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SDH information model for the Network Element (NE) view**

ETSI

European Telecommunications Standards Institute

ETSI Secretariat

Postal address: F-06921 Sophia Antipolis CEDEX - FRANCE

Office address: 650 Route des Lucioles - Sophia Antipolis - Valbonne - FRANCE

X.400: c=fr, a=atlas, p=etsi, s=secretariat - **Internet:** secretariat@etsi.fr

Tel.: +33 92 94 42 00 - Fax: +33 93 65 47 16

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Foreword

This draft second edition European Telecommunication Standard (ETS) has been produced by the Transmission and Multiplexing (TM) Technical Committee of the European Telecommunications Standards Institute (ETSI), and is now submitted for the Unified Approval Procedure (UAP) phase of the ETSI standards approval procedure.

This draft second edition ETS describes the information model for Network Elements (NEs) which use the Synchronous Digital Hierarchy (SDH) multiplexing structure.

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

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1 Scope

This draft second edition ETS defines the information model to be used at the interface between Network Elements (NEs) and management systems, for the management of Synchronous Digital Hierarchy (SDH) NEs.

This ETS defines the information model for SDH NEs.

This ETS 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 here (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 NE 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 Normative references

This ETS incorporates, by dated or 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] ITU-T Recommendation G.709 (1993): "Synchronous multiplexing structure".
- [2] ITU-T Recommendation G.774 (1992): "Synchronous digital hierarchy (SDH) management information model for the network element view".
- [3] ITU-T Recommendation G.774.03 (1994): "Synchronous digital hierarchy (SDH) management of multiplex-section protection for the network element view".
- [4] ITU-T Recommendation G.783 (1993): "Characteristics of synchronous digital hierarchy (SDH) equipment functional blocks".
- [5] ITU-T Recommendation M.3100 (1995): "Generic network information model".
- [6] ITU-T Recommendation X.721 (1992): "Information technology - Open Systems Interconnection - Structure of management information: Definition of management information".
- [7] ITU-T Recommendation G.702 (1988): "Digital hierarchy bit rates".
- [8] ETS 300 371 (1994): "Transmission and Multiplexing (TM); Plesiochronous Digital Hierachcy (PDH) information model for the Network Element (NE) view".

3 Abbreviations

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

AIS	Alarm Indication Signal
AP	Access Point
ATM	Asynchronous Transfer Mode
AU	Administrative Unit
AUG	Administrative Unit Group
CCITT	Comité Consultatif International Télégraphique et Téléphonique
CMIP	Common Management Information Protocol
CMIS	Common Management Information Service
CP	Connection Point
CTP	Connection Termination Point
GTP	Group Termination Point
HPA	Higher Order Path Adaptation
HPC	Higher Order Path Connection
HPT	Higher Order Path Termination
IA	Indirect Adaptor
IOS	Intra-Office Section
ISO	International Organization for Standardization
ITU-T	International Telecommunications Union - Telecommunications sector
LOF	Loss Of Frame
LPA	Lower Order Path Adaptation
LPC	Lower Order Path Connection
LPT	Lower Order Path Termination
MS	Multiplexer Section
MSA	Multiplexer Section Adaptation
MST	Multiplexer Section Termination
MSTTP	Multiplexer Section Trail Termination Point
NE	Network Element
OS	Operation System
OSI	Open Systems Interconnection
PDH	Plesiochronous Digital Hierarchy
Pkg	Packages
POH	Path Overhead
PPI	Plesiochronous Physical Interface
RDN	Relative Distinguished Name
RS	Regenerator Section
RST	Regenerator Section Termination
RSTTP	Regenerator Section Trail Termination Point
SDH	Synchronous Digital Hierarchy
SDHNE	Synchronous Digital Hierarchy Network Element
Snk	Sink
Src	Source
SPI	Synchronous Physical Interface
STM-N	Synchronous Transport Module-N
TMN	Telecommunication Management Network
TP	Termination Point
TTP	Trail Termination Point
TU	Tributary Unit
TUG	Tributary Unit Group
VC-n	Virtual Container n

4 Registration supporting Abstract Syntax Notation one (ASN.1)

```
PrETS5 {ccitt(0) identified-organization(4) etsi(0) ets(x) informationModel(0) asn1Module(2)
prETS5(0)}
DEFINITIONS IMPLICIT TAGS ::= BEGIN
-- EXPORT Everything
prETS300304 OBJECT IDENTIFIER ::= {ccitt(0) identified-organization(4) etsi(0) ets(304)
informationModel(0)}
etsObjectClass OBJECT IDENTIFIER ::= {prETS300304 managedObjectClass(3)}
etsPackage OBJECT IDENTIFIER ::= {prETS300304 package(4)}
etsParameter OBJECT IDENTIFIER ::= {prETS300304 parameter(5)}
etsNameBinding OBJECT IDENTIFIER ::= {prETS300304 nameBinding(6)}
etsAttribute OBJECT IDENTIFIER ::= {prETS300304 attribute(7)}
etsAction OBJECT IDENTIFIER ::= {prETS300304 action(9)}
etsNotification OBJECT IDENTIFIER ::= {prETS300304 notification(10)}
END
```

5 Generic objects fragment

In this fragment, a working sub-set of standard and mature object classes have been adopted, mainly from the ITU-T X.700 series of Recommendations.

5.1 Generic objects - object classes

In this context the IMPORTS Clause specifies the object classes which can be instantiated in the scope of this ETS. The IMPORTS Clause does not include uninstantiated superclasses.

```
BEGIN
IMPORTS
alarmRecord,
attributeValueChangeRecord,
eventForwardingDiscriminator,
log,
objectCreationRecord
objectDeletionRecord
stateChangeRecord,
FROM {joint-iso-ccitt ms(9) smi(3) part2(2) managedObjectClass(3) }

alarmSeverityAssignmentProfile
FROM {ccitt(0) recommendation(0) m(13) m3100(3100) informationModel(0) managedObjectClass(3) }
;
END
```

5.2 Generic objects - packages, attributes, ASN.1, name-bindings

All packages, attributes, ASN.1 and name-bindings associated with object classes are implicitly imported from ITU-T Recommendations defining the appropriate object classes.

6 SDH Termination Point (TP) fragment

6.1 SDH TP - object classes

In this context, the IMPORTS Clause specifies the object classes which can be instantiated in the scope of this ETS. The IMPORTS Clause does not include uninstantiated superclasses.

```
BEGIN
IMPORTS
au4CTPBidirectional,
au4CTPSink,
au4CTPSource,
augBidirectional,
augSink,
augSource,
electricalSPITTPBidirectional,
electricalSPITTPSink,
electricalSPITTPSource,
msCTPBidirectional,
msCTPSink,
msCTPSource,
msDatacomCTPBidirectional,
msDatacomCTPSink,
msDatacomCTPSource,
msOrderwireCTPBidirectional,
```

```
msOrderwireCTPSink,  
msOrderwireCTPSource,  
msTTPBidirectional,  
msTTPSink,  
msTTPSource,  
opticalSPITTPBidirectional,  
opticalSPITTPSink,  
opticalSPITTPSource,  
rsCTPBidirectional,  
rsCTPSink,  
rsCTPSource,  
rsDatacomCTPBidirectional,  
rsDatacomCTPSink,  
rsDatacomCTPSource,  
rsOrderwireCTPBidirectional,  
rsOrderwireCTPSink,  
rsOrderwireCTPSource,  
rsTTPBidirectional,  
rsTTPSink,  
rsTTPSource,  
rsUserChannelCTPBidirectional,  
rsUserChannelCTPSink,  
rsUserChannelCTPSource,  
tul1CTPBidirectional,  
tul1CTPSink,  
tul1CTPSource,  
tul2CTPBidirectional,  
tul2CTPSink,  
tul2CTPSource,  
tu2CTPBidirectional,  
tu2CTPSink,  
tu2CTPSource,  
tu3CTPBidirectional,  
tu3CTPSink,  
tu3CTPSource,  
tug2Bidirectional,  
tug2Sink,  
tug2Source,  
tug3Bidirectional,  
tug3Sink,  
tug3Source,  
vc11TTPBidirectional,  
vc11TTPSink,  
vc11TTPSource,  
vc12TTPBidirectional,  
vc12TTPSink,  
vc12TTPSource,  
vc2TTPBidirectional,  
vc2TTPSink,  
vc2TTPSource,  
vc3TTPBidirectional,  
vc3TTPSink,  
vc3TTPSource,  
vc4TTPBidirectional,  
vc4TTPSink,  
vc4TTPSource,  
vcnUserChannelCTPBidirectional,  
vcnUserChannelCTPSink,  
vcnUserChannelCTPSource  
FROM {ccitt(0) recommendation(0) g(7) g774(774) informationModel(0) managedObjectClass(3) }  
;  
END
```

6.2 SDH TP - packages

All packages associated with object classes are implicitly imported from ITU-T Recommendations defining the appropriate object classes.

6.3 SDH TP - attributes

All attributes associated with object classes are implicitly imported from ITU-T Recommendations defining the appropriate object classes.

supportedByObjectList

The value of the supportedByObjectList attribute points to the equipment and software objects which implement the TPs.

6.4 SDH TP - name bindings

```
BEGIN
IMPORTS
au4CTPBidirectional-augBidirectional,
au4CTPSink-augBidirectional,
au4CTPSink-augSink,
au4CTPSource-augBidirectional,
au4CTPSource-augSource,
augBidirectional-msTTPBidirectional,
augSink-msTTPSink,
augSource-msTTPSource,
electricalSPITTPBidirectional-sdhNE,
electricalSPITTPSink-sdhNE,
electricalSPITTPSource-sdhNE,
msCTPBidirectional-rsTTPBidirectional,
msCTPSink-rsTTPBidirectional,
msCTPSink-rsTTPSink,
msCTPSource-rsTTPBidirectional,
msCTPSource-rsTTPSource,
msDatacomCTPBidirectional-msTTPBidirectional,
msDatacomCTPSink-msTTPBidirectional,
msDatacomCTPSink-msTTPSink,
msDatacomCTPSource-msTTPBidirectional,
msDatacomCTPSource-msTTPSource,
msOrderwireCTPBidirectional-msTTPBidirectional,
msOrderwireCTPSink-msTTPBidirectional,
msOrderwireCTPSink-msTTPSink,
msOrderwireCTPSource-msTTPBidirectional,
msOrderwireCTPSource-msTTPSource,
msTTPBidirectional-sdhNE,
msTTPSink-sdhNE,
msTTPSource-sdhNE,
opticalSPITTPBidirectional-sdhNE,
opticalSPITTPSink-sdhNE,
opticalSPITTPSource-sdhNE,
rsCTPBidirectional-electricalSPITTPBidirectional,
rsCTPBidirectional-opticalSPITTPBidirectional,
rsCTPSink-electricalSPITTPBidirectional,
rsCTPSink-electricalSPITTPSink,
rsCTPSink-opticalSPITTPBidirectional,
rsCTPSink-opticalSPITTPSink,
rsCTPSource-electricalSPITTPBidirectional,
rsCTPSource-electricalSPITTPSource,
rsCTPSource-opticalSPITTPBidirectional,
rsCTPSource-opticalSPITTPSource,
rsDatacomCTPBidirectional-rsTTPBidirectional,
rsDatacomCTPSink-rsTTPBidirectional,
rsDatacomCTPSink-rsTTPSink,
rsDatacomCTPSource-rsTTPBidirectional,
rsDatacomCTPSource-rsTTPSource,
rsOrderwireCTPBidirectional-rsTTPBidirectional,
rsOrderwireCTPSink-rsTTPBidirectional,
rsOrderwireCTPSink-rsTTPSink,
rsOrderwireCTPSource-rsTTPBidirectional,
rsOrderwireCTPSource-rsTTPSource,
rsTTPBidirectional-sdhNE,
rsTTPSink-sdhNE,
rsTTPSource-sdhNE,
rsUserChannelCTPBidirectional-rsTTPBidirectional,
rsUserChannelCTPSink-rsTTPBidirectional,
rsUserChannelCTPSink-rsTTPSink,
rsUserChannelCTPSource-rsTTPBidirectional,
rsUserChannelCTPSource-rsTTPSource,
tull1CTPBidirectional-tug2Bidirectional,
tull1CTPSink-tug2Bidirectional,
tull1CTPSink-tug2Sink,
tull1CTPSource-tug2Bidirectional,
tull1CTPSource-tug2Source,
tul2CTPBidirectional-tug2Bidirectional,
tul2CTPSink-tug2Bidirectional,
tul2CTPSink-tug2Sink,
tul2CTPSource-tug2Bidirectional,
tul2CTPSource-tug2Source,
tu2CTPBidirectional-tug2Bidirectional,
tu2CTPSink-tug2Bidirectional,
tu2CTPSink-tug2Sink,
tu2CTPSource-tug2Bidirectional,
tu2CTPSource-tug2Source,
tu3CTPBidirectional-tug3Bidirectional,
tu3CTPSink-tug3Bidirectional,
tu3CTPSink-tug3Sink,
tu3CTPSource-tug3Bidirectional,
tu3CTPSource-tug3Source,
```

```
tug2Bidirectional-tug3Bidirectional,  
tug2Sink-tug3Sink,  
tug2Source-tug3Source,  
tug3Bidirectional-vc4TTPBidirectional,  
tug3Sink-vc4TTPSink,  
tug3Source-vc4TTPSource,  
vc11TTPBidirectional-sdhNE,  
vc11TTPSink-sdhNE,  
vc11TTPSource-sdhNE,  
vc12TTPBidirectional-sdhNE,  
vc12TTPSink-sdhNE,  
vc12TTPSource-sdhNE,  
vc2TTPBidirectional-sdhNE,  
vc2TTPSink-sdhNE,  
vc2TTPSource-sdhNE,  
vc3TTPBidirectional-sdhNE,  
vc3TTPSink-sdhNE,  
vc3TTPSource-sdhNE,  
vc4TTPBidirectional-sdhNE,  
vc4TTPSink-sdhNE,  
vc4TTPSource-sdhNE,  
vcnUserChannelCTPBidirectional-vc3TTPBidirectional,  
vcnUserChannelCTPBidirectional-vc4TTPBidirectional,  
vcnUserChannelCTPSink-vc3TTPBidirectional,  
vcnUserChannelCTPSink-vc3TTPSink,  
vcnUserChannelCTPSink-vc4TTPBidirectional,  
vcnUserChannelCTPSink-vc4TTPSink,  
vcnUserChannelCTPSource-vc3TTPBidirectional,  
vcnUserChannelCTPSource-vc3TTPSource,  
vcnUserChannelCTPSource-vc4TTPBidirectional,  
vcnUserChannelCTPSource-vc4TTPSource  
FROM {ccitt(0) recommendation(0) g(7) g774(774) informationModel(0) nameBinding(6) }  
;  
END
```

6.5 SDH TP - subordination rules

```
BEGIN  
IMPORTS  
augSinkSubordination,  
augSourceSubordination,  
augBidirectionalSubordination,  
electricalSPITTPSinkSubordination,  
electricalSPITTPSourceSubordination,  
electricalSPITTPBidirectionalSubordination,  
opticalSPITTPSinkSubordination,  
opticalSPITTPSourceSubordination,  
opticalSPITTPBidirectionalSubordination,  
msTTPSinkSubordination,  
msTTPSourceSubordination,  
msTTPBidirectionalSubordination,  
rsTTPSinkSubordination,  
rsTTPSourceSubordination,  
rsTTPBidirectionalSubordination,  
sdhNESubordination,  
tug2SinkSubordination,  
tug2SourceSubordination,  
tug2BidirectionalSubordination,  
tug3SinkSubordination,  
tug3SourceSubordination,  
tug3BidirectionalSubordination,  
vc3TTPSinkSubordination,  
vc3TTPSourceSubordination,  
vc3TTPBidirectionalSubordination,  
vc4TTPSinkSubordination,  
vc4TTPSourceSubordination,  
vc4TTPBidirectionalSubordination,  
  
FROM {ccitt(0) recommendation(0) g(7) g774(774)}  
;  
END
```

6.6 SDH TP - constraints

```
BEGIN
IMPORTS
downstreamConnectivityPointer-au4CTPSink,
upstreamConnectivityPointer-au4CTPSource,
downstreamConnectivityPointer-msCTPSink,
upstreamConnectivityPointer-msCTPSource,
upstreamConnectivityPointer-msTTPSink,
downstreamConnectivityPointer-msTTPSource,
downstreamConnectivityPointer-rsCTPSink,
upstreamConnectivityPointer-rsCTPSource,
upstreamConnectivityPointer-rsTTPSink,
downstreamConnectivityPointer-rsTTPSource,
downstreamConnectivityPointer-tu11CTPSink,
upstreamConnectivityPointer-tu11CTPSource,
downstreamConnectivityPointer-tu12CTPSink,
upstreamConnectivityPointer-tu12CTPSource,
downstreamConnectivityPointer-tu2CTPSink,
upstreamConnectivityPointer-tu2CTPSource,
downstreamConnectivityPointer-tu3CTPSink,
upstreamConnectivityPointer-tu3CTPSource,
upstreamConnectivityPointer-vc11TTPSink,
downstreamConnectivityPointer-vc11TTPSource,
upstreamConnectivityPointer-vc12TTPSink,
downstreamConnectivityPointer-vc12TTPSource,
upstreamConnectivityPointer-vc2TTPSink,
downstreamConnectivityPointer-vc2TTPSource,
upstreamConnectivityPointer-vc3TTPSink,
downstreamConnectivityPointer-vc3TTPSource,
FROM {ccitt(0) recommendation(0) g(7) g774(774)}
;
END

ets_upstreamConnectivityPointer-vc4TTPSink CONSTRAINT RULE
  OBJECT CLASS
    vc4TTPSink AND SUBCLASSES;
  IS RELATED TO
    vc4TTPSource, vc4TTPBidirectional,
    au4CTPSink, au4CTPBidirectional;
  USING ATTRIBUTE
    "Recommendation M.3100":upstreamConnectivityPointer;
  ACCORDING TO RULE
    SET SIZE (1) OF CHOICE{
      vc4TTPSource, vc4TTPBidirectional,
      au4CTPSink, au4CTPBidirectional};
;

ets_downstreamConnectivityPointer-vc4TTPSource CONSTRAINT RULE
  OBJECT CLASS
    vc4TTPSource AND SUBCLASSES;
  IS RELATED TO
    vc4TTPSink, vc4TTPBidirectional,
    au4CTPSource, au4CTPBidirectional;
  USING ATTRIBUTE
    "Recommendation M.3100":downstreamConnectivityPointer;
  CASE{
    single ACCORDING TO RULE
      SET SIZE (1) OF CHOICE{
        vc4TTPSink, vc4TTPBidirectional,
        au4CTPSource, au4CTPBidirectional};
;    broadcast ACCORDING TO RULE
      SET SIZE (1..N) OF CHOICE{
        vc4TTPSink, vc4TTPBidirectional,
        au4CTPSource, au4CTPBidirectional};
  }
```

7 Plesiochronous Digital Hierarchy (PDH) fragment

This clause provides Managed Objects required to model PDH interfaces on SDH equipment.

7.1 Object classes definitions

ITU-T Recommendation G.702 2 Mbit/s connection termination point

```
p12CTPSink MANAGED OBJECT CLASS
DERIVED FROM "Recommendation M.3100":connectionTerminationPointSink;
CHARACTERIZED BY
  "Recommendation M.3100":createDeleteNotificationsPackage,
  "Recommendation M.3100":operationalStatePackage,
  "Recommendation M.3100":stateChangeNotificationPackage,
  p12CTPSinkPkg PACKAGE
BEHAVIOUR
  p12CTPSinkBehaviourPkg BEHAVIOUR
  DEFINED AS
    *This managed object class terminates a G.702 2 Mbit/s connection and includes
the lower order path adaptation function (LPA).*
;;
  ATTRIBUTES
    p12CTPId GET;
;;
REGISTERED AS { etsObjectClass 13 };
```

```
p12CTPSource MANAGED OBJECT CLASS
DERIVED FROM "Recommendation M.3100":connectionTerminationPointSource;
CHARACTERIZED BY
  "Recommendation M.3100":createDeleteNotificationsPackage,
  p12CTPSourcePkg PACKAGE
BEHAVIOUR
  p12CTPSourceBehaviourPkg BEHAVIOUR
  DEFINED AS
    *This object class originates a G.702 2 Mbit/s connection*
;;
  ATTRIBUTES
    p12CTPId GET;
;;
REGISTERED AS { etsObjectClass 2 };
```

```
p12CTPBidirectional MANAGED OBJECT CLASS
DERIVED FROM "Recommendation M.3100":connectionTerminationPointBidirectional,
  p12CTPSink,
  p12CTPSource;
REGISTERED AS { etsObjectClass 3 };
```

G702 34 Mbit/s connection termination point

```
p31CTPSink MANAGED OBJECT CLASS
DERIVED FROM "Recommendation M.3100":connectionTerminationPointSink;
CHARACTERIZED BY
  "Recommendation M.3100":createDeleteNotificationsPackage,
  "Recommendation M.3100":operationalStatePackage,
  "Recommendation M.3100":stateChangeNotificationPackage,
  p31CTPSinkPkg PACKAGE
BEHAVIOUR
  p31CTPSinkBehaviourPkg BEHAVIOUR
  DEFINED AS
    *This managed object class terminates a G.702 34 Mbit/s connection and includes
the lower order path adaptation function (LPA).*
;;
  ATTRIBUTES
    p31CTPId GET;
;;
REGISTERED AS { etsObjectClass 4 };
```

```
p31CTPSource MANAGED OBJECT CLASS
DERIVED FROM "Recommendation M.3100":connectionTerminationPointSource;
CHARACTERIZED BY
  "Recommendation M.3100":createDeleteNotificationsPackage,
  p31CTPSourcePkg PACKAGE
BEHAVIOUR
  p31CTPSourceBehaviourPkg BEHAVIOUR
  DEFINED AS
    *This object class originates a G.702 34Mbit/s connection.*
;;
  ATTRIBUTES
```

```
                p31CTPId                                GET;
;;
REGISTERED AS { etsObjectClass 5 };

p31CTPBidirectional MANAGED OBJECT CLASS
  DERIVED FROM "Recommendation M.3100":connectionTerminationPointBidirectional,
                p31CTPSink,
                p31CTPSource;
REGISTERED AS { etsObjectClass 6 };

G702 140 Mbit/s connection termination point

p4CTPSink MANAGED OBJECT CLASS
  DERIVED FROM "Recommendation M.3100":connectionTerminationPointSink;
  CHARACTERIZED BY
    "Recommendation M.3100":createDeleteNotificationsPackage,
    "Recommendation M.3100":operationalStatePackage,
    "Recommendation M.3100":stateChangeNotificationPackage,
    p4CTPSinkPkg PACKAGE
  BEHAVIOUR
    p4CTPSinkBehaviourPkg BEHAVIOUR
    DEFINED AS
      *This managed object class terminates a G.702 140 Mbit/s connection and
includes the lower order path adaptation function (LPA).*
;;
  ATTRIBUTES
    p4CTPId                                GET;
;;
REGISTERED AS { etsObjectClass 7 };

p4CTPSource MANAGED OBJECT CLASS
  DERIVED FROM "Recommendation M.3100":connectionTerminationPointSource;
  CHARACTERIZED BY
    "Recommendation M.3100":createDeleteNotificationsPackage,
    p4CTPSourcePkg PACKAGE
  BEHAVIOUR
    p4CTPSourceBehaviourPkg BEHAVIOUR
    DEFINED AS
      *This object class originates a G.702 140 Mbit/s connection.*
;;
  ATTRIBUTES
    p4CTPId                                GET;
;;
REGISTERED AS { etsObjectClass 8 };

p4CTPBidirectional MANAGED OBJECT CLASS
  DERIVED FROM "Recommendation M.3100":connectionTerminationPointBidirectional,
                p4CTPSink,
                p4CTPSource;
REGISTERED AS { etsObjectClass 9 };
```

7.2 Attributes definitions

supportedByObjectList

The value of the supportedByObjectList attribute points to the equipment and software objects which implement the TPs.

G.702 2Mbit/s Connection Termination Point Identification

```
p12CTPId ATTRIBUTE
  WITH ATTRIBUTE SYNTAX      PrETS8.NameType ;
  MATCHES FOR                EQUALITY;
  BEHAVIOUR
    p12CTPIdBehaviour BEHAVIOUR
  DEFINED AS
    This attribute is used as an RDN for naming instances of the p12CTP object classes.
;;
REGISTERED AS { etsAttribute 1 };
```

G.702 34Mbit/s Connection Termination Point Identification

```
p31CTPId ATTRIBUTE
  WITH ATTRIBUTE SYNTAX      PrETS8.NameType ;
  MATCHES FOR                EQUALITY;
  BEHAVIOUR
    p31CTPIdBehaviour BEHAVIOUR
  DEFINED AS
    This attribute is used as an RDN for naming instances of the p31CTP object classes.
;;
REGISTERED AS { etsAttribute 2 };
```

G.702 140Mbit/s Connection Termination Point Identification

```
p4CTPId ATTRIBUTE
  WITH ATTRIBUTE SYNTAX      PrETS8.NameType ;
  MATCHES FOR                EQUALITY;
  BEHAVIOUR
    p4CTPIdBehaviour BEHAVIOUR
  DEFINED AS
    This attribute is used as an RDN for naming instances of the p4CTP object classes.
;;
REGISTERED AS { etsAttribute 3 };
```


7.3 Name bindings definitions

```
p12CTPSource-G774vc12TTPSource NAME BINDING
SUBORDINATE OBJECT CLASS p12CTPSource AND SUBCLASSES;
NAMED BY
SUPERIOR OBJECT CLASS "Recommendation G.774":vc12TTPSource AND SUBCLASSES;
WITH ATTRIBUTE p12CTPID;
BEHAVIOUR
    p12CTPSource-vc12TTPSource 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 };
```

```
p12CTPSink-G774vc12TTPSink NAME BINDING
SUBORDINATE OBJECT CLASS p12CTPSink AND SUBCLASSES;
NAMED BY
SUPERIOR OBJECT CLASS "Recommendation G.774":vc12TTPSink AND SUBCLASSES;
WITH ATTRIBUTE p12CTPID;
BEHAVIOUR
    p12CTPSink-vc12TTPSink 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 21 };
```

```
p31CTPSource-G774vc3TTPSource NAME BINDING
SUBORDINATE OBJECT CLASS p31CTPSource AND SUBCLASSES;
NAMED BY
SUPERIOR OBJECT CLASS "Recommendation G.774":vc3TTPSource AND SUBCLASSES;
WITH ATTRIBUTE p31CTPID;
BEHAVIOUR
    p31CTPSource-vc3TTPSource 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 };
```

```
p31CTPSink-G774vc3TTPSink NAME BINDING
SUBORDINATE OBJECT CLASS p31CTPSink AND SUBCLASSES;
NAMED BY
SUPERIOR OBJECT CLASS "Recommendation G.774":vc3TTPSink AND SUBCLASSES;
WITH ATTRIBUTE p31CTPID;
BEHAVIOUR
    p31CTPSink-vc3TTPSink 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 23 };
```

```
p4CTPSource-G774vc4TTPSource NAME BINDING
SUBORDINATE OBJECT CLASS p4CTPSource AND SUBCLASSES;
NAMED BY
SUPERIOR OBJECT CLASS "Recommendation G.774":vc4TTPSource AND SUBCLASSES;
WITH ATTRIBUTE p4CTPID;
BEHAVIOUR
    p4CTPSource-vc4TTPSource 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 24 };
```

```
p4CTPSink-G774vc4TTPSink NAME BINDING
SUBORDINATE OBJECT CLASS p4CTPSink AND SUBCLASSES;
NAMED BY
SUPERIOR OBJECT CLASS "Recommendation G.774":vc4TTPSink AND SUBCLASSES;
WITH ATTRIBUTE p4CTPID;
BEHAVIOUR
    p4CTPSink-vc4TTPSink 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 25 };
```

7.4 ASN.1 definitions

```
PrETS8{ccitt(0) identified-organization(4) etsi(0) ets(x) informationModel(0) asn1Module(2)
prETS8(1)}
DEFINITIONS IMPLICIT TAGS ::=
BEGIN
-- EXPORTS everything

IMPORTS

NameType FROM ASN1DefinedTypesModule {ccitt(0) recommendation(0) m(13) m3100(3100)
informationModel(0) asn1Module(2) asn1DefinedTypesModule(0)}

END -- end of ASN1DefinedTypesModule
```

8 Cross-connection fragment

8.1 Cross-connection - object classes

In this context the IMPORTS Clause specifies the object classes which can be instantiated in the scope of this ETS. The IMPORTS Clause does not include uninstantiated superclasses.

```
BEGIN
IMPORTS
crossConnection,
fabric,
gtp,
mpCrossConnection,
tpPool
FROM {ccitt(0) recommendation(0) m(13) m3100(3100) informationModel(0) managedObjectClass(3) }
;
END
```

8.2 Cross-connection - packages

All packages associated with object classes are implicitly imported from ITU-T Recommendations defining the appropriate object classes.

8.3 Cross-connection - attributes

All attributes associated with object classes are implicitly imported from ITU-T Recommendations defining the appropriate object classes.

```
supportedByObjectList
The value of the supportedByObjectList attribute points to the equipment and software
objects which implement the TPs.
```

8.4 Cross-connection - name bindings

```
BEGIN
IMPORTS
fabric-managedElement,
gtp-fabric,
mpCrossConnection-fabric,
tpPool-fabric
FROM {ccitt(0) recommendation(0) m(13) m3100(3100) informationModel(0) nameBinding(6) }
;
END

ets_crossConnection-fabric NAME BINDING
SUBORDINATE OBJECT CLASS "Recommendation M.3100" : crossConnection
  AND SUBCLASSES;
NAMED BY
SUPERIOR OBJECT CLASS      "Recommendation M.3100":fabric
  AND SUBCLASSES;
WITH ATTRIBUTE              "Recommendation M.3100":crossConnectionId;
BEHAVIOUR
  ets_crossConnection-fabricBehaviour BEHAVIOUR
  DEFINED AS
  *The value of the fromTermination attribute in the crossConnection object shall not be NULL. When
  an instance of crossConnection is deleted, the following attributes will be affected. The
  crossConnectionObjectPointer attributes in the termination points or in the gtp objects that were
  pointing to the deleted crossConnection instance shall be set to point to the Fabric responsible
  for the connection of the termination points. The counters in the appropriate TP Pool objects (if
  applicable) shall be updated. The connectivityPointer attributes in the disconnected termination
  points shall be set to NULL. Deleting a crossConnection object instance has no effect on the
  composition of any GTP*
  ;;
REGISTERED AS {etsNameBinding 16 };

ets_crossConnection-mpCrossConnection NAME BINDING
SUBORDINATE OBJECT CLASS "Recommendation M.3100":crossConnection
  AND SUBCLASSES;
NAMED BY
SUPERIOR OBJECT CLASS      "Recommendation M.3100":mpCrossConnection
  AND SUBCLASSES;
WITH ATTRIBUTE              "Recommendation M.3100":crossConnectionId;
BEHAVIOUR
  ets_crossConnection-mpCrossConnectionBehaviour BEHAVIOUR
  DEFINED AS
  *The value of the fromTermination attribute in the crossConnection object must be NULL. When an
  instance of crossConnection is deleted, the following attributes will be affected. The
  crossConnectionObjectPointer attributes in the termination points or in the gtp objects that were
  pointing to the deleted crossConnection instance shall be set to point to the Fabric responsible
  for the connection of the termination points. The counters in the appropriate TP Pool objects (if
  applicable) shall be updated. The connectivityPointer attributes in the disconnected termination
  points shall be set to NULL. Deleting the last cross-Connection contained in a multipoint cross
  connection object has the effect of also deleting the multipoint cross connection object instance
  (and updating the appropriate pointers). Deleting a crossConnection object instance has no effect
  on the composition of any GTP*
  ;;
REGISTERED AS {etsNameBinding 17 };
```

9 Protection fragment

The protection fragment information model is to be found in ITU-T Recommendation G.774.03 [3].

9.1 Object classes

In this context the IMPORTS Clause specifies the object classes which can be instantiated in the scope of this ETS. The IMPORTS Clause does not include uninstantiated superclasses.

```
BEGIN
IMPORTS
protectedTTPBidirectional
protectedTTPSink
protectedTTPSource
protectionGroup
protectionUnit
sdhMSProtectionGroup
sdhMSProtectionUnit
unprotectedCTPBidirectional
unprotectedCTPSink
unprotectedCTPSource
FROM {ccitt(0) recommendation(0) g(7) g774(774) hyphen(127) prot(03) informationModel(0)
managedObjectClass(3) }
;
END
```

9.2 Packages

All packages associated with object classes are implicitly imported from ITU-T Recommendations defining the appropriate object classes.

9.3 Attributes

All attributes associated with object classes are implicitly imported from ITU-T Recommendations defining the appropriate object classes.

```
supportedByObjectList
The value of the supportedByObjectList attribute points to the equipment and software
objects which implement the TPs.
```

9.4 Name bindings

```
BEGIN
IMPORTS
protectedTTPBidirectional-sdhNE
protectedTTPSink-sdhNE
protectedTTPSource-sdhNE
augBidirectional-protectedTTPBidirectional
augSink-protectedTTPSink
augSource-protectedTTPSource
protectionGroup-managedElement
protectionUnit-protectionGroup
unprotectedCTPBidirectional-msTTPBidirectional
unprotectedCTPSink-msTTPSink
unprotectedCTPSource-msTTPSource
FROM {ccitt(0) recommendation(0) g(7) g774(774) hyphen(127) prot(03) informationModel(0)
nameBinding(6) }
;
END
```

10 Equipment fragment

10.1 Equipment - object classes

In this context, the IMPORTS Clause specifies the object classes which can be instantiated in the scope of this ETS. The IMPORTS Clause does not include uninstantiated superclasses.

```
BEGIN
IMPORTS
sdhNE
FROM {ccitt(0) recommendation(0) g(7) g774(774) informationModel(0) managedObjectClass(3) }

software
FROM M.3100ObjectClass {ccitt(0) recommendation(0) m(13) m3100(3100) informationModel(0)
managedObjectClass(3) }
;
END
```

The external TimePackage shall be supported by the sdhNE instance.

```
equipmentProtectionGroup MANAGED OBJECT CLASS
DERIVED FROM "Recommendation G.774-03: 1994":protectionGroup;
CHARACTERIZED BY
    equipmentProtectionGroupPkg PACKAGE
        BEHAVIOUR equipmentProtectionGroupBeh;
        NOTIFICATIONS
            protectionSwitchReporting equipmentProtectionStatusParameter;;;
REGISTERED AS { etsObjectClass 14 };
equipmentProtectionGroupBeh BEHAVIOUR
    DEFINED AS
    " This object class is used specifically for representing an equipment protection group in a
    protection system.
    The invokeProtection action swtches always from protectedUnit to protectingUnit.
    Either no or all equipmentProtectionUnits within an equipmentProtectionGroup shall have the
    priorityPkg package.";

equipmentProtectionUnit MANAGED OBJECT CLASS
DERIVED FROM "Recommendation G.774-03: 1994":protectionUnit;
CHARACTERIZED BY
    "Recommendation M.3100: 1992":createDeleteNotificationsPackage,
    equipmentProtectionUnitPkg PACKAGE
        BEHAVIOUR equipmentProtectionUnitBeh;
        ATTRIBUTES
            equipmentProtectionStatus GET;;;
REGISTERED AS { etsObjectClass 15 };
equipmentProtectionUnitBeh BEHAVIOUR
    DEFINED AS
    " This object class is specific to equipment protection systems. Instances of this object class
    are used to represent a relationship between a functional object and an equipment.
    equipmentProtectionUnits are self-instantiated by the agent according to the equipment protection
    schemes adopted by the NE. An equipmentProtectionUnit instance is deleted when the sdhEquipment
    instance pointed to by the unreliableResourcePointer attribute are deleted, and is created again
    if the sdhEquipment are instantiated with the appropriate equipmentExpected attribute value.
    The reliableResourcePointer inherited by the protectionUnit superclass can be optionally an empty
    set for instances of this object class.
    The agent can also create and delete instances of the equipmentProtectionUnit in order to reflect
    local modifications in the equipment protection schemes.
    The attributeValueChange notification shall only be used to notify changes of the priority
    attribute.";

sdhEquipmentR MANAGED OBJECT CLASS
DERIVED FROM "Recommendation M.3100":equipment;
CHARACTERIZED BY
    "Recommendation M.3100":administrativeOperationalStatesPackage,
    "Recommendation M.3100":attributeValueChangeNotificationPackage,
    "Recommendation M.3100":createDeleteNotificationsPackage,
    "Recommendation M.3100":currentProblemListPackage,
    "Recommendation M.3100":locationNamePackage,
    "Recommendation M.3100":stateChangeNotificationPackage,
    "Recommendation M.3100":equipmentsEquipmentAlarmPackage,
    "Recommendation X.721":availabilityStatusPackage,
    sdhEquipmentPackage PACKAGE
    BEHAVIOUR
    sdhEquipmentBehaviour BEHAVIOUR
    DEFINED AS
    * The equipment object may be instantiated or exist without the presence of the physical
    resources. In this case the operational state shall be "disabled" and the availability status
    attribute shall contain the value "notInstalled".
```

When the resource is physically removed, the corresponding equipment object is not automatically deleted.

The equipmentExpected attribute shall be provided at instantiation time. The create request shall fail if the value of this attribute is unacceptable to the NE, and the failure reason shall indicate this mismatch in the response.

When there is a mismatch in the contents of the equipmentActual and the equipment Expected attribute, an equipmentAlarm notification with probable cause "replaceableUnitTypeMismatch" shall be raised. This checking is only performed if the availabilityStatus does not contain the value "notInstalled". The equipmentExpected value of "NULL" (no type) does not match any other value than NULL for equipmentActual. Changes in the value of the equipmentExpected attribute can only be achieved by object deletion and creation.

The "Recommendation M.3100":versionPackage package is not used.

The protectionUnitPointer attribute is used to point to a equipmentProtectionUnit within a equipmentProtectionGroup if the equipment is protectet. Otherwise the Pointer is null. One equipment could participate in several equipmentProtectionUnits at the same time.*

```
;;  
ATTRIBUTES  
"Recommendation M.3100":alarmStatus GET,  
"Recommendation M.3100":version GET,  
equipmentExpected GET,  
equipmentActual GET,  
specificPhysicalInstance GET,  
physicalConnectorList GET,  
protectionUnitPointer GET;  
;;  
REGISTERED AS { etsObjectClass 16 };
```

10.2 Equipment - attributes

All packages and attributes associated with object classes are implicitly imported from ITU-T Recommendations defining the appropriate object classes.

affectedObjectList

The value of the affectedObjectList attribute represents the functional objects implemented by the equipment or software object in which the attribute is applied. If the equipment or software object become disabled, all managed objects referred to by the affectedObjectList shall also be disabled.

```
equipmentActual ATTRIBUTE  
WITH ATTRIBUTE SYNTAX PrETS12.EquipmentActual;  
BEHAVIOUR  
equipmentActualBehaviour BEHAVIOUR  
DEFINED AS
```

This attribute contains the equipment type of the equipment actually present. The "EquipmentType" value is a vendor-specific identification of a particular set or class of equipment, where all the set members have equivalent capability.

```
;;  
REGISTERED AS {etsAttribute 4 };
```

```
equipmentExpected ATTRIBUTE  
WITH ATTRIBUTE SYNTAX PrETS12.EquipmentExpected;  
BEHAVIOUR  
equipmentExpectedBehaviour BEHAVIOUR  
DEFINED AS
```

This attribute contains the equipment type requested at object creation. The "EquipmentType" value is a vendor-specific identification of a particular set or class of equipment, where all the set members have equivalent capability.

```
;;  
REGISTERED AS {etsAttribute 5};
```

```
equipmentProtectionStatus ATTRIBUTE  
WITH ATTRIBUTE SYNTAX PrETS12.EquipmentProtectionStatus;  
MATCHES FOR EQUALITY, SET-COMPARISON,  
SET-INTERSECTION;  
BEHAVIOUR equipmentProtectionStatusBeh;  
REGISTERED AS { etsAttribute 12 };  
equipmentProtectionStatusBeh BEHAVIOUR  
DEFINED AS
```

" This attribute is used to indicate the status of the protection switch in a protectionUnit instance.

The remainder of this behaviour provides the allowable equipmentProtectionStatus attribute values for protected and protecting units for both revertive and non-revertive systems.

The following allowable equipmentProtectionStatus values are associated with each protected unit:

No Request: No switch request is present on the unit.

Manual Switch to Protecting Complete: The unit has completed a Manual Switch.

Automatic Switch Pending: The unit has a failure condition present and the protecting unit is unavailable.

Automatic Switch Complete: The unit has completed an Automatic Switch to the protecting unit due to failure condition.

Force Switch Complete, Automatic Switch Pending: The unit has completed a Force Switch. Additionally, the unit has an automatic switch pending.

Automatic Switch Complete, Wait-to-Restore: The unit has completed an Automatic Switch to the protecting unit. (revertive case only)

Force Switch Complete: The unit has completed a Force Switch to the protecting unit.

Protected Unit Lockout Completed: The unit has been locked out from the protecting unit.

Additionally the non-revertive protected protection unit has the following status values:

Do Not Revert: The protected unit has been switched to the protecting unit and the request to do so has been released. The switch to the protecting unit is maintained.

The following allowable protectionStatus values are associated with each protecting unit:

No Request: No request is present on the protecting unit.

Manual Switch to Protecting Unit Complete: The protected unit has completed a Manual Switch.

Automatic Switch Complete to Protecting Unit: The protected unit has completed an automatic switch to the protecting unit.

Automatic Switch Complete to Protecting Unit, Wait to Restore: The unit has completed an Automatic Switch to the protecting unit. (revertive case only)

Protecting Unit Failed: The protecting unit has a failure condition present.

Force Switch Complete to Protecting Unit: The unit has completed a Force Switch of a protected unit to the protecting unit.

Protecting Unit Locked Out: The protecting unit has been locked out.

Additionally, the non-revertive protecting unit has the following values:

Do Not Revert: The protected unit has been switched to the protecting unit and the request to do so has been released. The switch to the protecting unit is maintained.

Manual Switch to Protected Unit Complete: The unit has completed a Manual Switch from the protecting unit to the protected unit.

" ;

```
physicalConnectorList          ATTRIBUTE
    WITH ATTRIBUTE SYNTAX      PrETS12.PhysicalConnectorList;
    BEHAVIOUR
        physicalConnectorListBehaviour BEHAVIOUR
    DEFINED AS
```

This attribute is used to relate external cabling to the appropriate transport objects. There is an entry per connector.

```
;;
REGISTERED AS {etsAttribute 7 };
```

```
protectionUnitPointer          ATTRIBUTE
    WITH ATTRIBUTE SYNTAX      PrETS12.ProtectionUnitPointer;
    MATCHES FOR                 EQUALITY;
REGISTERED AS {etsAttribute 13 };
```

```
specificPhysicalInstance       ATTRIBUTE
    WITH ATTRIBUTE SYNTAX      PrETS12.PhysicalInstance;
    BEHAVIOUR
        specificPhysicalInstanceBehaviour BEHAVIOUR
    DEFINED AS
```

This attribute contains the unique identifier of the physical equipment (e.g. serial number). This may be a manufacturer dependent serial number or other unique identifier (or unknownInstance where the actual instance may not be determined from the actual equipment)

```
;;
REGISTERED AS {etsAttribute 6 };
```

[for information only.

Version ::=

-- Defined in M.3100, is used to present sufficient information to uniquely identify the "equipmentActual" for the purpose of repair or reordering.

]

10.3 Equipment - parameter

```
equipmentProtectionStatusParameter PARAMETER
```

```
CONTEXT EVENT-INFO;
```

```
WITH SYNTAX PrETS12.EquipmentProtectionStatusParameter;
```

```
BEHAVIOUR protectionStatusParameterBeh;
```

```
REGISTERED AS { etsParameter 1 };
```

```
equipmentProtectionStatusParameterBeh BEHAVIOUR
```

```
DEFINED AS
```

"This parameter is included in the additional info parameters of the protection switching reporting notification.

This notification is sent by the protection group according to the following rules. There are several cases:

The switch from protected to protecting or protecting to protected has been done without preempting an existing switch. In this case the old and new values of the Protection Status attribute of the protecting channel shall be reported in the notification by means of the oldProtectionStatus and newProtectionStatus parameters respectively.

A switch is performed by preempting an existing one. In this case the old and new values of the Protection Status attribute of the protecting unit shall be reported in the notification by means of the oldProtectionStatus and newProtectionStatus parameters respectively.

An autoswitch condition exists on an equipment but the auto-switch cannot be served due to the unavailability of the equipment that otherwise protects it. In this case the oldProtectionStatus and newProtectionStatus parameters refer to the protection status attribute value of the equipment on which the autoswitch condition arises. The exception is when the equipment is already forced or locked out, in which case no notification is sent.

A working equipment (protected unit) has been locked out or released from lockout without modifying any existing switch. In this case the oldProtectionStatus and newProtectionStatus parameters refer to the protection status attribute value of the working equipment which has been locked out.

A protection equipment (protecting unit) has been lockout or released from lockout without modifying the existing switch. In this case the oldProtectionStatus and newProtectionStatus parameters refer to the protection status attribute value of the protection equipment which has been lockout.

The protectionSwitchReporting is not sent when the automatic switch condition is toggling between the equipment failure and WTR condition. While in the lockout of forced switch state no notification is sent except for ending of release failure.";

10.4 Equipment - name bindings

All name bindings associated with object classes are implicitly imported from ITU-T Recommendations defining the appropriate object classes.

```
BEGIN
```

```
IMPORTS
```

```
equipment-managedElement,
```

```
equipment-equipment
```

```
FROM {ccitt(0) recommendation(0) m(13) m3100(3100) informationModel(0) nameBinding(6) }
```

```
;
```

```
END
```


10.5 Equipment - supporting ASN.1

All ASN.1 types associated with object classes are implicitly imported from ITU-T Recommendations defining the appropriate object classes.

```

PrETS12{ccitt(0)identified-organization(4)etsi(0)ets(x)informationModel(0)asn1Module(2)
prETS12(3)}
DEFINITIONS IMPLICIT TAGS ::=
BEGIN
-- EXPORTS everything

IMPORTS

Version FROM ASN1DefinedTypesModule {ccitt(0) recommendation(0) m(13) m3100(3100)
informationModel(0) asn1Module(2) asn1DefinedTypesModule(0)}
RDNSSequence FROM InformationFramework {joint-iso-ccitt ds(5) modules(1) informationFramework(1)};

Connector ::= SEQUENCE {
    connectorType      PrintableString,
    connectorLocation  PrintableString,
    supporting         ListOfLocalDistinguishedName}

EquipmentActual ::= CHOICE {
    noType             NULL,
    type               EquipmentType}
EquipmentAutoSwitchReason ::= CHOICE {
    waitToRestore      [0] NULL,
    equipmentFailure   [1] NULL
}

EquipmentExpected ::= CHOICE {
    noType             NULL,
    type               EquipmentType}

EquipmentProtectionStatus ::= SET OF CHOICE {
    noRequest          [0] NULL,
    doNotRevert        [1] NULL,
    manualSwitch       [2] SEQUENCE {
        switchStatus   [0] SwitchStatus,
        protectionUnitsSwitched [1] FromAndToProtectionUnit},
    autoSwitch         [3] SEQUENCE {
        switchStatus   [0] SwitchStatus,
        protectionUnitsSwitched [1] FromAndToProtectionUnit,
        autoSwitchReason [2] EquipmentAutoSwitchReason},
    forcedSwitch       [4] SEQUENCE {
        switchStatus   [0] SwitchStatus,
        protectionUnitsSwitched [1] FromAndToProtectionUnit},
    lockout            [5] SwitchStatus}

EquipmentProtectionStatusParameter ::= SEQUENCE {
    oldProtectionStatus EquipmentProtectionStatus,
    newProtectionStatus EquipmentProtectionStatus}

EquipmentType ::= PrintableString

ListOfLocalDistinguishedName ::= SET OF RDNSSequence

PhysicalConnectorList ::= SET OF Connector

PhysicalInstance ::= CHOICE {
    unknownInstance NULL,
    instance         PrintableString}

ProtectionUnitPointer ::= CHOICE {
    pointer          SET OF ObjectInstance
    null            NULL }

END -- end of ASN1DefinedTypesModule
  
```

11 Support objects fragment

11.1 Support objects - object classes

```
powerSupply MANAGED OBJECT CLASS
DERIVED FROM "Recommendation X.721":top;
CHARACTERIZED BY
"Recommendation M.3100":createDeleteNotificationsPackage,
powerSupplyPackage PACKAGE
BEHAVIOUR
powerSupplyBehaviourPkg BEHAVIOUR
DEFINED AS
```

The power supply object class is used to control the power supply sources within the SDHNE. There shall be one instance for each of the power supply sources.

```
;
;
ATTRIBUTES
powerSupplyId GET,
powerSource GET,
poweredEquipmentPtrList GET,
"Recommendation X.721":operationalState GET,
"Recommendation M.3100":supportedByObjectList GET;
NOTIFICATIONS
"Recommendation X.721":attributeValueChange,
"Recommendation X.721":statechange;
;;
REGISTERED AS { etsObjectClass 11 };
syncProtectionGroup MANAGED OBJECT CLASS
DERIVED FROM "Recommendation G.774-03: 1994":protectionGroup;
CHARACTERIZED BY
syncProtectionGroupPkg PACKAGE
BEHAVIOUR syncProtectionGroupBeh;
NOTIFICATIONS
protectionSwitchReporting syncProtectionStatusParameter;;;
CONDITIONAL PACKAGES
squelchStatusPkg PRESENT IF
*an instance represents the T4 selection function*;
squelchThresholdsPkg PRESENT IF
*an instance represents the T4 selection function and the SSM algorithm is
supported*;
SSMActivePackage PRESENT IF
*activation/deactivation of the SSM algorithm is supported*;
REGISTERED AS { etsObjectClass 17 };
syncProtectionGroupBeh BEHAVIOUR
DEFINED AS
```

"This object class is specific to synchronisation protection. The creation/deletion of a syncProtectionGroup is performed by the NE depending upon its synchronisation protection capabilities (intrinsic knowledge of the NE). The operationalState attribute reflects only the switch capabilities of the protection scheme(i.e. it becomes disabled when the NE has detected that it can no longer perform switch operations (automatic or manual)).

The manual switch operation can be performed among timing sources with the same or different priority and, when the SSM algorithm is active, with the same quality. A manual switch request between two timing sources with different quality levels and SSM algorithm is active will be rejected.

The forced switch operation can be performed among any timing sources, independently of the priority and quality levels.

All protectionUnits work in the protecting mode.

The protectionSwitchReporting notification is sent by the synchronisation protection group according to the following rules. There are several cases:

A switch from one protecting unit to another has occurred. In this case the new values of the protection status attributes of the protecting units which have been switched to and from shall be reported in the notification by means of the toProtectionStatus and fromProtectionStatus parameters respectively.

A protecting unit has a failure or a clearing of a failure without causing a switch. In this case the fromProtectionStatus parameter is not used and the toProtectionStatus parameter refers to the protection status attribute value of the protecting unit which has a failure or a clearing of a failure. The exception is when the protecting unit is already forced or locked out, in which case no notification is sent.

A protecting unit has been locked out or released from lockout without causing a switch. In this case the fromProtectionStatus parameter is not used and the toProtectionStatus parameter refers to the protection status attribute value of the protecting unit which has been locked out or released from lockout.

A protecting unit has been manually switch or released from manual switch without causing a switch. In this case the fromProtectionStatus parameter is not used and the toProtectionStatus parameter refers to the protection status attribute value of the protecting unit which has been manually switch or released from manual switch.

A protecting unit has been forced switch or released from forced switch without causing a switch. In this case the fromProtectionStatus parameter is not used and the toProtectionStatus parameter refers to the protection status attribute value of the protecting unit which has been forced switch or released from forced switch.

While in the lockout or forced switch state, no notifications are sent ";

```

syncProtectionUnit MANAGED OBJECT CLASS
  DERIVED FROM "Recommendation G.774-03: 1994":protectionUnit;
  CHARACTERIZED BY
    "Recommendation M.3100: 1992":createDeleteNotificationsPackage,
    syncProtectionUnitPkg PACKAGE
      BEHAVIOUR syncProtectionUnitBeh;
  ATTRIBUTES
    syncProtectionStatus GET;;;

  CONDITIONAL PACKAGES
    SSMQualityPackage PRESENT IF
      *the timing source has a SSM quality level*;
REGISTERED AS { etsObjectClass 18 };
syncProtectionUnitBeh BEHAVIOUR
  DEFINED AS
    "This object class is specific to synchronisation protection. Instances of this object class are
    used to represent a relationship between a timing source and the timing generator(or a timing
    physical termination). All instances of this object class will act in the protecting role (i.e.
    there will not be a syncProtectionUnit with the protecting attribute set to FALSE), in order to
    ensure the consistency of the priority list.
    This object class can be created by the OS or the NE. When it is created by the OS, the OS must
    provide a value for the attribute unreliableResourcePointer. ";

timingGenerator MANAGED OBJECT CLASS
  DERIVED FROM "Recommendation X.721":top;
  CHARACTERIZED BY
    timingGeneratorPackage PACKAGE
      BEHAVIOUR
        timingGeneratorBehaviourPkg BEHAVIOUR
          DEFINED AS
            For the selection of the timing sources a 1:n protection like mechanism is used.
            Each protectionUnit in the protectionGroup has a pointer, the unreliableResourcePointer, which
            points to the related TP (see figure A.15).

            The currentTimingSourcePointer points to the timing source currently in use. A value of NULL of
            this attribute indicates the use of the internal oscillator. In that case, the
            unreliableResourcePointer of the corresponding protectionUnit also points to NULL.
            The reliableResourcePointer of the protectionUnit related to the currently used timing source
            points to the timingGenerator. The reliableResourcePointers of the other protectionUnits related
            to timing sources which are not currently in use are pointing to NULL.
            To select a special instance of a possible timing source, the OS has to use the invokeProtection
            action of the protectionGroup.
            Only one instance of this object class shall be created.
            ;;
          ATTRIBUTES
            timingGeneratorId GET,
            currentTimingSourcePointer GET,
            "Recommendation X.721":operationalState GET,
            "Recommendation M.3100":supportedByObjectList GET;
          NOTIFICATIONS
            "Recommendation X.721":attributeValueChange,
            "Recommendation X.721":statechange;
          ;;
        REGISTERED AS { etsObjectClass 12 };

timingPhysicalTerminationBidirectional MANAGED OBJECT CLASS
  DERIVED FROM timingPhysicalTerminationSink,
               timingPhysicalTerminationSource;
  CHARACTERIZED BY
    timingPhysicalTerminationBidirectionalPkg PACKAGE
      BEHAVIOUR timingPhysicalTerminationBidirectionalBehaviour;;;
REGISTERED AS { etsObjectClass 19 };
timingPhysicalTerminationBidirectionalBehaviour BEHAVIOUR
  DEFINED AS
    "This object class originates and terminates the 2 MHz signal. ";

timingPhysicalTerminationSink MANAGED OBJECT CLASS
  DERIVED FROM "Recommendation X.721: 1992":top;
  CHARACTERIZED BY
    timingPhysicalTerminationSinkPkg PACKAGE
      BEHAVIOUR timingPhysicalTerminationSinkBehaviour;
  ATTRIBUTES
    timingPhysicalTerminationId GET,
    "Recommendation X.721: 1992":operationalState GET,
    "Recommendation M.3100: 1992":supportedByObjectList GET;
  NOTIFICATIONS
    "Recommendation X.721: 1992":objectCreation,
    "Recommendation X.721: 1992":objectDeletion,
    "Recommendation X.721: 1992":stateChange,
    "Recommendation X.721: 1992":attributeValueChange;;;

  CONDITIONAL PACKAGES
    "Recommendation M.3100: 1992":tmnCommunicationsAlarmInformationPackage
      PRESENT IF "There are alarms associated with the
    timingPhysicalTermination",

```

```

    "Recommendation M.3100: 1992":alarmSeverityAssignmentPointerPackage
        PRESENT IF "an instance supports it";
REGISTERED AS { etsObjectClass 20 };
timingPhysicalTerminationSinkBehaviour      BEHAVIOUR
    DEFINED AS
    "This managed object represents the external 2 MHz input interface (reference point T3 in the
    Recommendation G.783). This object class terminates (receives) the 2 MHz signal. The probable
    causes which are reported by a communicationsAlarm notification are lossOfSignal and
    degradedSignal.";

timingPhysicalTerminationSource MANAGED OBJECT CLASS
    DERIVED FROM      "Recommendation X.721: 1992": top;
    CHARACTERIZED BY
    timingPhysicalTerminationSourcePkg PACKAGE
        BEHAVIOUR      timingPhysicalTerminationSourceBeh;
    ATTRIBUTES
        timingPhysicalTerminationId          GET,
        "Recommendation X.721: 1992":operationalState      GET,
        "Recommendation M.3100: 1992":supportedByObjectList GET,
        outputTimingSourcePointer            GET;
    NOTIFICATIONS
        "Recommendation X.721: 1992":objectCreation,
        "Recommendation X.721: 1992":objectDeletion,
        "Recommendation X.721: 1992":stateChange,
        "Recommendation X.721: 1992":attributeValueChange;;
REGISTERED AS {etsObjectClass 21};
timingPhysicalTerminationSourceBeh          BEHAVIOUR
    DEFINED AS
    "This managed object represents the external 2 MHz output interface (reference point T4 in the
    Recommendation G.783). This object class originates (transmits) the 2 MHz signal.";

```

11.2 Support objects - packages

```

sSMActivePackage PACKAGE
    ATTRIBUTES
        sSMActive      GET-REPLACE;
REGISTERED AS { etsPackage 1 };

sSMQualityPackage PACKAGE
    ATTRIBUTES
        sSMQuality      GET-REPLACE;
REGISTERED AS { etsPackage 2 };

squelchStatusPkg PACKAGE
    ATTRIBUTES
        squelchStatus      GET;
REGISTERED AS { etsPackage 3 };
squelchThresholdsPkg PACKAGE
    ATTRIBUTES
        squelchT0Threshold      GET-REPLACE,
        squelchT1Threshold      GET-REPLACE;
REGISTERED AS { etsPackage 4 };

```

11.3 Support objects - attributes

supportedByObjectList

The value of the supportedByObjectList attribute points to the equipment and software objects which implement the TPs.

```
currentTimingSourcePointer  ATTRIBUTE
  WITH ATTRIBUTE SYNTAX    PrETS13.CurrentTimingSourcePointer;
  MATCHES FOR EQUALITY;
REGISTERED AS {etsAttribute 10 };
```

```
outputTimingSourcePointer  ATTRIBUTE
  WITH ATTRIBUTE SYNTAX    prETS13.OutputTimingSourcePointer;
  MATCHES FOR EQUALITY;
REGISTERED AS {etsAttribute 14 };
```

```
poweredEquipmentPtrList  ATTRIBUTE
  WITH ATTRIBUTE SYNTAX    PrETS13.PoweredEquipmentPtrList;
  MATCHES FOR EQUALITY, SET-COMPARISON, SET-INTERSECTION;
  BEHAVIOUR
    poweredEquipmentPtrListBehaviour BEHAVIOUR
    DEFINED AS
      This attribute is used to point to the equipment object instances which are powered by a
      powerSupply instance.
  ;;
REGISTERED AS {etsAttribute 11 };
```

```
powerSource ATTRIBUTE
  WITH ATTRIBUTE SYNTAX    PrETS13.PowerSource ;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    powerSourceBehaviour BEHAVIOUR
    DEFINED AS
      This attribute is used to display the voltage of a power source.
  ;;
REGISTERED AS { etsAttribute 9 };
```

```
powerSupplyId ATTRIBUTE
  WITH ATTRIBUTE SYNTAX    PrETS13.NameType ;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    powerSupplyIdBehaviour BEHAVIOUR
    DEFINED AS
      This attribute is used as an RDN for naming instances of the powerSupply object classes.
  ;;
REGISTERED AS { etsAttribute 8 };
```

```
sSMActive ATTRIBUTE
  WITH ATTRIBUTE SYNTAX    PrETS13.Boolean;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    sSMActiveBehaviour BEHAVIOUR
    DEFINED AS
      "This attribute indicates whether or not the SSM algorithm is active(active = TRUE).";
REGISTERED AS { etsAttribute 15 };
```

```
sSMQuality ATTRIBUTE
  WITH ATTRIBUTE SYNTAX    PrETS13.Integer;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    sSMQualityBehaviour BEHAVIOUR
    DEFINED AS
      "This attribute indicates the quality(0 to 15) of the timing source. Set operations on this
      attribute are not allowed for interfaces that carry quality information. When active, the SSM
      algorithm gives priority to the quality indications before considering priority indications
      attached to the protection units.";;
REGISTERED AS { etsAttribute 16 };
```

```
squelchStatus ATTRIBUTE
  WITH ATTRIBUTE SYNTAX    PrETS13.Boolean;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    squelchStatusBehaviour BEHAVIOUR
    DEFINED AS
      "This attribute indicates whether the selected input (either T0 or T1) to the T4 selection
      proces is squelched or not (squelched = TRUE).";
REGISTERED AS { etsAttribute 17 };
```

```
squelchT0Threshold ATTRIBUTE
  WITH ATTRIBUTE SYNTAX    PrETS13.Integer;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    squelchT0ThresholdBehaviour BEHAVIOUR
    DEFINED AS
```

"This attribute indicates the quality (0..15) of the T0 output below which the T0 output is squelched ";;
REGISTERED AS { etsAttribute 18 };

squelchT1Threshold ATTRIBUTE
WITH ATTRIBUTE SYNTAX PrETS13.Integer;
MATCHES FOR EQUALITY;
BEHAVIOUR
squelchT1ThresholdBehaviour BEHAVIOUR
DEFINED AS

"This attribute indicates the quality (0..15) of the T1 reference selected by selector A below which the T1 reference is squelched ";;
REGISTERED AS { etsAttribute 19 };

syncProtectionStatus ATTRIBUTE
WITH ATTRIBUTE SYNTAX PrETS13.SyncProtectionStatus;
MATCHES FOR EQUALITY, SET-COMPARISON,
SET-INTERSECTION;

BEHAVIOUR syncProtectionStatusBeh;
REGISTERED AS { etsAttribute 20 };
syncProtectionStatusBeh BEHAVIOUR
DEFINED AS

"This attribute is used to indicate the status of the protection switch in a protectionUnit instance.
The remainder of this behaviour provides the allowable syncProtectionStatus attribute values for protecting units.

No Request: No request is present on the protecting unit.

Manual Switch Complete to Protecting Unit: A Manual Switch has been completed to this protecting unit.

Force Switch Complete to Protecting Unit: A Force Switch has been completed to this protecting unit.

Automatic Switch Complete to Protecting Unit: An Automatic Switch has been completed to this protecting unit.

Protecting Unit Failed: The protecting unit has a failure condition present.

Protecting Unit Locked Out: The protecting unit has been locked out.";

timingGeneratorId ATTRIBUTE
WITH ATTRIBUTE SYNTAX PrETS13.NameType ;
MATCHES FOR EQUALITY;
BEHAVIOUR
timingGeneratorIdBehaviour BEHAVIOUR
DEFINED AS

This attribute is used as an RDN for naming instances of the timingGenerator object classes.

;;
REGISTERED AS { etsAttribute 7 };

timingPhysicalTerminationId ATTRIBUTE
WITH ATTRIBUTE SYNTAX pRETS13.NameType;
MATCHES FOR EQUALITY;
BEHAVIOUR
timingPhysicalTerminationIdBehaviour BEHAVIOUR
DEFINED AS

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

REGISTERED AS {etsAttribute 21 };

11.4 Support objects - name bindings

```
powerSupply-sdhNE NAME BINDING
  SUBORDINATE OBJECT CLASS powerSupply;
  NAMED BY
  SUPERIOR OBJECT CLASS "Recommendation G.774" : sdhNE;
  WITH ATTRIBUTE powerSupplyId;
  BEHAVIOUR
    powerSupply-sdhNEBehaviour BEHAVIOUR
  DEFINED AS
    The subordinate managed object is 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 };

syncProtectionUnit-syncProtectionGroup NAME BINDING
  SUBORDINATE OBJECT CLASS syncProtectionUnit;
  NAMED BY SUPERIOR OBJECT CLASS syncProtectionGroup;
  WITH ATTRIBUTE protectionUnitId;
  CREATE
    WITH-AUTOMATIC-INSTANCE-NAMING;
  DELETE
    ONLY-IF-NO-CONTAINED-OBJECTS;
  REGISTERED AS { etsNameBinding 26 };

timingGenerator-sdhNE NAME BINDING
  SUBORDINATE OBJECT CLASS timingGenerator;
  NAMED BY
  SUPERIOR OBJECT CLASS "Recommendation G.774":sdhNE;
  WITH ATTRIBUTE timingGeneratorId;
  BEHAVIOUR
    timingGenerator-sdhNEBehaviour BEHAVIOUR
  DEFINED AS
    The subordinate managed object is automatically instantiated when the superior managed object
    is instantiated, according to the make-up and mode of operation of the equipment.
  ;;
REGISTERED AS { etsNameBinding 19 };

timingPhysicalTerminationBidirectional-sdhNE NAME BINDING
  SUBORDINATE OBJECT CLASS timingPhysicalTerminationBidirectional;
  NAMED BY
  SUPERIOR OBJECT CLASS sdhNE;
  WITH ATTRIBUTE timingPhysicalTerminationId;
  BEHAVIOUR timingPhysicalTerminationBidirectional-sdhNEBeh BEHAVIOUR
  DEFINED AS
    "The subordinate managed object is automatically instantiated when the superior managed object is
    instantiated, according to the make-up and mode of operation of the equipment.";
  REGISTERED AS { etsNameBinding 27 };

timingPhysicalTerminationSink-sdhNE NAME BINDING
  SUBORDINATE OBJECT CLASS timingPhysicalTerminationSink;
  NAMED BY
  SUPERIOR OBJECT CLASS sdhNE;
  WITH ATTRIBUTE timingPhysicalTerminationId;
  BEHAVIOUR timingPhysicalTerminationSink-sdhNEBeh BEHAVIOUR
  DEFINED AS
    "The subordinate managed object is automatically instantiated when the superior managed object is
    instantiated, according to the make-up and mode of operation of the equipment.";
  REGISTERED AS { etsNameBinding 28 };

timingPhysicalTerminationSource-sdhNE NAME BINDING
  SUBORDINATE OBJECT CLASS timingPhysicalTerminationSource;
  NAMED BY SUPERIOR OBJECT CLASS sdhNE;
  WITH ATTRIBUTE timingPhysicalTerminationId;
  BEHAVIOUR timingPhysicalTerminationSource-sdhNEBeh BEHAVIOUR
  DEFINED AS
    "The subordinate managed object is automatically instantiated when the superior
    managed object is instantiated, according to the make-up and mode of operation of the
    equipment.";;
  REGISTERED AS {etsNameBinding 29 };
```

11.5 Support objects - parameter

```
syncProtectionStatusParameter PARAMETER
  CONTEXT EVENT-INFO;
  WITH SYNTAX PrETS13.SyncProtectionStatusParameter
  BEHAVIOUR syncProtectionStatusParameterBeh;
REGISTERED AS { etsParameter 2 };
syncProtectionStatusParameterBeh BEHAVIOUR
  DEFINED AS
    "This parameter is included in the additional info parameters of the protection switching
    reporting notification.";
```

11.6 Support objects - supporting ASN.1

```
PrETS13 {ccitt(0) identified-organization(4) etsi(0) ets(x) informationModel(0) asn1Module(2)
prETS13(4)}
```

```
DEFINITIONS IMPLICIT TAGS ::=
```

```
BEGIN
```

```
-- EXPORTS everything
```

```
IMPORTS
```

```
NameType FROM ASN1DefinedTypesModule {ccitt(0) recommendation(0) m(13) m3100(3100)
informationModel(0) asn1Module(2) asn1DefinedTypesModule(0)}
```

```
ObjectInstance FROM CMIP-1 {joint-iso-ccitt ms(9) cmip(1) modules(0) protocol(3)};
```

```
Boolean ::= BOOLEAN
```

```
CurrentTimingSourcePointer ::= CHOICE {
    pointer          [0] ObjectInstance,
    internalOscillator [1] NULL
}
```

```
Integer ::= INTEGER
```

```
outputTimingSourcePointer ::= ObjectInstance
```

```
PoweredEquipmentPtrList ::= SET OF ObjectInstance
```

```
PowerSource ::= INTEGER
```

```
SyncProtectionStatus ::= CHOICE {
    noRequest      [0] NULL,
    autoSwitch     [1] RelativeDistinguishedName,
    manualSwitch   [2] RelativeDistinguishedName,
    forcedSwitch   [3] RelativeDistinguishedName,
    lockout        [4] NULL,
    failure        [5] NULL
}
```

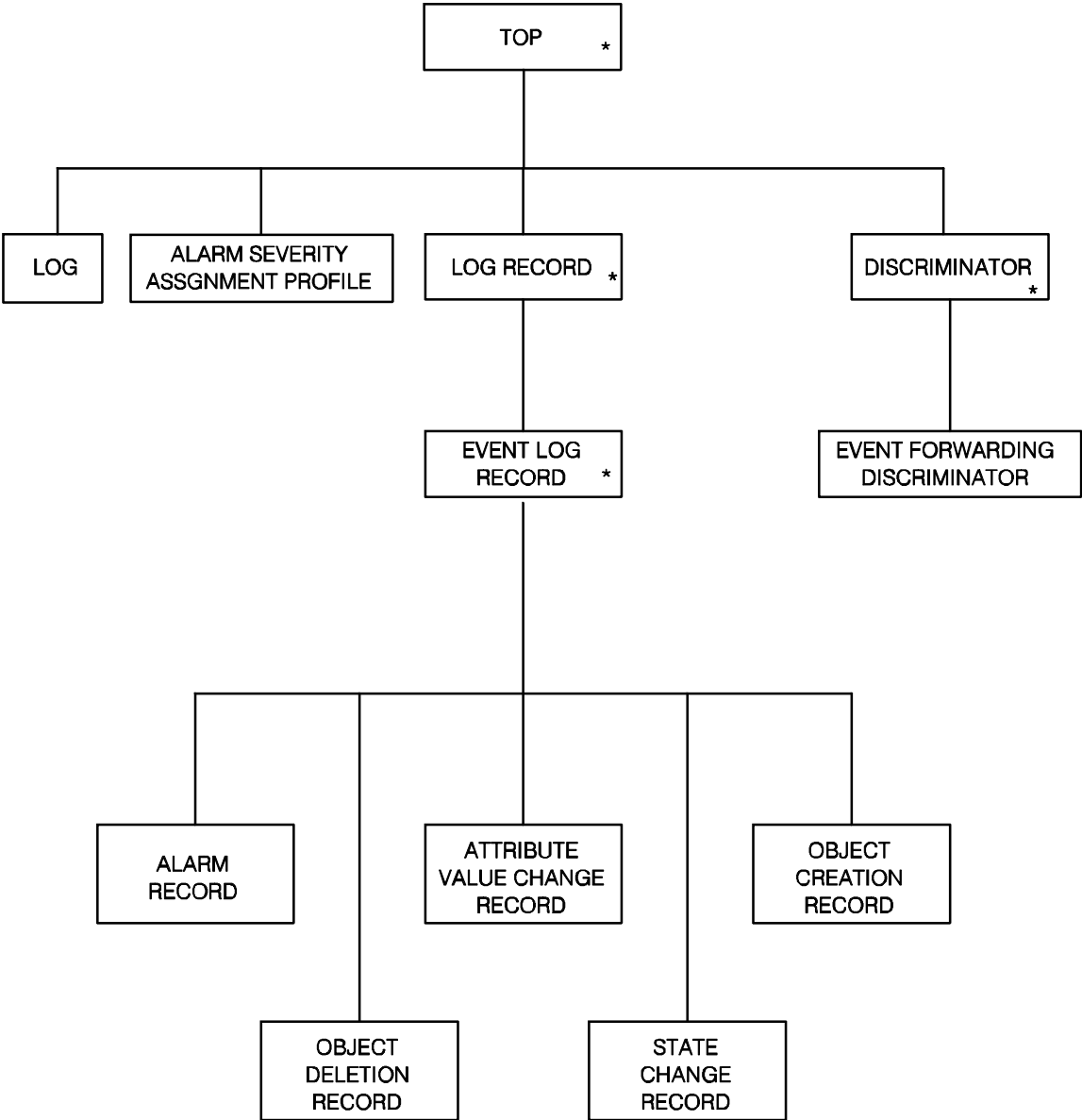
```
-- In the SyncProtectionStatus syntax, autoSwitch, manualSwitch and forcedSwitch will contain the
RDN of the synchronisation protection unit which has been switched from.
```

```
SyncProtectionStatusParameter ::= SEQUENCE {
    toProtectionStatus SyncProtectionStatus,
    fromProtectionStatus SyncProtectionStatus OPTIONAL}

```

```
END
```


Annex A (normative): Figures and tables



* not instantiated

Figure A.1: Generic objects inheritance

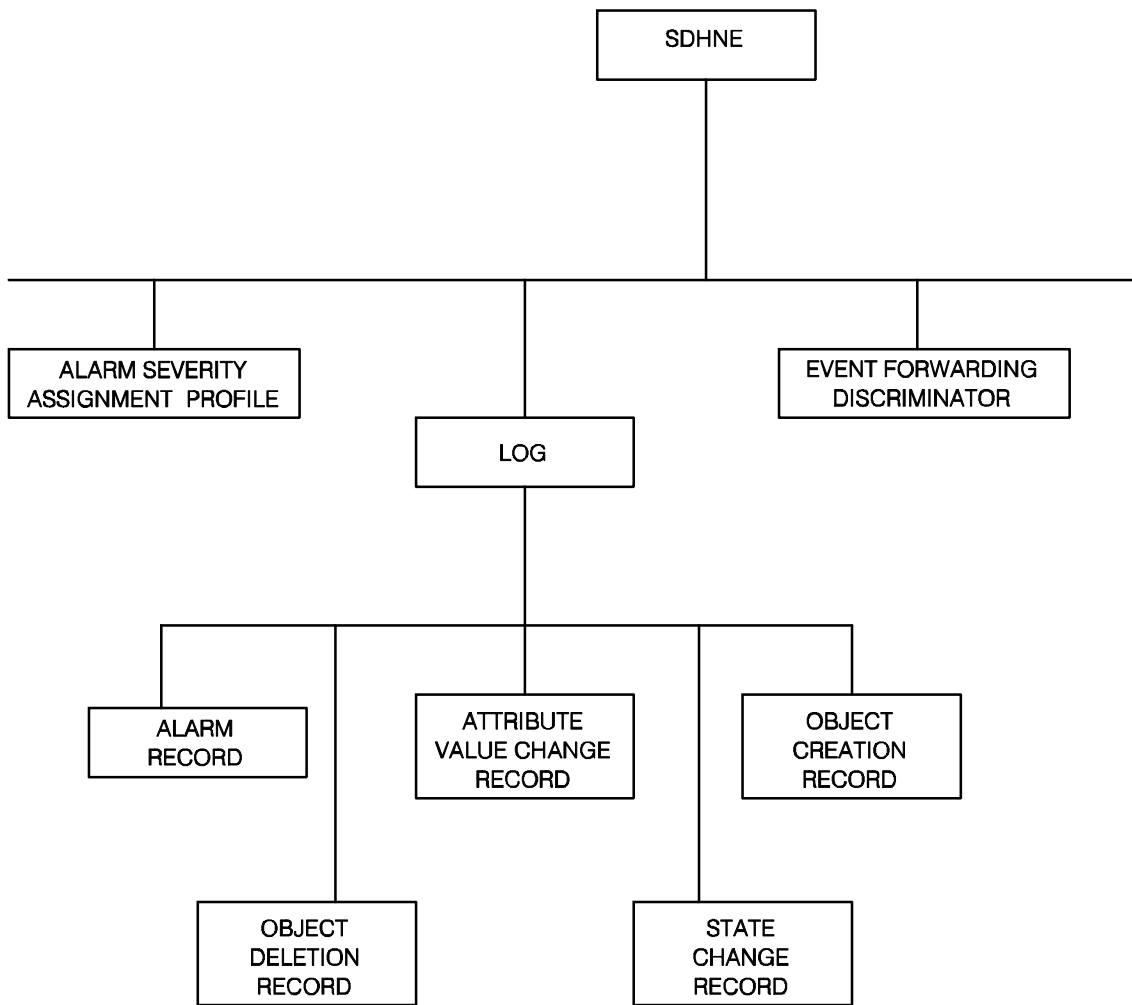


Figure A.2: Generic object naming

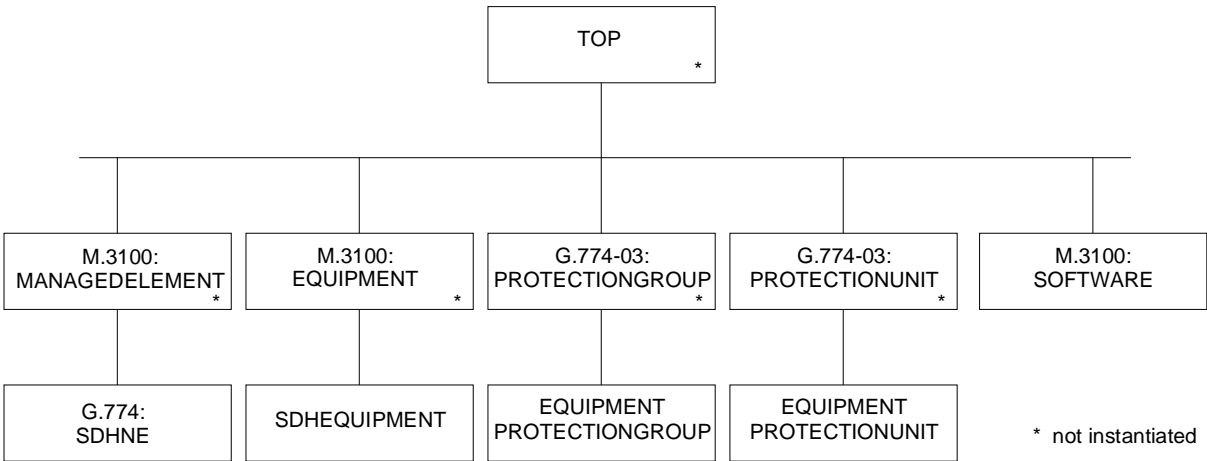


Figure A.3: Equipment objects inheritance

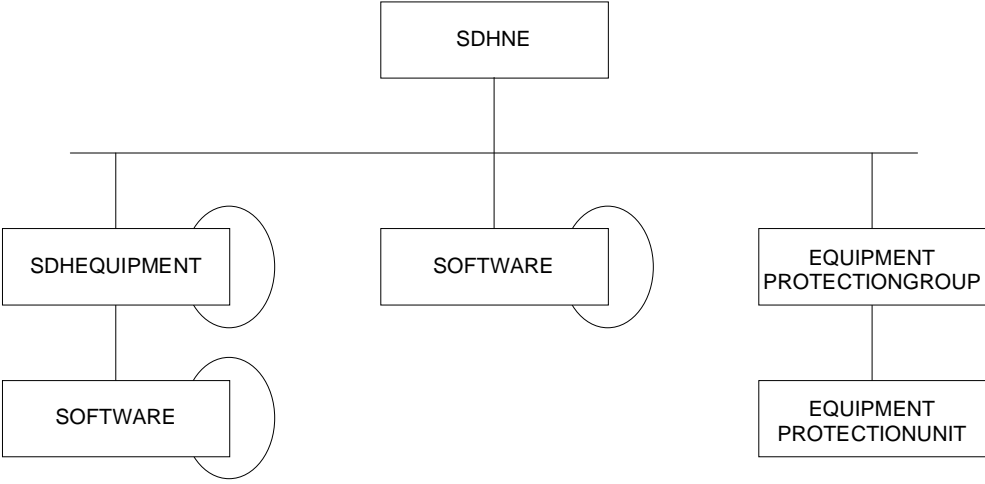


Figure A.4: Equipment object naming

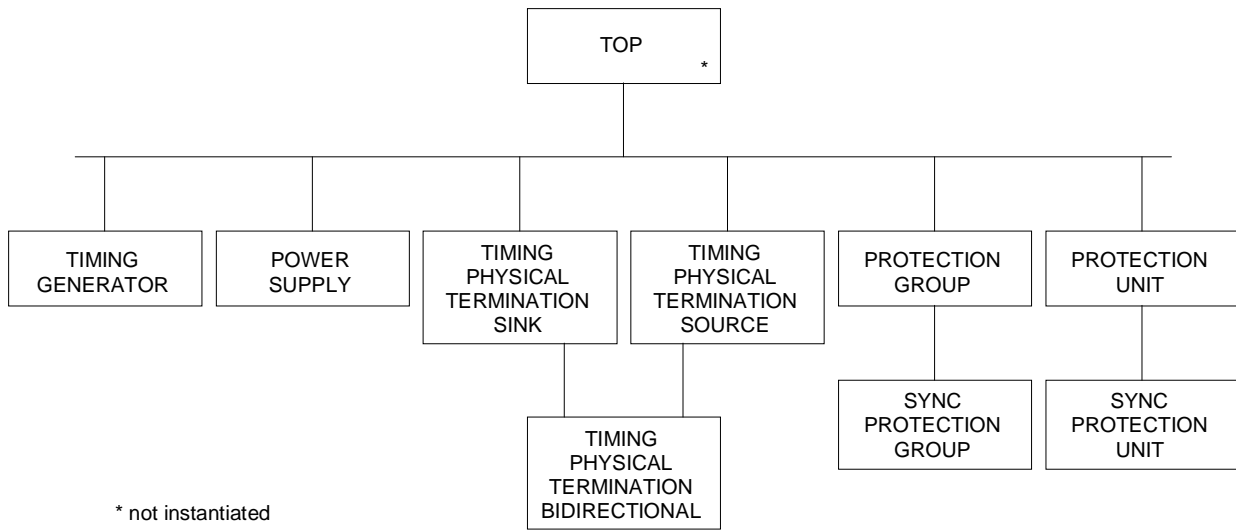


Figure A.5: Support objects inheritance

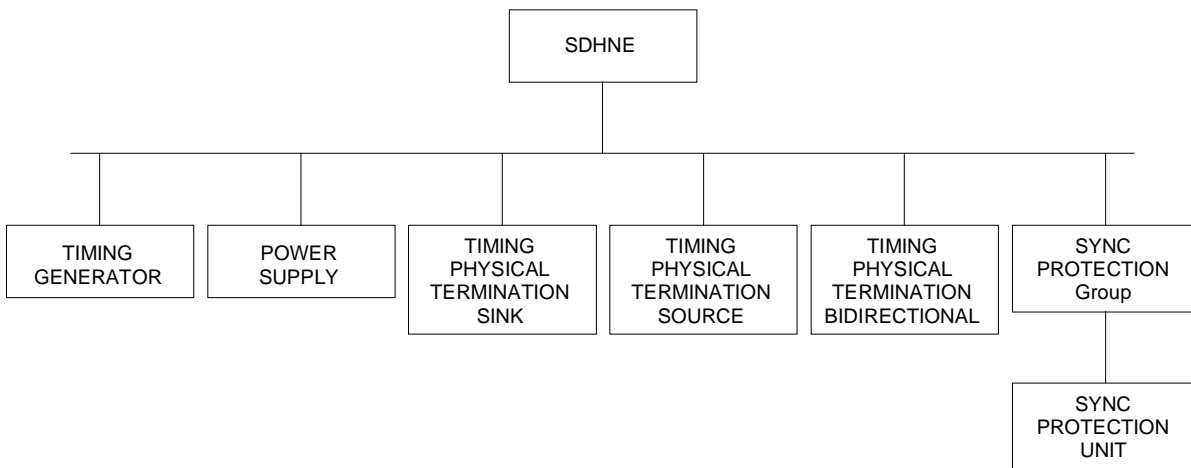
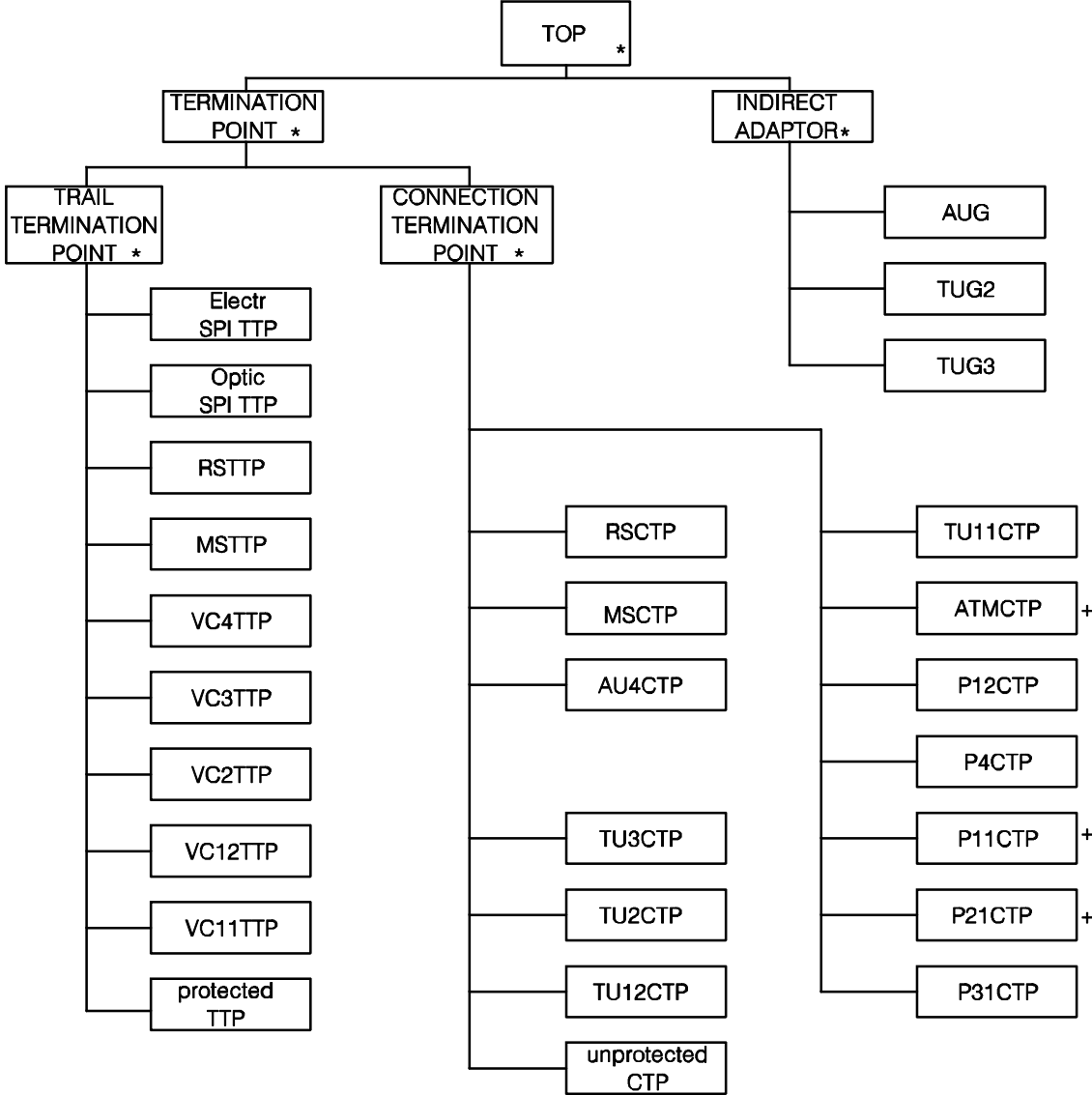


Figure A.6: Support objects naming

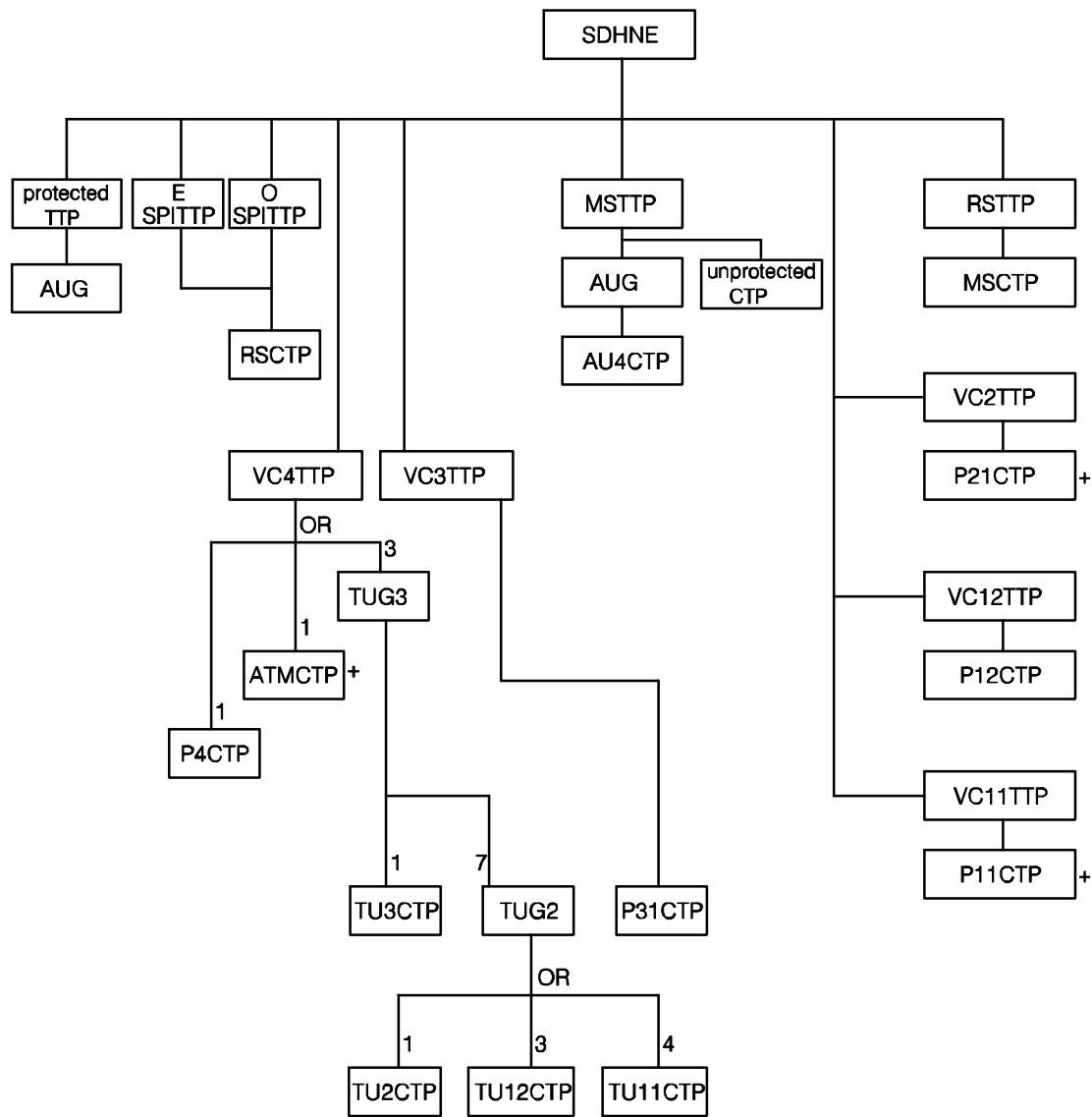


(All objects may be source, sink or bidirectional)

* not instantiated

+ not defined

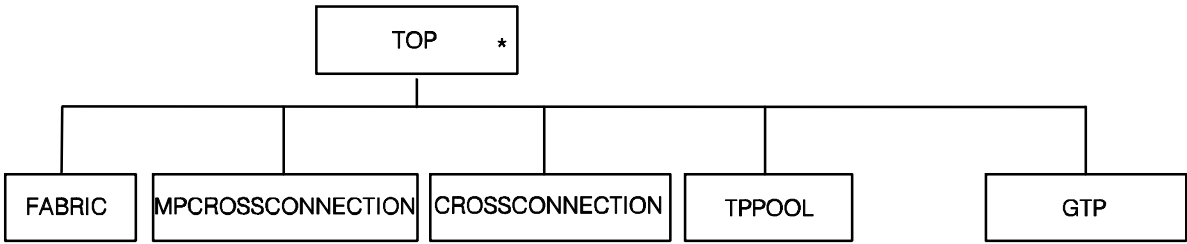
Figure A.7: Transport objects inheritance



(All objects may be source, sink or bidirectional)

+ not defined

Figure A.8: Transport objects naming



* not instantiated

Figure A.9: Cross-connection objects inheritance

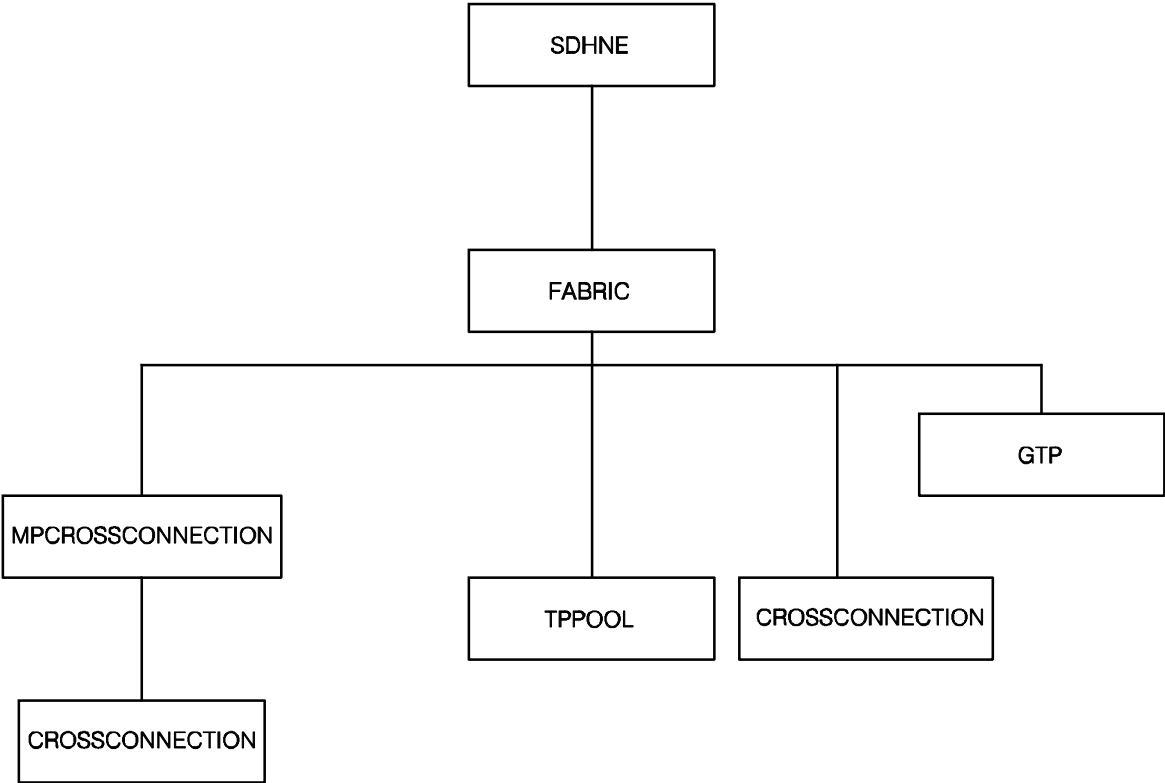
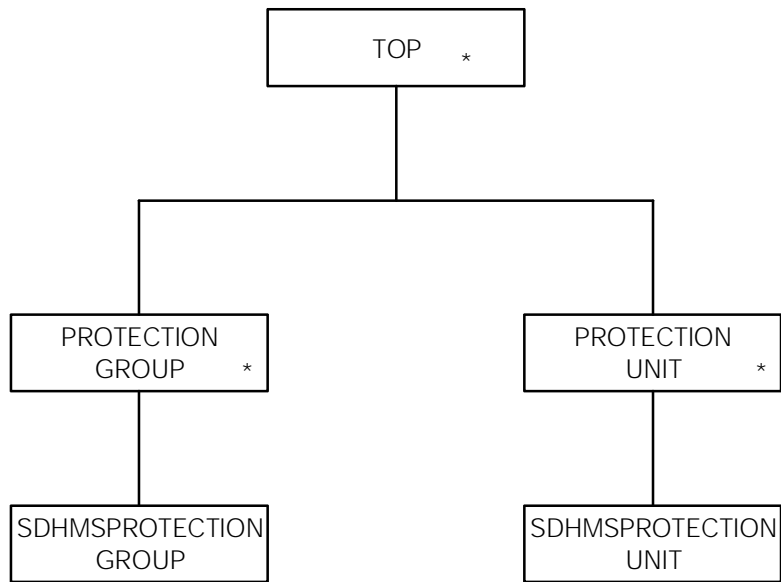


Figure A.10: Cross-connection objects naming



* not instantiated

Figure A.11: Section protection objects inheritance

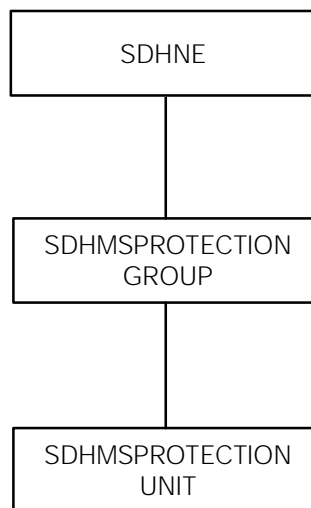


Figure A.12: Section protection objects naming

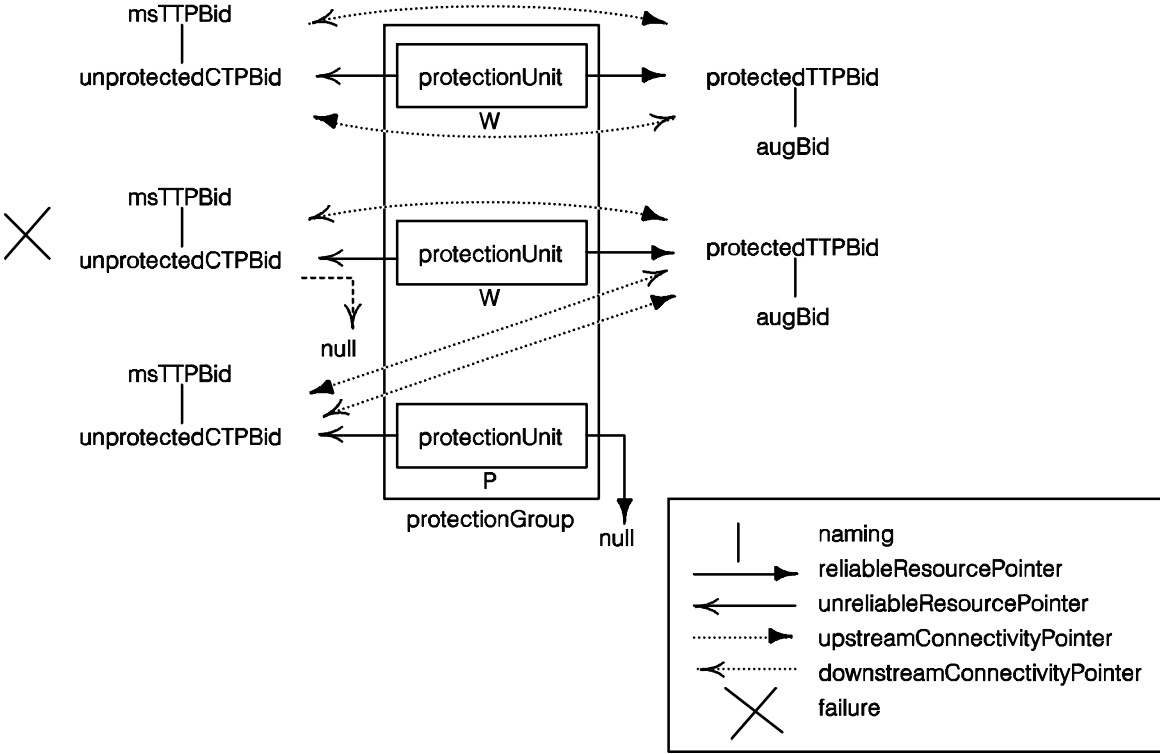


Figure A.13: Bidirectional 1:2 Protection model example

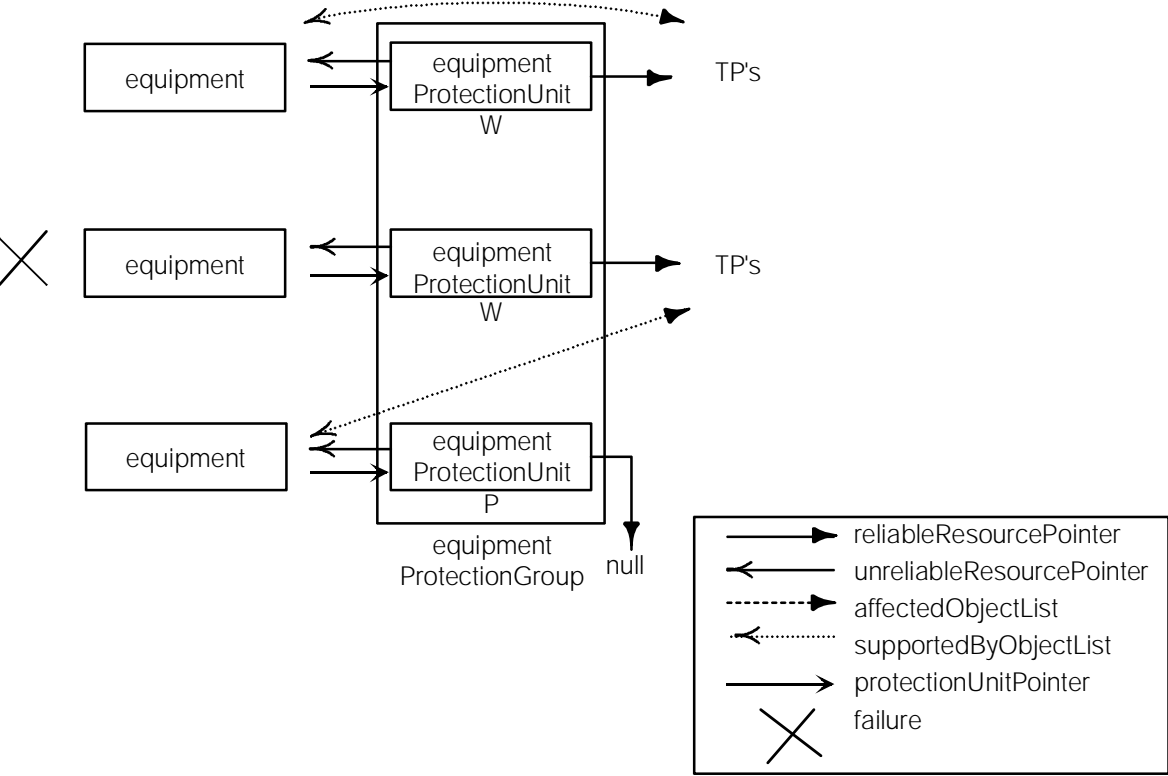


Figure A.14: Equipment protection 2:1 protection

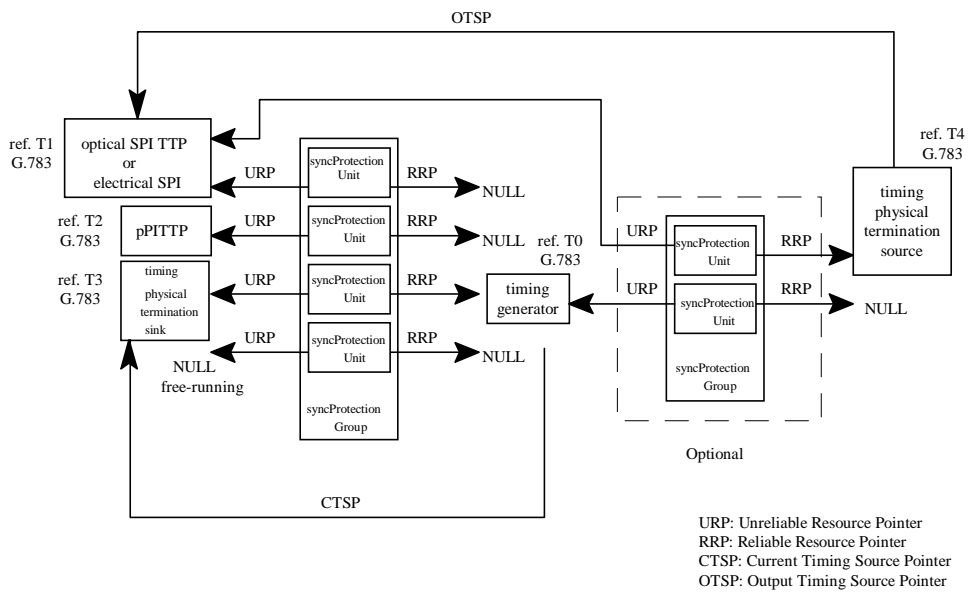
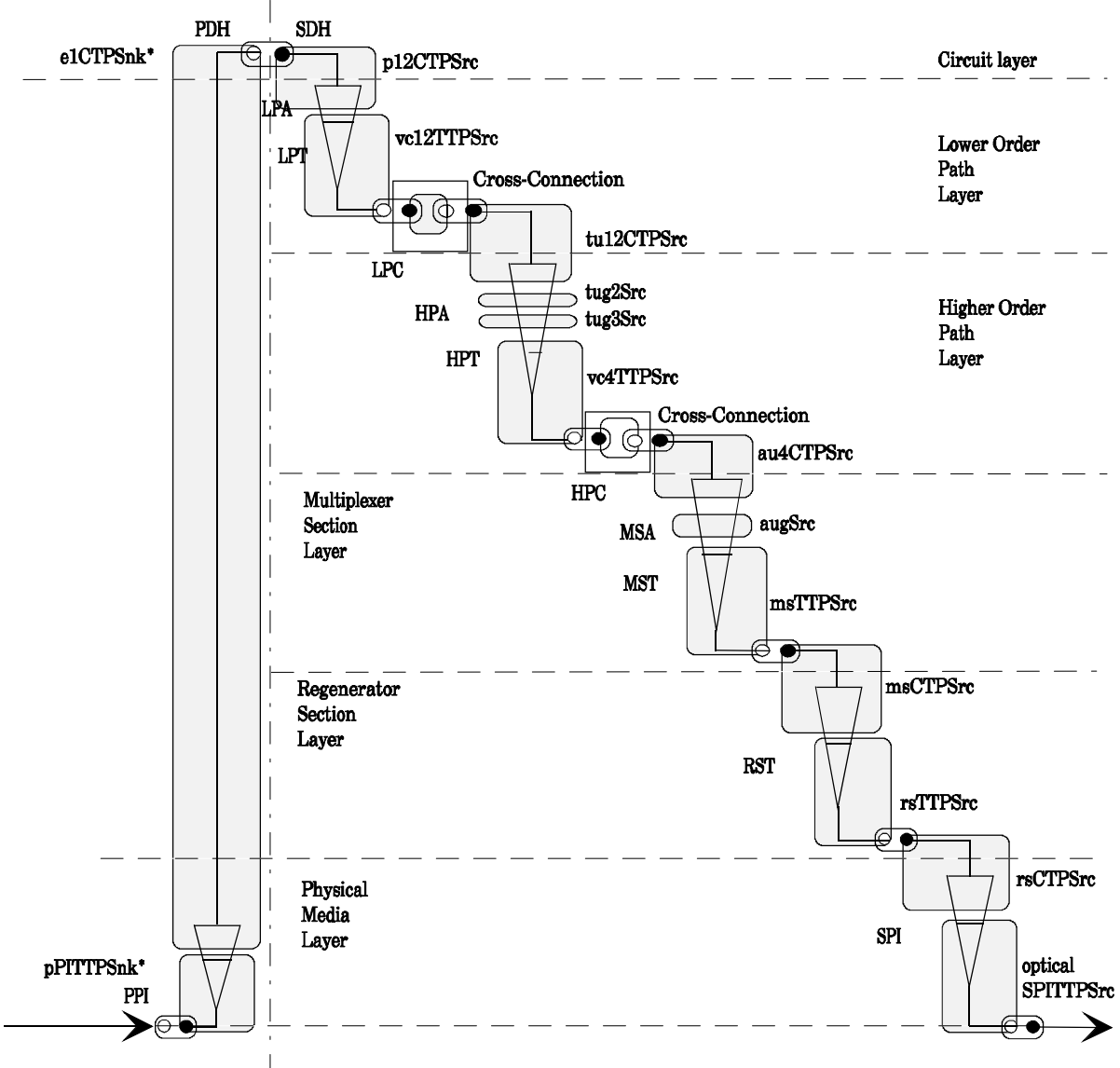
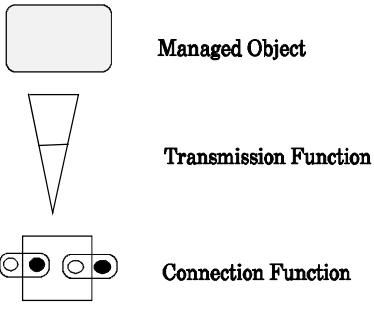


Figure A.15: Timing Protection Schema in the Information Model

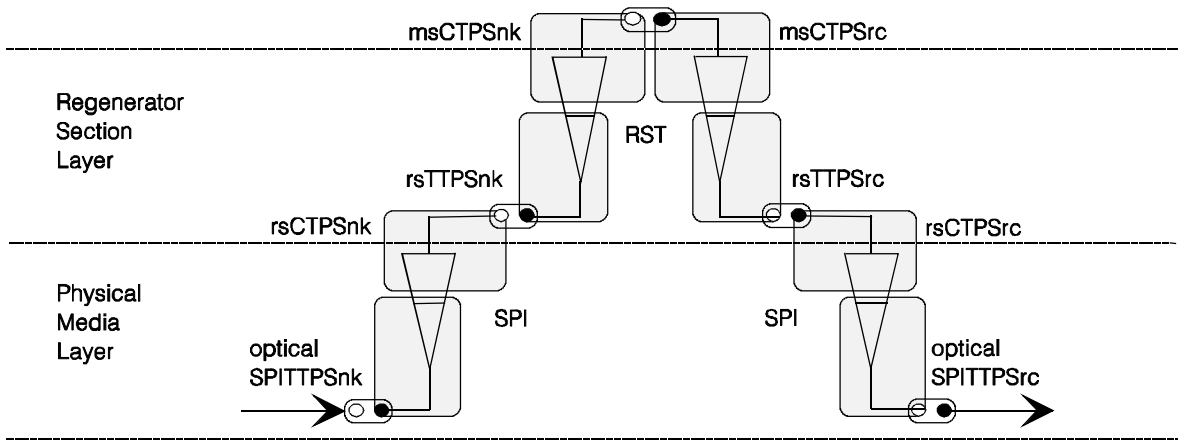


* defined in PrETS 300-371



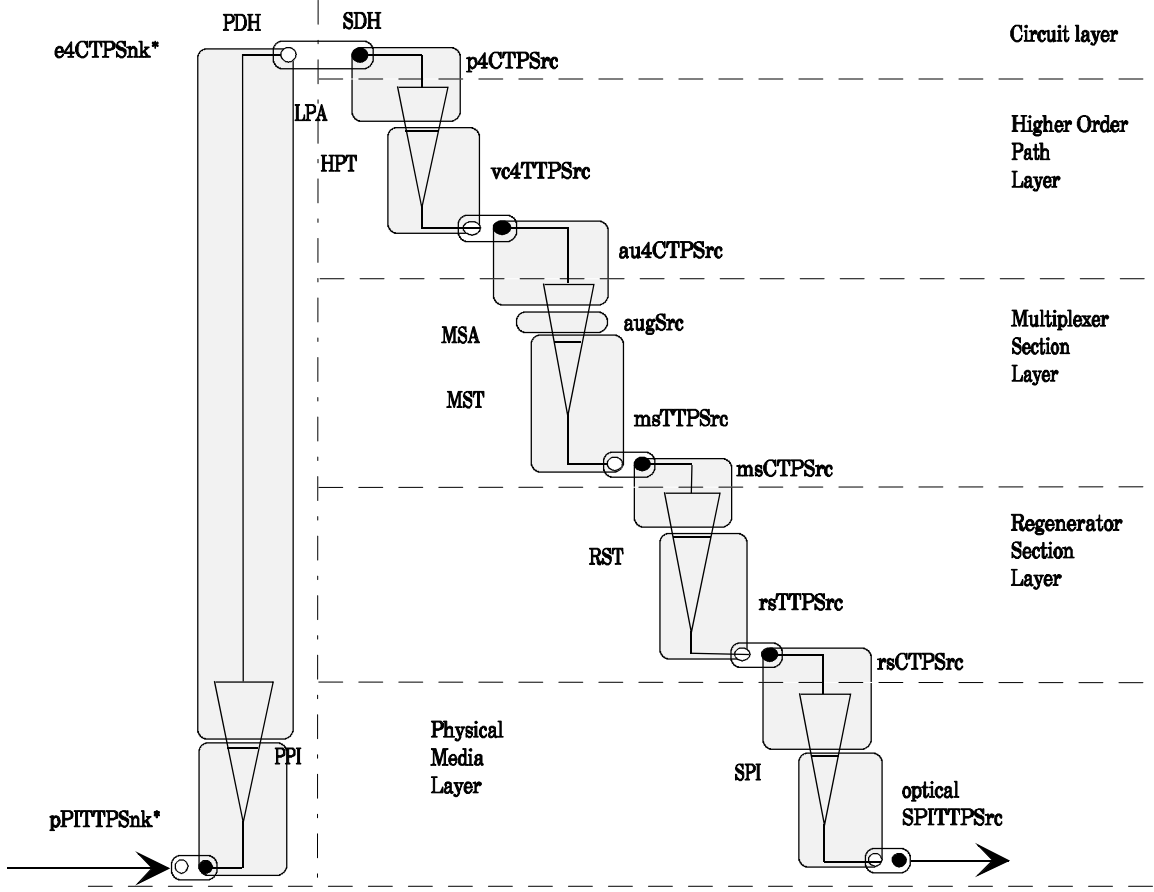
Example 1: 2 Mbit/s signals multiplexed to STM-N signal

Figure A.16: Examples for the relationship between object classes and transmission (continued)

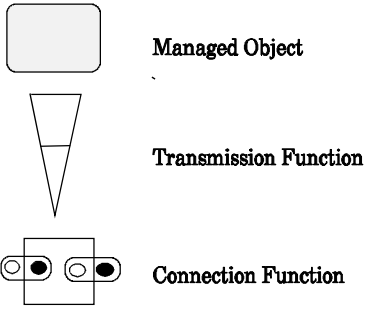


Example 2: STM-N unidirectional Repeater

Figure A.16 (continued)

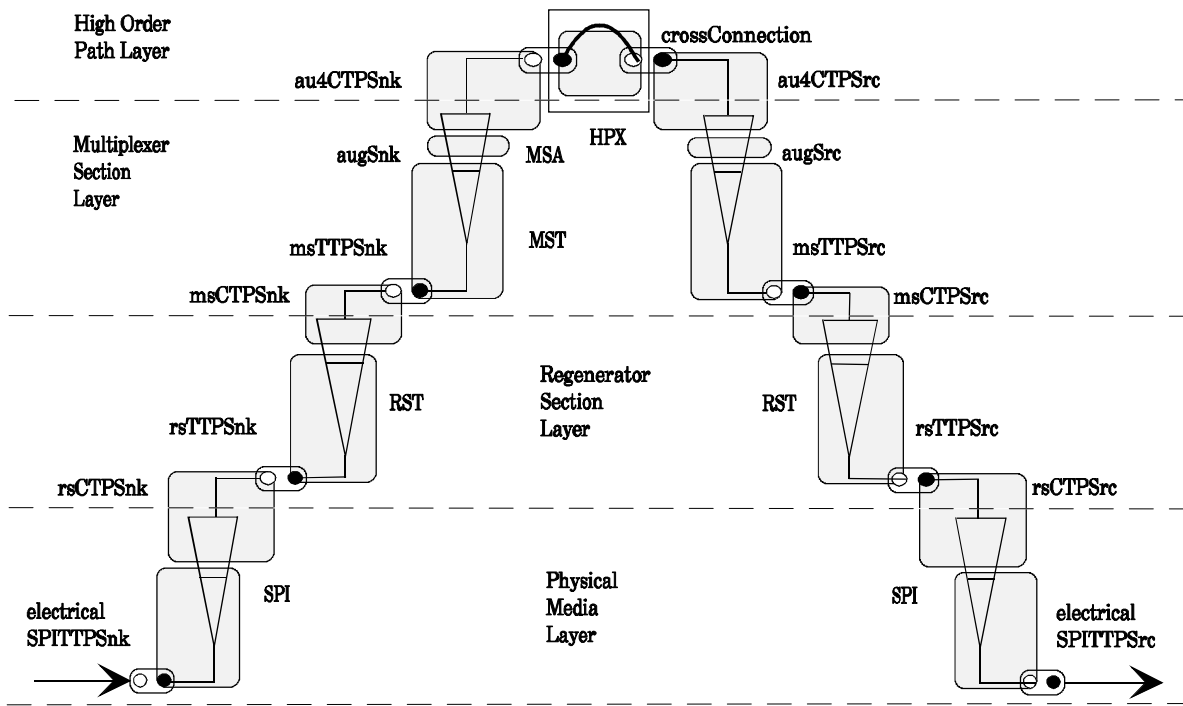


* defined in PrETS 300-371



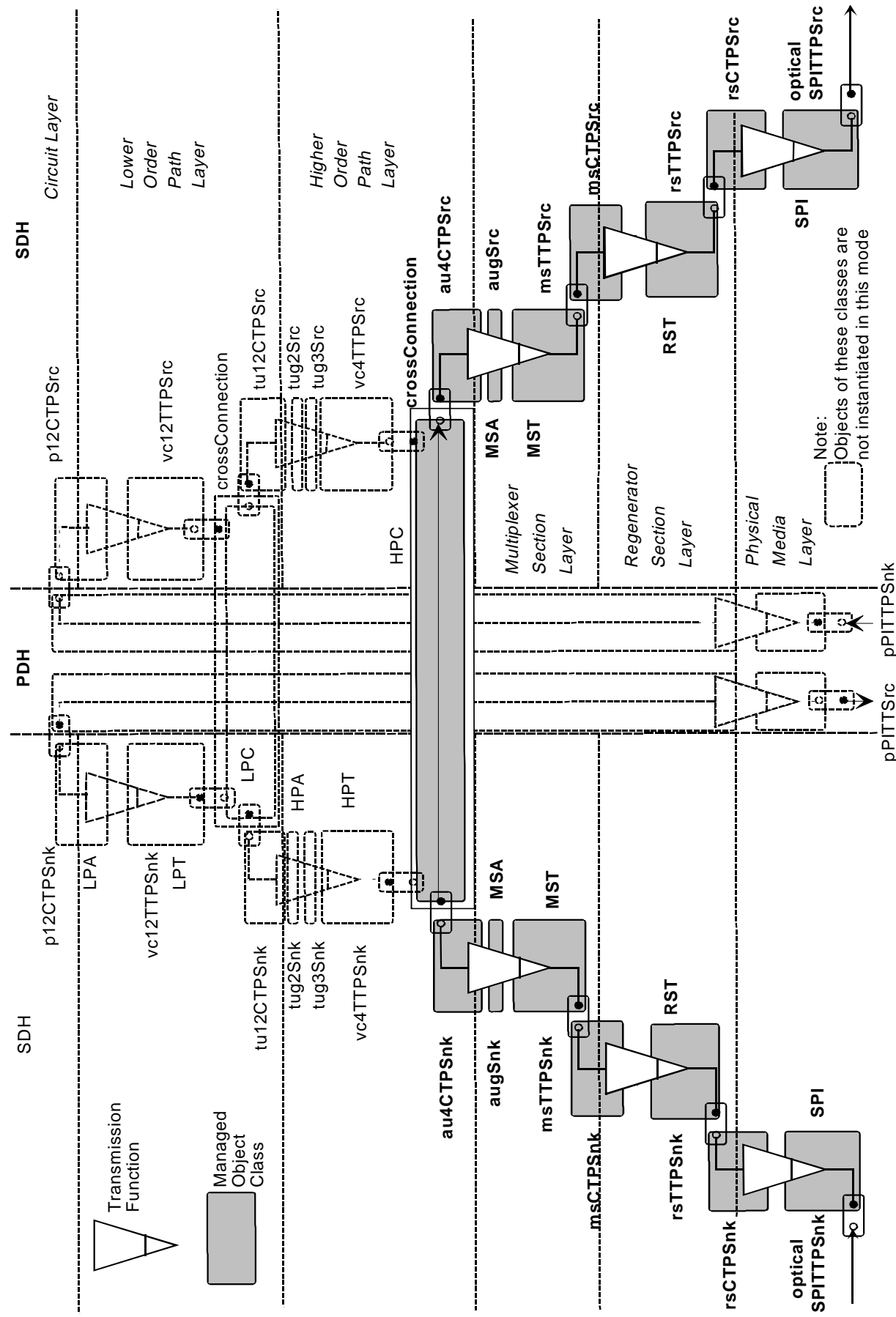
Example 3: 140 Mbit/s signals multiplexed to STM-N signal

Figure A.16 (continued)



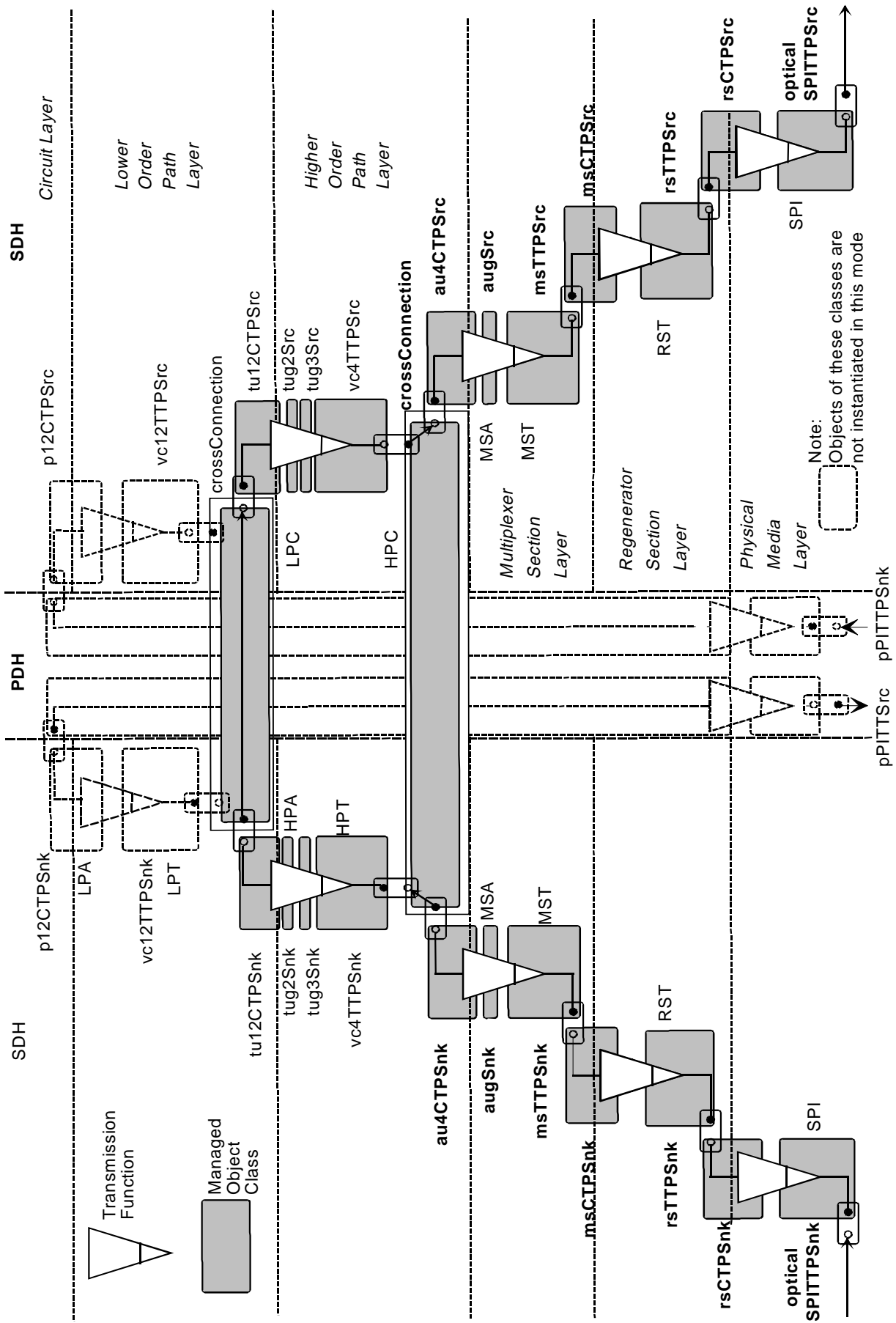
Example 4: SDXC4/4 Higher order cross-connect

Figure A.16 (concluded)



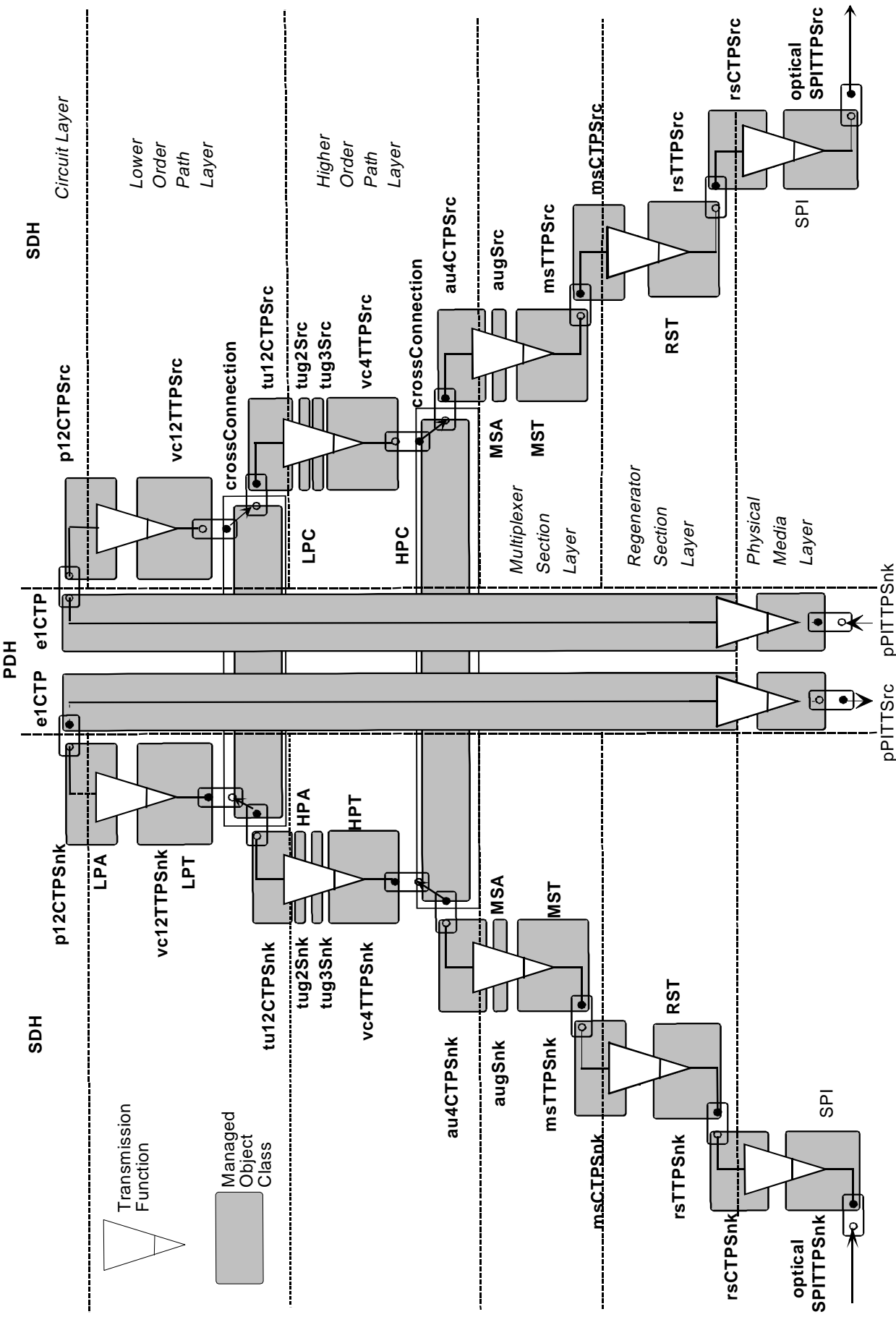
Example 1: Add-Drop-Mux or SDXC4/1 with Au-4 cross-connection active

Figure A.17



Example 2: Add-Drop-Mux or SDXC4/1 with TU-12 cross-connection active

Figure A.17 (continued)



Example 3: Add-Drop-Mux or SDXC4/1 with TU-12 cross-connection active

Figure A.17 (concluded)

Table A.1: Mapping of ITU-T Recommendation G.783 [4] defects on ITU-T Recommendation M.3100 [5] or ITU-T Recommendation X.721 [6] probable causes

Block in G.783 [4]		G.783 [4] defect	G.774 [2] probable cause	M.3100 [5] probable cause
4-1	SPI	Receive loss of signal	LOS	lossOfSignal
4-1	SPI	Transmit fail	-	- Use transmitFailure from X.721 [6]
4-2	RST	Loss of frame	LOF	lossOfFrame
4-3	MST	Multiplex section AIS	AIS	aIS
4-3	MST	Excessive errors	excessive BER	transmissionError
4-3	MST	Signal degrade	signal degrade	degradedSignal
4-3	MST	Far end receive failure	FERF	farEndReceiverFailure
4-5	MSA	Loss of AU pointer	LOP	lossOfPointer
4-5	MSA	AU AIS	AIS	aIS
4-7	HPT	Mismatch of HO path trace ID	path trace mismatch	pathTraceMismatch
4-7	HPT	Mismatch of HO path signal label	signal label mismatch	payloadTypeMismatch
4-7	HPT	HO path FERF	FERF	farEndReceiverFailure
4-8	HPA	Loss of TU pointer	LOP	lossOfPointer
4-8	HPA	TU AIS	AIS	aIS
4-8	HPA	Loss of TU multiframe	loss of TU multiframe	lossOfFrame
4-10	LPT	<i>Mismatch of LO path trace ID (note 2)</i>	<i>path trace mismatch</i>	pathTraceMismatch
4-10	LPT	Mismatch of LO path signal label	signal label mismatch	payloadTypeMismatch
4-10	LPT	LO path FERF	FERF	farEndReceiverFailure
4-11	LPA (note 1)	<i>Frame alignment loss</i>	LOF	lossOfFrame
4-12	PPI (note 1)	<i>Loss of incoming tributary signal</i>	LOS	lossOfSignal
4-14	HPOM (note 2)	<i>Mismatch of HP path trace ID</i>	<i>path trace mismatch</i>	pathTraceMismatch
4-14	HPOM (note 2)	<i>Mismatch of HP path signal label</i>	<i>signal label mismatch</i>	<i>payloadTypeMismatch</i>
4-14	HPOM (note 2)	HO path FERF	FERF	farEndReceiverFailure
4-15	LPOM (note 2)	<i>Mismatch of LO path trace ID</i>	<i>path trace mismatch</i>	<i>pathTraceMismatch</i>
4-15	LPOM (note 2)	<i>Mismatch of LO path signal label</i>	<i>signal label mismatch</i>	<i>payloadTypeMismatch</i>
4-15	LPOM (note 2)	LO path FERF	FERF	farEndReceiverFailure

NOTE 1: Not currently expressed in ITU-T Recommendation G.774 [2].

NOTE 2: Due to revision of ITU-T Recommendation G.709 [1] or ITU-T Recommendation G.783 [4].

Annex B (informative): Bibliography

For the purposes of this ETS, the following informative references have been used:

- ITU-T Recommendation G.707 (1993): "Synchronous Digital Hierarchy Bit Rates".
- ITU-T Recommendation G.708 (1993): "Network Node Interface for the Synchronous Digital Hierarchy".
- ITU-T Recommendation G.773 (1992): "Protocol suites for Q-interfaces for management of transmission systems".
- ITU-T Recommendation G.781 (1994): "Structure of Recommendations on multiplexing equipment for the synchronous digital hierarchy (SDH)".
- ITU-T Recommendation G.782 (1994): "Types and general characteristics of synchronous digital hierarchy (SDH) multiplexing equipment".
- ITU-T Recommendation G.784 (1993): "Synchronous Digital Hierarchy (SDH) Management".
- ITU-T Recommendations G.803 (1993): "Architectures of transport networks based on the synchronous digital hierarchy (SDH)".
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