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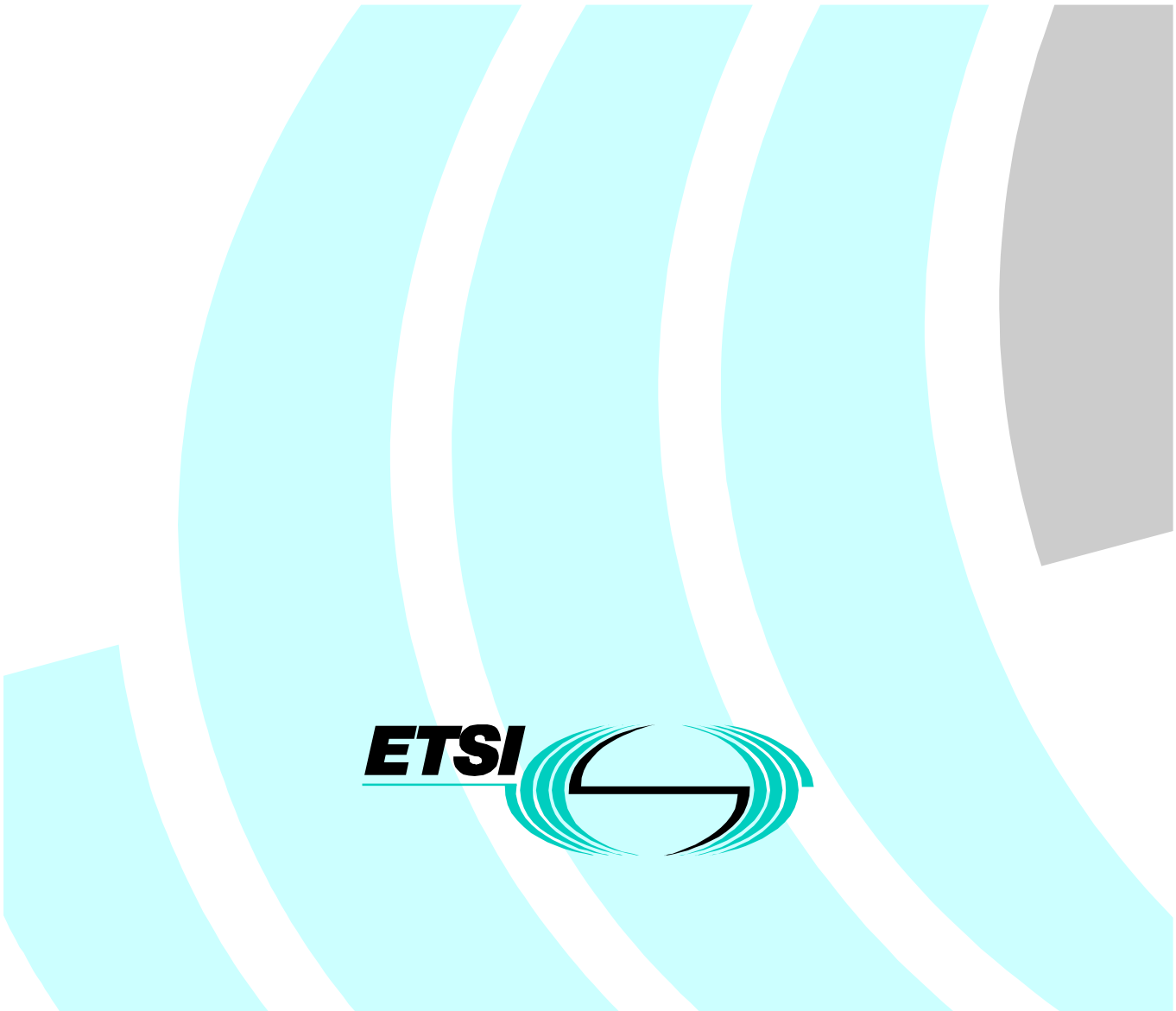
European Standard (Telecommunications series)

Telecommunications Management Nework (TMN); Plesiochronous Digital Hierarchy (PDH) information model for the Network Element (NE) view



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ETSI

Postal address
F-06921 Sophia Antipolis Cedex - FRANCE

Office address
650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16
Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

Internet
secretariat@etsi.fr
http://www.etsi.org

Contents

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Foreword

This European Standard (Telecommunications series) has been produced by the ETSI Technical Committee Telecommunications Management Network (TMN), and is now submitted for the ETSI standards One-step Approval Procedure.

The present document describes the information model for Network Elements (NEs), which use the Plesiochronous Digital Hierarchy (PDH) multiplexing structure.

Proposed national transposition dates	
Date of latest announcement of this EN (doa):	3 months after ETSI publication
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	6 months after doa
Date of withdrawal of any conflicting National Standard (dow):	6 months after doa

Introduction

Network Operators have extensive deployments of PDH and SDH equipments in their Networks. Some are flexible and/or is monitorable and do possess a standard management interface. A suitable PDH information model is required for such equipment to take advantage of the management capability provided by functional standards related to PDH interfaces of those equipments and enable it to be part of an overall managed network.

The model presented in the present document represents 4 major functional requirements:

1) Fixed PDH structures.

2) Flexible PDH structures.

3) SDH Transport over PDH bearers.

4) The monitoring of PDH Ports.

Fixed PDH Structures utilize the inheritance tree given in figure 1 and the naming tree in figure 3. As can be seen this can be used to model the rigid multiplexing structure from 64 kbits/sec to 140 Mbits/sec interfaces in line systems. An example is given in figure 7 of a 140Mbit/s line signal multiplexed through the 34Mbit/s and 8Mbit/s levels to a 2Mbit/s tributary signal which is mapped in a VC12 by a transmission system.

Flexible PDH structures use the same inheritance structure but the naming tree as in figure 2. This represents the flexible structures that may be encountered in PDH crossconnects with ports at all data rates. An example is given in figure 6.

The transport of SDH (VC12) and ATM traffic is represented by the Objects e3INTTTP and e4INTTTP for 34 Mbits/sec bearers and 140 Mbits/sec bearers respectively.

The reporting control of failures of PDH signals at the different path layers is modelled by reusing techniques specified in ITU-T Recommendation M.3100 (flexible assignment of severities to a failure).

The monitoring of the PDH ports is represented by the portMode Package that defines the behaviour. This package models a port that may be enabled for monitoring or may be disabled for monitoring. In addition the port may be set for auto monitoring providing no valid signal is present on the port. The port is then automatically enabled for monitoring when a valid signal is applied for the first time.

It should also be noted that the behaviour of the operationalState is as defined by the ETSI community (different from the SDH environment) and this only applies to this PDH model. This is apparent from the notes that remain in the document. Only equipment failures, and not transmission failures, affect the attribute value.

1 Scope

The present document defines the information model to be used at the interface between Network Elements (NEs) and management systems, for the management of equipment which use the Plesiochronous Digital Hierarchy (PDH).

The present document defines:

- the information model for network elements using PDH multiplexing, including PDH interfaces of Synchronous Digital Hierarchy (SDH) network elements.

The present document does not define:

- the protocol stack to be used for message communication;
- the network level management processes;
- the application contexts;
- the conformance requirements to be met by an implementation of this information model;
- information models for other systems or equipment.

The information model defined in the present document (and the corresponding message set) is concerned with the management of NEs, the equipment by which they are implemented and the functions contained within them. More precisely, it applies to an equipment domain visible at the element manager to element interface and is only concerned with information available within that domain. Information proper to the domain of a network level management process is not included within this model.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

[1] ETS 300 337 (1995): "Transmission and Multiplexing (TM); Generic frame structures for the transport of various signals (including Asynchronous Transfer Mode (ATM) cells and Synchronous Digital Hierarchy (SDH) elements) at the ITU-T Recommendation G.702 hierarchical rates of 2 048 kbit/s, 34 368 kbit/s and 139 264 kbit/s".

[2] ITU-T Recommendation G.702 (1988): "Digital hierarchy bit rates".

[3] ITU-T Recommendation M.3100 (1995): "Generic network information model".

[4] ITU-T Recommendation X.721 (1992): "Information technology; Open Systems Interconnection; Structure of management information: Definition of management information".

[5] ITU-T Recommendation G.704 (1995): "Synchronous frame structures used at 1 544 kbit/s, 6 312 kbit/s, 2 048 kbit/s, 8 488 kbit/s and 44 736 kbit/s hierarchical levels"

[6] ITU-T Recommendation G.706 (1991): "Frame alignment and Cyclic Redundancy Check (CRC) procedures relating to basic frame structures defined in Recommendation G.704"

[7] ETS 300 167 (1993): "Transmission and Multiplexing (TM); Functional characteristics of 2 048 kbit/s interfaces".

[8] ETS 300 417-5-1 (1997): "Transmission and Multiplexing (TM); Generic requirements of transport functionality of equipment; Part 5-1: Plesiochronous Digital Hierarchy (PDH) path layer functions".

[9] ETS 300 417-1-1 (1996): "Transmission and Multiplexing (TM); Generic requirements of transport functionality of equipment; Part 1: Generic processes and performance".

[10] ETS 300 417-2-1 (1996): "Transmission and Multiplexing (TM); Generic requirements of transport functionality of equipment; Part 2-1: Synchronous Digital Hierarchy (SDH) and Plesiochronous Digital Hierarchy (PDH) physical section layer functions".

3 Abbreviations

For the purposes of the present document, the following abbreviations apply.

AIS	Alarm Indication Signal
ASN.1	Abstract Syntax Notation No. 1
ATM	Asynchronous Transfer Mode
CTP	Connection Termination Point
EBER	Excessive Bit Error Ratio
FERF	Far End Receive Failure
LOF	Loss Of Frame
LOS	Loss Of Signal
NE	Network Element
PDH	Plesiochronous Digital Hierarchy
Pkg	Package
PPA	Plesiochronous Physical Adaptation
PPI	Plesiochronous Physical Interface
PPT	Plesiochronous Physical Termination
RDN	Relative Distinguished Name
SDH	Synchronous Digital Hierarchy
TMN	Telecommunications Management Network
TP	Termination Point
TTP	Trail Termination Point
VC-n	Virtual Container n

4 Registration supporting Abstract Syntax Notation No. 1 (ASN.1) for EN 300 371

```
ASN1TypeModule {ccitt(0) identified-organization(4) etsi(0) ets371(371) informationModel(0)
asn1Module(2) asn1TypeModule(0)}
DEFINITIONS IMPLICIT TAGS ::= BEGIN
-- EXPORT Everything
ETS300371 OBJECT IDENTIFIER ::= {ccitt(0) identified-organization(4) etsi(0) ets371(371)
informationModel(0)}
etsObjectClass OBJECT IDENTIFIER ::= {ETS300371 managedObjectClass(3)}
etsPackage OBJECT IDENTIFIER ::= {ETS300371 package(4)}
etsNameBinding OBJECT IDENTIFIER ::= {ETS300371 nameBinding(6)}
etsAttribute OBJECT IDENTIFIER ::= {ETS300371 attribute(7)}
etsAction OBJECT IDENTIFIER ::= {ETS300371 action(9)}
etsNotification OBJECT IDENTIFIER ::= {ETS300371 notification(10)}
END
```

5 PDH fragment

This clause provides managed objects required to model PDH interfaces.

In this context, the IMPORTS clause specifies the object classes which can be instantiated in the scope of the present document. The IMPORT clause does not include uninstantiated super classes.

```
BEGIN
IMPORTS
alarmSeverityAssignmentProfile
FROM ASN1DefinedTypesModule {itu(0) recommendation(0) m(13) gnm(3100) informationModel(0)
                    managedObjectClass (3)};
END
```

5.1 Object classes definitions

5.1.1 Electrical PDH physical interface

This subclause describes the object classes required to model the PDH physical interface.

NOTE: Whether these require attributes to model more features (e.g. PDH level, line code, etc.) is for further study.

```
pPITTPBidirectionalR1    MANAGED OBJECT CLASS
DERIVED FROM "Recommendation M.3100: 1995":trailTerminationPointBidirectional,
                            pPITTPSinkR1,
                            pPITTPSource;
REGISTERED AS { };


pPITTPSinkR1        MANAGED OBJECT CLASS
DERIVED FROM    "Recommendation M.3100:1995":trailTerminationPointSink;
CHARACTERIZED BY
    "Recommendation X.721: 1991":administrativeStatePackage,
    "Recommendation M.3100:1995":createDeleteNotificationsPackage,
    "Recommendation M.3100:1995":stateChangeNotificationPackage,
    "Recommendation M.3100:1995":tmnCommunicationsAlarmInformationPackage,
    "Recommendation M.3100:1995":userLabelPackage,
    "Recommendation M.3100:1995":alarmSeverityAssignmentPointerPackage,
    pPITTPSinkR1Pkg PACKAGE
        BEHAVIOUR
        alarmReportingControlBehaviour,
    pPITTPSinkR1BehaviourPkg BEHAVIOUR
    DEFINED AS
"This managed object class represents the point where the incoming interface signal is converted
into an internal logic level and the timing is recovered from the line signal. The upStream
connectivity pointer is NULL for an instance of this class.
A communicationsAlarm notification shall be issued if a Loss of Signal (LOS) is detected. The
probableCause parameter of the notification shall indicatelossOfSignal [3].
The operational state is disabled if a failure of the equipment affecting an instance of this class
prevents the resource from operation.";;
    ATTRIBUTES
    pPITTPId            GET;;;
    CONDITIONAL PACKAGES
        tpSpecificPersistanceTimePkg        PRESENT IF
        "the persistancy time for raising / clearing alarms can be set specifically for an instance
    of this class thus superseding the values which are in effect for all termination points of
    a NE",
        portModePkg         PRESENT IF
        "an instance supports it"
    ;
REGISTERED AS { };
```

```
pPITTPSource        MANAGED OBJECT CLASS
DERIVED FROM        "Recommendation M.3100:1995":trailTerminationPointSource;
CHARACTERIZED BY
    "Recommendation M.3100:1995":createDeleteNotificationsPackage,
    "Recommendation M.3100:1995":userLabelPackage,
    pPITTPSourcePkg PACKAGE
    BEHAVIOUR
    pPITTPSourceBehaviourPkg BEHAVIOUR
        DEFINED AS
"This managed object class represents the point where the internal logic level and
the timing is converted into a line signal.
The operational state is disabled if a failure of the equipment affecting an instance of this class
prevents the resource from operation.
The downStream connectivity pointer is NULL for an instance of this class.";;
    ATTRIBUTES
    pPITTPId            GET;;;

REGISTERED AS { etsObjectClass 3 };
```

NOTE: As for the attribute operationalState the decision has been taken in the ETSI/TM2 Meeting Dublin (Oct.97) that no transmission failures but equipment failures will impact the value of that attribute. This behaviour is applicable in general for the PDH TP fragment. No re-registration is considered to be necessary in the pPITTPSource class definition.

5.1.2 European PDH Alarm Indication Signal (AIS) trail termination point

This generic object class represents a particular case of termination point used in a managed element where no connectivity at respective level is provided. Instances of this object class are used when, in one layer, no flexibility is provided, but a direct adaptation to client is present.

The sink object class includes the AIS and LOF monitoring function of a respective Connection Termination Point (CTP) which is not instantiated where no connectivity on the respective level is provided.

Object classes inherited from this class are labelled according to the European PDH hierarchy (exATTP, where x = 0 stands for 64 kbit/s, x = 1 for 2 Mbit/s, x = 2 for 8 Mbit/s, x = 3 for 34 Mbit/s and x = 4 for 140 Mbit/s.)

NOTE: The possibility of adding conditional packages (present if the equipment supports the features) in order to model the capability to reveal Excessive Bit Error Ratio (EBER) is for further study.

The subclasses represent two types of combined functions:

1) En/Pne_A [10] and Pne_TT [8]
   The function En/Pne_A is the adaptation from physical section layer to the client PDH path layer (Pne) and the function Pne_TT terminates the trail in that path layer.

2) Pme/Pne_A and Pne_TT [8]
   The function Pme/Pne_A adapts from the server PDH path layer (Pme) to a framed, client PDH path layer (Pne) characteristic information (P31e_CI, P22e_CI, P12s_CI). The function Pne_TT terminates the trail in that path layers.

In both cases the management information exchanged with the combined functions is identical. As a consequence one object exATTP reflects the management view for the particular PDH path (x=1,2,3,4). Using the objects exATTP a PDH interface can be represented by a fewer number of instances than is obtained if objects are used which do not represent combined functions. These alternative representations are shown in figure 5 and figure 4, respectively.

```
ePDHATTPBidirectionalR1  MANAGED OBJECT CLASS
DERIVED FROM
    ePDHTTPBidirectionalR1,
    ePDHATTPSinkR1,
    ePDHATTPSource;

REGISTERED AS { };
```

```
ePDHATTPSinkR1  MANAGED OBJECT CLASS
DERIVED FROM ePDHTTPSinkR1;
CHARACTERIZED BY
ePDHATTPSinkR1Pkg       PACKAGE
BEHAVIOUR
ePDHATTPSinkR1Behaviour     BEHAVIOUR
            DEFINED AS
            "This object class includes the AIS and LOF monitoring function of a respective CTP
            which is not instantiated where no connectivity on the respective level is provided.
            A communicationsAlarm notification shall be issued if an AIS is detected. The
            probableCause parameter of the notification shall indicate aIS.
            A communicationsAlarm notification shall be issued if a LOF is detected. The
            probableCause parameter of the notification shall indicate lossOfFrame.
            An instance of this object class is used when, in one layer, no flexibility is provided,
            but a direct adaptation to client is present.
            The upStream connectivity pointer attribute value of an instance of this object class
            is equal to NULL";;
REGISTERED AS { };


ePDHATTPSource MANAGED OBJECT CLASS
DERIVED FROM ePDHTTPSource;
CHARACTERIZED BY
ePDHTPSourcePkg PACKAGE
BEHAVIOUR
ePDHATTPSourceBehaviourPkg BEHAVIOUR
            DEFINED AS
            "The downStream connectivity pointer attribute value of an instance of this object
            class is equal to NULL.";;;;
REGISTERED AS {etsObjectClass 5};
```

5.1.3 European PDH connection termination point

This subclause describes an object class (sink, source or bi-directional) which represents the model for a generic PDH connection termination point (2, 8, 34 and 140 Mbit/s).

Object classes inherited from this class are labelled according to the European PDH hierarchy (exCTP, where x = 0 stands for 64 kbit/s, x = 1 for 2 Mbit/s, x = 2 for 8 Mbit/s, x = 3 for 34 Mbit/s and x = 4 for 140 Mbit/s).

The subclasses represent two types of adaptation functions:

1) En/Pne_A or En/Pnx_A [10]
   The function En/Pne_A adapts from physical section layer (En) to a framed PDH path layer characteristic information (P4e_CI, P31e_CI, P22e_CI, P12s_CI).
   The function En/Pnx_A adapts from physical section layer (En) to an unframed PDH path layer characteristic information (Pnx_CI), which is a signal of non-specified content [10].

2) Pme/Pne_A or Pme/Pnx_A [8]
   The function Pme/Pne_A adapts from the server PDH path layer (Pme) to a framed, client PDH path layer (Pne) characteristic information (P31e_CI, P22e_CI, P12s_CI). The function Pme/Pnx_A adapts from the server PDH path layer (Pme) to an unframed PDH path layer characteristic information (Pnx_CI), which is a signal of non-specified content [8].

```
ePDHCTPSinkR1       MANAGED OBJECT CLASS
DERIVED FROM    "Recommendation M.3100:1995":connectionTerminationPointSink;
CHARACTERIZED BY
"Recommendation M.3100:1995":createDeleteNotificationsPackage,
"Recommendation M.3100:1995":operationalStatePackage,
"Recommendation M.3100:1995":stateChangeNotificationPackage,
"Recommendation M.3100:1995":tmnCommunicationsAlarmInformationPackage,
    "Recommendation M.3100:1995":alarmSeverityAssignmentPointerPackage,

ePDHCTPSinkR1Pkg PACKAGE
        BEHAVIOUR
        alarmReportingControlBehaviour,
    ePDHCTPSinkR1Behaviour  BEHAVIOUR
    DEFINED AS
"This object class represents the termination of a PDH connection and models the adaptation sink
function in different PDH path layers represented by subclasses of this class.
An instance of this object class shall be used when, in one layer, flexibility is available or when
there is no termination of a client characteristic information (Pnx-CI).
```

```
The attribute framedSignalMode may have the values 'active' and 'inactive'. An attributeValueChange
notification is issued when the value is modified and the inherited conditional package
attributeValueChangeNotificationPackage is instantiated.
If the value is set 'active', then the adaptation processing of a framed signal is provisioned and
the detection of the defects LOF and AIS is enabled. A communicationsAlarm notification shall be
issued if an AIS is detected. The probableCause parameter of the notification shall indicate aIS
[3]. A communicationsAlarm notification shall be issued if an LOF is detected. The probableCause
parameter of the notification shall indicate lossOfFrame [3]. In case of defect detection the
consequent action aSSF (all-ONES) is performed.
If the value is set 'inactive', then this adaptation function is deactivated assuming the reception
of an unframed signal (characteristic information Pnx_CI).
An attributeValueChange notification is issued when the value of the attribute frameStatus is
changed and the inherited conditional package attributeValueChangeNotificationPackage is
instantiated.
The operational state is disabled if a failure of the equipment affecting an instance of this class
prevents the resource from operation.
    ATTRIBUTES
ePDHCTPId       GET,
framedSignalMode    GET-REPLACE,
frameStatus     GET
;
    CONDITIONAL PACKAGES
tpSpecificPersistanceTimePkg    PRESENT IF
"the persistancy time for raising / clearing alarms can be set specifically for an instance of this
class thus superseding the values which are in effect for all termination points of a NE"
;
REGISTERED AS { };


ePDHCTPSource   MANAGED OBJECT CLASS
DERIVED FROM    "Recommendation M.3100: 1995":connectionTerminationPointSource;
CHARACTERIZED BY
"Recommendation M.3100: 1995":createDeleteNotificationsPackage,
ePDHCTPSourcePkg    PACKAGE
BEHAVIOUR
ePDHCTPSourceBehaviourPkg BEHAVIOUR
DEFINED AS
"This object class originates a PDH hierarchy connection.
The operational state is disabled if a failure of the equipment affecting an instance of this class
prevents the resource from operation.";;

    ATTRIBUTES
ePDHCTPId       GET;;;

REGISTERED AS {etsObjectClass 8};
```

NOTE 1: As for the attribute operationalState the decision has been taken in the ETSI/TM2 Meeting Dublin (Oct.97) that no transmission failures but equipment failures will impact the value of that attribute. This behaviour is applicable in general for the PDH TP fragment. No re-registration is considered to be necessary in the ePDHCTPSource class definition.

NOTE 2: The superclass ePDHCTPBidirectionalR1 (not instantiated) needs not to be defined since the instantiable bidirectional subclasses e*CTPBidirectionalR1 should inherit from ePDHCTPSinkR1 and / Source only. Note that the superclass CTPBidirectional inherits from cTPSink / Source without special properties added.

5.1.3.1 Monitoring European PDH connection termination point

```
eMonitoringCTPSink      MANAGED OBJECT CLASS
DERIVED FROM        ePDHCTPSinkR1;
CHARACTERIZED BY
    eMonitoringCTPSinkPkg       PACKAGE
    BEHAVIOUR
    pathTerminationMonitoringBehavior,
    eMonitoringCTPSinkBeh       BEHAVIOUR
    DEFINED AS
"An instance incorporates the monitoring capabilities of the trail termination sink function
(TTm-Sk) defined at the path layer represented by the subclass of this class. The monitoring
capabilities do not apply in case of unframed signals expected when the inherited attribute
framedSignalMode is set to value 'inactive'";;
REGISTERED AS {  };
```

NOTE: No eMonitoringCTPSource class is introduced since the existing definition of the eCTPSource class is equivalent.

5.1.4 European PDH trail termination point

This subclause describes an object class (sink, source or bidirectional) which represents the model for a generic PDH trail termination point (2, 8, 34 and 140 Mbit/s).

Object classes inherited from this class are labelled according to the European PDH hierarchy (exTTP, where x = 1 stands for 2 Mbit/s, x = 2 for 8 Mbit/s, x = 3 for 34 Mbit/s and x = 4 for 140 Mbit/s).

These subclasses represent the trail termination functions Pne_TT [8] which terminate the trails at the corresponding PDH path layers 2/8/34/140 Mbit/s (n=12, 22, 31, 4, respectively).

```
ePDHTTPSinkR1       MANAGED OBJECT CLASS
DERIVED FROM        "Recommendation M.3100:1995":trailTerminationPointSink;
CHARACTERIZED BY
    "Recommendation X.721: 1991":administrativeStatePackage,
    "Recommendation M.3100:1995":createDeleteNotificationsPackage,
    "Recommendation M.3100:1995":stateChangeNotificationPackage,
    "Recommendation M.3100:1995":tmnCommunicationsAlarmInformationPackage,
    "Recommendation M.3100:1995":alarmSeverityAssignmentPointerPackage,

    ePDHTTPSinkR1Pkg        PACKAGE
        BEHAVIOUR
        alarmReportingControlBehaviour,
        pathTerminationMonitoringBehavior,
    ePDHTTPSinkR1Behaviour  BEHAVIOUR
    DEFINED AS
"This object class represents the termination sink of a PDH trail.
The operationalState is disabled when a failure of the equipment affecting an instance of this class
prevents the resource from operation.";;

    ATTRIBUTES
    ePDHTTPId           GET;;;

    CONDITIONAL PACKAGES
        tpSpecificPersistanceTimePkg        PRESENT IF
"the persistancy time for raising / clearing alarms can be set specifically for an instance
of this class thus superseding the values which are in effect for all termination points of
a NE",

REGISTERED AS { };

ePDHTTPSource MANAGED OBJECT CLASS
DERIVED FROM "Recommendation M.3100:1995":trailTerminationPointSource;
CHARACTERIZED BY
    "Recommendation M.3100:1995":createDeleteNotificationsPackage,
    ePDHTTPSourcePkg PACKAGE
        BEHAVIOUR
        ePDHTTPSourceBehaviourPkg BEHAVIOUR
            DEFINED AS
"This object class originates a PDH hierarchy trail.
The operational state is disabled if a failure of the equipment affecting an instance of        this
class prevents the resource from operation.";;
    ATTRIBUTES
    ePDHTTPId   GET;;;

REGISTERED AS {etsObjectClass 11};
```

NOTE: As for the attribute operationalState the decision has been taken in the ETSI/TM2 Meeting Dublin (Oct.97) that no transmission failures but equipment failures will impact the value of that attribute. This behaviour is applicable in general for the PDH TP fragment. No re-registration is considered to be necessary in the ePDHTTPSource class definition.

```
ePDHTTPBidirectionalR1      MANAGED OBJECT CLASS
DERIVED FROM
    "Recommendation M.3100:1995":trailTerminationPointBidirectional,
    ePDHTTPSinkR1,
    ePDHTTPSource;
CHARACTERIZED BY
    ePDHTTPBidirectionalR1Pkg   PACKAGE
        BEHAVIOUR
        ePDHTTPBidirectionalR1Behaviour BEHAVIOUR
            DEFINED AS

The Far End Receiver Failure is signalized by a bidirectional trail termination that is represented
by an instance of this (sub-)class if a Server Signal Fail condition is detected.";;;;

REGISTERED AS { };
```

5.1.5 European PDH TTP's for transport SDH VC's and ATM cells

This generic object class models the PDH trail used to transport SDH VC's and ATM cells and the label Int stands for **interworking**.

The subclasses represent the combined functions En/Pns_A [10] and Pns_TT [8].
The function En/Pns_A is the adaptation from physical section layer to the client PDH path layer (Pns) and the function Pns_TT terminates the trail in that path layer (n=31,4).

```
ePDHIntTTPSinkR1  MANAGED OBJECT CLASS
  DERIVED FROM           ePDHATTPSinkR1;
   CHARACTERIZED BY
    ePDHIntTTPSinkR1Pkg  PACKAGE
        BEHAVIOUR
        ePDHIntTTPSinkR1BehaviourPkg BEHAVIOUR
        DEFINED AS
"This object class terminates a ETS 300 337 [1] trail transporting ATM cells or SDH elements.
A communicationsAlarm notification shall be issued if the trail trace received (TR byte) does not
match the trail trace expected. The probableCause parameter of the notification shall indicate trail
trace mismatch.
A communicationsAlarm notification shall be issued if the signal label received contains the all"0"
code. The probableCause parameter of the notification shall indicate 'unequipped'.";;
         ATTRIBUTES
            trTrailTraceExpected              GET-REPLACE,
            trTrailTraceReceived              GET;;;
   REGISTERED AS { };

ePDHIntTTPSource MANAGED OBJECT CLASS
DERIVED FROM       ePDHATTPSource;
CHARACTERIZED BY
    ePDHIntTTPSourcePkg PACKAGE
        BEHAVIOUR
        ePDHIntTTPSourceBehaviourPkg BEHAVIOUR
            DEFINED AS
            "This object class originates a ETS 300 337 [1] trail transporting ATM cells or SDH
            elements.";;
         ATTRIBUTES
            trTrailTraceSend                      GET-REPLACE;;;
   REGISTERED AS { etsObjectClass 14 };

ePDHIntTTPBidirectionalR1    MANAGED OBJECT CLASS
DERIVED FROM ePDHATTPBidirectionalR1,
    ePDHIntTTPSinkR1,
    ePDHIntTTPSource;
REGISTERED AS { };
```

5.1.6 140 Mbit/s object classes

```
e4ATTPSinkR1 MANAGED OBJECT CLASS
DERIVED FROM ePDHATTPSinkR1;
CHARACTERIZED BY
    e4ATTPSinkR1Pkg PACKAGE
        BEHAVIOUR
        e4ATTPSinkR1BehaviourPkg BEHAVIOUR
            DEFINED AS
            "This object class terminates a CCITT Recommendation G.702 [2] 140 Mbit/s
            trail.";;
REGISTERED AS { };

e4ATTPSource MANAGED OBJECT CLASS
DERIVED FROM ePDHATTPSource;
CHARACTERIZED BY
    e4ATTPSourcePkg PACKAGE
        BEHAVIOUR
        e4ATTPSourceBehaviourPkg BEHAVIOUR
            DEFINED AS
            "This object class originates a CCITT Recommendation G.702 [2] 140 Mbit/s trail.";;
REGISTERED AS {etsObjectClass 17};

e4ATTPBidirectionalR1 MANAGED OBJECT CLASS
DERIVED FROM
    ePDHATTPBidirectionalR1,
    e4ATTPSinkR1,
    e4ATTPSource;
REGISTERED AS { };
```

```
e4CTPSinkR1 MANAGED OBJECT CLASS
DERIVED FROM ePDHCTPSinkR1;
CHARACTERIZED BY
    e4CTPSinkR1Pkg PACKAGE
        BEHAVIOUR
        e4CTPSinkR1BehaviourPkg BEHAVIOUR
            DEFINED AS
            "This object class terminates a CCITT Recommendation G.702 [2] 140 Mbit/s
            connection.";;;;

REGISTERED AS { };

e4CTPSource MANAGED OBJECT CLASS
DERIVED FROM ePDHCTPSource;
CHARACTERIZED BY
    e4CTPSourcePkg PACKAGE
        BEHAVIOUR
        e4CTPSourceBehaviourPkg BEHAVIOUR
            DEFINED AS
            "This object class originates a CCITT Recommendation G.702 [2] 140 Mbit/s
            connection.";;;;

REGISTERED AS {etsObjectClass 20};

e4CTPBidirectionalR1 MANAGED OBJECT CLASS
DERIVED FROM
    e4CTPSinkR1,
    e4CTPSource;

REGISTERED AS { };

e4MonitoringCTPSink     MANAGED OBJECT CLASS
DERIVED FROM        eMonitoringCTPSink;
CHARACTERIZED BY
    e4MonitoringCTPSinkPkg      PACKAGE
    BEHAVIOUR
    e4MonitoringCTPSinkBeh      BEHAVIOUR
    DEFINED AS
"An instance of this class represents the adaptation sink function but incorporates the monitoring
capabilities of a 140Mbit/s path termination sink function";;
REGISTERED AS { };

e4MonitoringCTPBidirectional    MANAGED OBJECT CLASS
DERIVED FROM        e4MonitoringCTPSink,
e4CTPSource;
REGISTERED AS { };

e4TTPSinkR1 MANAGED OBJECT CLASS
DERIVED FROM ePDHTTPSinkR1;
CHARACTERIZED BY
    e4TTPSinkR1Pkg PACKAGE
        BEHAVIOUR
        e4TTPSinkR1BehaviourPkg BEHAVIOUR
            DEFINED AS
            "This object class terminates a CCITT Recommendation G.702 [2] 140 Mbit/s
            trail.";;;;
REGISTERED AS { };

e4TTPSource MANAGED OBJECT CLASS
DERIVED FROM ePDHTTPSource;
CHARACTERIZED BY
    e4TTPSourcePkg PACKAGE
        BEHAVIOUR
        e4TTPSourceBehaviourPkg BEHAVIOUR
            DEFINED AS
            "This object class originates a CCITT Recommendation G.702 [2] 140 Mbit/s trail.";;;;
REGISTERED AS {etsObjectClass 23};

e4TTPBidirectionalR1 MANAGED OBJECT CLASS
DERIVED FROM
    ePDHTTPBidirectionalR1,
    e4TTPSinkR1,
    e4TTPSource;
REGISTERED AS { };
```

```
e4IntTTPSinkR1 MANAGED OBJECT CLASS
  DERIVED FROM           ePDHIntTTPSinkR1;
   CHARACTERIZED BY
    e4IntTTPSinkR1Pkg PACKAGE
        BEHAVIOUR
        e4IntTTPSinkR1BehaviourPkg BEHAVIOUR
            DEFINED AS
            "This object class terminates a ETS 300 337 [1] 140 Mbit/s trail transporting ATM
            cells or SDH elements.";;;;
   REGISTERED AS { };

e4IntTTPSource MANAGED OBJECT CLASS
DERIVED FROM       ePDHIntTTPSource;
CHARACTERIZED BY
    e4IntTTPSourcePkg  PACKAGE
        BEHAVIOUR
        e4IntTTPSourceBehaviourPkg BEHAVIOUR
            DEFINED AS
            "This object class originates a ETS 300 337 [1] 140 Mbit/s trail transporting ATM
            cells or SDH elements.";;;;
REGISTERED AS { etsObjectClass 26};

e4IntTTPBidirectionalR1 MANAGED OBJECT CLASS
DERIVED FROM
    ePDHIntTTPBidirectionalR1,
    e4IntTTPSinkR1,
    e4IntTTPSource;
REGISTERED AS { };
```

5.1.7 34 Mbit/s object classes

```
e3ATTPSinkR1 MANAGED OBJECT CLASS
DERIVED FROM ePDHATTPSinkR1;
CHARACTERIZED BY
    e3ATTPSinkR1Pkg PACKAGE
        BEHAVIOUR
        e3ATTPSinkR1BehaviourPkg BEHAVIOUR
            DEFINED AS
            "This object class terminates a CCITT Recommendation G.702 [2] 34 Mbit/s trail.";;;;
REGISTERED AS { };

e3ATTPSource MANAGED OBJECT CLASS
DERIVED FROM ePDHATTPSource;
CHARACTERIZED BY
    e3ATTPSourcePkg PACKAGE
        BEHAVIOUR
        e3ATTPSourceBehaviourPkg BEHAVIOUR
            DEFINED AS
            "This object class originates a CCITT Recommendation G.702 [2] 34 Mbit/s trail.";;;;
REGISTERED AS {etsObjectClass 29};

e3ATTPBidirectionalR1 MANAGED OBJECT CLASS
DERIVED FROM
    ePDHATTPBidirectionalR1,
    e3ATTPSinkR1,
    e3ATTPSource;
REGISTERED AS { };

e3CTPSinkR1 MANAGED OBJECT CLASS
DERIVED FROM ePDHCTPSinkR1;
CHARACTERIZED BY
    e3CTPSinkR1Pkg PACKAGE
        BEHAVIOUR
        e3CTPSinkR1BehaviourPkg BEHAVIOUR
            DEFINED AS
            "This object class terminates a CCITT Recommendation G.702 [2] 34 Mbit/s
            connection.";;;;
REGISTERED AS { };

e3CTPSource MANAGED OBJECT CLASS
DERIVED FROM ePDHCTPSource;
CHARACTERIZED BY
    e3CTPSourcePkg PACKAGE
        BEHAVIOUR
        e3CTPSourceBehaviourPkg BEHAVIOUR
            DEFINED AS
            "This object class originates a CCITT Recommendation G.702 [2] 34 Mbit/s
            connection.";;;;
REGISTERED AS {etsObjectClass 32};
```

```
e3CTPBidirectionalR1 MANAGED OBJECT CLASS
DERIVED FROM
    e3CTPSinkR1,
    e3CTPSource;

REGISTERED AS { };

e3MonitoringCTPSink     MANAGED OBJECT CLASS
DERIVED FROM        eMonitoringCTPSink;
CHARACTERIZED BY
    e3MonitoringCTPSinkPkg      PACKAGE
    BEHAVIOUR
    e3MonitoringCTPSinkBeh      BEHAVIOUR
    DEFINED AS
"An instance of this class represents the adaptation sink function but incorporates the monitoring
capabilities of a 34Mbit/s path termination sink function";;
REGISTERED AS { };

e3MonitoringCTPBidirectional    MANAGED OBJECT CLASS
DERIVED FROM        e3MonitoringCTPSink,
                e3CTPSource;
REGISTERED AS { };

e3TTPSinkR1 MANAGED OBJECT CLASS
DERIVED FROM ePDHTTPSinkR1;
CHARACTERIZED BY
    e3TTPSinkR1Pkg PACKAGE
        BEHAVIOUR
        e3TTPSinkR1BehaviourPkg BEHAVIOUR
            DEFINED AS
            "This object class terminates a CCITT Recommendation G.702 [2] 34 Mbit/s trail.";;;;
REGISTERED AS { };

e3TTPSource MANAGED OBJECT CLASS
DERIVED FROM ePDHTTPSource;
CHARACTERIZED BY
    e3TTPSourcePkg PACKAGE
        BEHAVIOUR
        e3TTPSourceBehaviourPkg BEHAVIOUR
            DEFINED AS
            "This object class originates a CCITT Recommendation G.702 [2] 34 Mbit/s trail.";;;;
REGISTERED AS {etsObjectClass 35};

e3TTPBidirectionalR1 MANAGED OBJECT CLASS
DERIVED FROM
    ePDHTTPBidirectionalR1,
    e3TTPSinkR1,
    e3TTPSource;
REGISTERED AS { };

e3IntTTPSinkR1 MANAGED OBJECT CLASS
  DERIVED FROM          ePDHIntTTPSinkR1;
   CHARACTERIZED BY
    e3IntTTPSinkR1Pkg  PACKAGE
        BEHAVIOUR
        e3IntTTPSinkR1BehaviourPkg BEHAVIOUR
            DEFINED AS
            "This object class terminates a ETS 300 337 [1] 34 Mbit/s trail transporting ATM
            cells or SDH elements.";;;;
REGISTERED AS { };

e3IntTTPSource MANAGED OBJECT CLASS
DERIVED FROM       ePDHIntTTPSource;
CHARACTERIZED BY
    e3IntTTPSourcePkg  PACKAGE
        BEHAVIOUR
        e3IntTTPSourceBehaviourPkg BEHAVIOUR
            DEFINED AS
            "This object class originates a ETS 300 337 [1] 34 Mbit/s trail transporting ATM
            cells or SDH elements.";;;;
   REGISTERED AS { etsObjectClass 38};

e3IntTTPBidirectionalR1 MANAGED OBJECT CLASS
DERIVED FROM
    ePDHIntTTPBidirectionalR1,
    e3IntTTPSinkR1,
    e3IntTTPSource;
REGISTERED AS  { };
```

5.1.8 8 Mbit/s object classes

```
e2ATTPSinkR1 MANAGED OBJECT CLASS
DERIVED FROM ePDHATTPSinkR1;
CHARACTERIZED BY
    e2ATTPSinkR1Pkg  PACKAGE
        BEHAVIOUR
        e2ATTPSinkR1BehaviourPkg BEHAVIOUR
            DEFINED AS
            "This object class terminates a CCITT Recommendation G.702 [2] 8 Mbit/s trail.";;;;
REGISTERED AS { };

e2ATTPSource MANAGED OBJECT CLASS
DERIVED FROM ePDHATTPSource;
CHARACTERIZED BY
    e2ATTPSourcePkg PACKAGE
        BEHAVIOUR
        e2ATTPSourceBehaviourPkg BEHAVIOUR
            DEFINED AS
            "This object class originates a CCITT Recommendation G.702 [2] 8 Mbit/s trail.";;;;
REGISTERED AS {etsObjectClass 41};

e2ATTPBidirectionalR1 MANAGED OBJECT CLASS
DERIVED FROM
    ePDHATTPBidirectionalR1,
    e2ATTPSinkR1,
    e2ATTPSource;
REGISTERED AS { };

e2CTPSinkR1 MANAGED OBJECT CLASS
DERIVED FROM ePDHCTPSinkR1;
CHARACTERIZED BY
    e2CTPSinkR1Pkg  PACKAGE
        BEHAVIOUR
        e2CTPSinkR1BehaviourPkg BEHAVIOUR
            DEFINED AS
            "This object class terminates a CCITT Recommendation G.702 [2] 8 Mbit/s
            connection.";;;;
REGISTERED AS { };

e2CTPSource MANAGED OBJECT CLASS
DERIVED FROM ePDHCTPSource;
CHARACTERIZED BY
    e2CTPSourcePkg PACKAGE
        BEHAVIOUR
        e2CTPSourceBehaviourPkg BEHAVIOUR
            DEFINED AS
            "This object class originates a CCITT Recommendation G.702 [2] 8 Mbit/s
            connection.";;;;
REGISTERED AS {etsObjectClass 44};

e2CTPBidirectionalR1 MANAGED OBJECT CLASS
DERIVED FROM
    e2CTPSinkR1,
    e2CTPSource;
REGISTERED AS { };

e2MonitoringCTPSink     MANAGED OBJECT CLASS
DERIVED FROM        eMonitoringCTPSink;
CHARACTERIZED BY
    e2MonitoringCTPSinkPkg      PACKAGE
    BEHAVIOUR
    e2MonitoringCTPSinkBeh      BEHAVIOUR
    DEFINED AS
"An instance of this class represents the adaptation sink function but incorporates the monitoring
capabilities of a 8Mbit/s path termination sink function";;
REGISTERED AS { };

e2MonitoringCTPBidirectional    MANAGED OBJECT CLASS
DERIVED FROM        e2MonitoringCTPSink,
e2CTPSource;
REGISTERED AS { };

e2TTPSinkR1 MANAGED OBJECT CLASS
DERIVED FROM ePDHTTPSinkR1;
CHARACTERIZED BY
    e2TTPSinkR1Pkg PACKAGE
        BEHAVIOUR
        e2TTPSinkR1BehaviourPkg BEHAVIOUR
            DEFINED AS
            "This object class terminates a CCITT Recommendation G.702 [2] 8 Mbit/s trail.";;;;
REGISTERED AS { };
```

```
e2TTPSource MANAGED OBJECT CLASS
DERIVED FROM ePDHTTPSource;
CHARACTERIZED BY
    e2TTPSourcePkg PACKAGE
        BEHAVIOUR
        e2TTPSourceBehaviourPkg BEHAVIOUR
            DEFINED AS
            "This object class originates a CCITT Recommendation G.702 [2] 8 Mbit/s trail.";;;;
REGISTERED AS {etsObjectClass 47};

e2TTPBidirectionalR1 MANAGED OBJECT CLASS
DERIVED FROM
    ePDHTTPBidirectionalR1,
    e2TTPSinkR1,
    e2TTPSource;
REGISTERED AS { };
```

5.1.9 2 Mbit/s object classes

```
e1ATTPSinkR1 MANAGED OBJECT CLASS
DERIVED FROM ePDHATTPSinkR1;
CHARACTERIZED BY
    e1ATTPSinkR1Pkg  PACKAGE
    ATTRIBUTES
    frameStatus     GET;
    BEHAVIOUR
    e1ATTPSinkR1Behaviour BEHAVIOUR
            DEFINED AS
            "This object class terminates a CCITT Recommendation G.702 [2] 2 Mbit/s trail.";;

    CONDITIONAL PACKAGES
    crcMonitoringPkg            PRESENT IF
    "an instance supports CRC-4 procedures [6, 7]";
REGISTERED AS { };

e1ATTPSourceR1 MANAGED OBJECT CLASS
DERIVED FROM ePDHATTPSource;
CHARACTERIZED BY
    e1ATTPSourceR1Pkg PACKAGE
        BEHAVIOUR
        e1ATTPSourceR1BehaviourPkg BEHAVIOUR
            DEFINED AS
"This object class originates a CCITT Recommendation G.702 [2] 2 Mbit/s trail.
The attribute crcOperationMode contained in the conditional package crcOperationPkg determines the
operation of the 2 Mbit/s trail termination source. The value 'disabled' sets the transmitted
Si-bits (bit 1 of the frame) to the binary '1' state [5].
The value 'forced' configures CRC-4 procedure. The value 'automatic' triggers the modified CRC-4
multiframe algorithm in order to allow interworking of equipments with and without a CRC-4
capability [6].";;
    CONDITIONAL PACKAGES
    crcOperationPkg PRESENT IF
    "an instance supports CRC-4 procedures [6, 7]";
REGISTERED AS { };

e1ATTPBidirectionalR1 MANAGED OBJECT CLASS
DERIVED FROM
    ePDHATTPBidirectionalR1,
    e1ATTPSinkR1,
    e1ATTPSourceR1;
CHARACTERIZED BY
    e1ATTPBidirectionalR1Pkg    PACKAGE
    BEHAVIOUR
    e1ATTPBidirectionalR1Beh    BEHAVIOUR
    DEFINED AS
"Either both or none of the inherited conditional packages crcMonitoringPkg and crcOperationPkg
should be instantiated.
The attribute crcOperationMode contained in the conditional package crcOperationPkg determines the
operation of the 2 Mbit/s trail termination. The value 'disabled' sets the transmitted Si-bits (bit
1 of the frame) to the binary '1' state and disables processing of the Si-bits in the receive signal
[5].
The value 'forced' configures CRC-4 procedure with consequent actions [6]: in case of loss of
CRC4-submultiframe all-ONES (aTSF) is inserted downstream and Far End Receiver Failure (FERF) is
signalized upstream (as in case of LOF). A communicationsAlarm notification is emitted with
probableCause 'lossOfMultiFrame' [3].
The value 'automatic' triggers the modified CRC-4 multiframe algorithm in order to allow
interworking of equipments with and without a CRC-4 capability [6]. If this procedure fails then
further CRC-4 processing is inhibited and transmitted E-bits are kept in binary state '0'.";;
REGISTERED AS { };
```

```
e1CTPSinkR1 MANAGED OBJECT CLASS
    DERIVED FROM      ePDHCTPSinkR1;
    CHARACTERIZED BY
    e1CTPSinkR1Pkg  PACKAGE
    BEHAVIOUR
        e1CTPSinkR1BehaviourPkg BEHAVIOUR
        DEFINED AS
"This object class terminates a CCITT Recommendation G.702 2 Mbit/s connection..";;;;
REGISTERED AS { };

e1CTPSource MANAGED OBJECT CLASS
DERIVED FROM ePDHCTPSource;
CHARACTERIZED BY
    e1CTPSourcePkg PACKAGE
        BEHAVIOUR
        e1CTPSourceBehaviourPkg BEHAVIOUR
            DEFINED AS
            "This object class originates a CCITT Recommendation G.702 [2] 2 Mbit/s
            connection.";;;;
REGISTERED AS {etsObjectClass 53};

e1CTPBidirectionalR1 MANAGED OBJECT CLASS
DERIVED FROM
    e1CTPSinkR1,
    e1CTPSource;
REGISTERED AS { };

e1MonitoringCTPSink     MANAGED OBJECT CLASS
DERIVED FROM        eMonitoringCTPSink;
CHARACTERIZED BY
    e1MonitoringCTPSinkPkg      PACKAGE
    BEHAVIOUR
    e1MonitoringCTPSinkBeh      BEHAVIOUR
    DEFINED AS
"An instance of this class represents the adaptation sink function but incorporates the monitoring
capabilities of a 2Mbit/s path termination sink function. The conditional package crcMonitoring (if
instantiated) is in effect when the inherited attribute framedSignalMode is set to value 'active'."
;;
    CONDITIONAL PACKAGES
    crcMonitoringPkg            PRESENT IF
    "an instance supports CRC-4 procedures [6, 7]";
REGISTERED AS { };

e1MonitoringCTPBidirectional    MANAGED OBJECT CLASS
DERIVED FROM        e1MonitoringCTPSink,
                e1CTPSource;
REGISTERED AS { };

e1TTPSinkR1     MANAGED OBJECT CLASS
DERIVED FROM    ePDHTTPSinkR1;
CHARACTERIZED BY
    e1TTPSinkR1Pkg  PACKAGE
    BEHAVIOUR
    e1TTPSinkR1Behaviour    BEHAVIOUR
    DEFINED AS
"This object class terminates a CCITT Recommendation G.702 [2] 2 Mbit/s trail.";
    ;
    CONDITIONAL PACKAGES
    crcMonitoringPkg            PRESENT IF
    "an instance supports CRC-4 procedures [6, 7]"
;
REGISTERED AS { };

e1TTPSourceR1           MANAGED OBJECT CLASS
DERIVED FROM        ePDHTTPSource;
CHARACTERIZED BY
    e1TTPSourceR1Pkg    PACKAGE
    BEHAVIOUR
    e1TTPSourceR1Behaviour BEHAVIOUR
    DEFINED AS
    "This object class originates a CCITT Recommendation G.702 [2] 2 Mbit/s trail.
The attribute crcOperationMode contained in the conditional package crcOperationPkg determines the
operation of the 2 Mbit/s trail termination source. The value 'disabled' sets the transmitted
Si-bits (bit 1 of the frame) to the binary '1' state [5].
The value 'forced' configures CRC-4 procedure. The value 'automatic' triggers the modified CRC-4
multiframe algorithm in order to allow interworking of equipments with and without a CRC-4
capability [6]."
    ;;
    CONDITIONAL PACKAGES
    crcOperationPkg PRESENT IF
    "an instance supports CRC-4 procedures [6, 7]";
REGISTERED AS { };
```

```
e1TTPBidirectionalR1        MANAGED OBJECT CLASS
DERIVED FROM
    ePDHTTPBidirectionalR1,
    e1TTPSinkR1,
    e1TTPSourceR1;
CHARACTERIZED BY
    e1TTPBidirectionalR1Pkg PACKAGE
    BEHAVIOUR
    e1TTPBidirectionalR1Beh BEHAVIOUR
    DEFINED AS
"Either both or none of the inherited conditional packages crcMonitoringPkg and crcOperationPkg
should be instantiated.
The attribute crcOperationMode contained in the conditional package crcOperationPkg determines the
operation of the 2 Mbit/s trail termination. The value 'disabled' sets the transmitted Si-bits (bit
1 of the frame) to the binary '1' state and disables processing of the Si-bits in the receive signal
[5].
The value 'forced' configures CRC-4 procedure with consequent actions [6]: in case of loss of
CRC4-submultiframe all-ONES (aTSF) is inserted downstream and Far End Receiver Failure (FERF) is
signalized upstream (as in case of LOF). A communicationsAlarm notification is emitted with
probableCause 'lossOfMultiFrame' [3].
The value 'automatic' triggers the modified CRC-4 multiframe algorithm in order to allow
interworking of equipments with and without a CRC-4 capability [6]. If this procedure fails then
further CRC-4 processing is inhibited and transmitted E-bits are kept in binary state '0'.";;
REGISTERED AS { };
```

5.1.10 64 kbit/s object classes

```
e0CTPSink MANAGED OBJECT CLASS
DERIVED FROM "Recommendation M.3100: 1995":connectionTerminationPointSink;
CHARACTERIZED BY
"Recommendation M.3100: 1995":createDeleteNotificationsPackage,
"Recommendation M.3100: 1995":operationalStatePackage,
"Recommendation M.3100: 1995":stateChangeNotificationPackage,
    e0CTPSinkPkg  PACKAGE
        BEHAVIOUR
        e0CTPSinkBehaviourPkg BEHAVIOUR
            DEFINED AS
" An instance of this object class terminates a 64 kbit/s connection. Where
additional features are requested and supported by the equipment, appropriate
subclassing is recommended (e.g. where monitoring is required, the
tmnCommunicationsAlarmInformationPkg should be included)";;
    ATTRIBUTES
    e0CTPId         GET;;;
REGISTERED AS {etsObjectClass 58};

e0CTPSource MANAGED OBJECT CLASS
DERIVED FROM "Recommendation M.3100: 1995":connectionTerminationPointSource;
CHARACTERIZED BY
    "Recommendation M.3100: 1995":createDeleteNotificationsPackage,
    e0CTPSourcePkg PACKAGE
        BEHAVIOUR
        e0CTPSourceBehaviourPkg BEHAVIOUR
            DEFINED AS
            "An instance of this object class originates a 64 kbit/s connection.";;;;
    ATTRIBUTES
    e0CTPId         GET;;;
REGISTERED AS {etsObjectClass 59};

e0CTPBidirectional MANAGED OBJECT CLASS
DERIVED FROM
    "Recommendation M.3100: 1995":connectionTerminationPointBidirectional,
    e0CTPSink,
    e0CTPSource;
REGISTERED AS {etsObjectClass 60};
```

5.2 Attributes definitions

```
pPITTPId ATTRIBUTE
WITH ATTRIBUTE SYNTAX   ASN1DefinedTypesModule1.NameType;
MATCHES FOR EQUALITY;
    BEHAVIOUR
    pPITTPIdBehaviour BEHAVIOUR
    DEFINED AS
    "This attribute is used as a Relative Distinguished Name (RDN) for naming instances of the
    pPITTP object classes.";;

REGISTERED AS {etsAttribute 1};
```

```
ePDHCTPId ATTRIBUTE
WITH ATTRIBUTE SYNTAX   ASN1DefinedTypesModule1.NameType;
MATCHES FOR EQUALITY;
    BEHAVIOUR
    ePDHCTPIdBehaviour BEHAVIOUR
    DEFINED AS
    "This attribute is used as a RDN for naming instances of the ePDHCTP object classes.";;

REGISTERED AS {etsAttribute 2};

ePDHTTPId ATTRIBUTE
WITH ATTRIBUTE SYNTAX   ASN1DefinedTypesModule1.NameType;
MATCHES FOR EQUALITY;
    BEHAVIOUR
    ePDHTTPIdBehaviour BEHAVIOUR
    DEFINED AS
    "This attribute is used as a RDN for naming instances of the ePDHTTP object classes.";;

REGISTERED AS {etsAttribute 3};

trTrailTraceExpected ATTRIBUTE
WITH ATTRIBUTE SYNTAX   ASN1DefinedTypesModule1.TrailTrace;
MATCHES FOR EQUALITY;
    BEHAVIOUR
    trTrailTraceExpectedBehaviour BEHAVIOUR
    DEFINED AS
    "This attribute is used to specify the value of the expected TR byte PDH trail trace 16 bytes
message for instances of the e3IntTTP and e4IntTTP object class.";;

REGISTERED AS {etsAttribute 4};

trTrailTraceReceived ATTRIBUTE
WITH ATTRIBUTE SYNTAX   ASN1DefinedTypesModule1.TrailTrace;
MATCHES FOR EQUALITY;
    BEHAVIOUR
    trTrailTraceReceivedBehaviour BEHAVIOUR
    DEFINED AS
    "This attribute is used to know the value of the incoming TR byte PDH trail trace 16 bytes
message for instances of the e3IntTTP and e4IntTTP object class.";;;;
REGISTERED AS {etsAttribute 5};
trTrailTraceSend ATTRIBUTE
WITH ATTRIBUTE SYNTAX   ASN1DefinedTypesModule1.TrailTrace;
MATCHES FOR EQUALITY;
    BEHAVIOUR
    trTrailTraceSendBehaviour BEHAVIOUR
    DEFINED AS
    "This attribute is used to specify the value of the outgoing TR byte PDH trail trace 16 bytes
message for instances of the e3IntTTP and eg4IntTTP object class.";;

REGISTERED AS {etsAttribute 6};

e0CTPId ATTRIBUTE
WITH ATTRIBUTE SYNTAX   ASN1DefinedTypesModule1.NameType;
MATCHES FOR EQUALITY;
    BEHAVIOUR
    e0CTPIdBehaviour BEHAVIOUR
    DEFINED AS
    "This attribute is used as a RDN for naming instances of the e0CTP object classes.";;

REGISTERED AS {etsAttribute 7};
```

5.2.1 Additional attributes

The following attributes definitions have to be added :

```
burstyDegradeConsecutive            ATTRIBUTE
    WITH ATTRIBUTE SYNTAX       ASN1TypeModule.NCSBSRange;
    MATCHES FOR             EQUALITY;
    BEHAVIOUR               burstyDegradeConsecutiveBehaviour;
REGISTERED AS {   }
;
burstyDegradeConsecutiveBehaviour       BEHAVIOUR
    DEFINED AS
"The attribute burstyDegradeConsecutive indicates the number of consecutive BAD seconds that should
be counted before the declaration of degradedSignal. It indicates also number of consecutive GOOD
seconds that are necessary for the degradedSignal clearing.";;

burstyDegradeThreshold              ATTRIBUTE
    WITH ATTRIBUTE SYNTAX       ASN1TypeModule.CapThreshold;
    MATCHES FOR             EQUALITY;
    BEHAVIOUR               burstyDegradeThresholdBehaviour;
```

```
REGISTERED AS {   }
;
burstyDegradeThresholdBehaviour     BEHAVIOUR
    DEFINED AS
"The attribute burstyDegradeThreshold contains the value that should be compared with errored blocks
in that second in order to consider that second as a GOOD one or a BAD one.";;

clearingTime    ATTRIBUTE
    WITH ATTRIBUTE SYNTAX   ASN1TypeModule.PersistanceTime;
    MATCHES FOR     EQUALITY
                ORDERING;
REGISTERED AS {   };

crcOperationMode        ATTRIBUTE
    WITH ATTRIBUTE SYNTAX   ASN1TypeModule.CRCOperationMode;
    MATCHES FOR         EQUALITY;
REGISTERED AS {  };

enableCRCMode       ATTRIBUTE
    WITH ATTRIBUTE SYNTAX   ASN1TypeModule.Activation;
    MATCHES FOR         EQUALITY;
REGISTERED AS {  };

framedSignalMode    ATTRIBUTE
            WITH ATTRIBUTE SYNTAX   ASN1TypeModule.FramedSignalMode;
            MATCHES FOR         EQUALITY;
REGISTERED AS {   };

frameStatus     ATTRIBUTE
            WITH ATTRIBUTE SYNTAX   ASN1TypeModule.FrameStatus;
            MATCHES FOR         EQUALITY;
            BEHAVIOUR           frameStatusBehaviour;
REGISTERED AS {   }
;
frameStatusBehaviour    BEHAVIOUR
DEFINED AS
*The attribute indicates the detected framing properties of the characteristic information at the
corresponding PDH path layer. If the detection process is not activated or pending then the value is
0 (noIndication)*;

portMode ATTRIBUTE
    WITH ATTRBUTE SYNTAX    ASN1TypeModule.PortMode;
    MATCHES FOR EQUALITY, ORDERING;
    BEHAVIOUR
        portModeBehaviour   BEHAVIOUR
    DEFINED AS
"This attribute indicates the current state of the port mode for the containing managed object
instance. The states indicated are:
        0 - Port Mode  is in the MON state.
        1 - Port Mode  is in the NMON state.
        2 - Port Mode is in the AUTO state.";;
REGISTERED AS { };

raisingTime ATTRIBUTE
    WITH ATTRIBUTE SYNTAX   ASN1TypeModule.PersistanceTime;
    MATCHES FOR     EQUALITY
                ORDERING;
REGISTERED AS {   };

remoteCRCIndication     ATTRIBUTE
    WITH ATTRIBUTE SYNTAX   ASN1TypeModule.Activation;
    MATCHES FOR     EQUALITY;
REGISTERED AS {   };
```

5.3 Name bindings definitions

```
pPITTPSinkR1-managedElement NAME BINDING
        SUBORDINATE OBJECT CLASS pPITTPSinkR1 AND SUBCLASSES;
        NAMED BY SUPERIOR OBJECT CLASS "Recommendation M.3100: 1995":managedElement AND SUBCLASSES;
        WITH ATTRIBUTE pPITTPId;
        CREATE
                WITH-REFERENCE-OBJECT,
                WITH-AUTOMATIC-INSTANCE-NAMING;
        DELETE
                DELETES-CONTAINED-OBJECTS;
REGISTERED AS { };

pPITTPSource-managedElement NAME BINDING
        SUBORDINATE OBJECT CLASS pPITTPSource AND SUBCLASSES;
        NAMED BY SUPERIOR OBJECT CLASS "Recommendation M.3100: 1995":managedElement AND SUBCLASSES;
        WITH ATTRIBUTE pPITTPId;
```

```
        CREATE
                WITH-REFERENCE-OBJECT,
                WITH-AUTOMATIC-INSTANCE-NAMING;
        DELETE
                DELETES-CONTAINED-OBJECTS;
REGISTERED AS { etsNameBinding 2 };

ePDHTTPSinkR1-managedElement NAME BINDING
   SUBORDINATE OBJECT CLASS ePDHTTPSinkR1 AND SUBCLASSES;
   NAMED BY
   SUPERIOR OBJECT CLASS    "Recommendation M.3100: 1995":managedElement AND SUBCLASSES;
   WITH ATTRIBUTE           ePDHTTPId;
      BEHAVIOUR ePDHTTPSinkR1-managedElementBehaviour BEHAVIOUR
    DEFINED AS
    "The subordinate managed object may be automatically instantiated when the superior managed
object is instantiated, according to the make-up and mode of operation of the equipment.";;
REGISTERED AS { };

ePDHTTPSource-managedElement NAME BINDING
   SUBORDINATE OBJECT CLASS ePDHTTPSource AND SUBCLASSES;
   NAMED BY
   SUPERIOR OBJECT CLASS    "Recommendation M.3100: 1995":managedElement AND SUBCLASSES;
   WITH ATTRIBUTE           ePDHTTPId;
      BEHAVIOUR ePDHTTPSource-managedElementBehaviour BEHAVIOUR
    DEFINED AS
    "The subordinate managed object may be automatically instantiated when the superior managed
object is instantiated, according to the make-up and mode of operation of the equipment.";;
REGISTERED AS {etsNameBinding 4};

ePDHCTPSinkR1-pPITTPSinkR1 NAME BINDING
   SUBORDINATE OBJECT CLASS ePDHCTPSinkR1 AND SUBCLASSES;
   NAMED BY
   SUPERIOR OBJECT CLASS    pPITTPSinkR1 AND SUBCLASSES;
   WITH ATTRIBUTE           ePDHCTPId;
   BEHAVIOUR
      ePDHCTPSinkR1-pPITTPSinkR1Behaviour BEHAVIOUR
    DEFINED AS
    "The subordinate managed object may be automatically instantiated when the superior managed
object is instantiated, according to the make-up and mode of operation of the equipment.";;
REGISTERED AS { };

ePDHCTPSource-pPITTPSource NAME BINDING
   SUBORDINATE OBJECT CLASS ePDHCTPSource AND SUBCLASSES;
   NAMED BY
   SUPERIOR OBJECT CLASS    pPITTPSource AND SUBCLASSES;
   WITH ATTRIBUTE           ePDHCTPId;
   BEHAVIOUR
      ePDHCTPSource-pPITTPSourceBehaviour BEHAVIOUR
    DEFINED AS
    "The subordinate managed object may be automatically instantiated when the superior managed
object is instantiated, according to the make-up and mode of operation of the equipment.";;
REGISTERED AS {etsNameBinding 6};

e0CTPSink-pPITTPSinkR1 NAME BINDING
   SUBORDINATE OBJECT CLASS e0CTPSink AND SUBCLASSES;
   NAMED BY
   SUPERIOR OBJECT CLASS    pPITTPSinkR1 AND SUBCLASSES;
   WITH ATTRIBUTE           e0CTPId;
   BEHAVIOUR
      e0CTPSink-pPITTPSinkR1Behaviour BEHAVIOUR
    DEFINED AS
    "The subordinate managed object may be automatically instantiated when the superior managed
object is instantiated, according to the make-up and mode of operation of the equipment.";;
REGISTERED AS { };

e0CTPSource-pPITTPSource NAME BINDING
   SUBORDINATE OBJECT CLASS e0CTPSource AND SUBCLASSES;
   NAMED BY
   SUPERIOR OBJECT CLASS    pPITTPSource AND SUBCLASSES;
   WITH ATTRIBUTE           e0CTPId;
   BEHAVIOUR
      e0CTPSource-pPITTPSourceBehaviour BEHAVIOUR
    DEFINED AS
    "The subordinate managed object may be automatically instantiated when the superior managed
object is instantiated, according to the make-up and mode of operation of the equipment.";;
REGISTERED AS {etsNameBinding 8};

ePDHCTPSinkR1-ePDHTTPSinkR1 NAME BINDING
   SUBORDINATE OBJECT CLASS ePDHCTPSinkR1 AND SUBCLASSES;
   NAMED BY
   SUPERIOR OBJECT CLASS    ePDHTTPSinkR1 AND SUBCLASSES;
   WITH ATTRIBUTE           ePDHCTPId;
   BEHAVIOUR
```

```
      ePDHCTPSinkR1-ePDHTTPSinkR1Behaviour BEHAVIOUR
    DEFINED AS
    "The subordinate managed object may be automatically instantiated when the superior managed
object is instantiated, according to the make-up and mode of operation of the equipment.";;
REGISTERED AS { };

ePDHCTPSource-ePDHTTPSource NAME BINDING
   SUBORDINATE OBJECT CLASS ePDHCTPSource AND SUBCLASSES;
   NAMED BY
   SUPERIOR OBJECT CLASS    ePDHTTPSource AND SUBCLASSES;
   WITH ATTRIBUTE           ePDHCTPId;
   BEHAVIOUR
      ePDHCTPSource-ePDHTTPSourceBehaviour BEHAVIOUR
    DEFINED AS
    "The subordinate managed object may be automatically instantiated when the superior managed
object is instantiated, according to the make-up and mode of operation of the equipment.";;
REGISTERED AS {etsNameBinding 10};

e0CTPSink-e1TTPSinkR1 NAME BINDING
   SUBORDINATE OBJECT CLASS e0CTPSink AND SUBCLASSES;
   NAMED BY
   SUPERIOR OBJECT CLASS    e1TTPSinkR1 AND SUBCLASSES;
   WITH ATTRIBUTE           e0CTPId;
   BEHAVIOUR
      e0CTPSink-e1TTPSinkR1Behaviour BEHAVIOUR
    DEFINED AS
    "The subordinate managed object may be automatically instantiated when the superior managed
object is instantiated, according to the make-up and mode of operation of the equipment.";;
REGISTERED AS { };

e0CTPSource-e1TTPSource NAME BINDING
   SUBORDINATE OBJECT CLASS e0CTPSource AND SUBCLASSES;
   NAMED BY
   SUPERIOR OBJECT CLASS    e1TTPSource AND SUBCLASSES;
   WITH ATTRIBUTE           e0CTPId;
   BEHAVIOUR
      e0CTPSource-e1TTPSourceBehaviour BEHAVIOUR
    DEFINED AS
    "The subordinate managed object may be automatically instantiated when the superior managed
object is instantiated, according to the make-up and mode of operation of the equipment.";;
REGISTERED AS {etsNameBinding 12};

ePDHATTPSinkR1-pPITTPSinkR1 NAME BINDING
   SUBORDINATE OBJECT CLASS ePDHATTPSinkR1 AND SUBCLASSES;
   NAMED BY
   SUPERIOR OBJECT CLASS    pPITTPSinkR1 AND SUBCLASSES;
   WITH ATTRIBUTE           ePDHTTPId;
   BEHAVIOUR
      ePDHATTPSinkR1-pPITTPSinkR1Behaviour BEHAVIOUR
    DEFINED AS
    "The subordinate managed object may be automatically instantiated when the superior managed
object is instantiated, according to the make-up and mode of operation of the equipment.";;
REGISTERED AS { };

ePDHATTPSource-pPITTPSource NAME BINDING
   SUBORDINATE OBJECT CLASS ePDHATTPSource AND SUBCLASSES;
   NAMED BY
   SUPERIOR OBJECT CLASS    pPITTPSource AND SUBCLASSES;
   WITH ATTRIBUTE           ePDHTTPId;
   BEHAVIOUR
      ePDHATTPSinkR1-pPITTPSourceBehaviour BEHAVIOUR
    DEFINED AS
    "The subordinate managed object may be automatically instantiated when the superior managed
object is instantiated, according to the make-up and mode of operation of the equipment.";;
REGISTERED AS {etsNameBinding 14};

e0CTPSink-e1ATTPSinkR1 NAME BINDING
   SUBORDINATE OBJECT CLASS e0CTPSink AND SUBCLASSES;
   NAMED BY
   SUPERIOR OBJECT CLASS    e1ATTPSinkR1 AND SUBCLASSES;
   WITH ATTRIBUTE           e0CTPId;
   BEHAVIOUR
      e0CTPSink-e1ATTPSinkR1Behaviour BEHAVIOUR
    DEFINED AS
    "The subordinate managed object may be automatically instantiated when the superior managed
object is instantiated, according to the make-up and mode of operation of the equipment.";;
REGISTERED AS { };

e0CTPSource-e1ATTPSourceR1 NAME BINDING
   SUBORDINATE OBJECT CLASS e0CTPSource AND SUBCLASSES;
   NAMED BY
   SUPERIOR OBJECT CLASS    e1ATTPSourceR1 AND SUBCLASSES;
   WITH ATTRIBUTE           e0CTPId;
```

```
   BEHAVIOUR
      e0CTPSource-e1ATTPSourceR1Behaviour BEHAVIOUR
    DEFINED AS
    "The subordinate managed object may be automatically instantiated when the superior managed
object is instantiated, according to the make-up and mode of operation of the equipment.";;
REGISTERED AS {etsNameBinding 16};

e3ATTPSinkR1-e4ATTPSinkR1 NAME BINDING
   SUBORDINATE OBJECT CLASS e3ATTPSinkR1 AND SUBCLASSES;
   NAMED BY
   SUPERIOR OBJECT CLASS    e4ATTPSinkR1 AND SUBCLASSES;
   WITH ATTRIBUTE           ePDHTTPId;
   BEHAVIOUR
      e3ATTPSinkR1-e4ATTPSinkR1Behaviour BEHAVIOUR
    DEFINED AS
    "The subordinate managed object may be automatically instantiated when the superior managed
object is instantiated, according to the make-up and mode of operation of the equipment.";;
REGISTERED AS { };

e3ATTPSource-e4ATTPSource NAME BINDING
   SUBORDINATE OBJECT CLASS e3ATTPSource AND SUBCLASSES;
   NAMED BY
   SUPERIOR OBJECT CLASS    e4ATTPSource AND SUBCLASSES;
   WITH ATTRIBUTE           ePDHTTPId;
   BEHAVIOUR
      e3ATTPSource-e4ATTPSourceBehaviour BEHAVIOUR
    DEFINED AS
    "The subordinate managed object may be automatically instantiated when the superior managed
object is instantiated, according to the make-up and mode of operation of the equipment.";;
REGISTERED AS {etsNameBinding 18};

e2ATTPSinkR1-e3ATTPSinkR1 NAME BINDING
   SUBORDINATE OBJECT CLASS e2ATTPSinkR1 AND SUBCLASSES;
   NAMED BY
   SUPERIOR OBJECT CLASS    e3ATTPSinkR1 AND SUBCLASSES;
   WITH ATTRIBUTE           ePDHTTPId;
   BEHAVIOUR
      e2ATTPSinkR1-e3ATTPSinkR1Behaviour BEHAVIOUR
    DEFINED AS
    "The subordinate managed object may be automatically instantiated when the superior managed
object is instantiated, according to the make-up and mode of operation of the equipment.";;
REGISTERED AS { };

e2ATTPSource-e3ATTPSource NAME BINDING
   SUBORDINATE OBJECT CLASS e2ATTPSource AND SUBCLASSES;
   NAMED BY
   SUPERIOR OBJECT CLASS    e3ATTPSource AND SUBCLASSES;
   WITH ATTRIBUTE           ePDHTTPId;
   BEHAVIOUR
      e2ATTPSource-e3ATTPSourceBehaviour BEHAVIOUR
    DEFINED AS
    "The subordinate managed object may be automatically instantiated when the superior managed
object is instantiated, according to the make-up and mode of operation of the equipment.";;
REGISTERED AS {etsNameBinding 20};

e1ATTPSinkR1-e2ATTPSinkR1 NAME BINDING
   SUBORDINATE OBJECT CLASS e1ATTPSinkR1 AND SUBCLASSES;
   NAMED BY
   SUPERIOR OBJECT CLASS    e2ATTPSinkR1 AND SUBCLASSES;
   WITH ATTRIBUTE           ePDHTTPId;
   BEHAVIOUR
      e1ATTPSinkR1-e2ATTPSinkR1Behaviour BEHAVIOUR
    DEFINED AS
    "The subordinate managed object may be automatically instantiated when the superior managed
object is instantiated, according to the make-up and mode of operation of the equipment.";;
REGISTERED AS { };

e1ATTPSourceR1-e2ATTPSource NAME BINDING
   SUBORDINATE OBJECT CLASS e1ATTPSourceR1 AND SUBCLASSES;
   NAMED BY
   SUPERIOR OBJECT CLASS    e2ATTPSource;
   WITH ATTRIBUTE           ePDHTTPId;
   BEHAVIOUR
      e1ATTPSourceR1-e2ATTPSourceBehaviour BEHAVIOUR
    DEFINED AS
    "The subordinate managed object may be automatically instantiated when the superior managed
object is instantiated, according to the make-up and mode of operation of the equipment.";;
REGISTERED AS {etsNameBinding 22};
```

5.3.1 Additional name bindings

defaultNMONAlarmSeverityAssignment-managedElement

```
defaultNMONAlarmSeverityAssignment-managedElement   NAME BINDING
    SUBORDINATE OBJECT CLASS
    "Recommendation M.3100: 1995":alarmSeverityAssignmentProfile  AND SUBCLASSES;
    NAMED BY
    SUPERIOR OBJECT CLASS
    "Recommendation M.3100: 1995":managedElement  AND SUBCLASSES;
    WITH ATTRIBUTE
    "RecommendationM.3100: 1995":alarmSeverityAssignmentProfileId;
    BEHAVIOUR
    defaultNMONAlarmSeverityAssignment-managedElementBeh    BEHAVIOUR
        DEFINED AS
        *One instance of the subordinate class is auto created by the node.
        The default values of this object instance shall always map all
        possible alarms which the node can generate to the "non-alarmed"
        severity code.*;
REGISTERED AS { };
```

5.4 ASN.1 definitions

```
ASN1DefinedTypesModule1 {ccitt(0) identified-organization(4) etsi(0) ets371(371) informationModel(0)
asn1Module(2) asn1DefinedTypesModule1(1)}
DEFINITIONS IMPLICIT TAGS ::=
BEGIN
-- EXPORTS everything
IMPORTS

NameType FROM  ASN1DefinedTypesModule {ccitt(0) recommendation(0) m(13) m3100(3100)
informationModel(0) asn1Modules(2) asn1DefinedTypesModule(0)};

TrailTrace ::= CHOICE {
    null        NULL,
    pathtrace   [1] GraphicString
}
Activation::=BOOLEAN
CapThreshold::= INTEGER
CRCOperationMode::=ENUMERATED {disabled(0), forced(1), automatic(2)}
FramedSignalMode::=ENUMERATED {inactive(0), active(1)}
FrameStatus::=  INTEGER
        --0: noIndication
        --1: edcMF
NCSBSRange::=INTEGER(2..10)
    degradeConsecutiveDefault   NCSBSRange::={6}
PersistanceTime::=INTEGER(1..300)
    defaultRaisingPersistancy       PersistanceTime::={25}
    defaultClearingPersistancy  PersistanceTime::={100}
PortMode::=INTEGER

END -- end of ASN1DefinedTypesModule
```

5.5 Packages

```
crcMonitoringPkg    PACKAGE
    BEHAVIOUR
    crcMonitoringPkgBeh BEHAVIOUR
    DEFINED AS
"This packages defines the monitoring capabilities applied to signals with a CRC submultiframe
structure.
The attribute enableCRCMode set to TRUE selects the near/far-end performance processing of the
receive signal based on CRC-4 block errors.
During this mode of operation the degraded signal criteria are in effect dependent on the setting of
the attributes burstyDegradeConsecutive and burstyDegradeThreshold. A communicationsAlarm
notification shall be issued if the account for the detection of the degraded defect is encountered.
The probableCause parameter of the notification shall indicate 'degradedSignal' [3].
The attribute remoteCRCIndication reflects the CRC-4 multiframe generator / detector status at the
far-end NE [8].
The value of burstyDegradeConsecutive attribute represents the number of consecutive seconds that
should be taken into account for the detection or clearing of the degraded defect. The attribute
burstyDegradeThreshold contains the value that should be compared with errored blocks in that second
in order to consider that second as a GOOD one or a BAD one [9].";;
    ATTRIBUTES
    burstyDegradeConsecutive    DEFAULT VALUE
    ASN1TypeModule.degradeConsecutiveDefault
                    GET-REPLACE,
```

```
    burstyDegradeThreshold  GET-REPLACE,
    enableCRCMode       GET-REPLACE,
    remoteCRCIndication     GET;
REGISTERED AS {  };

crcOperationPkg     PACKAGE
BEHAVIOUR
    crcOperationPkgBeh  BEHAVIOUR
    DEFINED AS
"This packages enables to control the operation modes defined for interworking with equipment which
may or may not incorporate CRC procedure";
    ATTRIBUTES
    crcOperationMode    GET-REPLACE;
REGISTERED AS {  };

tpSpecificPersistanceTimePkg    PACKAGE
    BEHAVIOUR       tpSpecificPersistanceTimePkgBehaviour;
    ATTRIBUTES
        raisingTime REPLACE-WITH-DEFAULT
                DEFAULT VALUE   ASN1TypeModule.defaultRaisingPersistancy
                GET-REPLACE,
        clearingTime    REPLACE-WITH-DEFAULT
                DEFAULT VALUE   ASN1TypeModule.defaultClearingPersistancy
                GET-REPLACE;
REGISTERED AS {xxx}
;
tpSpecificPersistanceTimePkgBehaviour BEHAVIOUR
DEFINED AS
"This package models the filter (f4) applied for correlated fault causes in order to indicate
failures. The integer values (p) of the contained attributes raisingTime and clearingTime define
intervals of persistance time (Tp). The nominal values Tp are associated to the integer value p by
the equation
Tp=p*0.1 sec.
The range and the default intervals of activating and clearing a failure are specified in
ETS 300 417-1 [9].";;

portModePkg PACKAGE
    BEHAVIOUR
        portModePkgBehaviour    BEHAVIOUR
    DEFINED AS
"Any object supporting this package can support the portMode function. It has three states: AUTO,
NMON and MON. The AUTO shall be the default.
In the AUTO state the value of the portMode attribute is AUTO and the containing managed object's
alarmSeverityAssignmentProfilePointer attribute shall  point at the instance of the
AlarmSeverityAssignmentProfile managed object class which has a nameBinding value of
defaultNMONAlarmSeverityAssignmentProfile-managedElement.
In the NMON state the value of the portMode is NMON and the containing managed object's
alarmSeverityProfilePointer attribute shall  point at the same instance as in AUTO  mode, i.e. it
points to the AlarmSeverityAssignmentProfile managed object class which has a nameBinding value of
defaultNMONAlarmSeverityAssignment-managedElement.
In the MON state the value of the portMode is MON and the containing managed object's
alarmSeverityAssignmentProfilePointer attribute shall has a value indicating some other
AlarmSeverityAssignmentProfile instance than the one used in NMON/AUTO state or it should be NULL.
When portMode changes from AUTO or NMON to MON the alarmSeverityAssignmentProfilePointer shall
revert to the value as stated above.
The MON, NMON or AUTO state is entered via M-Set of the portMode attribute by a managing system. In
addition, the containing object leaves the AUTO state when a valid signal is detected (i.e. LOS is
cleared) by the containing object, and in this case an attributeValueChange notification is emitted.
An attempt from management system to change the portMode attribute from either MON or NMON to AUTO
is rejected, when there is a valid signal.
When the portMode attribute changes, the alarmSeverityAssignmentProfilePointer attribute of the
containing object changes automatically by NE according to the behaviour specified in this package.
In NMON or AUTO state the alarmSeverityAssignmentProfilePointer should always point to the
alarmSeverityAssignmentProfile instance with nameBinding
defaultNMONAlarmSeverityAssignmentProfile-managedElement."
    ;;
    ATTRIBUTES
    portMode    GET-REPLACE;
    NOTIFICATIONS
    "Recommendation X.721:1992":attributeValueChange;
REGISTERED AS  { ? };
```

5.6 Behaviour definitions

```
alarmReportingControlBehaviour      BEHAVIOUR
DEFINED AS
"If the attribute alarmSeverityProfilePointer points to an instance of the MOC
alarmSeverityAssignmentProfile then the perceivedSeverity associated with the probableCause in the
communicationsAlarm is determined by the assignment given in the attribute
alarmSeverityAssignmentList of that instance. The value 'non-alarmed' of the severity assigned to a
problem inhibits the emission of the potential communicationsAlarm notification of that problem.
This behaviour meets the ability to configure the defect correlation filter not to report selected
fault causes (i.e. problems) and hence no associated failures will be alerted by communicationsAlarm
notifications.
The alarmSeverityProfilePointer may point to an instance of alarmSeverityAssignmentProfile which is
auto-created by the NE according the name-binding label
'defaultNMONAlarmSeverityAssignment-managedElement'. This relationship of the termination point
reflects the NMON state during which no communicationsAlarm is reported at all.
When the severity changes to a value 'non-alarmed' for a problem which has been notified by an
instance of this class then a communicationsAlarm notification with the perceivedSeverity 'cleared'
is issued and the corresponding entry in the attributes currentProblemList and alarmStatus is
removed. When the severity changes from 'non-alarmed' to a value other than 'non-alarmed' then a
pending, persistent defect will be notified.
If the alarm severity cannot be assigned by the way of an alarmSeverityAssignmentProfile object
(e.g. the attribute alarmSeverityProfilePointer has the value NULL or no assignment is given in the
attribute alarmSeverityAssignmentList) then one of the two choices applies when reporting alarms:
a)  agent assigns the severity,
b)  the value 'indeterminate' is used.";;

pathTerminationMonitoringBehavior   BEHAVIOUR
    DEFINED AS
"A communicationsAlarm notification shall be issued if a Server Signal Fail (SSF) is detected. The
probableCause parameter of the notification shall indicate serverSignalFailure.
A communicationsAlarm notification shall be issued if a Far End Receiver Failure is detected. The
probableCause parameter of the notification shall indicate farEndReceiverFailure (fERF) [3].
Detection of a fERF has no effect on the operationalState.
Instances of the subclasses of this class may be used at the different PDH path layers to provide
with performance data monitoring capabilities based on Frame Alignment Signal Errors (FASE) [8].";;
```

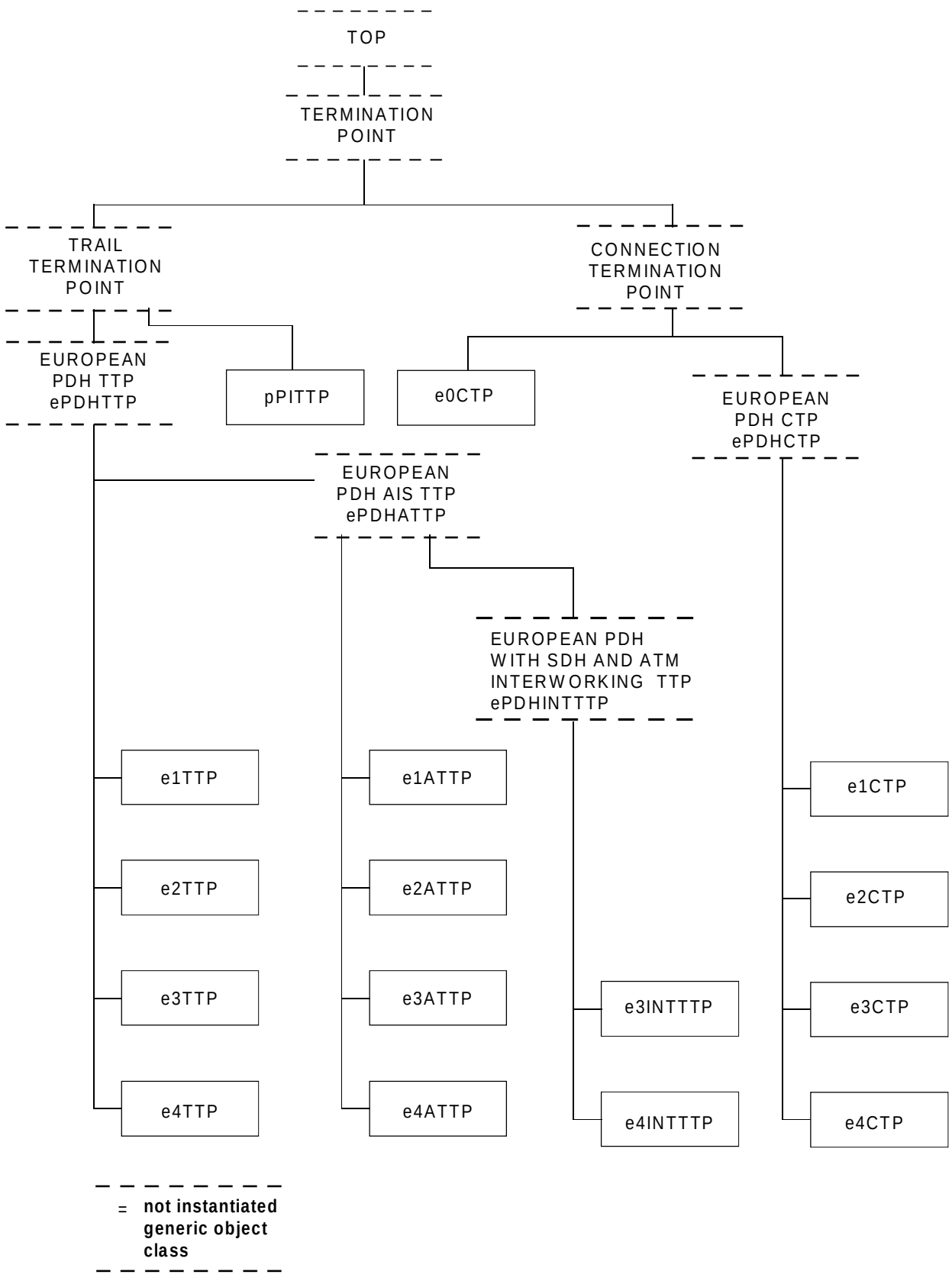

Figure 1: PDH transport object inheritance (all PDH objects may be source, sink or bidirectional)

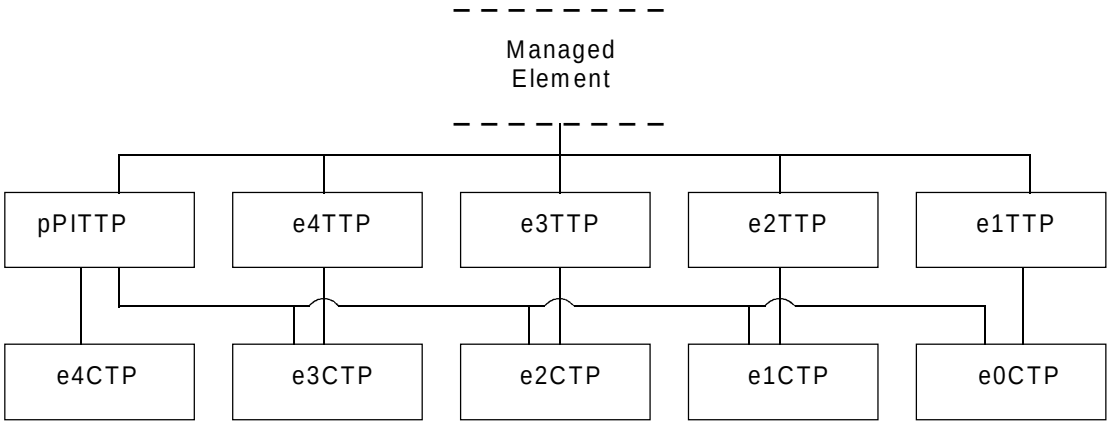

Figure 2: PDH object naming when PDH cross connectivity is available

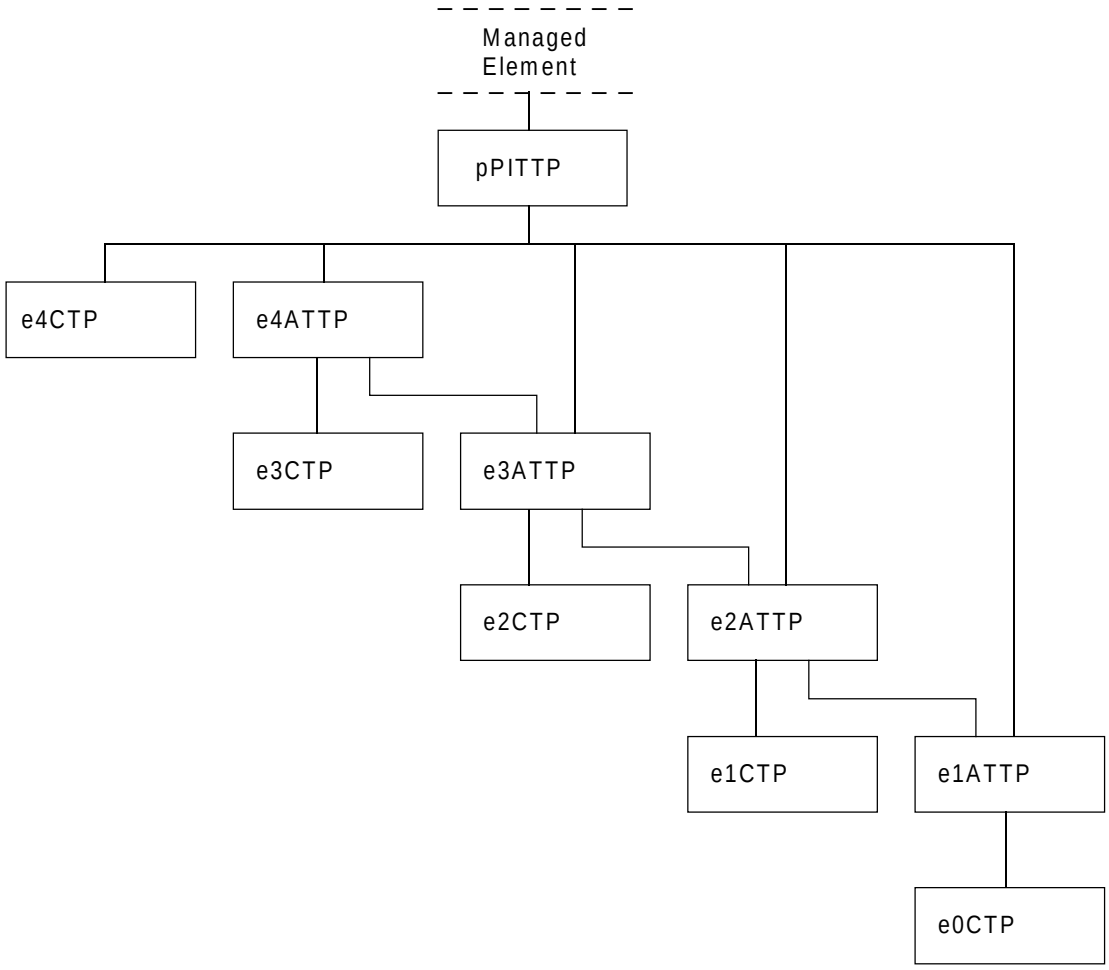

Figure 3: PDH object naming when no PDH cross connectivity is available

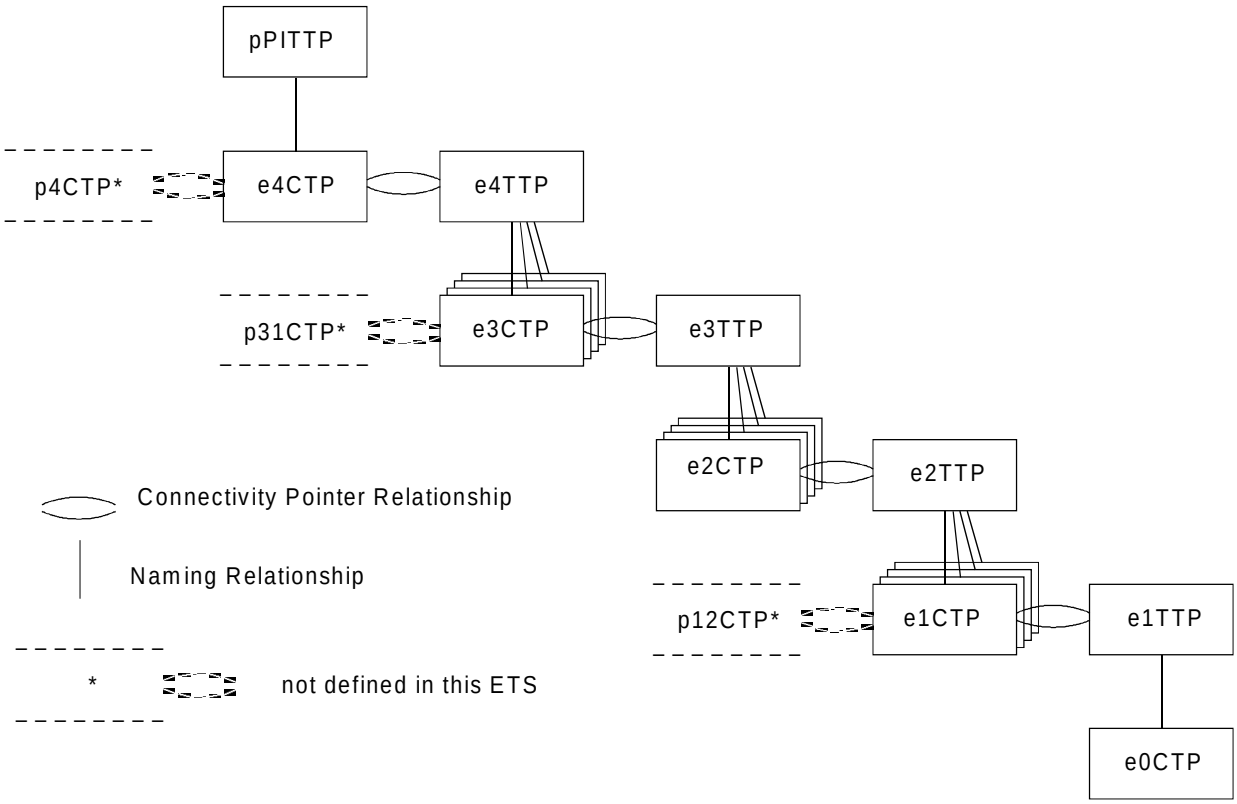

Figure 4: Naming and pointer relationships for PDH and relationship with SDH object classes

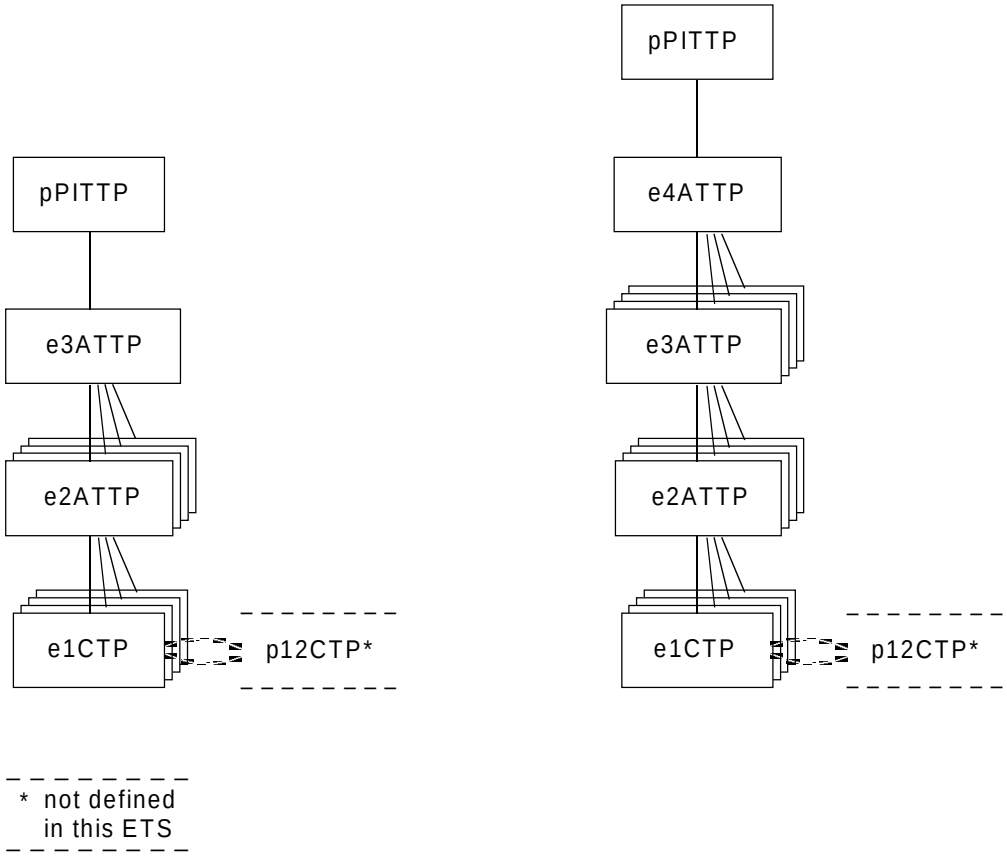

Figure 5: Naming and pointer relationships examples for short version 34/vc12 and 140/vc12 transmultiplexer

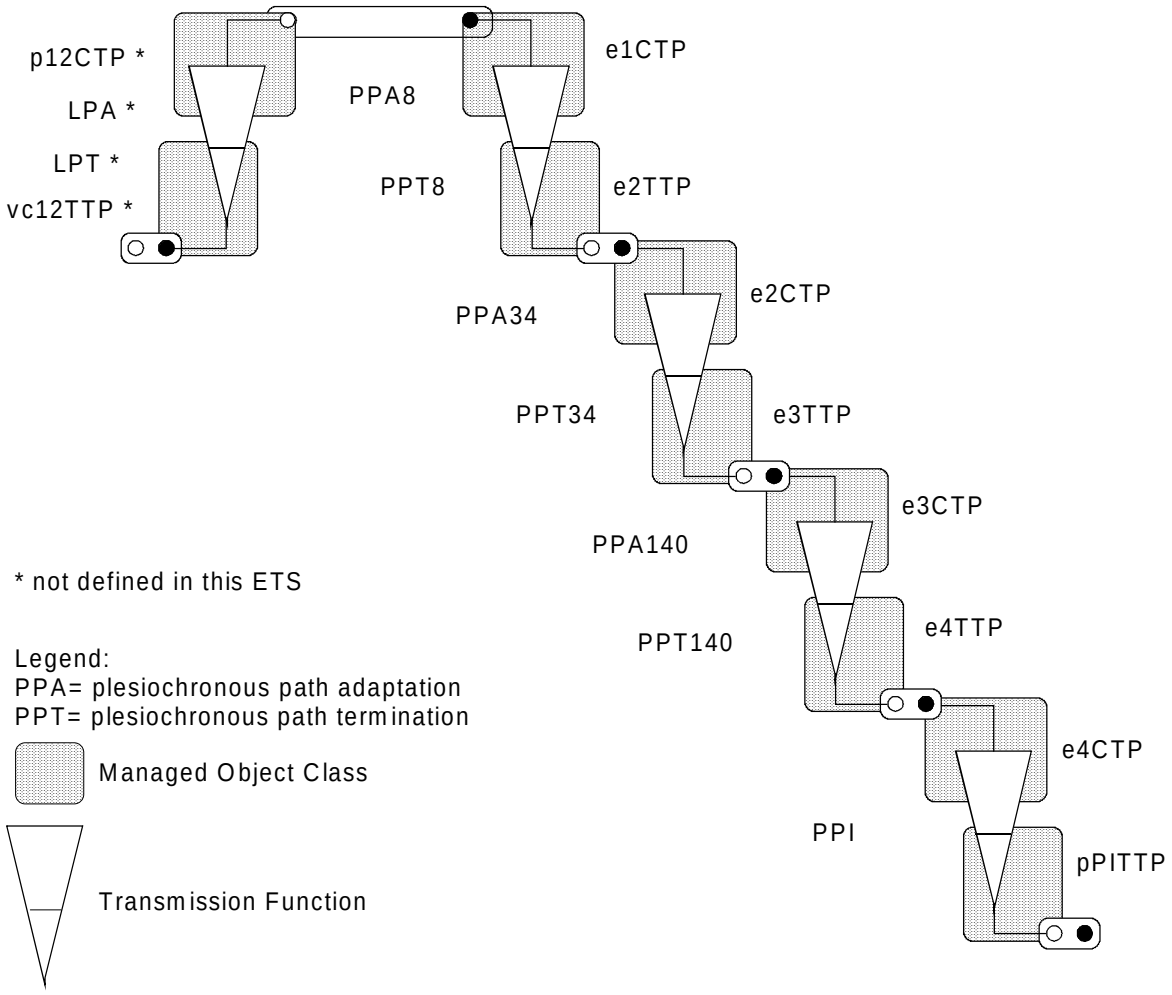

Figure 6: Example for relationship between object classes and transmission functions

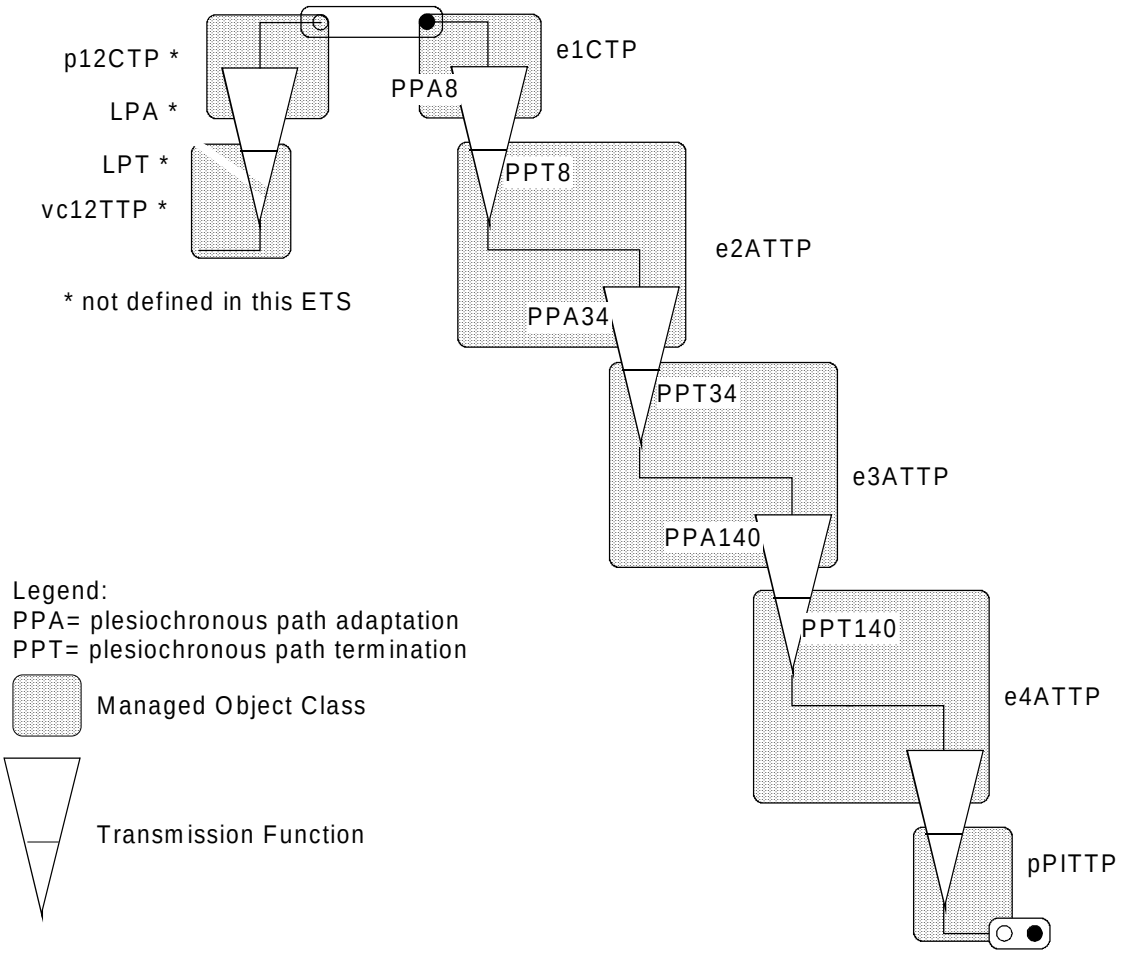

Figure 7: Example for relationship between object classes and transmission functions short version without PDH cross connectivity

History

Document history		
Edition 1	November 1994	Publication as ETS 300 371
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V1.3.1	October 1998	One-step Approval Procedure OAP 9907: 1998-10-16 to 1999-02-12