	E:	Element of Network
ET:	Exchange Termination	OS:	Operations System
TE:	Terminal Equipment	CI:	Customer Installation
B:	Broadband	CA:	Customer Access
T:	ISDN T-type interface	N:	Network
S:	Service	WSF:	Work Station Function

Figure 3: Example of TMN architecture for a VP/VC cross-connected network

6 B-ISDN management services

This clause describes the management requirements for managing a VP/VC network connection and a VP/VC cross-connect. They are based ETR 047 [3], in particular on the TMN management of transport network.

A VP network support VP point-to-point bidirectional service (ETS 300 455 [2]). At present, a VC network supports VC point-to-point bidirectional services (not yet specified). According to the methodology for the specification of TMN interfaces (CCITT Recommendation M.3020 [16]) the descriptions of the TMN management service components are provided.

The management service components for configuration management, fault management and performance management are covered.

6.1 Management of VP/VC network connections

6.1.1 Configuration

Set-up VP/VC network connection

For this service component, a traffic descriptor (ITU-T Recommendation I.371 [13]) containing the characteristics of the requested connection in terms of bandwidth and quality of service is needed (no negotiation about traffic parameters is possible at this level):

- identify the start and the end points of the VP/VC network connection;

- identify the transmission path trail(s) or VP trail (note 1) to support the VP/VC network connection;

- create the individual VP/VC link connections and individual VP/VC cross-connections to provide the VP/VC network connection with the requested capacity and quality of service;

- test the individual VP/VC link connections and VP/VC cross-connections;

- activate the individual VP/VC link connections and VP/VC cross-connections;

- create the VP/VC network connection.

Release VP/VC network connections:

- identify the start and end-point(s) of the VP/VC network connection;

- delete the VP/VC network connection;

- identify the individual VP/VC link and VP/VC cross-connections of the VP/VC network connection;

- disconnect individual VP/VC connection;

- delete the individual VP/VC links and VP/VC cross-connections of the VP/VC network connection.

VP/VC network connection reconfiguration: see note 2.

For this service component, a traffic descriptor (ITU-T Recommendation I.371 [13]) containing the characteristics of the requested connection in terms of bandwidth and quality of service is needed (no negotiation about traffic parameters is possible at this level).

Different policies can be envisaged as for modification of bandwidth and Quality of Service (QoS), depending on the need to re-route the connection to provide extra bandwidth or increased QoS:

- modification could be accepted even though a re-routeing is necessary, which would imply a (short) disruption of the VP;

- modification could be denied when re-routeing is necessary.

The bandwidth, QoS reconfiguration and re-routeing (ITU-T Recommendation I.311 [9]) of an established VP/VC network connection during its lifetime is included in this management service component:

- identify the start and the end points of the VP/VC network connection;

- identify the transmission path trail(s) or VP trail (note 1) to provide the reconfigured VP/VC network connection;

- create the individual VP/VC links and VP/VC cross-connections to support the reconfigured VP/VC network connection with the requested capacity and quality of service, supported by another server trail if needed;

- activate the individual VP/VC links and VP/VC cross-connections if needed;

- disconnect VP/VC links and VP/VC cross-connections between the reconfiguration endpoints (if needed);

- create/delete the VP/VC network connection;

- validate the VP/VC network connection.

    NOTE 1:   A transmission path trail/VP trail is server trail of the VP/VC client layer.

    NOTE 2:   Reconfiguration in this context is defined as the set-up of a reconfigured VP/VC network connection between the same end points as the given old network connection and the release of the old VP/VC network connection. The reconfigured VP/VC network connection may differ in VP/VC route, VP/VC network connection capacity and/or VP/VC QoS are compared to the old VP/VC network connection. There is a need for fast switch over between the old and the reconfigured VP/VC network connection.

6.1.2 Faults

Failure detection on VP/VC network connection:

- identify the connection and termination point(s), which report the fault.

Failure localization on VP/VC network connection (for instance tracing):

- identify the VP/VC links and VP/VC cross-connections supporting the VP/VC network connection, which is associated with the fault-reporting termination points;

- check condition of the connections of the network connection, reporting of a continuity failure (note 1).

Failure correction on VP/VC network connection: (note 2).

This service component is included into the VP/VC network connection protection if only the possibility related to reconfiguration and switching protection are considered for this service component.

Alarm surveillance on network connection:

- identify the start and end-point(s) of the VP/VC network connection subjected to surveillance;

- set appropriate thresholds in these points;

- if a fault or a condition of severely degraded performance situation is detected the TMN will be notified.

VP/VC network connection testing on demand:

- identify start and end-points of the network connection to be tested;

- activate OAM segment F4 or F5 flow Continuity Check demanded in the start-point;

- check the conditions in the end-point(s) as result of the OAM F4 or F5 flow segment continuity check.

VP/VC network connection protection: (note 2).

Provision of VP/VC protection network connection:

- identify start and end-point(s) of the VP/VC protection network connection;

- identify spare transmission path/VP trail network connection to support VP/VC protection network connection;

- create VP/VC links and VP/VC cross-connections supported by other server network connection, if needed.

Protection switching by using the VP/VC protection network connection:

- activate individual spare VP/VC links and VP/VC cross-connections as predefined by VP/VC network connection protection provisioning;

- disconnect old VP/VC links and VP/VC cross-connections;

- create the new VP/VC network connection.

VP/VC network connection restoration:

- identify VP/VC network connections to be restored;

- set-up these VP/VC network connections.

    NOTE 1:   The capability of the individual connections or connection points to report on their status or to set thresholds within them is not completely covered by the network model as described in TCR-TR 014 [5].

    NOTE 2:   In contrast to VP/VC network connection reconfiguration within VP/VC network connection protection, the spare VP/VC network connection is predefined by management and stored in the NEs concerned. In case of failure, only the fast switch-over to the predefined spare VP/VC network connection has to be triggered and performed.

6.1.3   Performance

Performance data collection

The measurements of the following parameters defined in ITU-T Recommendation I.356 [10] are required:

- cell loss ratio;

- cell misinsertion rate;

- mean cell transfer delay;

- Cell Delay Variation (CDV).

The network performance parameters defined in ITU-T Recommendation I.35BA [11] should be taken into account.

Performance monitoring:

- identify start and end point(s) of the VP/VC Network connection to be monitored;

- activate/deactivate OAM segment F4 or F5 flows in the start/end point(s) (to monitor parameters such as bit error rate, cell loss/insertion, cell transfer delay, CDV);

- set appropriate thresholds;

- reporting of a performance monitoring.

Monitoring of history performance data:

The monitoring of history performance data parameters defined in performance data collection is required.

6.2 Management of VP/VC cross-connects

6.2.1 Management of transmission convergence layer

The ATM Network Element (ATMNE) will manage the SDH/PDH termination points in conformance with ETS 300 371 [1] and CCITT Recommendation G.774 [6].

6.2.1.1 Configuration

ATM transmission convergence will be configured taking into account the transmission system (PDH/SDH).

6.2.1.2 Faults

An alarm will be notified when a Loss Of Cell delineation (LOC) situation would occur.

6.2.1.3 Performance

No performance monitoring will be supported at the transmission convergence layer.

6.2.2 Management of VP/VC layer

6.2.2.1 Configuration

- **Set-up VP/VC cross-connections:** this function deals with the establishment of cross-connections between the input and output ports of the cross-connect, choosing any of the unused VPI or VCI values for those ports. The following functions are required:

    - identify input and output ports of the VP/VC cross-connect;
    - reserve the VP/VC cross-connection;
    - create the Connection Termination Points (CTPs) and activate UPC/NPC on the base of traffic parameters;
    - activate the VP/VC cross-connection.

    Moreover the cross-connect shall have the capability to update the list of the cross-connections currently being ordered:

    - release VP/VC cross-connections:

        - identify input and output ports of the VP/VC cross-connect;
        - deactivate the VP/VC cross-connection;
        - delete the CTPs and deactivate UPC/NPC on the base of traffic descriptor.

- **Modify VP/VC cross-connections:** modification is used for altering or modifying the parameters (such as bandwidth or QoS) of the VP/VC connection at any time between establishment and release. The following functions are necessary:

    - identify input and output ports of the VP/VC cross-connect;
    - reserve the VP/VC cross-connection;
    - modify the values of parameters of the CTPs and UPC/NPC traffic parameters;
    - activate the VP/VC cross-connection.

- **Reconfigure VP/VC cross-connections:** reconfiguration is used where there is a failure of a VP/VC cross-connection that was already established. For reconfiguration of a VP/VC cross-connection, the original VP/VC that was set-up shall be released and a new VP/VC cross-connection established.

  The following functions are required:

  - identify input and output ports of the VP/VC cross-connection;
  - reserve the new VP/VC cross-connection;
  - create the CTPs and activate UPC/NPC on the base of traffic parameters;
  - activate the new VP/VC cross-connection;
  - delete the old CTPs and deactivate UPC/NPC on the base of traffic parameters;
  - deactivate the faulty VP/VC cross-connection.

- **Administrative state of the VP/VC cross-connection:** the VP/VC cross-connect shall have the capability of setting a VP/VC cross-connection in an "unlocked" administrative state (traffic flow is enabled), or in a "locked" state (traffic flow is suspended). This capability will be used by system management to take corrective actions in response to performance degradation or a fault in the cross-connection.

- **NE recovery:** the cross-connect contains a lot of data which needs to be administered and regularly backed up. During certain trouble conditions it may also be necessary to perform restarts at different levels.

6.2.2.2 Faults

- Notify VP/VC cross-connection faults:

  - if a fault or a condition of severely degraded performance situation is detected, the management system shall be notified.

6.2.2.3 Performance

VP/VC cross-connection performance:

- supervise the overload and congestion state of the cross-connect;

- check the following NEs additional parameters, for example:

  - cell multiplexing error check;

  - supervise indications coming from UPC/NPC functions, for example:

    - discarded cells.

Performance data collection

It is required to collect data about parameters as identified to support the requirements definition in subclause 6.1.3.

Monitoring of history performance data

The monitoring of history performance data parameters defined in subclause 6.1.3, is required.

7 B-ISDN management information model description

This clause gives some overall guidance as for the use of the information model defined in the clauses 8 to 15.

7.1 Transmission layer

Objects from the transmission layer dealt with in this subclause are those from the SDH or PDH standards, along with the tcBidirectional object which models the transmission convergence necessary for the transfer of ATM cells.

These objects are deeply related to the LT functions, and are, therefore, dependent upon the hardware.

They could be instantiated by an ATM cross-connect, either:

- inherently upon insertion of the interface board which supports the LT; or

- may be instantiated as a consequence of an "equipment management" MMC.

Corresponding objectCreation notifications would notify the OS of the availability of the transmission path termination in the NE. The OS would then be responsible to correlate this termination to either:

- a customer (UNI);

- another termination inter network (Inter Carrier Interface (ICI));

- another termination intra network (NNI).

Only the OS has the knowledge for that, which is the subject of the next subclause.

7.2 Access to the ATM layer

Control of resources to be allocated at the ATM layer at the boundary of the transmission layer is modelled by the atmAccesspoint object. It mainly depends on the "atmProfileType" attribute (customer, intraNetwork, interCarrier).

7.3 VP/VC provisioning

Only point-to-point connections are dealt with.

Provisioning of VP/VC is based on the generic model defined in CCITT Recommendation M.3100 [17], by specializing generic objects:

- vpTTP and vcTTP, derived from CCITT Recommendation M.3100 [17]: TTP;

- vpCTP and vcCTP, derived from CCITT Recommendation M.3100 [17]: CTP;

- atmCrossConnection, which corresponds to CCITT Recommendation M.3100 [17]: crossConnection;

- atmFabric which provides the cross-connecting capability.

CTP shall first be created, and can then be cross-connected thanks to an "atmConnect" action processed by an "atmFabric" object.

vpCTP objects are named after the atmAccessPoint objects introduced in subclause 7.2.

vcCTP objects are named after vpTTP objects.

ATM connections can bear either unidirectional or bidirectional cell flow. However, only bidirectional CTP objects can be instantiated, due to:

- VPi/VCi allocation, which is valid for both directions of transmission;

- bandwidth management, which enables the modification of bandwidth from 0 to a non null value, so that an ATM connection is not inherently unidirectional or bidirectional, but rather could be at some moment unidirectional, and at other times bidirectional;

- support of OAM flow for segment monitoring, which might necessitate both ways of transmission.
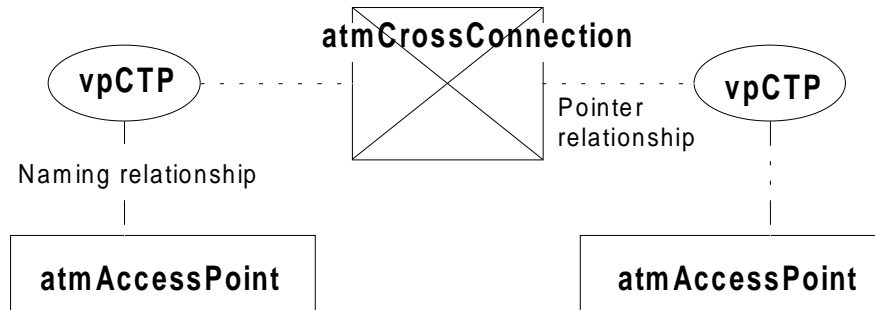
Figure 4: Point-to-point VP CTP cross-connection

7.4   Segment monitoring

Segment monitoring is controlled by monitor objects: performance monitoring is controlled by performanceMonitor objects and continuity monitoring is controlled by continuityMonitor objects. Source, sink and bidirectional objects are defined, but only bidirectional objects are instantiable.

Segments are delimited by monitor objects, and the OS can control the extension of a segment within an ATMNE where the segment is terminated, thanks to the flowDirection attribute:

- the segment can be terminated as soon as it enters the atmNE, by instantiating the monitor object after the corresponding edge CTP and setting the flowDirection attribute to the "outOfSwitch" value (see figure 5);
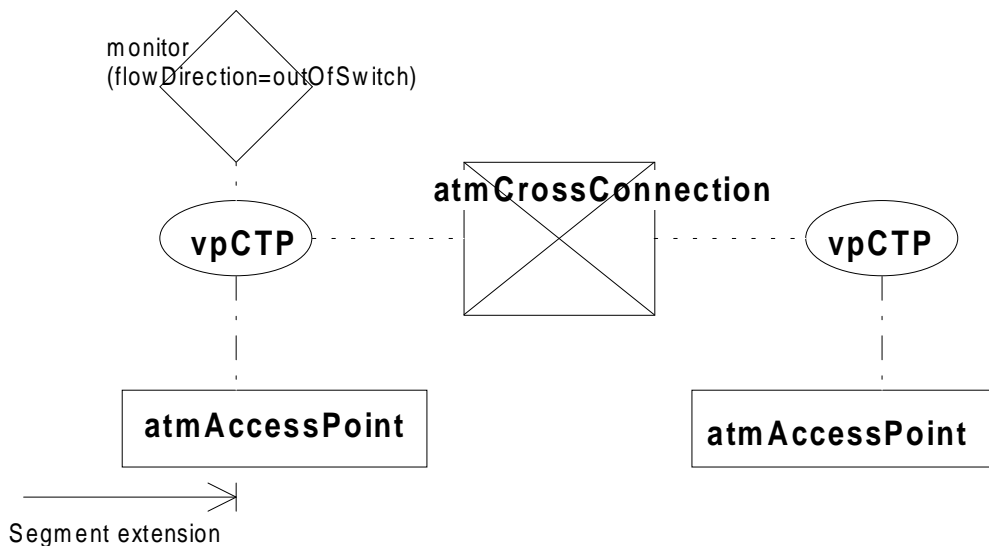
Figure 5: Case A, the monitor object and the segment extension definition

- the segment can cover the internal cross-connection within an ATMNE, by instantiating the monitor object after the cross-connected CTP, and setting the flow direction attribute to the "inToSwitch" value (see figure 6).
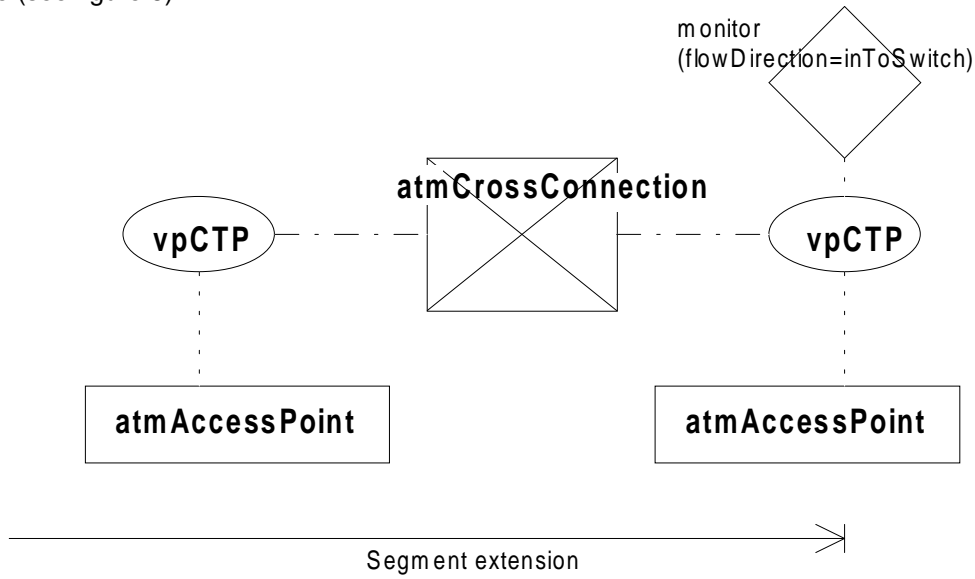
Figure 6: Case B, the monitor object and the segment extension definition

If two segments need be monitored and are terminated within a same ATMNE, they can be terminated as shown in figures 7 and 8.
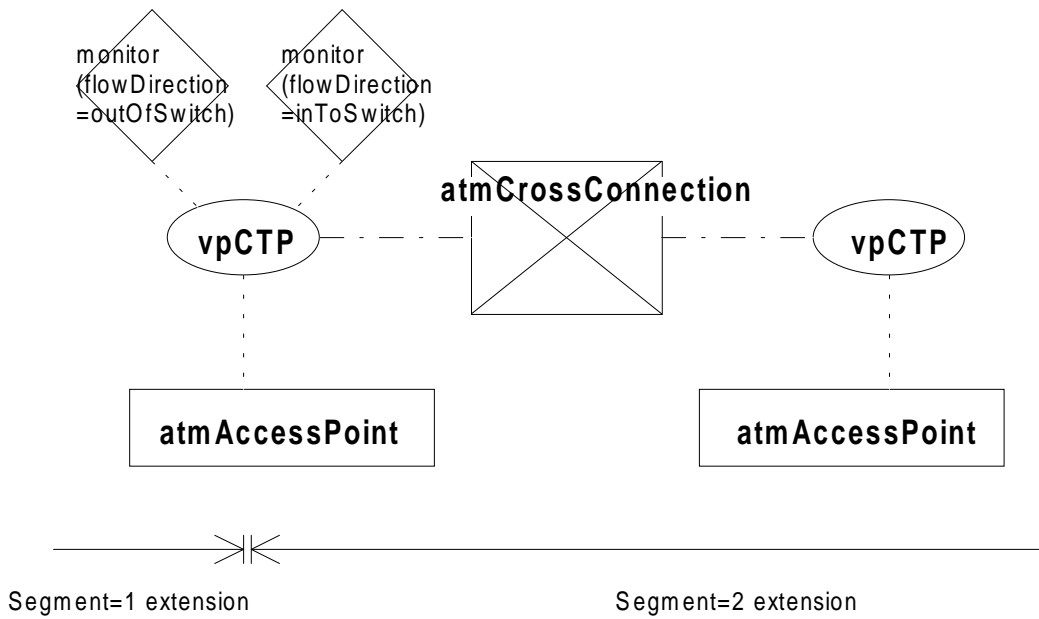
Figure 7: Case C, the monitor objects and the segment extension definition
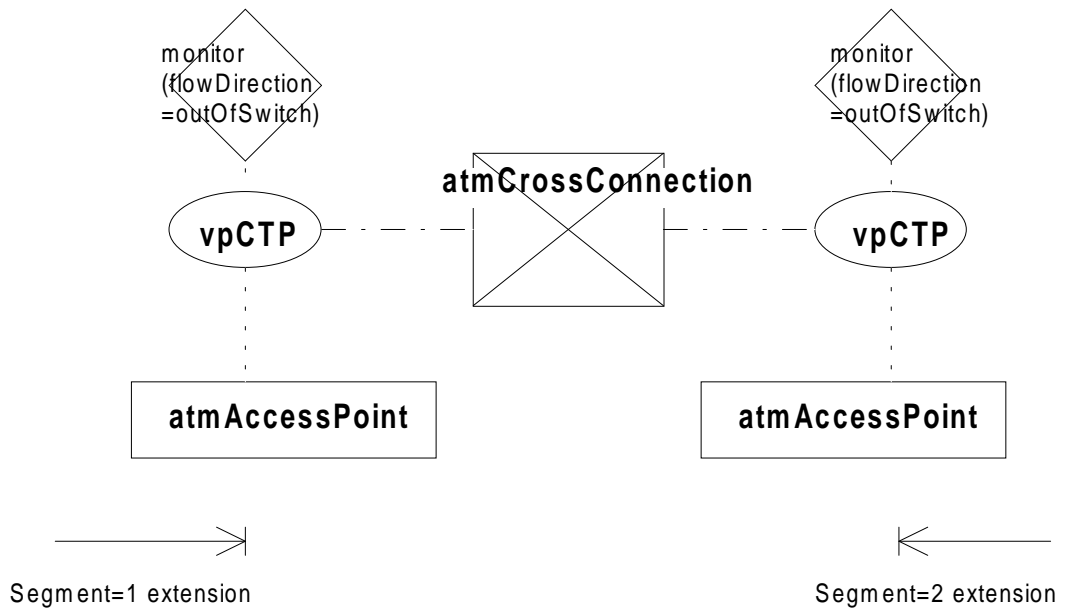
Figure 8: case D, the monitor objects and the segment extension definition

If the segment to be monitored is wholly contained within an ATMNE, monitor objects should be instantiated as shown in figure 9.
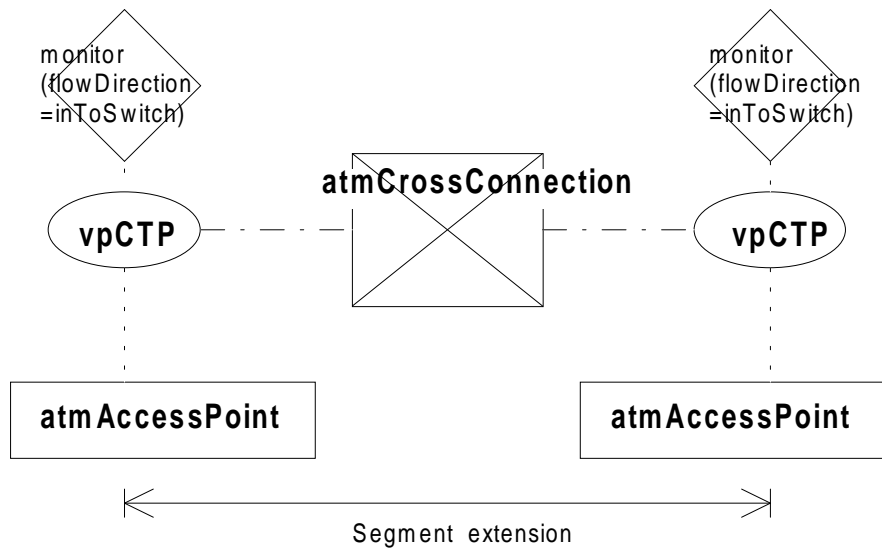
Figure 9: case E, the monitor objects and the segment extension definition

7.5 Performance Data Collection

The model applicable for performance data collection is that defined in ITU-T Recommendation Q.822 [20].

8 Managed object class definitions

Clauses 8 to 15 define the information model.

8.1 Inheritance tree
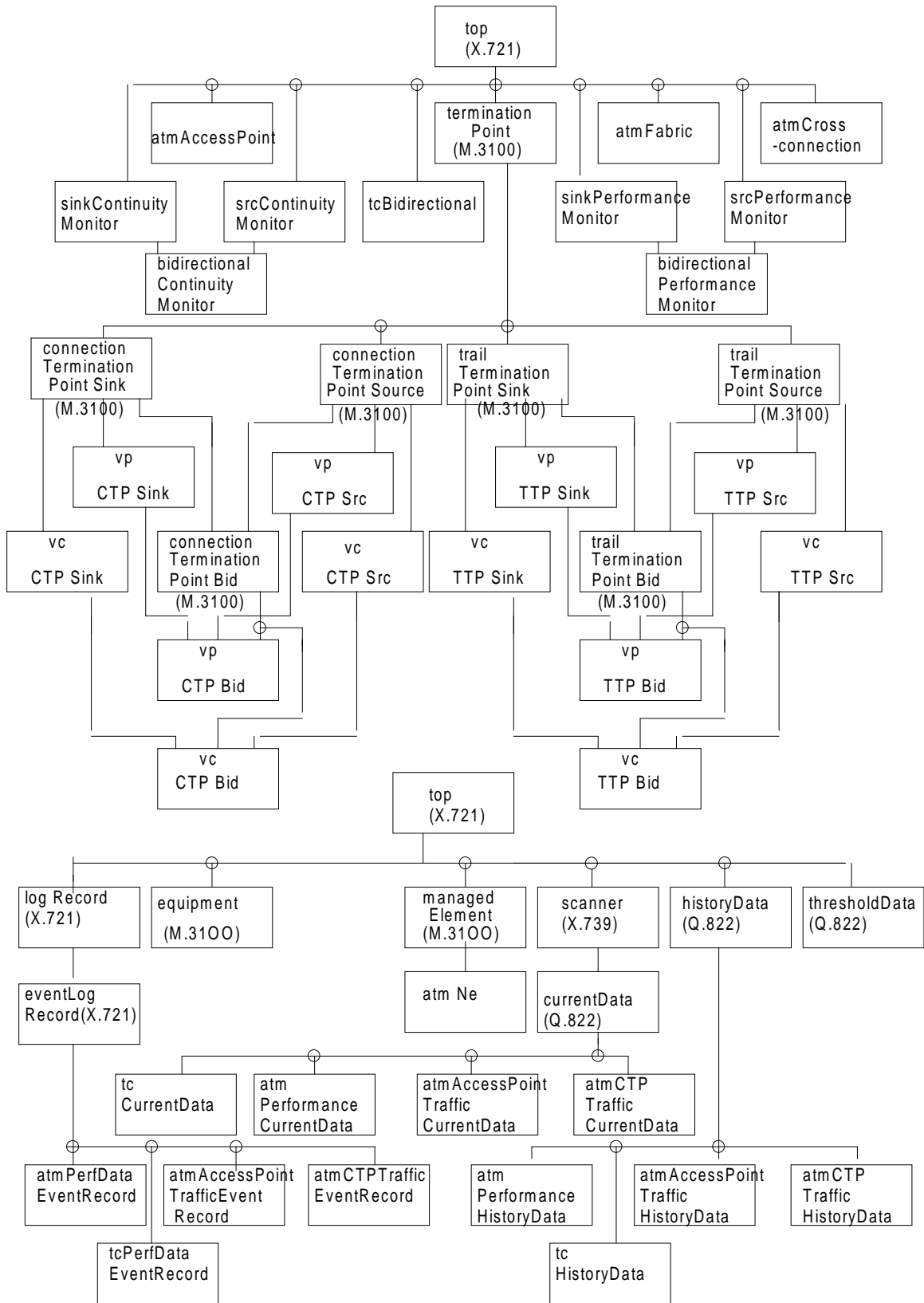
Figure 10: ATM inheritance hierarchy

8.2   Naming tree
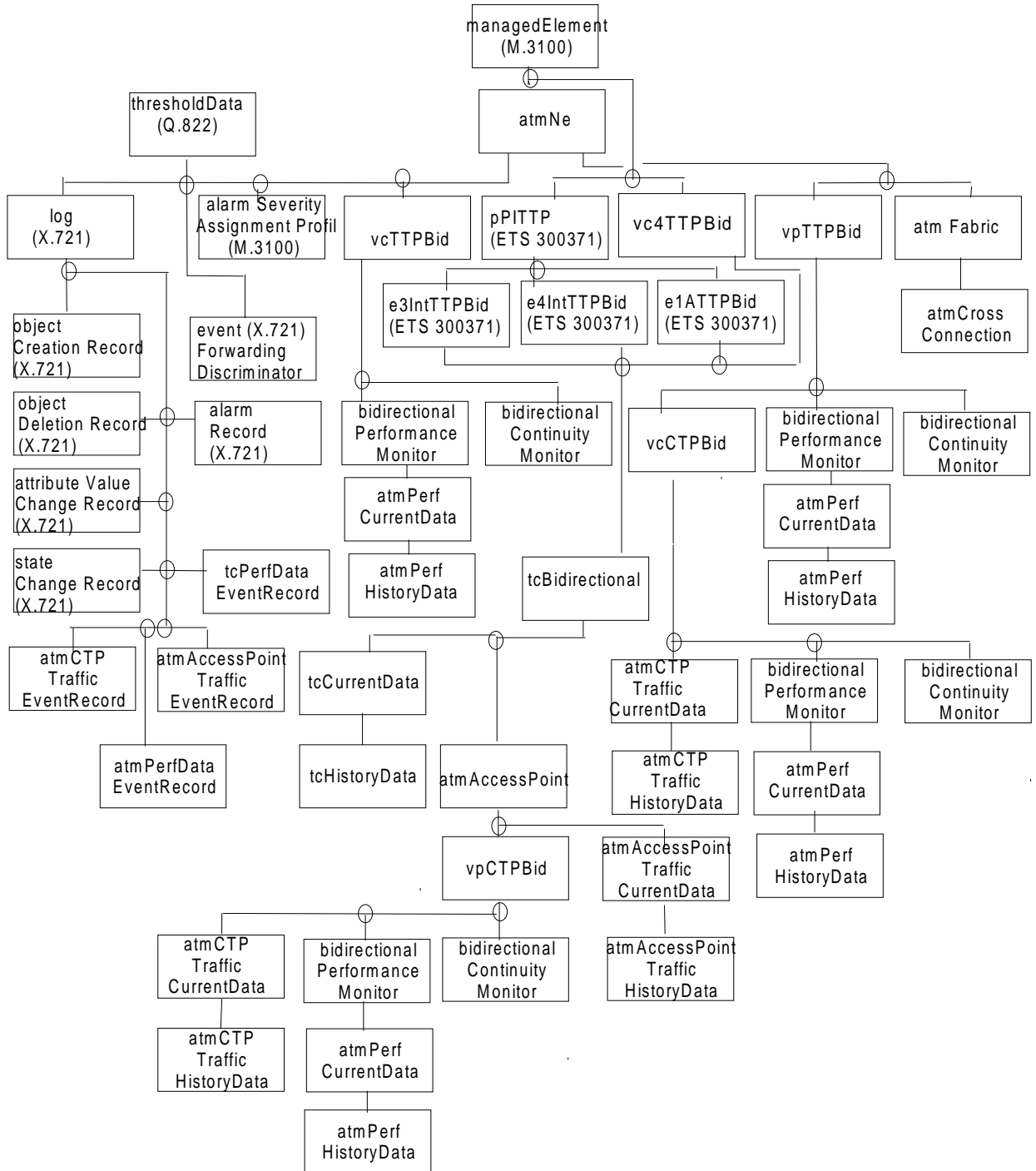
Figure 11: ATM managed objects naming tree

The generic OSI management objects are imported as defined in subclause 8.8:

- "X.721":objectCreationRecord: This object is used to store in the log the event of objectCreation notifications;

- "X.721":objectDeletionRecord: This object is used to store in the log the event of objectDeletion notifications;

- "X.721":attributeValueChangeRecord: This object is used to store in the log the event of attributeValueChange notifications;

- "X.721":stateChangeRecord: This object is used to store in the log the event of stateChange notifications, as emitted for example by the atmFabric object;

- "X.721":alarmRecord: This object is used to store in the log the event of communicationsAlarm notifications which can be emitted by the vpTTPbidirectional object;

- "X.721":eventForwardingDiscriminator: This object is needed for selectively passing of notifications from any object to the OS.

8.3 Managed element fragment

8.3.1 Equipment object class

This object class represents the physical characteristics of a particular equipment configuration and defines the physical structure of the network element in terms of fixed and replaceable units.

8.3.2 ATMNE managed object class

The atmNe object class is a class of managed objects representing ATM telecommunication equipment or ATM TMN entities within the B-ISDN, which perform ATM managed element functions.

```
atmNe MANAGED OBJECT CLASS

DERIVED FROM "Rec. M.3100:1992":managedElement;
CHARACTERIZED BY
    atmNePackage PACKAGE
        BEHAVIOUR
            atmNeBehaviour BEHAVIOUR
DEFINED AS
"This managed object class is used to represent the managed network elements within an ATM
network.
Instances of this class are created when the ATM managed elements are being initialized.
Instances of this class should only be deleted when the ATM managed element is being removed
permanently from service.";;;;

REGISTERED AS { ASN1TypeModule.managedObjectClass 0 };
```

8.4 Termination point and configuration fragment

IMPORTANT NOTICE: **In contradiction with the Guidelines for the Definition of Managed Objects (GDMO) rules**, for objects defined in this document, conditional Packages inherited from terminationPoint, connectionTerminationPoint or trailTerminationPoint objects defined in CCITT Recommendation M.3100 [17] shall not be instantiated unless otherwise stated in the "CHARACTERIZED BY" or the "CONDITIONAL PACKAGES" clauses.

8.4.1 Transmission layer

Objects defined at the transmission layer are those defined in the related SDH and PDH standards.

In addition to these objects, it is necessary to model the adaptation of the PDH or SDH transmission layer for the transfer of ATM cells.

8.4.1.1 atmAccessPoint

```
atmAccessPoint MANAGED OBJECT CLASS

DERIVED FROM "Rec: X.721 | ISO/IEC 10165-2:1992":top;
CHARACTERIZED BY
    atmAccessPointPackage PACKAGE
        BEHAVIOUR
            atmAccessPointBehaviour BEHAVIOUR
DEFINED AS
"This object enables the profiling of atm capabilities provided by an atm client layer above a
transmission server layer.
Profiling is defined as a customer, intraNetwork, or interCarrier profile as reflected in the
atmProfileType attribute.
Profiling affects the VPi range which is to be supported, the maximum bandwidth available, the
transparency with respect to segment OAM flows.
VPi are to be allocated within a VPi range defined by the vpiRange attribute.
Bandwidth is to be allocated within a limit which may be agreed upon with the subscriber or the
peer network operator.
For a customer profile, the VPi field within a cell is limited to 8 bits, policing applies, and
segment OAM flows are not allowed to cross this interface. Default vpiRange is defined as
decimal255.
For an interCarrier profile, the VPi field within a cell is limited to 12 bits, policing applies,
and segment OAM flows, as a default behaviour, are not allowed to cross this interface. Default
vpiRange is defined as decimal4095.
For an intraNetwork profile, the VPi field within a cell is limited to 12 bits, policing does not
apply, and Segment OAM flows are allowed to cross this interface. Default vpiRange is defined as
decimal4095.
The administrativeState attribute enables the control of the possible allocation of resources
(when locked resource allocation is not permitted), which prevents creation of atm termination
points (e.g. vpCTPbidirectional).Allocation of VPi is constrained by the vpiRange,
supportedVPiRange, maxSupportedActiveVPc and maxNumActiveVPc.";;

    ATTRIBUTES
        atmAccessPointId                                        GET,
        atmProfileType                                          GET,
        vpiRange                                                REPLACE-WITH-DEFAULT
                                                                GET-REPLACE
                            resourceAllocatedToClientParameter,
        supportedVpiRange                                       GET,
        maxSupportedActiveVPc                                   GET,
        maxNumActiveVPc                                         REPLACE-WITH-DEFAULT
                                                                GET-REPLACE,
        maxIncomingBandwidth
                REPLACE-WITH-DEFAULT
                DEFAULT VALUE DERIVATION RULE
                defaultMaxBandwidthBehaviour
                GET-REPLACE
                resourceAllocatedToClientParameter
                insufficientBandwidthAtTheserverTrailParameter,
        maxOutgoingBandwidth
                        REPLACE-WITH-DEFAULT
                DEFAULT VALUE DERIVATION RULE
                defaultMaxBandwidthBehaviour
                                                                GET-REPLACE
                    resourceAllocatedToClientParameter
                    insufficientBandwidthAtTheserverTrailParameter,
    "Rec: X.721 | ISO/IEC 10165-2:1992":administrativeState     GET-REPLACE;;;

CONDITIONAL PACKAGES
    vcLayerPackage PRESENT IF "the atmNe supports vc Layer";

REGISTERED AS { ASN1TypeModule.managedObjectClass 1 };

defaultMaxBandwidthBehaviour BEHAVIOUR
DEFINED AS
"The defaultMaxBandwidth shall be evaluated by the ATMNE with respect to the bandwidth available
at the server layer, by applying some appropriate criteria (e.g. 0,8 Erlang). Moreover, depending
on its internal architecture, the ATMNE may take into account multiplexing constraints which
would relate different interfaces.";
```

8.4.1.2   tcBidirectional

This object models the transmission convergence functionality which consists in the delineation of cells. Management of this functionality implies the capability to notify an alarm when a loss of cell delineation situation occurs.

```
tcBidirectional MANAGED OBJECT CLASS

DERIVED FROM "Rec: X.721 | ISO/IEC 10165-2:1992":top;
CHARACTERIZED BY
        "Rec. M.3100:1992": tmnCommunicationsAlarmInformationPackage,
        "Rec. M.3100:1992":createDeleteNotificationsPackage,
        "Rec. M.3100:1992":stateChangeNotificationPackage,
        "Rec. M.3100:1992":operationalStatePackage,
        tcBidirectionalPackage PACKAGE
        BEHAVIOUR
        tcBidirectionalBehaviour BEHAVIOUR
DEFINED AS
"This object represents the transmission convergence sublayer functionality, i.e. the adaptation
of the ATM Layer to the underlying infrastructure. The object also supports notification of a
""Rec: X.721 | ISO/IEC 10165-2:1992"":communicationsAlarm when a loss of cell delineation
condition is detected. The probable cause shall be set to LOC.";;

    ATTRIBUTES
        tcBidirectionalId                                       GET;;;

    CONDITIONAL PACKAGES
        "Rec. M.3100:1992": alarmSeverityAssignmentPointerPackage PRESENT IF
        "the managed object supports configuration of alarm severity";

REGISTERED AS { ASN1TypeModule.managedObjectClass 2 };
```

8.4.2   ATM layer

8.4.2.1   vcCTPsink

The vcCTPsink object class is a class of managed objects representing the VC termination point sink where a VC link connection is terminated.

```
vcCTPsink MANAGED OBJECT CLASS

DERIVED FROM "Rec. M.3100:1992":connectionTerminationPointSink;
CHARACTERIZED BY
        "Rec. M.3100:1992":stateChangeNotificationPackage,
        "Rec. M.3100:1992":operationalStatePackage,
        "Rec. M.3100:1992": crossConnectionPointerPackage,
    vcCTPsinkPackage PACKAGE
        BEHAVIOUR
        vcCTPsinkBehaviour BEHAVIOUR
DEFINED AS
"The vcCTPsink object terminates a VC link connection. Conditional Packages inherited from
terminationPoint and connectionTerminationPointSink shall not be instantiated unless otherwise
stated in the ""CHARACTERIZED BY"" or the ""CONDITIONAL PACKAGES"" clauses. The appropriate
atmCTPTrafficCurrentData object should be automatically created. The
downstreamConnectivityPointer shall be set to NULL if the vcCTPsink object is not cross-
connected. If the object is cross-connected, it shall point to the crossConnected
vcCTPsourceAccording to CCITT Recommendation M.3100, it shall also be set to NULL if the
vcCTPsink is cross-connected but the crossConnection administrativeState is set to LOCKED. If it
is related to a vcTTPsink, it shall point to that object. The operationalState attribute reflects
the capacity to receive the VC cell flow. It will have the value DISABLED when the CTP can not
perform its function at all, and have the value ENABLED as long as the resources represented by
this object is working fully or partially. If the termination point is capable of detecting an
AIS signal, the operationalState will remain ENABLED even if such a signal is detected. The
modification of the inTrafficDescriptor attribute applies to cross-connected objects (if any).
This modification can be denied due to lack of Bit rate at the server trail or at the cross-
connected TP 's server trail (if any). The deletion of a cross-connected vcCTPsink entails the
deletion of the cross-connection.The serverTrailFaultPropagation attribute should be set to TRUE
if a failure indication shall result in VC-AIS generation";;
        ATTRIBUTES
            vcCTPId                                         GET,
            serverTrailFaultPropagation                     GET-REPLACE,
            inTrafficDescriptor                             REPLACE-WITH-DEFAULT
                                                            GET-REPLACE

            insufficientCapacityAtTheServerTrailParameter;;;

REGISTERED AS { ASN1TypeModule.managedObjectClass 3 };
```

8.4.2.2   vcCTPsource

The vcCTPsource object class is a class of managed objects representing the VC termination point source where a VC link connection is originated.

```
vcCTPsource MANAGED OBJECT CLASS

DERIVED FROM "Rec. M.3100:1992":connectionTerminationPointSource;
CHARACTERIZED BY
         "Rec. M.3100:1992":stateChangeNotificationPackage,
        "Rec. M.3100:1992":operationalStatePackage,
         "Rec. M.3100:1992":crossConnectionPointerPackage,
    vcCTPsourcePackage PACKAGE
        BEHAVIOUR
            vcCTPsourceBehaviour BEHAVIOUR
DEFINED AS
"The vcCTPsource object originates a VC link connection.
Conditional Packages inherited from terminationPoint and connectionTerminationPointSrc shall not
be instantiated unless otherwise stated in the ""CHARACTERIZED BY"" or the ""CONDITIONAL
PACKAGES"" clauses.
The upstreamConnectivityPointer shall be set to NULL if the vcCTPsource object is not cross-
connected. If the object is cross-connected, it shall point to the crossConnected vcCTPsink.
According to CCITT Recommendation M.3100, it shall also be set to NULL if the vcCTPsource is
cross-connected but the crossConnection administrativeState is set to LOCKED.
If it is related to a vcTTPsink,it shall point to that object.
The operationalState attribute reflects the capacity to transmit the VC cell flow. It will have
the value DISABLED when the CTP can not perform its function at all, and have the value ENABLED
as long as the resources represented by this object is working fully or partially.
The modification of the outTrafficDescriptor attribute applies to cross-connected objects (if
any).
It can be denied for lack of Bit rate at the server trail or at the cross-connected TP's server
trail (if any).
The deletion of a cross-connected vcCTPsource entails the deletion of the cross-connection.";;

        ATTRIBUTES
            vcCTPId                                          GET,
            outTrafficDescriptor                             REPLACE-WITH-DEFAULT
                                                             GET-REPLACE

            insufficientCapacityAtTheServerTrailParameter;;;

REGISTERED AS { ASN1TypeModule.managedObjectClass 4 };
```

8.4.2.3   vcCTPbidirectional

The vcCTPbidirectional object originates a VC link connection (outgoing VC cell flow) and terminates a VC link connection (incoming cell flow), both supported by a same Trail at the server layer, and identified by the same VCi

vcCTPbidirectional objects are created by the OS, when the VC Link Connection is established in order to take into account the VCI allocation number and the necessary traffic parameters.

The vcCTPbidirectional object is contained in a vpTTPbidirectional object which multiplexes the VC flow, and is identified by the VCi (see the vcCTPId attribute).

The VCi choice can be made by either the OS or the atmNE.

The choice of peak rate is made by the OS.

```
vcCTPbidirectional MANAGED OBJECT CLASS

DERIVED FROM "Rec. M.3100:1992":connectionTerminationPointBidirectional, vcCTPsink, vcCTPsource;

REGISTERED AS { ASN1TypeModule.managedObjectClass 5 };
```

8.4.2.4   vcTTPSink

```
vcTTPsink MANAGED OBJECT CLASS

DERIVED FROM "Rec. M.3100:1992":trailTerminationPointSink;
CHARACTERIZED BY
        "Rec. M.3100:1992":stateChangeNotificationPackage,
        "Rec. M.3100:1992":tmnCommunicationsAlarmInformationPackage,
        "Rec. M.3100:1992":operationalStatePackage,
        "Rec. M.3100:1992":crossConnectionObjectPointerPackage,
     vcTTPsinkPackage PACKAGE
        BEHAVIOUR
        vcTTPSinkBehaviour BEHAVIOUR
DEFINED AS
"The vcTTPsink object terminates a vc TRAIL.
Conditional Packages inherited from terminationPoint and trailTerminationPointSink shall not be
instantiated unless otherwise stated in the ""CHARACTERIZED BY"" or the ""CONDITIONAL PACKAGES""
clauses.
The vcTTPSink may be connected to a vcCTPSink object at creation time. The connection is
performed at the creation time of this object by setting the upstreamConnectivityPointer to the
vcCTPSink object instance.
The vcTTP object terminates the F5-AIS cell flow. When it recieves an F5-AIS cell, it changes its
operational state attribute DISABLED. The operational state attribute returns to the previous
state ENABLED when normal conditions are restored.
 administrativeState: If it is LOCKED, no user cells are processed or transmitted.
The modification to inTrafficDescriptor attribute applies to the related vcCTP. The modification
can be denied due to lack of resources at the related vcCTP's server trail.
This object supports notification of a "Rec: X.721 | ISO/IEC 10165-2:1992":communicationsAlarm
(from
tmnCommunicationsAlarmInformationPackage) when AIS is detected. The probableCause shall be set to
AIS.";;

        ATTRIBUTES
        vcTTPId                                                       GET,
        "Rec: X.721 | ISO/IEC 10165-2:1992": administrativeState      GET-REPLACE,
        maxInTrafficDescriptor                                        REPLACE-WITH-DEFAULT
                                                                      GET-REPLACE

        insufficientCapacityAtTheServerTrailParameter;;;

REGISTERED AS { ASN1TypeModule.managedObjectClass 6};
```

8.4.2.5   vcTTPSource

```
vcTTPsource MANAGED OBJECT CLASS

DERIVED FROM "Rec. M.3100:1992":trailTerminationPointSource;
CHARACTERIZED BY
        "Rec. M.3100:1992":stateChangeNotificationPackage,
        "Rec. M.3100:1992":tmnCommunicationsAlarmInformationPackage,
        "Rec. M.3100:1992":operationalStatePackage,
        "Rec. M.3100:1992":crossConnectionPointerPackage,
     vcTTPsrcPackage PACKAGE
        BEHAVIOUR
        vcTTPSourceBehaviour BEHAVIOUR
DEFINED AS
"The vcTTPsource object originates a vc TRAIL.
Conditional Packages inherited from terminationPoint and trailTerminationPointSource shall not be
instantiated unless otherwise stated in the ""CHARACTERIZED BY"" or the ""CONDITIONAL PACKAGES""
clauses.
The vcTTPSource may be connected to a vcCTPSource object at creation time. The connection is
performed at the creation time of this object by setting the downstreamConnectivityPointer to the
vcCTPSource object instance.
When the fault occurs, the vcTTP object generates the F5-RDI cell flow, and changes its
operational state attribute to DISABLED. The operational state attribute returns to the previous
state ENABLED when normal conditions are restored. administrativeState: If it is locked, no user
cells are processed or transmitted.
The modification to maxOutTrafficDescriptor attribute applies to the related vcCTP. The
modification can be denied for lack of resources or for lack of bitrate at the related vcCTP's
server trail. This object supports notification of a "Rec: X.721 | ISO/IEC 10165-
2:1992":communicationsAlarm (from
tmnCommunicationsAlarmInformationPackage) when RDI is detected. The probableCause shall be set to
RDI.";;

        ATTRIBUTES
        vcTTPId                                                       GET,
        "Rec: X.721 | ISO/IEC 10165-2:1992":administrativeState       GET-REPLACE,
        maxOutTrafficDescriptor                                       REPLACE-WITH-DEFAULT
                                                                      GET-REPLACE

        insufficientCapacityAtTheServerTrailParameter;;;

REGISTERED AS { ASN1TypeModule.managedObjectClass 7};
```

8.4.2.6   vcTTPBidirectional

```
vcTTPbidirectional MANAGED OBJECT CLASS

DERIVED FROM "Rec. M.3100:1992":trailTerminationPointBidirectional, vcTTPSink, vcTTPSource;
CHARACTERIZED BY
    vcTTPbidirectionalPackage PACKAGE
        BEHAVIOUR
        vcTTPBidirectionalBehaviour BEHAVIOUR
DEFINED AS
"The vcTTPBidirectional object originates and terminates a vc TRAIL.
Conditional Packages inherited from terminationPoint and trailTerminationPointBid shall never be
instantiated unless otherwise stated in the ""CHARACTERIZED BY"" or the ""CONDITIONAL PACKAGES""
clauses.
The vcTTPBidirectional may be connected to a vcCTPBidirectional object at creation time. The
connection is performed at the creation time of this object by setting the
upstreamConnectivityPointer and the downstreamConnectivityPointer to the vcCTPBidirectional
object instance.
The vcTTPBidirectional object terminates and generates the F5 OAM flow. When it receives an F5-
AIS cell, it sends backward an F5-RDI cell, and sets the operational state attribute to DISABLED.
The operational state attribute returns to the previous state enabled when normal conditions are
restored.
The modification to maxOutTrafficDescriptor or maxInTrafficDescriptor attribute applies to the
related vcCTP. The modification can be denied due to lack of resources or due to lack of bitrate
at the related vcCTP's server trail.";;;;

REGISTERED AS { ASN1TypeModule.managedObjectClass 8 };
```

8.4.2.7   vpCTPsink

The vpCTPsink object class is a class of managed objects representing the VP termination point sink where a VP link connection is terminated.

```
vpCTPsink MANAGED OBJECT CLASS

DERIVED FROM "Rec. M.3100:1992":connectionTerminationPointSink;
CHARACTERIZED BY
        "Rec. M.3100:1992":stateChangeNotificationPackage,
         "Rec. M.3100:1992":operationalStatePackage,
        "Rec. M.3100:1992": crossConnectionPointerPackage,
    vpCTPsinkPackage PACKAGE
        BEHAVIOUR
        vpCTPsinkBehaviour BEHAVIOUR
DEFINED AS
"The vpCTPsink object terminates a VP link connection.
Conditional Packages inherited from terminationPoint and connectionTerminationPointSink shall
never be instantiated unless otherwise stated in the ""CHARACTERIZED BY"" or the ""CONDITIONAL
PACKAGES"" clauses.
The appropriate atmCTPTrafficCurrentData object should be automatically created.
The downstreamConnectivityPointer shall be set to NULL if the vpCTPsink object is not cross-
connected. If the object is cross-connected, it shall point to the crossConnected vpCTPsource.
According to CCITT Recommendation M.3100, it shall also be set to NULL if the vpCTPsink is cross-
connected but the crossConnection administrativeState is set to locked.
If it is related to a vpTTPsink, it shall point to that object.
The operationalState attribute reflects the capacity to receive the VP cell flow. It will have
the value DISABLED when the CTP can not perform its function at all, and have the value ENABLED
as long as the resources represented by this object is working fully or partially. If the
termination point is capable of detecting an AIS signal, the operationalState will remain ENABLED
even if such a signal is detected.
The modification of the inTrafficDescriptor attribute applies to cross-connected objects (if
any).
This modification can be denied due to lack of Bit rate at the server trail or at the cross-
connected TP 's server trail(if any).
The deletion of a vpCTPsink cross-connected to a vpCTPsource entails the deletion of the cross
connection.";;

    ATTRIBUTES
        vpCTPId                                              GET,
        inTrafficDescriptor                                  REPLACE-WITH-DEFAULT
                                                             GET-REPLACE

        insufficientCapacityAtTheServerTrailParameter;;;

REGISTERED AS { ASN1TypeModule.managedObjectClass 9 };
```

8.4.2.8   vpCTPsource

The vpCTPsource object class is a class of managed objects representing the VP termination point source where a VP link connection is originated.

```
vpCTPsource MANAGED OBJECT CLASS

DERIVED FROM "Rec. M.3100:1992":connectionTerminationPointSource;
CHARACTERIZED BY
        "Rec. M.3100:1992":stateChangeNotificationPackage,
        "Rec. M.3100:1992":operationalStatePackage,
        "Rec. M.3100:1992":crossConnectionPointerPackage,
      vpCTPsourcePackage PACKAGE
      BEHAVIOUR
          vpCTPsourceBehaviour BEHAVIOUR
DEFINED AS
"The vpCTPsource object originates a VP link connection.
Conditional Packages inherited from terminationPoint and connectionTerminationPointSrc shall not
be instantiated unless otherwise stated in the ""CHARACTERIZED BY"" or the ""CONDITIONAL
PACKAGES"" clauses.
The upstreamConnectivityPointer shall be set to NULL if the vpCTPsource object is not cross-
connected. If the object is cross-connected, it shall point to the crossConnected vpCTPsink.
According to CCITT Recommendation M.3100, it shall also be set to NULL if the vpCTPsource is
cross-connected but the crossConnection administrativeState is set to locked.
If it is related to a vpTTPsink, it shall point to that object.
The operationalState attribute reflects the capacity to transmit the VP cell flow. It will have
the value DISABLED when the CTP can not perform its function at all, and have the value ENABLED
as long as the resources represented by this object is working fully or partially.
The modification of the maxOutTrafficDescriptor attribute applies to cross-connected objects (if
any).
It can be denied for lack of bit rate at the server trail or at the cross-connected TP's server
trail (if any).
The deletion of a vpCTPsource cross-connected to a vpCTPsink entails the deletion of the cross
connection.";;

    ATTRIBUTES
       vpCTPId                                                   GET,
       outTrafficDescriptor                                      REPLACE-WITH-DEFAULT
                                                                 GET-REPLACE

       insufficientCapacityAtTheServerTrailParameter;;;

REGISTERED AS { ASN1TypeModule.managedObjectClass 10 };
```

8.4.2.9   vpCTPbidirectional

The vpCTPbidirectional object originates a VP link connection (outgoing VP cell flow) and terminates a VP link connection (incoming cell flow), both supported by a same Trail at the server layer, and identified by the same VPi

vpCTPbidirectional objects are created by the OS, when the VP Link Connection is established in order to take into account the VPI allocation number and the necessary traffic parameters.

The *vpCTPbidirectional* object is contained in an atmAccessPoint object which multiplexes the VP flow, and is identified by the VPi (see the vpCTPId attribute).

The VPi choice can be made by either the OS or the ATMNE.

The choice of peak rate is made by the OS.

```
vpCTPbidirectional MANAGED OBJECT CLASS

    DERIVED FROM "Rec. M.3100:1992":connectionTerminationPointBidirectional, vpCTPsink,
vpCTPsource;

REGISTERED AS { ASN1TypeModule.managedObjectClass 11 };
```

8.4.2.10   vpTTPsink

vpTTPsink MANAGED OBJECT CLASS

DERIVED FROM "Rec. M.3100:1992":trailTerminationPointSink;
CHARACTERIZED BY
          "Rec. M.3100:1992":stateChangeNotificationPackage,
          "Rec. M.3100:1992":tmnCommunicationsAlarmInformationPackage,
     vpTTPsinkPackage PACKAGE
          BEHAVIOUR
          vpTTPSinkBehaviour BEHAVIOUR
DEFINED AS
"The vpTTPsink object terminates a vp TRAIL.
Conditional Packages inherited from terminationPoint and trailTerminationPointSink shall not be
instantiated unless otherwise stated in the ""CHARACTERIZED BY"" or the ""CONDITIONAL PACKAGES""
clauses.
The vpTTPSink may be connected to a vpCTPSink object at creation time. The connection is
performed at the creation time of this object by setting the upstreamConnectivityPointer to the
vpCTPSink object instance. The modification of the maxInTrafficdescriptor attribute applies to
the related vpCTP. The modification can be denied due to lack of resources at the related vpCTP's
server trail.
administrativeState: If it is locked, no user cells are processed or transmitted.
This object supports notification of a ""Rec: X.721 | ISO/IEC 10165-2:1992"":communicationsAlarm
(from
tmnCommunicationsAlarmInformationPackage) when AIS is detected. The probableCause shall be set to
AIS.";;

          ATTRIBUTES
              vpTTPId   GET,
              "Rec: X.721 | ISO/IEC 10165-2:1992": administrativeState   GET-REPLACE,
              maxInTrafficDescriptor

                                                                           REPLACE-WITH-DEFAULT
                                                                           GET-REPLACE

              resourceAllocatedToClientParameter
              insufficientBandwidthAtTheserverTrailParameter;;;

REGISTERED AS { ASN1TypeModule.managedObjectClass 12 };

8.4.2.11   vpTTPsource

vpTTPsource MANAGED OBJECT CLASS

DERIVED FROM "Rec. M.3100:1992":trailTerminationPointSource;
CHARACTERIZED BY
          "Rec. M.3100:1992": stateChangeNotificationPackage,
          "Rec. M.3100:1992": tmnCommunicationsAlarmInformationPackage,
     vpTTPsourcePackage PACKAGE
          BEHAVIOUR
          vpTTPSourceBehaviour BEHAVIOUR
DEFINED AS
"The vpTTPsource object originates a vp TRAIL.
Conditional Packages inherited from terminationPoint and trailTerminationPointSource shall not be
instantiated unless otherwise stated in the ""CHARACTERIZED BY"" or the ""CONDITIONAL PACKAGES""
clauses.
The vpTTPSource may be connected to a vpCTPSource object at creation time. The connection is
performed at the creation time of this object by setting the downstreamConnectivityPointer to the
vpCTPSource object instance.
The modification of the maxOutTrafficDescriptor attribute applies to the related vpCTP. The
modification can be denied due to lack of resources at the related vpCTP's server trail.
administrativeState: If it is locked, no user cells are processed or transmitted.This object
supports notification of a ""Rec: X.721 | ISO/IEC 10165-2:1992"":communicationsAlarm (from
tmnCommunicationsAlarmInformationPackage) when RDI is detected. The probableCause shall be set to
RDI.";;

          ATTRIBUTES
              vpTTPId   GET,
              "Rec: X.721 | ISO/IEC 10165-2:1992": administrativeState   GET-REPLACE,
              maxOutTrafficDescriptor

                                                                           REPLACE-WITH-DEFAULT
                                                                           GET-REPLACE

              resourceAllocatedToClientParameter
              insufficientBandwidthAtTheserverTrailParameter;;;

REGISTERED AS { ASN1TypeModule.managedObjectClass 13 };

8.4.2.12 vpTTPbidirectional

```
vpTTPbidirectional MANAGED OBJECT CLASS

DERIVED FROM "Rec. M.3100:1992":trailTerminationPointBidirectional, vpTTPSink, vpTTPSource;
CHARACTERIZED BY
    vpTTPbidirectionalPackage PACKAGE
        BEHAVIOUR
        vpTTPBidirectionalBehaviour BEHAVIOUR
DEFINED AS
"The vpTTPBidirectional object originates and terminates a vp TRAIL.
Conditional Packages inherited from terminationPoint and trailTerminationPointBid shall not be
instantiated unless otherwise stated in the ""CHARACTERIZED BY"" or the ""CONDITIONAL PACKAGES""
clauses.
The vpTTPBidirectional may be connected to a vpCTPBidirectional object at creation time. The
connection is performed at the creation time of this object by setting the
upstreamConnectivityPointer and the downstreamConnectivityPointer to the vpCTPBidirectional
object instance.
The modification of the maxInTrafficDescriptor and maxOutTrafficDescriptor attributes applies to
the related vpCTP. The modification can be denied due to lack of resources or due to lack of
bitrate at the vpCTP's server trail.
The vpTTPBidirectional object represent the termination function of the F4-AIS cell flow. When it
receives a F4-AIS cell, it generates a F4-RDI cells flow and transmit it upstream. Consequently
it changes its operationalState attribute to DISABLED. When the normal conditions are restored
the operationalState returns to ENABLED.
administrativeState: If it is locked, no user cells are processed or transmitted.Allocation of
VCi is constrained by the vciRange, supportedVCiRange,maxSupportedActiveVCc and
maxNumActiveVCc.";;

    ATTRIBUTES
        vciRange                             REPLACE-WITH-DEFAULT      GET-REPLACE ,
        maxNumActiveVCc                                                GET-REPLACE;;;

REGISTERED AS { ASN1TypeModule.managedObjectClass 14 };
```

8.5 ATM Cross-connect fragment

8.5.1 atmCross-Connection (point-to-point)

The point-to-point cross-connection is modelled in CCITT Recommendation M.3100 [17] and its application to ATMNE is illustrated in figure 8.5.2.

The atmCrossConnection object class (CCITT Recommendation M.3100 [17]) represents an assignment relationship between:

- a vpCTPbidirectional object and another vpCTPbidirectional object;

- a vcCTPbidirectional object and another vcCTPbidirectional object.
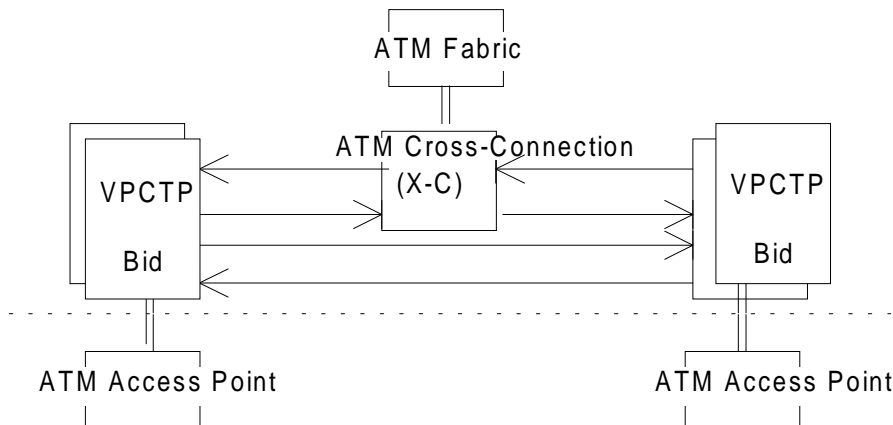
Figure 12: Point-to-point VP CTP cross-connection

A VP cross-connection (the same applies for VC cross-connection) is modelled with the following attributes:

- the crossConnectionPointer attribute defined in the vpCTPsink, vpCTPsource and vpCTPbidirectional object class points to the atmCrossConnection object;

- the fromTermination attribute defined in the atmCrossConnection object points to the vpCTPsink object (from which the cell flow is incoming the ATMNE), or to either one of both vpCTPbidirectional objects involved;

- the toTermination attribute defined in the atmCrossConnection object points to the vpCTPsource object (from which the cell flow is outgoing the ATMNE), or to either one of both vpCTPbidirectional objects involved.

   NOTE 1:   "M.3100":crossConnection object classes use signaltype and directionality attributes; these attributes are not present in the ATM cross-connection. atmCrossConnection object cannot inherit from "M.3100":crossConnection object class and should inherit from "X.721":top.

   NOTE 2:   Later on, it is expected that CCITT Recommendation M.3100 [17]: crossConnection object classes will be redefined in order to be used for SDH, PDH, and ATM techniques.

The atmCrossConnection object does not include such attributes as "trafficDescriptor". Cross-connected cell rate is defined by the cross-connected CTP objects "trafficDescriptor" attributes. They should take the same value.

Disruption of an atmCrossConnection is reflected by the attribute *operationalstate* = DISABLED of the *atmCrossConnection* object. A *stateChangeNotification* is transmitted to the OS and an Alarm Indication Signal (AIS) F4 flow is generated downstream from the VP connecting point (e.g. ATM cross-connect) which detects the VP failure (ITU-T Recommendation I.610 [14]).

```
atmCrossConnection MANAGED OBJECT CLASS

DERIVED FROM "Rec: X.721 | ISO/IEC 10165-2:1992":top;
CHARACTERIZED BY
        "Rec. M.3100:1992":stateChangeNotificationPackage,
        "Rec. M.3100:1992":administrativeOperationalStatesPackage,
    atmCrossConnectionPackage PACKAGE
        BEHAVIOUR
            atmCrossConnectionBehaviour BEHAVIOUR
DEFINED AS
"This object class represents an assignment relationship between:
- a CTPbidirectional and another CTPbidirectional,
which are identified in the fromTermination attribute and the toTermination attribute
respectively.
administrativeState: when Locked, no traffic is allowed to pass through. The connectivity
pointers of the cross-connected TPs are NULL.
operationalState: when DISABLED: the cross-connection is unable to perform its normal
function.";;

    ATTRIBUTES
        atmCrossConnectionId                                         GET,
            "Rec. M.3100:1992":fromTermination                       GET,
            "Rec. M.3100:1992":toTermination                         GET;;;

REGISTERED AS { ASN1TypeModule.managedObjectClass 15 };
```

8.5.2   atmFabric

The atmFabric models the functionality of managing the establishment and release of atmCrossConnections.

> NOTE: Later on, it is expected that CCITT Recommendation M.3100 [17] Fabric object class should be redefined in order to be generic and useful for SDH, PDH, and ATM techniques.

For the time being, the gtp object (group termination point) and the tpPool object (termination point Pool) are not reused from "M.3100":fabric object.

The attribute "*characteristicInfo*" is not applicable for ATM.

The "connect" action is redefined in order to take into account the B-ISDN functional needs, for instance the establishment of VP protection connections.

```
atmFabric MANAGED OBJECT CLASS

DERIVED FROM "Rec: X.721 | ISO/IEC 10165-2:1992":top;
CHARACTERIZED BY
        "Rec. M.3100:1992":stateChangeNotificationPackage,
        "Rec. M.3100:1992":administrativeOperationalStatesPackage,
    atmFabricPackage PACKAGE
        BEHAVIOUR
        atmFabricPackageBehaviour BEHAVIOUR
DEFINED AS
"The atmFabric models the functionality of managing the establishment and release of
atmCrossConnections.
administrativeState:when locked: no cross-connection can be set-up or removed.
operationalState: when set to DISABLED: the managing system will not be able to set-up or remove
any cross-connections. The operationalState of the already established cross-connections
indicates whether they are impacted.
The CCITT Recommendation M.3100:mismatchingTPInstance problem cause shall be returned if
connection cannot be performed due to bandwidth inconsistency between TPs.";;

        ATTRIBUTES
            atmFabricId                                          GET,
            "Rec. M.3100:1992":supportedByObjectList             GET-REPLACE
                                                                 ADD-REMOVE;
        ACTIONS
            atmConnect,
            "Rec. M.3100:1992":disconnect;;;

REGISTERED AS { ASN1TypeModule.managedObjectClass 16 };
```

8.6 Performance monitoring and fault management fragment

8.6.1 Source performance monitor

```
sourcePerformanceMonitor MANAGED OBJECT CLASS

DERIVED FROM "Rec: X.721 | ISO/IEC 10165-2:1992":top;
CHARACTERIZED BY
        "Rec. M.3100:1992":stateChangeNotificationPackage,
    sourcePerformanceMonitorPackage PACKAGE
        BEHAVIOUR
        sourcePerformanceMonitorBehaviour BEHAVIOUR
DEFINED AS
"This Managed Object models the source of a performance monitoring OAM flow. If this object is
named by a CTP object it represents the source of a segment OAM flow. If this object is named by
a TTP object it represents the source of an End-to-End flow.
The controlPM action enables the control of the generation of the PM flow.
The controlPM action may be used to request the object to start a Performance Monitoring
procedure, the sourcePMMechanismActive attribute will be set to TRUE.

If far end data processing is supported the controlPM action may also be used to request the
processing of the far end PM data received from the remote segment termination point. If the
request is accepted the fePMDataProcessingMechanismActive attribute will be set to TRUE.";;

    ATTRIBUTES
        performanceMonitorId                                        GET,
        sourcePMMechanismActive
        INITIAL VALUE ASN1TypeModule.booleanFalse                   GET,
        flowDirection                                               GET,
        outAverageMonitoringBlockSize                               GET,
        "Rec: X.721 | ISO/IEC 10165-2:1992":operationalState        GET;
    ACTIONS
        controlPM;;;
    CONDITIONAL PACKAGES
        fePMDataProcessingPackage PRESENT IF "an instance supports it";

REGISTERED AS { ASN1TypeModule.managedObjectClass 17 };
```

8.6.2 Sink performance monitor

```
sinkPerformanceMonitor MANAGED OBJECT CLASS

DERIVED FROM "Rec: X.721 | ISO/IEC 10165-2:1992":top;
CHARACTERIZED BY
    "Rec. M.3100:1992":stateChangeNotificationPackage,
    sinkPerformanceMonitorPackage PACKAGE
        BEHAVIOUR
        sinkPerformanceMonitorBehaviour BEHAVIOUR
DEFINED AS
"This Managed Object models the sink of a performance monitoring OAM flow.If this object is named
by a CTP object it represents the sink of a segment OAM flow. If this object is named by a TTP
object it represents the sink of an End-to-End flow.

It terminates the flow whether it is processed or not.
The controlPM action enables the control of the processing of the PM flow.
The controlPM action may be used to request the object to start a Performance Monitoring
procedure. If the request is accepted the sinkPMMechanismActive attribute will be set to TRUE.
If backward data reporting is supported the controlPMaction may also be used to request the
backward reporting of PM data. If the request is accepted the backward PMReporting
MechanismActive attribute will be set to TRUE.";;

    ATTRIBUTES
        performanceMonitorId                                        GET,
        sinkPMMechanismActive
                INITIAL VALUE ASN1TypeModule.booleanFalse           GET,
        flowDirection                                               GET,
        inAverageMonitoringBlockSize                                GET,
            "Rec: X.721 | ISO/IEC 10165-2:1992":operationalState    GET;
    ACTIONS
        controlPM;;;
    CONDITIONAL PACKAGES
        backwardPMReportingPackage PRESENT IF "an instance supports it";

REGISTERED AS { ASN1TypeModule.managedObjectClass 18 };
```

8.6.3   Bidirectional performance monitor

```
bidirectionalPerformanceMonitor MANAGED OBJECT CLASS

DERIVED FROM sourcePerformanceMonitor, sinkPerformanceMonitor;

REGISTERED AS { ASN1TypeModule.managedObjectClass 19 };
```

8.6.4   sourceContinuityMonitor

```
sourceContinuityMonitor MANAGED OBJECT CLASS

DERIVED FROM "Rec: X.721 | ISO/IEC 10165-2:1992":top;
CHARACTERIZED BY
    "Rec. M.3100:1992":stateChangeNotificationPackage,
    sourceContinuityMonitorPackage PACKAGE
        BEHAVIOUR
        sourceContinuityMonitorBehaviour BEHAVIOUR
DEFINED AS
"This Managed Object models the source of a continuity check OAM flow. If this object is named by
a CTP object it represents the source of a segment OAM flow. If this object is named by a TTP
object it represents the source of an End-to-End flow.
The controlCC action is used to manage the activation and deactivation of the continuity check
OAM flow generation.
If both ends of the monitored entity agree to activate the Continuity Check function, the
sourceCCMechanismActive attribute will be set to TRUE.
The sourceContinuityMonitor object is used for inheritance only.";;

        ATTRIBUTES
            continuityMonitorId                                      GET,
            flowDirection                                           GET,
            sourceCCMechanismActive
                INITIAL VALUE ASN1TypeModule.booleanFalse
                                                                    GET,
                "Rec: X.721 | ISO/IEC 10165-2:1992":operationalState  GET;
        ACTIONS
            controlCC;;;

REGISTERED AS { ASN1TypeModule.managedObjectClass 20 };
```

8.6.5   sinkContinuityMonitor

```
sinkContinuityMonitor MANAGED OBJECT CLASS

DERIVED FROM "Rec: X.721 | ISO/IEC 10165-2:1992":top;
CHARACTERIZED BY
    "Rec. M.3100:1992":tmnCommunicationsAlarmInformationPackage,
    "Rec. M.3100:1992":stateChangeNotificationPackage,
    sinkContinuityMonitorPackage PACKAGE
        BEHAVIOUR
        sinkContinuityMonitorBehaviour BEHAVIOUR
DEFINED AS
"This Managed Object models the sink of a continuity check OAM flow. If this object is named by a
CTP object it represents the sink of a segment OAM flow. If this object is named by a TTP object
it represents the sink of an End-to-End flow.
It terminates the flow whether it is processed or not.
The controlCC action is used to manage the activation and deactivation of the continuity check
OAM flow processing.
When the sinkCCMechanismActive attribute is ""TRUE"" and the VP/VC is detected as disrupted, a
communication alarm, with the probable Cause set to lossOfSignal is notified. The
sinkContinuityMonitor object is used for inheritance only.";;

        ATTRIBUTES
            continuityMonitorId                                      GET,
            flowDirection                                           GET,
            sinkCCMechanismActive
                INITIAL VALUE ASN1TypeModule.booleanFalse             GET,
                "Rec: X.721 | ISO/IEC 10165-2:1992":operationalState  GET;
        ACTIONS
            controlCC;;;

REGISTERED AS { ASN1TypeModule.managedObjectClass 21 };
```

8.6.6 bidirectionalContinuityMonitor

```
bidirectionalContinuityMonitor MANAGED OBJECT CLASS

DERIVED FROM sourceContinuityMonitor, sinkContinuityMonitor;

REGISTERED AS { ASN1TypeModule.managedObjectClass 22 };
```

8.7 Performance data collection fragment

8.7.1 Transmission convergence performance data

8.7.1.1 tcCurrentData

```
tcCurrentData MANAGED OBJECT CLASS

DERIVED FROM "Rec. Q.822:1993":currentData;
CHARACTERIZED BY
    "Rec. M.3100:1992":createDeleteNotificationsPackage,
    tcHECCurrentDataPackage,
    tcCurrentDataPackage PACKAGE
        BEHAVIOUR
        tcCurrentDataBehaviour BEHAVIOUR
DEFINED AS
"This managed object contains the current protocol monitoring data collected for its superior
tcBidirectional object.
The administrativeState (inherited from X.739:scanner) is used to allow/inhibit the
collection/summarize of data. Setting the value from UNLOCKED to LOCKED suspends the activity of
this object.
This object shall be automatically created whenever an instance of the tcBidirectional object
class is created.";;;;

REGISTERED AS { ASN1TypeModule.managedObjectClass 23 };
```

8.7.1.2 tcHistoryData

```
tcHistoryData MANAGED OBJECT CLASS

DERIVED FROM "Rec. Q.822:1993":historyData;
CHARACTERIZED BY
    tcHECHistoryDataPackage,
    tcHistoryDataPackage PACKAGE
    BEHAVIOUR
        tcHistoryDataBehaviour BEHAVIOUR
DEFINED AS
"This managed object contains the past protocol monitoring data collected for its superior
tcBidirectional object.";;;;

REGISTERED AS { ASN1TypeModule.managedObjectClass 24 };
```

8.7.1.3 tcPerformanceDataEventRecord

```
tcPerformanceDataEventRecord MANAGED OBJECT CLASS

DERIVED FROM "Rec: X.721 | ISO/IEC 10165-2:1992":eventLogRecord;
CHARACTERIZED BY
    tcPerformanceDataEventRecordPackage PACKAGE
        BEHAVIOUR
        tcPerformanceDataEventRecordBehaviour BEHAVIOUR
DEFINED AS
"The tcPerformanceDataEventRecord object is a managed support object that is used to log data
reported by the scanReport notification.
Instances of this object class can only be created by the managed system and are contained in a
log object in the ATMNE.";;;;

    CONDITIONAL PACKAGES
        tcHECHistoryDataPackage PRESENT IF "an instance supports it, if the parameter was present
        in the received notification";

REGISTERED AS { ASN1TypeModule.managedObjectClass 25 };
```

8.7.2 ATM performance data

The information model for vpCTP and vcCTP objects performance data collection enables the collection of the information related to the PM OAM flow.

It is based on the ITU-T Recommendation Q.822 [20] model.

8.7.2.1 atmPerformanceCurrentData

```
atmPerformanceCurrentData MANAGED OBJECT CLASS

DERIVED FROM "Rec. Q.822:1993":currentData;
CHARACTERIZED BY
    atmPMCurrentDataPackage,
    "Rec. M.3100:1992":createDeleteNotificationsPackage,
    atmPerformanceCurrentDataPackage PACKAGE
        BEHAVIOUR
        atmPerformanceCurrentDataBehaviour BEHAVIOUR
DEFINED AS
"This managed object contains the current PM data collected for the connection being monitored.
If far-end data collection is supported, this object shall contain the far-end data as well. The
administrativeState (inherited from X.739:scanner) is used to allow/inhibit the
collection/summarize of data. Setting the value from UNLOCKED to LOCKED suspends the activity of
this object. This object shall be automatically created whenever an instance of the
bidirectionalPerformanceMonitor object class is created.";;;;

CONDITIONAL PACKAGES

    feAtmPMCurrentDataPackage PRESENT IF "an instance supports it";

REGISTERED AS { ASN1TypeModule.managedObjectClass 26 };
```

8.7.2.2 atmPerformanceHistoryData

```
atmPerformanceHistoryData MANAGED OBJECT CLASS

DERIVED FROM "Rec. Q.822:1993":historyData;
CHARACTERIZED BY
    atmPerformanceHistoryDataPackage PACKAGE
        BEHAVIOUR
        atmPerformanceHistoryDataBehaviour BEHAVIOUR
DEFINED AS
"This managed object contains the past Performance data collected for the connection being
monitored. If far-end data collection is supported, this object shall contain the far-end data as
well.";;;;

CONDITIONAL PACKAGES
    feAtmPMHistoryDataPackage PRESENT IF "an instance supports it";

REGISTERED AS { ASN1TypeModule.managedObjectClass 27 };
```

8.7.2.3 atmPerformanceDataEventRecord

```
atmPerformanceDataEventRecord MANAGED OBJECT CLASS

DERIVED FROM "Rec: X.721 | ISO/IEC 10165-2:1992":eventLogRecord;

CHARACTERIZED BY
    atmPerformanceDataEventRecordPackage PACKAGE
        BEHAVIOUR
        atmPerformanceDataEventRecordBehaviour BEHAVIOUR
DEFINED AS
"The atmPerformanceDataEventRecord object is a managed support object that is used to log data
reported by the scanReport notification.
Instances of this object class can only be created by the managed system and are contained in a
log object in the atmNE.";;;;

    CONDITIONAL PACKAGES
        atmPerformanceHistoryDataPackage PRESENT IF "an instance supports it and if the atm
        performance parameters were present in the received notification",
        feAtmPerformanceHistoryDataPackage PRESENT IF "an instance supports it and if the far-end
        atm performance parameters were present in the received notification";

REGISTERED AS { ASN1TypeModule.managedObjectClass 28 };
```

8.7.3 ATM access point data

The information model for atmAccessPoint object performance data collection enables the collection of the count of cells received with unallocated VPi.

It is based on the ITU-T Recommendation Q.822 [20] model: Performance attributes are defined in packages, which is included in both atmAccessPointTrafficCurrentData and atmAccessPointTrafficHistoryData Managed Object Classes. The classes are derived from the ITU-T Recommendation Q.822 [20]:currentData and ITU-T Recommendation Q.822 [20]:historyData Managed Object Classes.

8.7.3.1 atmAccessPointTrafficCurrentData

```
atmAccessPointTrafficCurrentData MANAGED OBJECT CLASS

DERIVED FROM "Rec. Q.822:1993":currentData;
CHARACTERIZED BY
    atmTrafficLoadCurrentDataPackage,
    unallocatedCellsCurrentDataPackage,
    atmAccessPointTrafficCurrentDataPackage PACKAGE
        BEHAVIOUR
        atmAccessPointTrafficCurrentDataBehaviour BEHAVIOUR
DEFINED AS
"This managed object contains the current data collected for its superior atmAccessPoint object.
The measurements stored by this objects are the following:
- number of incoming cells on the ATM access point
- number of outgoing cells on the ATM access point
- number of cells discarded due to an unallocated VPi or VPi/VCi
- and upcNpcData if this is to be recorded.
The administrativeState (inherited from X.739:scanner) is used to allow/inhibit the
collection/summarize of data. Setting the value from UNLOCKED to LOCKED suspends the activity of
this object.";;;;

    CONDITIONAL PACKAGES
        upcNpcCurrentDataPackage PRESENT IF
        "if discarded cells at UNI or ICI by policing functions are to be recorded.";

REGISTERED AS { ASN1TypeModule.managedObjectClass 29 };
```

8.7.3.2 atmAccessPointTrafficHistoryData

```
atmAccessPointTrafficHistoryData MANAGED OBJECT CLASS

DERIVED FROM "Rec. Q.822:1993":historyData;
CHARACTERIZED BY
    atmTrafficLoadHistoryDataPackage,
    unallocatedCellsHistoryDataPackage,
    atmAccessPointTrafficHistoryDataPackage PACKAGE
        BEHAVIOUR
        atmAccessPointTrafficHistoryDataBehaviour BEHAVIOUR
DEFINED AS
"This managed object contains past data collected for its superior atmAccessPoint object. The
measurements stored by this objects are the following:
- number of incoming cells on the ATM access point
- number of outgoing cells on the ATM access point
- number of cells discarded due to an unallocated VPi or VPi/VCi
- and upcNpcData if this is to be recorded";;;;

    CONDITIONAL PACKAGES
        upcNpcHistoryDataPackage PRESENT IF
        "the current data object which contains the history data contains this package.";

REGISTERED AS { ASN1TypeModule.managedObjectClass 30 };
```

8.7.3.3 atmAccessPointTrafficEventRecord

```
atmAccessPointTrafficEventRecord MANAGED OBJECT CLASS

DERIVED FROM "Rec: X.721 | ISO/IEC 10165-2:1992":eventLogRecord;
CHARACTERIZED BY
    atmAccessPointTrafficEventRecordPackage PACKAGE
        BEHAVIOUR
            atmAccessPointTrafficEventRecordBehaviour BEHAVIOUR
DEFINED AS
"The atmAccessPointTrafficEventRecord object is a managed support object that is used to log data
reported by the scanReport notification.
Instances of this object class can only be created by the managed system and are contained in a
log object in the ATMNE.";;;;

CONDITIONAL PACKAGES
    atmTrafficLoadHistoryDataPackage PRESENT IF
        "the traffic load parameters were present in the received notification",
    upcNpcHistoryDataPackage PRESENT IF
        "the upc/npc parameters were present in the received notification",
    unallocatedCellsHistoryDataPackage PRESENT IF
        "the unallocated cells parameter was present in the received notification";

REGISTERED AS { ASN1TypeModule.managedObjectClass 31 };
```

8.7.4 ATM CTP traffic data

The information model for vpCTP / vcCTP objects traffic data collection enables the collection of the count
of incoming and outgoing ATM cells.

It is based on the ITU-T Recommendation Q.822 [20] model. The classes are derived from the ITU-T
Recommendation Q.822 [20]:currentData and the ITU-T Recommendation Q.822 [20]:historyData
Managed Object Classes.

8.7.4.1 atmCTPTrafficCurrentData

```
atmCTPTrafficCurrentData MANAGED OBJECT CLASS

DERIVED FROM "Rec. Q.822:1993":currentData;
CHARACTERIZED BY
    atmTrafficLoadCurrentDataPackage,
    atmCTPTrafficCurrentDataPackage PACKAGE
        BEHAVIOUR
        atmCTPTrafficCurrentDataBehaviour BEHAVIOUR
DEFINED AS
"This managed object contains the current data collected for its superior Connection Termination
Point object, i.e. vpCTPbidirectional or vcCTPbidirectional. The measurements stored by this
object are the following:
- number of incoming cells at the termination point
- number of outgoing cells at the termination point
- and upcNpcData if this is to be recorded.
The administrativeState (inherited from X.739:scanner) is used to allow/inhibit the
collection/summarize of data. Setting the value from UNLOCKED to LOCKED suspends the activity of
this object.";;;;

CONDITIONAL PACKAGES
    upcNpcCurrentDataPackage PRESENT IF "the atmCTPTrafficCurrentData object is included in
    objects belonging to ATM access point in line with profileType";

REGISTERED AS { ASN1TypeModule.managedObjectClass 32 };
```

8.7.4.2 atmCTPTrafficHistoryData

```
atmCTPTrafficHistoryData MANAGED OBJECT CLASS

DERIVED FROM "Rec. Q.822:1993":historyData;
CHARACTERIZED BY
    atmTrafficLoadHistoryDataPackage,
    atmCTPTrafficHistoryDataPackage PACKAGE
        BEHAVIOUR
        atmCTPTrafficHistoryDataBehaviour BEHAVIOUR
DEFINED AS
"This managed object contains the history data collected for its superior Connection Termination
Point object, i.e. vpCTPBidirectional or vcCTPBidirectional. The measurements stored by this
object are the following:
- number of incoming cells at the termination point
- number of outgoing cells at the termination point
- and upcNpcData if this is to be recorded.";;;;

    CONDITIONAL PACKAGES
        upcNpcHistoryDataPackage PRESENT IF
        "the corresponding current data object contains the upcNpcCurrentDataPackage.";

REGISTERED AS { ASN1TypeModule.managedObjectClass 33 };
```

8.7.4.3 atmCTPTrafficEventRecord

```
atmCTPTrafficEventRecord MANAGED OBJECT CLASS

DERIVED FROM "Rec: X.721 | ISO/IEC 10165-2:1992":eventLogRecord;
CHARACTERIZED BY
    atmCTPTrafficEventRecordPackage PACKAGE
        BEHAVIOUR
            atmCTPTrafficEventRecordBehaviour BEHAVIOUR
DEFINED AS
"The atmCTPTrafficEventRecord object is a managed support object that is used to log data
reported by the scanReport notification.
Instances of this object class can only be created by the managed system and are contained in a
log object in the ATMNE.";;;;

CONDITIONAL PACKAGES
    atmTrafficLoadHistoryDataPackage PRESENT IF
        "the traffic load parameters were present in the received notification",
    upcNpcHistoryDataPackage PRESENT IF
        "the upc/npc parameters were present in the received notification";

REGISTERED AS { ASN1TypeModule.managedObjectClass 34 };
```

8.8 Object classes imported from other recommendations

The ITU-T Recommendation Q.822 [20] object thresholdData has to be imported in the ATM MIM to
contain a set of threshold values which correspond to the attributes as contained in the related
currentData object. If any of the counters of these attributes crosses the thresholds defined in the
thresholdData object, then a qualityOfServiceAlarm notification is issued by the related currentData object.
The following text defines the importation of the thresholdData object class in the MIM:

```
BEGIN
IMPORTS

alarmSeverityAssignementProfile

FROM    {ccitt(0) recommendation(0) m(13) m3100(3100) informationModel(0) managedObjectClass(3)
thresholdData
FROM {ccitt(0) recommendation(0) q(17) q822(822) informationModel (0) managedObjectClass(3)};

-- For alarm surveillance, event reporting, state change notifications, logging, etc, the
-- following generic object classes are imported:
alarmRecord,
attributeValueChangeRecord,
eventForwardingDiscriminator,
log,
objectCreationRecord,
objectDeletionRecord,
stateChangeRecord,

FROM {joint-iso-ccitt ms(9) smi(3) part2(2) managedObjectClass(3)};

END
```

9 Package definitions

9.1 atmPMCurrentDataPackage

```
atmPMCurrentDataPackage PACKAGE
        BEHAVIOUR
            atmPMCurrentDataBehaviour BEHAVIOUR
DEFINED AS
"This package includes attributes defined for the vp and vc OAM flow related to performance data
collection. The SECB, error cells and SES attributes should be included when the measurement of
them is defined.";;

    ATTRIBUTES
        userCells
                REPLACE-WITH-DEFAULT
                DEFAULT VALUE ASN1TypeModule.defaultZero                    GET,
        lostCells
                REPLACE-WITH-DEFAULT
                DEFAULT VALUE ASN1TypeModule.defaultZero                    GET,
        misinsertedCells
                REPLACE-WITH-DEFAULT
                DEFAULT VALUE ASN1TypeModule.defaultZero                    GET;

REGISTERED AS { ASN1TypeModule.package 0 };
```

9.2 atmPMHistoryDataPackage

```
atmPMHistoryDataPackage PACKAGE
        BEHAVIOUR
            atmPMHistoryDataBehaviour BEHAVIOUR
DEFINED AS
"This package includes attributes defined for the VP and VC OAM flow related to performance data
collection.The SECB, error cells and SES attributes should be included when the measurement of
them is defined.";;

    ATTRIBUTES
        userCells                                                          GET,
        lostCells                                                          GET,
        misinsertedCells                                                   GET;

REGISTERED AS { ASN1TypeModule.package 1 };
```

9.3 atmTrafficLoadCurrentDataPackage

```
atmTrafficLoadCurrentDataPackage PACKAGE
        BEHAVIOUR
            atmTrafficLoadCurrentDataPackageBehaviour BEHAVIOUR
DEFINED AS
"This package includes attributes defined for the traffic load data collection:
- the incomingCells attribute contains the number of incoming ATM cells transported by the
containing entity.
- the outgoingCells attribute contains the number of outgoing ATM cells transported by the
containing entity.";;

    ATTRIBUTES
        incomingCells   REPLACE-WITH-DEFAULT
                        DEFAULT VALUE ASN1TypeModule.defaultZero           GET,
        outgoingCells   REPLACE-WITH-DEFAULT
                        DEFAULT VALUE ASN1TypeModule.defaultZero           GET;

REGISTERED AS { ASN1TypeModule.package 2 };
```

9.4   atmTrafficLoadHistoryDataPackage

```
atmTrafficLoadHistoryDataPackage PACKAGE
        BEHAVIOUR
            atmTrafficLoadHistoryDataPackageBehaviour BEHAVIOUR
DEFINED AS
"This package includes attributes defined for the traffic load data collection:
- the incomingCells attribute contains the number of incoming ATM cells transported by the
  containing entity.
- the outgoingCells attribute contains the number of outgoing ATM cells transported by the
  containing entity.";;

    ATTRIBUTES
        incomingCells                                                   GET,
        outgoingCells                                                   GET;

REGISTERED AS { ASN1TypeModule.package 3 };
```

9.5   backwardPMReportingPackage

```
backwardPMReportingPackage PACKAGE
        BEHAVIOUR
            backwardPMReportingBehaviour BEHAVIOUR
DEFINED AS
"This package includes attributes used to indicate the far end backward reporting activity.";;

    ATTRIBUTES
        backwardPMReportingMechanismActive
                INITIAL VALUE ASN1TypeModule.booleanFalse               GET;

REGISTERED AS { ASN1TypeModule.package 4 };
```

9.6   feAtmPMCurrentDataPackage

```
feAtmPMCurrentDataPackage PACKAGE
        BEHAVIOUR
            feAtmPMCurrentDataBehaviour BEHAVIOUR
DEFINED AS
"This package includes attributes defined for the VP and VC OAM flow related to far end
performance data collection report.The SECB, error cells and SES attributes should be included
when the measurement of them is defined.";;

    ATTRIBUTES
        feUserCells
                REPLACE-WITH-DEFAULT
                DEFAULT VALUE ASN1TypeModule.defaultZero                GET,
        feLostCells
                REPLACE-WITH-DEFAULT
                DEFAULT VALUE ASN1TypeModule.defaultZero                GET,
        feMisinsertedCells
                REPLACE-WITH-DEFAULT
                DEFAULT VALUE ASN1TypeModule.defaultZero                GET;

REGISTERED AS { ASN1TypeModule.package 5 };
```

9.7   feAtmPMHistoryDataPackage

```
feAtmPMHistoryDataPackage PACKAGE
        BEHAVIOUR
            feAtmPMHistoryDataBehaviour BEHAVIOUR
DEFINED AS
"This package includes attributes defined for the VP and VC OAM flow related to far end
performance data collection report.The SECB, error cells and SES attributes should be included
when the measurement of them is defined.";;

    ATTRIBUTES
        feUserCells                                                     GET,
        feLostCells                                                     GET,
        feMisinsertedCells                                              GET;

REGISTERED AS { ASN1TypeModule.package 6 };
```

9.8　　　fePMDataProcessingPackage

```
fePMDataProcessingPackage PACKAGE
        BEHAVIOUR
            fePMDataProcessingBehaviour BEHAVIOUR
DEFINED AS
"This package includes attributes used to indicate the far end data processing activity.";;

    ATTRIBUTES
        fePMDataProcessingMechanismActive
                INITIAL VALUE ASN1TypeModule.booleanFalse             GET;

REGISTERED AS { ASN1TypeModule.package 7 };
```

9.9　　　tcHECCurrentDataPackage

```
tcHECCurrentDataPackage PACKAGE
        BEHAVIOUR
            tcHECCurrentDataPackageBehaviour BEHAVIOUR
DEFINED AS
"This package includes attributes defined for the protocol monitoring of the transmission
convergence sublayer:
- incoming cells with HEC violations.
- incoming cells discarded due to uncorrectable header bit errors.";;

        ATTRIBUTES
        hecErroredCells
                REPLACE-WITH-DEFAULT
                DEFAULT VALUE ASN1TypeModule.defaultZero              GET,
        hecDiscardedCells
                REPLACE-WITH-DEFAULT
                DEFAULT VALUE ASN1TypeModule.defaultZero              GET;

REGISTERED AS { ASN1TypeModule.package 8 };
```

9.10　　　tcHECHistoryDataPackage

```
tcHECHistoryDataPackage PACKAGE
        BEHAVIOUR
            tcHECHistoryDataPackageBehaviour BEHAVIOUR
DEFINED AS
"This package includes attributes defined for the protocol monitoring of the transmission
convergence sublayer:
- incoming cells with HEC violations.
- incoming cells discarded due to uncorrectable header bit errors.";;

    ATTRIBUTES
        hecErroredCells                                              GET,
        hecDiscardedCells                                           GET;

REGISTERED AS { ASN1TypeModule.package 9 };
```

9.11　　　unallocatedCellsCurrentDataPackage

```
unallocatedCellsCurrentDataPackage PACKAGE
        BEHAVIOUR
            unallocatedCellsCurrentDataPackageBehaviour BEHAVIOUR
DEFINED AS
"This package includes the count attribute which records the number of cells received with an
unallocated VPi or VCi.";;

    ATTRIBUTES
        unallocatedCells
                REPLACE-WITH-DEFAULT
                DEFAULT VALUE ASN1TypeModule.defaultZero              GET;

REGISTERED AS { ASN1TypeModule.package 10 };
```

9.12 unallocatedCellsHistoryDataPackage

```
unallocatedCellsHistoryDataPackage PACKAGE
        BEHAVIOUR
            unallocatedCellsHistoryDataPackageBehaviour BEHAVIOUR
DEFINED AS
"This package includes the count attribute which records the number of cells received with an
unallocated VPi or VCi.";;
    ATTRIBUTES
        unallocatedCells                                              GET;

REGISTERED AS { ASN1TypeModule.package 11 };
```

9.13 upcNpcCurrentDataPackage

```
upcNpcCurrentDataPackage PACKAGE
        BEHAVIOUR
            upcNpcCurrentDataPackageBehaviour BEHAVIOUR
DEFINED AS
"This package includes attributes defined for the upc/npc functions performance data collection:
- the taggedCLP0Cells attribute contains the number of CLP=0 cells tagged by the upc or npc
  function.
- the discardedCLP0Cells attribute contains the number of CLP=0 cells discarded by the upc or npc
  function.
- the discardedCLP1Cells attribute contains the number of CLP=1 cells discarded by the upc or npc
  function.";;

    ATTRIBUTES
        taggedCLP0Cells      REPLACE-WITH-DEFAULT
                             DEFAULT VALUE ASN1TypeModule.defaultZero        GET,
        discardedCLP0Cells   REPLACE-WITH-DEFAULT
                             DEFAULT VALUE ASN1TypeModule.defaultZero        GET,
        discardedCLP1Cells   REPLACE-WITH-DEFAULT
                             DEFAULT VALUE ASN1TypeModule.defaultZero        GET;

REGISTERED AS { ASN1TypeModule.package 12 };
```

9.14 upcNpcHistoryDataPackage

```
upcNpcHistoryDataPackage PACKAGE
        BEHAVIOUR
            upcNpcHistoryDataPackageBehaviour BEHAVIOUR
DEFINED AS
"This package includes attributes defined for the UPC/NPC functions performance data collection
and is used for the HistoryData:
- the discardedCells attribute contains the number of cells discarded by the UPC or NPC function.
- the taggedCLP0Cells attribute contains the number of CLP=0 cells tagged by the UPC or NPC
  function.
- the discardedCLP0Cells attribute contains the number of CLP=0 cells discarded by the UPC or NPC
  function.
- the discardedCLP1Cells attribute contains the number of CLP=1 cells discarded by the UPC or NPC
  function.";;

    ATTRIBUTES
        taggedCLP0Cells                                               GET,
        discardedCLP0Cells                                            GET,
        discardedCLP1Cells                                            GET;

REGISTERED AS { ASN1TypeModule.package 13 };
```

9.15 vcLayerPackage

```
vcLayerPackage PACKAGE
        BEHAVIOUR
            vcLayerBehaviourPackage BEHAVIOUR

    DEFINED AS
 "This package includes attributes to limit VC Layer values.";;

    ATTRIBUTES
        supportedVciRange                                            GET,
        maxSupportedActiveVCc                                        GET;

REGISTERED AS { ASN1TypeModule.package 14 };
```

10 Attribute definitions

10.1 atmAccessPointId

```
atmAccessPointId ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1TypeModule.NameType ;

MATCHES FOR EQUALITY;

BEHAVIOUR
    atmAccessPointIdBehaviour BEHAVIOUR
DEFINED AS
"This attribute is used for naming atmAccessPoint objects.";;

REGISTERED AS { ASN1TypeModule.attribute 0 };
```

10.2 atmCrossConnectionId

```
atmCrossConnectionId ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1TypeModule.NameType;

MATCHES FOR EQUALITY;

BEHAVIOUR
    atmCrossConnectionIdBehaviour BEHAVIOUR
DEFINED AS
"This attribute is used for naming the atmCrossConnection objects.";;

REGISTERED AS { ASN1TypeModule.attribute 1 };
```

10.3 atmFabricId

```
atmFabricId ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1TypeModule.NameType;

MATCHES FOR EQUALITY;

BEHAVIOUR
    atmFabricIdBehaviour BEHAVIOUR

    DEFINED AS
    "This attribute is used for naming the atmFabric object.";;

REGISTERED AS { ASN1TypeModule.attribute 2 };
```

10.4 atmProfilType

```
atmProfileType ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1TypeModule.AtmProfileType ;

MATCHES FOR EQUALITY;

BEHAVIOUR
    atmProfileTypeBehaviour BEHAVIOUR
DEFINED AS
"This attribute defines the types of atm profiles (e.g. a customer, intra Network, inter Carrier
profile).";;

REGISTERED AS { ASN1TypeModule.attribute 3 };
```

10.5   backwardReportingMechanismActive

```
backwardReportingMechanismActive ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1TypeModule.Boolean;

MATCHES FOR EQUALITY;

BEHAVIOUR
     backwardReportingMechanismActiveBehaviour BEHAVIOUR
DEFINED AS
".This attribute is used to indicate if backward reporting of performance data is active or
not";;

REGISTERED AS { ASN1TypeModule.attribute 4 };
```

10.6   continuityMonitorId

```
continuityMonitorId ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1TypeModule.NameType;

MATCHES FOR EQUALITY;

BEHAVIOUR
     continuityMonitorIdBehaviour BEHAVIOUR
DEFINED AS
"This attribute is used for naming Continuity Monitor objects";;

REGISTERED AS { ASN1TypeModule.attribute 5 };
```

10.7   discardedCLP0Cells

```
discardedCLP0Cells ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1TypeModule.Count;

MATCHES FOR EQUALITY,ORDERING;

BEHAVIOUR
     discardedCLP0CellsBehaviour BEHAVIOUR
DEFINED AS
"This attribute contains the number of CLP=0 cells discarded by the UPC or NPC function.";;

REGISTERED AS { ASN1TypeModule.attribute 6 };
```

10.8   discardedCLP1Cells

```
discardedCLP1Cells ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1TypeModule.Count;

MATCHES FOR EQUALITY,ORDERING;

BEHAVIOUR
     discardedCLP1CellsBehaviour BEHAVIOUR
DEFINED AS
"This attribute contains the number of CLP=1 cells discarded by the UPC or NPC function.";;

REGISTERED AS { ASN1TypeModule.attribute 7 };
```

10.9   feLostCells

```
feLostCells ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1TypeModule.Count;

MATCHES FOR EQUALITY,ORDERING;

BEHAVIOUR
     feLostCellsBehaviour BEHAVIOUR
DEFINED AS
"This attribute countains the count of lost cells that were detected by the far-end terminal.";;
REGISTERED AS { ASN1TypeModule.attribute 8 };
```

10.10   feMisinsertedCells

```
feMisinsertedCells ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1TypeModule.Count;

MATCHES FOR EQUALITY,ORDERING;

BEHAVIOUR
    feMisinsertedCellsBehaviour BEHAVIOUR
DEFINED AS
"This attribute countains the count of misinserted cells that were detected by the far end
terminal.";;

REGISTERED AS { ASN1TypeModule.attribute 9 };
```

10.11   fePMDataProcessingMechanismActive

```
fePMDataProcessingMechanismActive ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1TypeModule.Boolean;

MATCHES FOR EQUALITY;

BEHAVIOUR
    fePMDataProcessingMechanismActiveBehaviour BEHAVIOUR
DEFINED AS
".This attribute is used to indicate if far end performance data processing is active or not";;

REGISTERED AS { ASN1TypeModule.attribute 10 };
```

10.12   feUserCells

```
feUserCells ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1TypeModule.Count;

MATCHES FOR EQUALITY,ORDERING;

BEHAVIOUR
    feUserCellsBehaviour BEHAVIOUR
DEFINED AS
"This attribute countains the count of incoming user information cells processed on the
termination point being monitored by the far-end terminal.";;

REGISTERED AS { ASN1TypeModule.attribute 11 };
```

10.13   flowDirection

```
flowDirection ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1TypeModule.FlowDirection;

MATCHES FOR EQUALITY;

BEHAVIOUR
    flowDirectionBehaviour BEHAVIOUR
DEFINED AS
"The flowDirection attribute indicate in which direction the monitoring is made, in relation to
the TP by which the monitor object is named. The value ""outOfSwitch"" means that the monitored
flow extends from TP toward the network. The value ""inToSwitch"" means that monitored flow
extends from TP into the cross-connect.If both flows (inToSwitch and outOfSwitch) need to be
monitored, then two monitor objects should be created.";;

REGISTERED AS { ASN1TypeModule.attribute 12 };
```

10.14   hecDiscardedCells

```
hecDiscardedCells ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1TypeModule.Count;

MATCHES FOR EQUALITY,ORDERING;

BEHAVIOUR
    hecDiscardedCellsBehaviour BEHAVIOUR
DEFINED AS
"This attribute contains the number of incoming cells discarded in the transmission convergence
sublayer, due to uncorrectable header bit errors.";;

REGISTERED AS { ASN1TypeModule.attribute 13 };
```

10.15   hecErroredCells

```
hecErroredCells ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1TypeModule.Count;

MATCHES FOR EQUALITY,ORDERING;

BEHAVIOUR
    hecErroredCellsBehaviour BEHAVIOUR
DEFINED AS
"This attribute contains the number of incoming cells with HEC violations.";;

REGISTERED AS { ASN1TypeModule.attribute 14 };
```

10.16   inAverageMonitoringBlockSize

```
inAverageMonitoringBlockSize ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1TypeModule.AverageMonitoringBlockSize ;

MATCHES FOR EQUALITY;

BEHAVIOUR
    inAverageMonitoringBlockSizeBehaviour BEHAVIOUR
DEFINED AS
"This attribute contains the average monitoring block size, associated with the incoming ATM cell
flow along a VPC/VCC. The inAverageMonitoringBlockSize may be set to a length of 128, 256, 512 or
1024 cells. This attribute is automatically set as a result of the VPC performance monitoring
activation.";;

REGISTERED AS { ASN1TypeModule.attribute 15 };
```

10.17   incomingCells

```
incomingCells ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1TypeModule.Count;

MATCHES FOR EQUALITY,ORDERING;

BEHAVIOUR
    incomingCellsBehaviour BEHAVIOUR
DEFINED AS
"This attribute contains the number of incoming cells.";;

REGISTERED AS { ASN1TypeModule.attribute 16 };
```

10.18   inTrafficDescriptor

```
inTrafficDescriptor ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1TypeModule.TrafficDescriptor;

MATCHES FOR EQUALITY;

BEHAVIOUR
    inTrafficDescriptorBehaviour BEHAVIOUR
DEFINED AS
"This attribute describes the characteristics of an incoming cell flow. The specification of the
Peak Cell Rate values is defined in ITU-T Recommendation I.371.
The NULL value shall be used when neither user nor oam cells are permitted to flow in the
ATMNE.";;

REGISTERED AS { ASN1TypeModule.attribute 17 };
```

10.19   lostCells

```
lostCells ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1TypeModule.Count;

MATCHES FOR EQUALITY,ORDERING;

BEHAVIOUR
    lostCellsBehaviour BEHAVIOUR
DEFINED AS
"This attribute countains the count of detected lost cells.";;

REGISTERED AS { ASN1TypeModule.attribute 18 };
```

10.20   maxIncomingBandwidth

```
maxIncomingBandwidth ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1TypeModule.MaxBandwidth ;

MATCHES FOR EQUALITY, ORDERING;

BEHAVIOUR
    maxIncomingBandwidthBehaviour BEHAVIOUR
DEFINED AS
"This attribute is used to limit the incoming bandwidth resources which can be allocated by an
atm access point.
The NULL value shall be used when neither user nor oam cells are permitted to flow in the
ATMNE.The unit is cells/s.";;

REGISTERED AS { ASN1TypeModule.attribute 19 };
```

10.21   maxInTrafficDescriptor

```
maxInTrafficDescriptor ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1TypeModule.TrafficDescriptor;

MATCHES FOR EQUALITY;

BEHAVIOUR
    maxInTrafficDescriptorBehaviour BEHAVIOUR
DEFINED AS
"This attribute describes the characteristics of an incoming cell flow.The NULL value shall be
used when neither user nor oam cells are permitted to flow in the ATMNE.";;

REGISTERED AS { ASN1TypeModule.attribute 20 };
```

10.22   maxOutgoingBandwidth

```
maxOutgoingBandwidth ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1TypeModule.MaxBandwidth ;

MATCHES FOR EQUALITY, ORDERING;

BEHAVIOUR
    maxOutgoingBandwidthBehaviour BEHAVIOUR
DEFINED AS
"This attribute is used for defining the outgoing bandwidth resources which can be allocated by
an ATM access point.
The NULL value shall be used when neither user or oam cells are permitted to flow out the
ATMNE.The unit is cells/s.";;

REGISTERED AS { ASN1TypeModule.attribute 21 };
```

10.23   maxOutTrafficDescriptor

```
maxOutTrafficDescriptor ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1TypeModule.TrafficDescriptor;

MATCHES FOR EQUALITY;

BEHAVIOUR
    maxOutTrafficDescriptorBehaviour BEHAVIOUR
DEFINED AS
"This attribute describes the characteristics of an outgoing cell flow.
The NULL value shall be used when neither user nor oam cells are permitted to flow out the atm
Network Element.";;

REGISTERED AS { ASN1TypeModule.attribute 22 };
```

10.24   misinsertedCells

```
misinsertedCells ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1TypeModule.Count;

MATCHES FOR EQUALITY,ORDERING;

BEHAVIOUR
    misinsertedCellsBehaviour BEHAVIOUR
DEFINED AS
"This attribute countains the count of detected misinserted cells.";;

REGISTERED AS { ASN1TypeModule.attribute 23 };
```

10.25   outAverageMonitoringBlockSize

```
outAverageMonitoringBlockSize ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1TypeModule.AverageMonitoringBlockSize ;

MATCHES FOR EQUALITY;

BEHAVIOUR
    outAverageMonitoringBlockSizeBehaviour BEHAVIOUR
DEFINED AS
"This attribute contains the average monitoring block size, associated with the outgoing
direction of a monitored ATM cell flow along a VPC/VCC. The outAverageMonitoringBlockSize may be
set to a length of 128, 256, 512 or 1024 cells. This attribute is automatically set as a result
of the VPC performance monitoring activation";;

REGISTERED AS { ASN1TypeModule.attribute 24 };
```

10.26   outgoingCells

```
outgoingCells ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1TypeModule.Count;

MATCHES FOR EQUALITY,ORDERING;

BEHAVIOUR
    outgoingCellsBehaviour BEHAVIOUR
DEFINED AS
"This attribute contains the number of outgoing cells.";;

REGISTERED AS { ASN1TypeModule.attribute 25 };
```

10.27   outTrafficDescriptor

```
outTrafficDescriptor ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1TypeModule.TrafficDescriptor;

MATCHES FOR EQUALITY;

BEHAVIOUR
    outTrafficDescriptorBehaviour BEHAVIOUR
DEFINED AS
"This attribute describes the characteristics of an outgoing cell flow. The specification of the
Peak Cell Rate values is defined in ITU-T Recommendation I.371.
The NULL value shall be used when neither user nor oam cells are permitted to flow out the
ATMNE.";;

REGISTERED AS { ASN1TypeModule.attribute 26 };
```

10.28   performanceMonitorId

```
performanceMonitorId ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1TypeModule.NameType;

MATCHES FOR EQUALITY;

BEHAVIOUR performanceMonitorIdBehaviour BEHAVIOUR
DEFINED AS
"This attribute is used for naming Performance Monitor objects.";;

REGISTERED AS { ASN1TypeModule.attribute 27 };
```

10.29   sourceCCMechanismActive

```
sourceCCMechanismActive ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1TypeModule.Boolean;

MATCHES FOR EQUALITY;

BEHAVIOUR
     sourceCCMechanismActiveBehaviour BEHAVIOUR
DEFINED AS
"This attribute indicates whether the generation of the CC OAM flow is active.";;

REGISTERED AS { ASN1TypeModule.attribute 28 };
```

10.30   sourcePMMechanismActive

```
sourcePMMechanismActive ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1TypeModule.Boolean;

MATCHES FOR EQUALITY;

BEHAVIOUR
    sourcePMMechanismActiveBehaviour BEHAVIOUR
DEFINED AS
"This attribute indicates whether the generation of the PM OAM flow is active.";;

REGISTERED AS { ASN1TypeModule.attribute 29 };
```

10.31   sinkCCMechanismActive

```
sinkCCMechanismActive ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1TypeModule.Boolean;

MATCHES FOR EQUALITY;

BEHAVIOUR
     sinkCCMechanismActiveBehaviour BEHAVIOUR
DEFINED AS
"This attribute indicates whether the processing of the CC OAM flow is active.";;

REGISTERED AS { ASN1TypeModule.attribute 30 };
```

10.32   sinkPMMechanismActive

```
sinkPMMechanismActive ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1TypeModule.Boolean;

MATCHES FOR EQUALITY;

BEHAVIOUR
    sinkPMMechanismActiveBehaviour BEHAVIOUR
DEFINED AS
"This attribute indicates whether the processing of the PM OAM flow is active. ";;

REGISTERED AS { ASN1TypeModule.attribute 31 };
```

10.33   taggedCLP0Cells

```
taggedCLP0Cells ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1TypeModule.Count;

MATCHES FOR EQUALITY,ORDERING;

BEHAVIOUR
    taggedCLP0CellsBehaviour BEHAVIOUR
DEFINED AS
"This attribute contains the number of CLP=0 cells tagged by the upc or npc function.";;

REGISTERED AS { ASN1TypeModule.attribute 32 };
```

10.34   tcBidirectionalId

```
tcBidirectionalId ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1TypeModule.NameType;

MATCHES FOR EQUALITY;

BEHAVIOUR
    tcBidirectionalIdBehaviour BEHAVIOUR
DEFINED AS
"This attribute is used for naming the tcBidirectional objects.";;

REGISTERED AS { ASN1TypeModule.attribute 33 };
```

10.35   unallocatedCells

```
unallocatedCells ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1TypeModule.Count;

MATCHES FOR EQUALITY,ORDERING;

BEHAVIOUR
    unallocatedCellsBehaviour BEHAVIOUR
DEFINED AS
"This attribute contains the number of unallocated cells, ie which bears an unallocated VPi value
(detected at an atmAccessPoint or anallocated VCI value (detected at a vpTTP).";;

REGISTERED AS { ASN1TypeModule.attribute 34 };
```

10.36   userCells

```
userCells ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1TypeModule.Count;

MATCHES FOR EQUALITY,ORDERING;

BEHAVIOUR
    userCellsBehaviour BEHAVIOUR
DEFINED AS
"This attribute countains the count of incoming user information cells processed on the
termination point being monitored.";;

REGISTERED AS { ASN1TypeModule.attribute 35 };
```

10.37   vpiRange

```
vpiRange ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1TypeModule.VpiRange;

MATCHES FOR EQUALITY;

BEHAVIOUR
    vpiRangeBehaviour BEHAVIOUR

    DEFINED AS
"Reflects the number of bits available for the routeing a defined in ITU-T Recommendations I.150
and I.361.This limitation comes from the remote peer equipment. The OS can request to set this
attribute to the peer equipment limitations, if any. The initial value is determined by the
atmProfileType in the atmAccessPoint.";;

REGISTERED AS { ASN1TypeModule.attribute 36 };
```

10.38   vciRange

```
vciRange ATTRIBUTE
WITH ATTRIBUTE SYNTAX ASN1TypeModule.VciRange;

MATCHES FOR EQUALITY;

BEHAVIOUR
    vciRangeBehaviour BEHAVIOUR

    DEFINED AS
"Reflects the number of bits available for the routeing as defined in ITU-T Recommendations
I.150 and I.361.This limitation comes from the remote peer equipment. The OS can request to set
this attribute to the peer equipment limitations, if any.The initial value is determined by the
atmProfileType in the atmAccessPoint.";;

REGISTERED AS { ASN1TypeModule.attribute 37 };
```

10.39   supportedVpiRange

```
supportedVpiRange ATTRIBUTEWITH ATTRIBUTE SYNTAX ASN1TypeModule.VpiRange;

MATCHES FOR EQUALITY;

BEHAVIOUR
    supportedVpiRangeBehaviour BEHAVIOUR

    DEFINED AS
"Reflects the number of bits available for routeing as defined in ITU-T Recommendations I.150 and
I.361. This limitation comes from the managed interface itself in the ATMNE. The value should be
the maximum possible range for that type of interface dependent on the atmProfileType.";;

REGISTERED AS { ASN1TypeModule.attribute 38 };
```

10.40 supportedVciRange

```
supportedVciRange ATTRIBUTEWITH ATTRIBUTE SYNTAX ASN1TypeModule.VciRange;

MATCHES FOR EQUALITY;

BEHAVIOUR
    supportedVciRangeBehaviour BEHAVIOUR

    DEFINED AS
"Reflects the number of bits available for routeing as defined in ITU-T Recommendations I.150 and
I.361. This limitation comes from the managed interface itself in the ATMNE. The value should be
the maximum possible range for that type of interface dependent on the atmProfileType.";;

REGISTERED AS { ASN1TypeModule.attribute 39 };
```

10.41 maxSupportedActiveVPc

```
maxSupportedActiveVPc ATTRIBUTE
WITH ATTRIBUTE SYNTAX ASN1TypeModule.MaxNum;

MATCHES FOR EQUALITY;

BEHAVIOUR
    maxSupportedActiveVPcBehaviour BEHAVIOUR

    DEFINED AS
"This limitation of the maximum number of VPc's comes from the managed interface itself in the
ATMNE.";;

REGISTERED AS { ASN1TypeModule.attribute 40 };
```

10.42 maxSupportedActiveVCc

```
maxSupportedActiveVCc ATTRIBUTE
WITH ATTRIBUTE SYNTAX ASN1TypeModule.MaxNum;

MATCHES FOR EQUALITY;

BEHAVIOUR
    maxSupportedActiveVCcBehaviour BEHAVIOUR

    DEFINED AS
"This limitation of the maximum number of VCc's comes from the managed interface itself in the
ATMNE.";;

REGISTERED AS { ASN1TypeModule.attribute 41 };
```

10.43 maxNumActiveVPc

```
maxNumActiveVPc ATTRIBUTE
WITH ATTRIBUTE SYNTAX ASN1TypeModule.MaxNum;

MATCHES FOR EQUALITY;

    BEHAVIOUR
        maxNumActiveVPcBehaviour BEHAVIOUR

        DEFINED AS
 "This limitation of the maximum number of VPc's comes from the remote peer equipment. The OS can
request to set this attribute to the peer equipment limitation, if any.";;

REGISTERED AS { ASN1TypeModule.attribute 42 };
```

10.44 maxNumActiveVCc

```
maxNumActiveVCc ATTRIBUTE
    WITH ATTRIBUTE SYNTAX ASN1TypeModule.MaxNum;

    MATCHES FOR EQUALITY;

    BEHAVIOUR
        maxNumActiveVCcBehaviour BEHAVIOUR

        DEFINED AS
 "This limitation of the maximum number of VCc's comes from the remote peer equipment. The OS can
request to set this attribute to the peer equipment limitation, if any.";;

REGISTERED AS { ASN1TypeModule.attribute 43 };
```

10.45   vcCTPId

```
vcCTPId ATTRIBUTE

    WITH ATTRIBUTE SYNTAX ASN1TypeModule.VCi;

    MATCHES FOR EQUALITY;

    BEHAVIOUR
        vcCTPIdBehaviour BEHAVIOUR
DEFINED AS
"This attribute is used for naming the vcCTP objects. It contains the VCi value of the VC link
connection it originates/terminates.";;

REGISTERED AS { ASN1TypeModule.attribute 44 };
```

10.46   vcTTPId

```
vcTTPId ATTRIBUTE

    WITH ATTRIBUTE SYNTAX ASN1TypeModule.NameType;

    MATCHES FOR EQUALITY;

    BEHAVIOUR
        vcTTPIdBehaviour BEHAVIOUR
DEFINED AS
"This attribute is used for naming the vcTTP objects.";;

REGISTERED AS { ASN1TypeModule.attribute 45 };
```

10.47   vpCTPId

```
vpCTPId ATTRIBUTE

    WITH ATTRIBUTE SYNTAX ASN1TypeModule.VPi;

    MATCHES FOR EQUALITY;

    BEHAVIOUR
        vpCTPIdBehaviour BEHAVIOUR
DEFINED AS
"This attribute is used for naming the vpCTP objects. It contains the VPi value of the VP link
connection it originates/terminates.";;

REGISTERED AS { ASN1TypeModule.attribute 46 };
```

10.48   vpTTPId

```
vpTTPId ATTRIBUTE

    WITH ATTRIBUTE SYNTAX ASN1TypeModule.NameType;

    MATCHES FOR EQUALITY;

    BEHAVIOUR
        vpTTPIdBehaviour BEHAVIOUR
DEFINED AS
"This attribute is used for naming the vpTTP objects.";;

REGISTERED AS { ASN1TypeModule.attribute 47 };
```

10.49   vpiRange

```
vpiRange ATTRIBUTE

    WITH ATTRIBUTE SYNTAX ASN1TypeModule.VPiRange;

    MATCHES FOR EQUALITY;

    BEHAVIOUR
        vpiRangeBehaviour BEHAVIOUR
DEFINED AS
"This attribute is used to limit the VPi resources which may be allocated by an atmAccessPoint:
it reflects the number of bits available for routeing as defined in ITU-T Recommendations I.150
and I.361.";;

REGISTERED AS { ASN1TypeModule.attribute 48 };
```

11   Peak rate modification parameters definition

It is useful with the model of B-ISDN management aspects to take into account the peak rate modifications.

This clause lists the conditions in order to accept the modification and proposes parameters for the information model.

The modification of peak rate shall be consistent through the network and through the different ATMNE.

In the case of modification of peak rate under VP each VP termination point (vpCTPsource, vpCTPsink; vpTTPsource, vpTTPsink) shall be verified and consistent.

If one VP cross-connection connects two of these VP termination points, the modification of the VP peak rate shall be effective only if the added bit rate is able to be cross-connected .

If we add bit rate on the vpCTP, this added bit rate will be accepted only if the atmAccessPoint objects is able to allocate the additional bandwidth:

-       one added vcCTP bit rate is conditional with the availability of the total peak rate on the vpTTP server;

-       one added vpCTP bit rate is conditional with the availability of the total peak rate on the atmAccessPoint server;

-       one decreased vpTTP bit rate is conditional with the peak rate on the vcCTP client; the decreasing of the bit rate shall be compatible with the sum of the allocated peak rate to the different vcCTP clients.

11.1   InsufficientCapacityAtTheServerTrailParameter

```
insufficientCapacityAtTheServerTrailParameter PARAMETER

    CONTEXT SPECIFIC-ERROR;

    WITH SYNTAX ASN1TypeModule.InsufficientCapacityAtTheServerTrailParameter;

    BEHAVIOUR
        insufficientCapacityAtTheServerTrailParameterBehaviour BEHAVIOUR
DEFINED AS
"This parameter is used in conjunction with an attribute defining resources at a client layer:
the modification of an attribute in a client layer object (e.g. the inTrafficDescriptor attribute
of a vpCTPbidirectional object) is denied because the server layer object (e.g. the
atmAccessPoint) could not allocate the required additional resources.
This parameter indicates the attributeId of the attribute which could not be modified (e.g. the
""inTrafficDescriptor"" object Identifier) and the server trail object instance which could not
allocate the required resources.
This parameter can also be returned in response to the creation of a client layer object when the
server layer cannot allocate the required resources.";;

REGISTERED AS { ASN1TypeModule.parameter 0 };
```

11.2   resourceAllocatedToClientParameter

```
resourceAllocatiedToClientParameter PARAMETER
```

```
        CONTEXT SPECIFIC-ERROR;

        WITH SYNTAX ASN1TypeModule.ResourceAllocatedToClientParameter;

        BEHAVIOUR
            resourceAllocatedToClientParameterBehaviour BEHAVIOUR
DEFINED AS
"This parameter is used in conjunction with an attribute defining resource at a server layer:
The modification of an attribute in a server layer object (e.g. the maxIncomingBandwidth
attribute of an atmAccessPoint object) is denied because resources already allocated to client
layer objects (e.g. vpCTPBidirectional) exceed the new (lower) server object attribute value.
This parameter indicates the attribute Id of the attribute which could not be modified (e.g. the
""maxIncomingBandwidth"" registered object identifier.";;

REGISTERED AS { ASN1TypeModule.parameter 1 };
```

12   Notification definitions

No notification is needed.

13   Action definitions

13.1   controlCC

```
controlCC ACTION

    BEHAVIOUR
        controlCCBehaviour BEHAVIOUR

            DEFINED AS
"This action is used to request both the activation and deactivation of the Continuity Check OAM
cell generation and processing procedures at the termination points upon which the continuity
check function is performed, i.e. the VPC or VPC/VCC Segment.
Since it applies to bidirectionalContinuityMonitor objects, this action may, eg, requests the
activation one way and the deactivation the other way.";;

    MODE CONFIRMED;
    WITH INFORMATION SYNTAX
        ASN1TypeModule.ControlCCInformation;
    WITH REPLY SYNTAX
        ASN1TypeModule.ControlCCResult;

REGISTERED AS { ASN1TypeModule.action 0 };
```

13.2   atmConnect

```
atmConnect ACTION

    BEHAVIOUR
    atmConnectBehaviour BEHAVIOUR
DEFINED AS
"This action is used to establish a cross-connection between:
- vpCTPbidirectional and vpCTPbidirectional
- vcCTPbidirectional and vcCTPbidirectional
When TPs to be cross-connected are inconsistent ,e.g. due to bandwidth mismatch, the cross
connection shall be refused with the ""mismatchingTPs"" problemCause.";;

    MODE CONFIRMED;
    WITH INFORMATION SYNTAX
        ASN1TypeModule.AtmConnectInformation;
    WITH REPLY SYNTAX
        ASN1TypeModule.ConnectResult;

REGISTERED AS { ASN1TypeModule.action 1 };
```

13.3   controlPM

```
controlPM ACTION

    BEHAVIOUR
        controlPMBehaviour BEHAVIOUR
DEFINED AS
"This action is used to request both the activation and deactivation of the Performance
Monitoring OAM cell generation and processing procedures at the termination point upon which the
performance monitoring function is performed, i.e. the VPC or VPC/VCC Segment.
Since it applies to bidirectionalPerformancelMonitor objects, this action may, e.g, requests the
activation one way and the deactivation the other way.";;

    MODE CONFIRMED;
    WITH INFORMATION SYNTAX
        ASN1TypeModule.ControlPMInformation;
    WITH REPLY SYNTAX
        ASN1TypeModule.ControlPMResult;

REGISTERED AS { ASN1TypeModule.action 2 };
```

14   Name binding definition

The TTP of a "Server Layer" contains the CTP objects of the "Client Layer". As for vpCTP, they are
contained in an atmAccessPoint object which models the de/multiplexing of VP cell flows in/out of the
server trail.

14.1   atmAccessPoint-tcBidirectional

```
atmAccessPoint-tcBidirectional NAME BINDING

    SUBORDINATE OBJECT CLASS    atmAccessPoint;

    NAMED BY SUPERIOR OBJECT CLASS  tcBidirectional;
        WITH ATTRIBUTE  atmAccessPointId;

    CREATE
        WITH-REFERENCE-OBJECT,
        WITH-AUTOMATIC-INSTANCE-NAMING
        insufficientCapacityAtTheServerTrail;

    DELETE
        ONLY-IF-NO-CONTAINED-OBJECTS;

REGISTERED AS { ASN1TypeModule.nameBinding 0 };
```

14.2   atmAccessPointTrafficCurrentData-atmAccessPoint

```
atmAccessPointTrafficCurrentData-atmAccessPoint NAME BINDING

    SUBORDINATE OBJECT CLASS atmAccessPointTrafficCurrentData;

    NAMED BY
    SUPERIOR OBJECT CLASS atmAccessPoint;
    WITH ATTRIBUTE "Rec. X.739 | ISO/IEC 10164-11:1993":scannerId;

    CREATE
        WITH-REFERENCE-OBJECT,
        WITH-AUTOMATIC-INSTANCE-NAMING;

    DELETE
        DELETES-CONTAINED-OBJECTS;

REGISTERED AS { ASN1TypeModule.nameBinding 1 };
```

14.3   atmCrossConnection-atmFabric

```
atmCrossConnection-atmFabric NAME BINDING

    SUBORDINATE OBJECT CLASS    atmCrossConnection;
    NAMED BY SUPERIOR OBJECT CLASS  atmFabric;
    WITH ATTRIBUTE  atmCrossConnectionId;

REGISTERED AS { ASN1TypeModule.nameBinding 2 };
```

14.4 atmCTPTrafficCurrentData-vcCTPbidirectional

```
atmCTPTrafficCurrentData-vcCTPbidirectional NAME BINDING

    SUBORDINATE OBJECT CLASS atmCTPTrafficCurrentData;
    NAMED BY
    SUPERIOR OBJECT CLASS vcCTPbidirectional;
    WITH ATTRIBUTE "Rec. X.739 | ISO/IEC 10164-11:1993":scannerId;

    CREATE
        WITH-REFERENCE-OBJECT,
        WITH-AUTOMATIC-INSTANCE-NAMING;

    DELETE
        DELETES-CONTAINED-OBJECTS;

REGISTERED AS { ASN1TypeModule.nameBinding 3 };
```

14.5 atmCTPTrafficCurrentData-vpCTPbidirectional

```
atmCTPTrafficCurrentData-vpCTPbidirectional NAME BINDING

    SUBORDINATE OBJECT CLASS atmCTPTrafficCurrentData;
    NAMED BY
    SUPERIOR OBJECT CLASS vpCTPbidirectional;
    WITH ATTRIBUTE "Rec. X.739 | ISO/IEC 10164-11:1993":scannerId;

    CREATE
        WITH-REFERENCE-OBJECT,
        WITH-AUTOMATIC-INSTANCE-NAMING;

    DELETE
        DELETES-CONTAINED-OBJECTS;

REGISTERED AS { ASN1TypeModule.nameBinding 4 };
```

14.6 atmFabric-atmNe

```
atmFabric-atmNe NAME BINDING

    SUBORDINATE OBJECT CLASS    atmFabric;
    NAMED BY SUPERIOR OBJECT CLASS  atmNe;
    WITH ATTRIBUTE   atmFabricId;

REGISTERED AS { ASN1TypeModule.nameBinding 5 };
```

14.7 atmPerformanceCurrentData-bidirectionalPerformanceMonitor

```
atmPerformanceCurrentData-bidirectionalPerformanceMonitor NAME BINDING

    SUBORDINATE OBJECT CLASS    atmPerformanceCurrentData;
    NAMED BY SUPERIOR OBJECT CLASS  bidirectionalPerformanceMonitor AND SUBCLASSES;
    WITH ATTRIBUTE   "Rec. X.739 | ISO/IEC 10164-11:1993":scannerId;

        BEHAVIOUR
        atmPerformanceCurrentData-bidirectionalPerformanceMonitorBehaviour BEHAVIOUR
DEFINED AS
"A atmPerformanceCurrentData object instance shall be created/deleted automatically, whenever a
bidirectionalPerformanceMonitor object instance is created/deleted by means of a systems
management operation.";;

REGISTERED AS { ASN1TypeModule.nameBinding 6 };
```

14.8 bidirectionalContinuityMonitor-vpCTPbidirectional

```
bidirectionalContinuityMonitor-vpCTPbidirectional NAME BINDING

    SUBORDINATE OBJECT CLASS    bidirectionalContinuityMonitor;
    NAMED BY SUPERIOR OBJECT CLASS  vpCTPbidirectional;
    WITH ATTRIBUTE   continuityMonitorId;

    CREATE
        WITH-REFERENCE-OBJECT,
        WITH-AUTOMATIC-INSTANCE-NAMING;

    DELETE
        DELETES-CONTAINED-OBJECTS;

REGISTERED AS { ASN1TypeModule.nameBinding 7 };
```

14.9 bidirectionalContinuityMonitor-vcCTPbidirectional

```
bidirectionalContinuityMonitor-vcCTPbidirectional NAME BINDING

    SUBORDINATE OBJECT CLASS    bidirectionalContinuityMonitor;
    NAMED BY SUPERIOR OBJECT CLASS  vcCTPbidirectional;
    WITH ATTRIBUTE  continuityMonitorId;

    CREATE
        WITH-REFERENCE-OBJECT,
        WITH-AUTOMATIC-INSTANCE-NAMING;

    DELETE
        DELETES-CONTAINED-OBJECTS;

REGISTERED AS { ASN1TypeModule.nameBinding 8 };
```

14.10 bidirectionalContinuityMonitor-vcTTPbidirectional

```
bidirectionalContinuityMonitor-vpTTPbidirectional NAME BINDING

    SUBORDINATE OBJECT CLASS    bidirectionalContinuityMonitor;
    NAMED BY SUPERIOR OBJECT CLASS  vcTTPbidirectional;
    WITH ATTRIBUTE  continuityMonitorId;

    CREATE
        WITH-REFERENCE-OBJECT,
        WITH-AUTOMATIC-INSTANCE-NAMING;

    DELETE
        DELETES-CONTAINED-OBJECTS;

REGISTERED AS { ASN1TypeModule.nameBinding 9 };
```

14.11 bidirectionalContinuityMonitor-vpTTPbidirectional

```
bidirectionalContinuityMonitor-vpTTPbidirectional NAME BINDING

    SUBORDINATE OBJECT CLASS    bidirectionalContinuityMonitor;
    NAMED BY SUPERIOR OBJECT CLASS  vpTTPbidirectional;
    WITH ATTRIBUTE  continuityMonitorId;

    CREATE
        WITH-REFERENCE-OBJECT,
        WITH-AUTOMATIC-INSTANCE-NAMING;

    DELETE
        DELETES-CONTAINED-OBJECTS;

REGISTERED AS { ASN1TypeModule.nameBinding 10 };
```

14.12 bidirectionalPerformanceMonitor-vcCTPBid

```
bidirectionalPerformanceMonitor-vcCTPBid NAME BINDING

    SUBORDINATE OBJECT CLASS    bidirectionalPerformanceMonitor;
    NAMED BY SUPERIOR OBJECT CLASS  vcCTPBid AND SUBCLASSES;
    WITH ATTRIBUTE  performanceMonitorId;

    CREATE
        WITH-REFERENCE-OBJECT,
        WITH-AUTOMATIC-INSTANCE-NAMING;

    DELETE
        DELETES-CONTAINED-OBJECTS;

REGISTERED AS { ASN1TypeModule.nameBinding 11 };
```

14.13   bidirectionalPerformanceMonitor-vpCTPBid

```
bidirectionalPerformanceMonitor-vpCTPBid NAME BINDING

    SUBORDINATE OBJECT CLASS    bidirectionalPerformanceMonitor;
    NAMED BY SUPERIOR OBJECT CLASS  vpCTPBid AND SUBCLASSES;
    WITH ATTRIBUTE  performanceMonitorId;

    CREATE
        WITH-REFERENCE-OBJECT,
        WITH-AUTOMATIC-INSTANCE-NAMING;

    DELETE
        DELETES-CONTAINED-OBJECTS;

REGISTERED AS { ASN1TypeModule.nameBinding 12 };
```

14.14   bidirectionalPerformanceMonitor-vcTTPBid

```
bidirectionalPerformanceMonitor-vcTTPBid NAME BINDING

    SUBORDINATE OBJECT CLASS    bidirectionalPerformanceMonitor;
    NAMED BY SUPERIOR OBJECT CLASS  vcTTPBid AND SUBCLASSES;
    WITH ATTRIBUTE  performanceMonitorId;

    CREATE
        WITH-REFERENCE-OBJECT,
        WITH-AUTOMATIC-INSTANCE-NAMING;

    DELETE
        DELETES-CONTAINED-OBJECTS;

REGISTERED AS { ASN1TypeModule.nameBinding 13 };
```

14.15   bidirectionalPerformanceMonitor-vpTTPBid

```
bidirectionalPerformanceMonitor-vpTTPBid NAME BINDING

    SUBORDINATE OBJECT CLASS    bidirectionalPerformanceMonitor;
    NAMED BY SUPERIOR OBJECT CLASS  vpTTPBid AND SUBCLASSES;
    WITH ATTRIBUTE  performanceMonitorId;

    CREATE
        WITH-REFERENCE-OBJECT,
        WITH-AUTOMATIC-INSTANCE-NAMING;

    DELETE
        DELETES-CONTAINED-OBJECTS;

REGISTERED AS { ASN1TypeModule.nameBinding 14 };
```

14.16   tcBidirectional-e1ATTPBidirectional

```
tcBidirectional-e1ATTPBidirectional NAME BINDING

    SUBORDINATE OBJECT CLASS    tcBidirectional;
    NAMED BY SUPERIOR OBJECT CLASS  e1ATTPBidirectional;
    WITH ATTRIBUTE  tcBidirectionalId;

    BEHAVIOUR
        tcBidirectional-e1ATTPBidirectionalBehaviour BEHAVIOUR
DEFINED AS
"The subordinate.managed object is automatically instantiated when the superior managed object
is instantiated, according to the make-up mode and operation of the ATMNE.";;

REGISTERED AS { ASN1TypeModule.nameBinding 15 };
```

14.17   tcBidirectional-e3IntTTPBidirectional

```
tcBidirectional-e3IntTTPBidirectional NAME BINDING

    SUBORDINATE OBJECT CLASS    tcBidirectional;
    NAMED BY SUPERIOR OBJECT CLASS  e3IntTTPBidirectional;
    WITH ATTRIBUTE  tcBidirectionalId;

    BEHAVIOUR
        tcBidirectional-e3IntTTPBidirectionalBehaviour BEHAVIOUR
DEFINED AS
"The subordinate.managed object is automatically instantiated when the superior managed object
is instantiated, according to the make-up mode and operation of the ATMNE.";;

REGISTERED AS { ASN1TypeModule.nameBinding 16 };
```

14.18   tcBidirectional-e4IntTTPBidirectional

```
tcBidirectional-e4IntTTPBidirectional NAME BINDING

    SUBORDINATE OBJECT CLASS    tcBidirectional;
    NAMED BY SUPERIOR OBJECT CLASS  e4IntTTPBidirectional;
    WITH ATTRIBUTE tcBidirectionalId;

    BEHAVIOUR
        tcBidirectional-e4IntTTPBidirectionalBehaviour BEHAVIOUR
DEFINED AS
"The subordinate.managed object is automatically instantiated when the superior managed object
is instantiated, according to the make-up mode and operation of the ATMNE.";;

REGISTERED AS { ASN1TypeModule.nameBinding 17 };
```

14.19   tcBidirectional-vc4TTPBidirectional

```
tcBidirectional-vc4TTPBidirectional NAME BINDING

    SUBORDINATE OBJECT CLASS    tcBidirectional;
    NAMED BY SUPERIOR OBJECT CLASS  vc4TTPBidirectional;
    WITH ATTRIBUTE tcBidirectionalId;

    BEHAVIOUR
        tcBidirectional-vc4TTPBidirectionalBehaviour BEHAVIOUR
DEFINED AS
"The subordinate.object shall be automatically created according to the make-up mode and
operation of the ATMNE.";;

REGISTERED AS { ASN1TypeModule.nameBinding 18 };
```

> NOTE: Name Bindings for tcBidirectional with respect to all trail termination point objects for SDH and PDH
>
> should also be provided (at least those for the TTP used to support B-ISDN network).

14.20   tcCurrentData-tcBidirectional

```
tcCurrentData-tcBidirectional NAME BINDING

    SUBORDINATE OBJECT CLASS            tcCurrentData;
    NAMED BY SUPERIOR OBJECT CLASS      tcBidirectional;
    WITH ATTRIBUTE      "Rec. X.739 | ISO/IEC 10164-11:1993":scannerId;

    BEHAVIOUR
        tcCurrentData-tcBidirectionalBehaviour BEHAVIOUR
DEFINED AS
"The subordinate.object shall be automatically created whenever a tcBidirectional object is
created.";;

REGISTERED AS { ASN1TypeModule.nameBinding 19 };
```

14.21 vc4TTPBidirectional-managedElement

```
vc4TTPBidirectional-managedElement NAME BINDING

    SUBORDINATE OBJECT CLASS            vc4TTPBidirectional;
    NAMED BY SUPERIOR OBJECT CLASS managedElement AND SUBCLASSES;
    WITH ATTRIBUTE  vc4TTPId;

    BEHAVIOUR
        vc4TTPBidirectional-managedElementBehaviour BEHAVIOUR
DEFINED AS
"The subordinate.object shall be automatically created according to the make-up mode and
operation of the NE";;

REGISTERED AS { ASN1TypeModule.nameBinding 20 };
```

14.22 vcCTPbidirectional-vpTTPbidirectional

```
vcCTPbidirectional-vpTTPbidirectional NAME BINDING

    SUBORDINATE OBJECT CLASS            vcCTPbidirectional;
    NAMED BY SUPERIOR OBJECT CLASS      vpTTPbidirectional;
    WITH ATTRIBUTE  vcCTPId;

    CREATE
        WITH-AUTOMATIC-INSTANCE-NAMING
        insufficientCapacityAtTheServerTrailParameter;

    DELETE
        DELETES-CONTAINED-OBJECTS;

REGISTERED AS { ASN1TypeModule.nameBinding 21 };
```

14.23 vpCTPbidirectional-atmAccessPoint

```
vpCTPbidirectional-atmAccessPoint NAME BINDING

    SUBORDINATE OBJECT CLASS            vpCTPbidirectional;
    NAMED BY SUPERIOR OBJECT CLASS      atmAccessPoint;
    WITH ATTRIBUTE  vpCTPId;

    CREATE
        WITH-AUTOMATIC-INSTANCE-NAMING
        insufficientCapacityAtTheServerTrailParameter;

    DELETE
        DELETES-CONTAINED-OBJECTS;

REGISTERED AS { ASN1TypeModule.nameBinding 22 };
```

14.24 vcTTPbidirectional-atmNe

```
vcTTPbidirectional-aTMNe NAME BINDING

    SUBORDINATE OBJECT CLASS vcTTPbidirectional;
    NAMED BY
    SUPERIOR OBJECT CLASS aTMNe;
    WITH ATTRIBUTE vcTTPId;

    CREATE
        WITH-REFERENCE-OBJECT,
        WITH-AUTOMATIC-INSTANCE-NAMING;

    DELETE
        ONLY-IF-NO-CONTAINED-OBJECTS;

REGISTERED AS { ASN1TypeModule.nameBinding 23 };
```

14.25 vpTTPbidirectional-atmNe

```
vpTTPbidirectional-atmNe NAME BINDING

    SUBORDINATE OBJECT CLASS vpTTPbidirectional;
    NAMED BY
    SUPERIOR OBJECT CLASS atmNe;
    WITH ATTRIBUTE vpTTPId;

    CREATE
        WITH-REFERENCE-OBJECT,
        WITH-AUTOMATIC-INSTANCE-NAMING;

    DELETE
        ONLY-IF-NO-CONTAINED-OBJECTS;
REGISTERED AS { ASN1TypeModule.nameBinding 24 };
```

14.26 Name binding imported from other recommmendations

```
BEGIN

IMPORTS
    pPITTP-managedElement
    e1ATTPBidirectional-pPITTP
    e3IntTTPBidirectional-pPITTP
    e4IntTTPBidirectional-pPITTP
    FROM {ccitt(0) identified-organization(4) etsi(0) ets(371) informationModel(0)
nameBinding(6)};
    historyData-currentData
    thresholdData-currentData
    thresholdData-managedElement
    FROM {ccitt(0) recommendation(0) q(17) q822(822) informationModel(0) nameBinding(6)};
    logRecord-log
    FROM {joint-iso-ccitt(2) ms(9) smi(3) part2(2) nameBinding(6)};
    eventForwardingDiscriminator-managedElement
    log-managedElement
    equipment-managedElement
    FROM {ccitt(0) recommendation(0) m(13) m3100(3100) informationModel(0) nameBinding(6)};

END
```

15 Abstract syntax

```
ASN1TypeModule { ccitt(0) identified-organization(4) etsi(0) ets(469) informationModel(0)
asn1Module(2) asn1TypesModule(0) }

DEFINITIONS IMPLICIT TAGS ::=

BEGIN

IMPORTS
    NameType,
    CrossConnectionObjectPointer,
    ConnectResult
    FROM ASN1DefinedTypesModule {ccitt(0) recommendation(0) m(13) gnm(3100) informationModel(0)
asn1Modules(2) asn1DefinedTypesModule(0) }
    Count,
    AdministrativeState
    FROM Attribute-ASN1Module { joint-iso-ccitt ms(9) smi(3) part2(2) asn1Module (2) 1 }
    ObjectInstance
    FROM CMIP-1 { joint-iso-ccitt ms(9) cmip(1) modules(0) protocol(3) };
informationModel OBJECT IDENTIFIER ::= { ccitt(0) identified-organization(4) etsi(0) ets(469)
informationModel (0) }
standardSpecificExtension OBJECT IDENTIFIER ::= { informationModel standardSpecificExtension(0) }
managedObjectClass OBJECT IDENTIFIER ::=         { informationModel managedObjectClass(3) }
package OBJECT IDENTIFIER ::=                     { informationModel package(4) }
parameter OBJECT IDENTIFIER ::=                  { informationModel parameter(5) }
nameBinding OBJECT IDENTIFIER ::=                { informationModel nameBinding(6) }
attribute OBJECT IDENTIFIER ::=                  { informationModel attribute(7) }
attributeGroup OBJECT IDENTIFIER ::=             { informationModel attributeGroup(8) }
action OBJECT IDENTIFIER ::=                      { informationModel action(9) }
notification OBJECT IDENTIFIER ::=               { informationModel notification(10) }
defaultZero INTEGER ::= 0
booleanFalse BOOLEAN ::= FALSE
AtmConnectInformation ::= SEQUENCE OF SEQUENCE {
    CHOICE {
        pointToPoint    [0]             PointToPoint },
    administrativeState                 AdministrativeState         OPTIONAL}
AtmProfileType ::= ENUMERATED {
    customer                            (0),
    intraNetwork                        (1),
    interCarrier                        (2) }
AverageMonitoringBlockSize ::= ENUMERATED {
    decimal128 (0),
    decimal256 (1),
    decimal512 (2),
    decimal1024 (3)}
defaultMonitoringBlockSize AverageMonitoringBlockSize ::= decimal128
CCProblem ::= ENUMERATED {
    noSourceUserFlow                    (0),
    noSinkUserFlow                      (1),
    sourceAlreadyActive                 (2),
    sinkAlreadyActive                   (3) }
CellDelayVariationTolerance::=INTEGER
FlowDirection::= ENUMERATED {
    outOfSwitch (0),
    inToSwitch (1) }
ControlCCInformation ::= SEQUENCE {
    activateSourceCCMechanism [1]       BOOLEAN                     OPTIONAL,
    activateSinkCCMechanism [2]         BOOLEAN                     OPTIONAL}
ControlCCResult ::= SEQUENCE {
    sourceCCMechanismActive [1]         BOOLEAN                     OPTIONAL,
    sinkCCMechanismActive [2]           BOOLEAN                     OPTIONAL,
    additionalInformation               SET OF CCProblem            OPTIONAL}
ControlPMInformation ::= SEQUENCE {
    controlSourcePMMechanism [1]        SourcePMMechanism           OPTIONAL,
    controlSinkPMMechanism [2]          SinkPMMechanism             OPTIONAL}
ControlPMResult ::= SEQUENCE {
    sourcePMMechanismResult [1]         SourcePMMechanism           OPTIONAL,
    sinkPMMechanismResult [2]           SinkPMMechanism             OPTIONAL,
    additionalInformation               SET OF PMProblem            OPTIONAL}
InsufficientCapacityAtTheServerTrailParameter::= SEQUENCE{
    attributeId OBJECT IDENTIFIER,
    serverTrailObjectInstance   ObjectInstance}
MaxBandwidth ::= CHOICE { NULL, INTEGER }
MaxNum ::= INTEGER
PeakCellRate ::= SEQUENCE{
    m INTEGER (0..31),
    k INTEGER (0..511)}
PMProblem ::= ENUMERATED {
    noSourceUserFlow                    (0),
    noSinkUserFlow                      (1),
    sourceAlreadyActive                 (2),
    sinkAlreadyActive                   (3),
    fePMdataNotAvailable                (4),
```

```
        fePMDataProcessingNotSupported       (5),
        backwardReportingAlreadyActive       (6),
        fePMDataProcessingAlreadyActive      (7) }
PointToPoint::= SEQUENCE {
        fromTP  ObjectInstance,
        toTP    ObjectInstance}
ResourceAllocatedToClientParameter ::= OBJECT IDENTIFIER
SourcePMMechanism ::= SEQUENCE {
        sourcePMMechanismStatus              SourcePMMechanismStatus,
        sourceAverageMonitoringBlockSize     AverageMonitoringBlockSize     OPTIONAL}
SourcePMMechanismStatus ::= ENUMERATED {
        deactivate                           (0),
        generate                             (1),
        generateAndProcessFePMData           (2),
        processFePMData                      (3) }
SinkPMMechanism ::= SEQUENCE {
        sinkPMMechanismStatus                SinkPMMechanismStatus,
        sinkAverageMonitoringBlockSize       AverageMonitoringBlockSize     OPTIONAL}
SinkPMMechanismStatus ::= ENUMERATED {
        deactivate                           (0),
        process                              (1),
        processAndReportBackward             (2) }
TrafficDescriptor ::= CHOICE {
        NULL,
        [1]SEQUENCE {
        peakCellRate-CLP0            PeakCellRate,
        peakCellRate-CLP0and1              PeakCellRate,
        cellDelayVariationTolerance-CLP0and1    CellDelayVariationTolerance,
        cellDelayVariationTolerance-CLP0        CellDelayVariationTolerance},
        [2]SEQUENCE {
        peakCellRate-CLP0            PeakCellRate,
        cellDelayVariationTolerance-CLP0        CellDelayVariationTolerance}}
VCi ::= INTEGER (0..65535)
VPi ::= INTEGER (0..4095)

VciRange ::= ENUMERATED {
        decimal1 (0),
        decimal3 (1),
        decimal7 (2),
        decimal15 (3),
        decimal31 (4),
        decimal63 (5),
        decimal127 (6),
        decimal255 (7),
        decimal511 (8),
        decimal1023 (9),
        decimal2047 (10),
        decimal4095 (11),
        decimal8191 (12),
        decimal16383 (13),
        decimal32767 (14),
        decimal65535 (15) }

VPiRange ::= ENUMERATED {
        decimal1 (0),
        decimal3 (1),
        decimal7 (2),
        decimal15 (3),
        decimal31 (4),
        decimal63 (5),
        decimal127 (6),
        decimal255 (7),
        decimal511 (8),
        decimal1023 (9),
        decimal2047 (10),
        decimal4095 (11) }
        END
```

History

Document history			
August 1995	Public Enquiry	PE 90:	1995-08-21 to 1995-12-15
May 1996	Converted into Adobe Acrobat Portable Document Format (PDF)		