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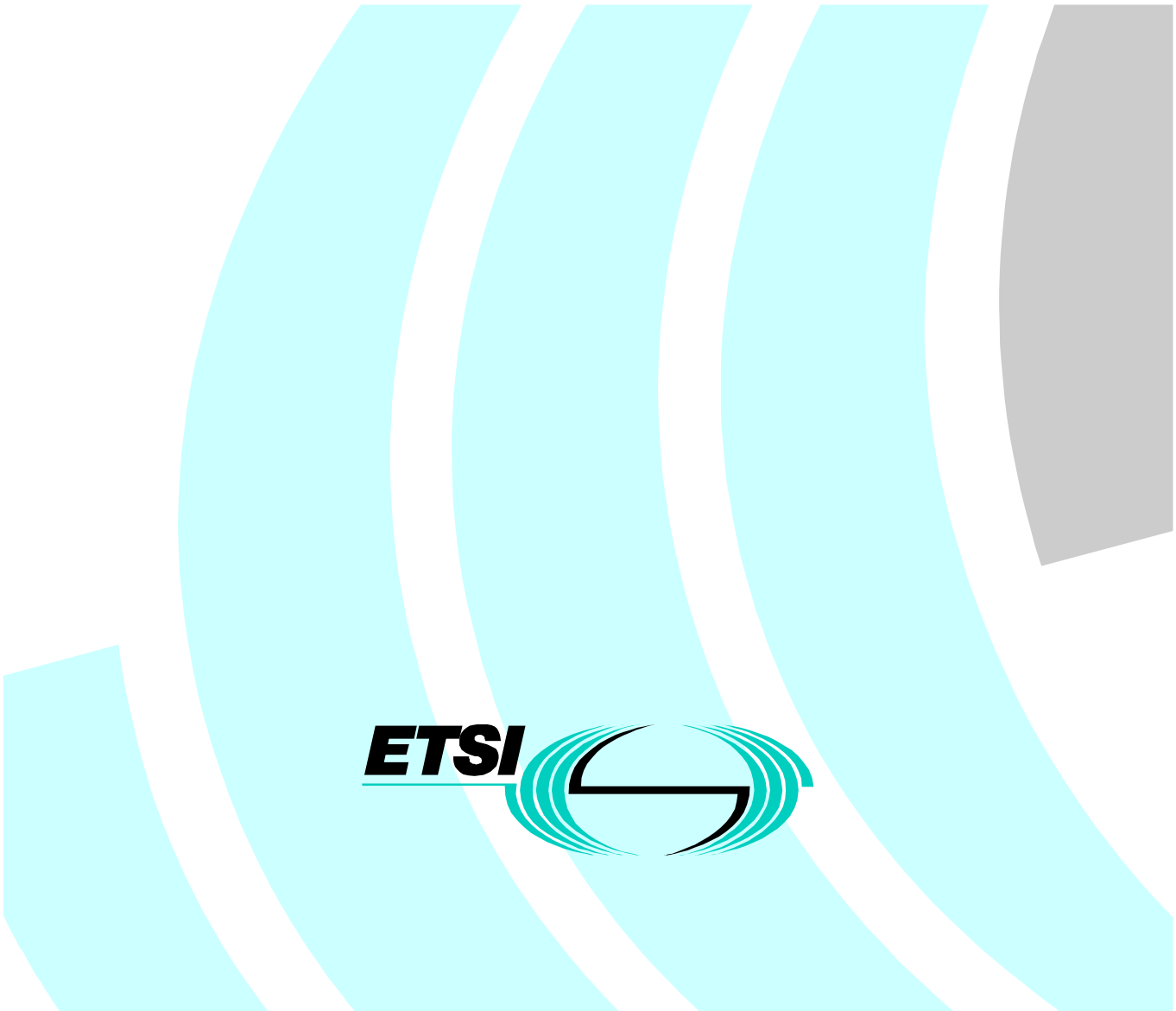
Telecommunications Management Network (TMN); TM-SDH IM-non intrusive monitoring function and supervisory unequipped termination function for the network element view



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Contents

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Foreword

This ETSI Standard (ES) has been produced by ETSI Technical Committee Telecommunications Management Network (TMN).

The present document describes the information model to manage the Trail monitoring function and the supervised trail termination functions of the SDH NE in accordance with the requirement of NE standard specification.

1 Scope

The present document defines the information model to be used at the interface between network elements and management systems, for the management of trail non-intrusive monitoring which covers the functions TTm (POM-Path Overhead Monitoring) and TTs (SUM-Supervised Unequipped Trail Monitor/Generator) provisionable at SDH path layers.

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.

The Information Model defined here (and the corresponding Message Set) is concerned with the management of network elements, 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] ITU-T Recommendation X.721: "Information technology - Open Systems Interconnection - Structure of management information: Definition of management information".

[2] ITU-T Recommendation M.3100: "Generic network information model".

[3] Void.

[4] ITU-T Recommendation G.774: "Synchronous Digital Hierarchy (SDH) management information model for the network element view".

[5] ITU-T Recommendation X.722: "Information technology - Open Systems Interconnection - Structure of Management Information: Guidelines for the definition of managed objects".

[6] Void.

[7] Void.

[8] Void.

[9] Void.

[10] Void.

[11] ITU-T Recommendation G.774-01: "Synchronous Digital Hierarchy (SDH) performance monitoring for the network element view".

[12] Void.

[13] ITU-T Recommendation G.774-05: "Synchronous Digital Hierarchy (SDH) management of connection supervision functionality (HCS/LCS) for the network element view".

[14] ITU-T Recommendation G.774-06: "Synchronous Digital Hierarchy (SDH) unidirectional performance monitoring for the network element view".

[15] ITU-T Corrigendum to G.774: "Synchronous digital hierarchy (SDH) management information model for the network element view".

[16] Void.

[17] Void.

[18] Void.

[19] Void.

[20] ITU-T Recommendation X.739: "Information technology - Open Systems Interconnection - Systems Management: Metric objects and attributes".

[21] ITU-T Recommendation G.831: "Management capabilities of transport networks based on the Synchronous Digital Hierarchy (SDH)".

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

[23] EN 300 417-4-1: "Transmission and Multiplexing (TM); Generic requirements of transport functionality of equipment; Part 4-1: Synchronous Digital Hierarchy (SDH) path layer functions".

3 Abbreviations

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

AIS	Alarm Indication Signal
APId	Access Point Identifier
ASN.1	Abstract Syntax Notation 1
cRDI	Restricted Digital Info.
cSSF	Service Switching Function
CTP	Connection Termination Point
DEG	Degraded
dTIM	Trace Identifier Mismatch defect
FEBE	Far End Block Error (now REI)
FERF	Far End Receive Failure (now RDI)
ITU	International Telecommunications Union
ITU-T	International Telecommunications Union -Transmission sector
LOP	Low Order Path
MON	Monitored (the supervision process is active as opposed to NMON)
NMON	Non Monitored
RDI	Remote Defect Indication (formerly FERF)
RDN	Relative Distinguished Name
SDH	Synchronous Digital Hierarchy
TCM	Tandem Connection Monitoring
TMN	Telecommunications Management Network
TP	Termination Point
TTI	Trail Trace Identifier
VC	Virtual Container

4 Information model of Trail non intrusive Monitoring and Supervisory Unequipped Monitoring

4.1 Overview

The approach followed in ITU-T Recommendation G.774-05 [13] for modelling the non-intrusive functionality was the inheritance. The resulting objects (Supervised points) cannot be easily harmonized with EN 300 417-4-1 [23], because their non-intrusive monitoring functional definition correspond with a TTPSink, whereas the Supervised points have an important adaptation role. The separation of functionally in EN 300 417-4-1 [23] appears so as incompatible with the hybrid nature of ITU-T Recommendation G.774-05 [13] SupervisedCTPs. Futhermore, the support of functionality such as TCM requires a flexibility that cannot be covered by the unified dual (generator, monitoring) nature modeled for the current ITU-T Recommendation G.774-05 [13] bi-directional points.

The features of Layer Monitoring Functions (defined in EN 300 417-4-1 [23]) which influence the proposed modelling approach are summarized below.

- R1. The whole set of Layer Monitoring Functions (as specified in [23]) should be modelled, including new features not reflected in the ITU-T Recommendation G.774-05 [13] (e.g. change from a supervisory-unequipped signal to a simple unequipped signal, should be detected and signalled).

- R2. The modelled Layer Monitoring Functions would be applied also for the monitoring of egressing trails (at matrix output ports).

- R3. The Sxm_TT_Sk function should be applied not only for monitoring trails with an equipped payload but also for unused link connections on external managing system request.

- R4. The Sxs_TT_Sk/So functions may be supported for a specific equipment at the same time in the range 0 % to 100 %.

- R5. The Sxm_TT_Sk function may be supported for a specific equipment at the same time in the range 0 % to 100 %.

4.2 Object class definitions

4.2.1 NON-INTRUSIVE MONITORING FRAGMENT

4.2.1.1 trailMonitor

```
trailMonitor                                MANAGED OBJECT CLASS
    DERIVED FROM                          "ITU-T Recommendation X.721 [1]: 1992": top;
    CHARACTERIZED BY
    "ITU-T Recommendation M.3100 [2]: 1995": alarmSeverityAssignmentPointerPackage,
    "ITU-T Recommendation M.3100 [2]: 1995": createDeleteNotificationsPackage,
    "ITU-T Recommendation M.3100 [2]: 1995": stateChangeNotificationPackage,
    "ITU-T Recommendation M.3100 [2]: 1995": tmnCommunicationsAlarmInformationPackage,
    thresholdsForBurstyPackage,
    trailMonitorPackage                 PACKAGE
    BEHAVIOUR       "Draft REN/TMN-39: 1998": alarmReportingControlBehaviour,
                    trailMonitorPackageBehaviour;
    ATTRIBUTES
    trailTIExpected             GET-REPLACE,
    trailTIAccepted             GET,
    monitoringDirection         GET,
    trailMonitorId              GET;
    CONDITIONAL                     PACKAGES
    unequippedTrailIndicationPackage        PRESENT IF
    *If monitoring of unused link connections should be provided*,
    "Draft REN/TMN-39: 1998": tpSpecificPersistenceTimePkg      PRESENT IF
    *the persistence 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 {etsSDHObjectClass 1000 }; -- Warning, only for compilation purposes
trailMonitorPackageBehaviour                    BEHAVIOUR
    DEFINED AS
```

```
    *If non-intrusive monitoring capabilities are to be provided, an instance of this class should
be created (automatically or by means of a management operation).
    The MON/NMON condition for all the involved probableCauses should be complaint with the
principles stated on alarmReportingControlBehaviour.
    If the attribute unequippedTrailIndication: = TRUE (unequipped trail monitoring), then a
communicationsAlarm notification shall be issued only if both, the signal label received and the
path trace received contain the all "0"s code. The probableCause parameter of the notification shall
indicate unequipped.
If the attribute unequippedTrailIndication: = FALSE or it has not been instantiated (monitoring
trails with equipped payload), then a communicationsAlarm notification shall be issued whenever the
label received contains the all "0"s code. The probableCause parameter of the notification shall
indicate unequipped.
    For dTIM detection the following behaviour applies:
-   The null choice for the trailTIExpected attribute matches with any value of path trace received
(no dTIM detection).
-   If mode1 choice of trailTIExpected is in place, dTIM is declared whenever the path trace
accepted (content of trailTIAccepted attribute) does not match the path trace expected (content of
trailTIExpected attribute).
-   If mode2 is the selected choice, a dTIM is detected whenever the trailTIAccepted attribute does
not contain a repeated single byte.
    On dTIM detection, a communicationsAlarm notification shall be issued. The probableCause
parameter of the notification shall indicate pathTraceMismatch.
A dTIM detection when the mode2 is the selected one, should be taken as an indication of mis-
connection with other new equipment when expecting the signal from an old equipment.
On detection of a Server Signal Fail (due to AIS or LOP), a communicationsAlarm notification shall
be issued. The probableCause parameter of the notification shall indicate serverSignalFailure.
A communicationsAlarm notification shall be issued whenever a RDI (Remote Defect Indication) is
detected. The probableCause parameter of the notification shall indicate farEndReceiverFailure.
At the end of every second, the number of errored blocks should be compared with the value of
burstyDegradeThreshol attribute; if it is greater or equal that such value, then the second should
be considered as BAD. If a number of consecutive BAD seconds greater or equal than the value
contained in the burstyDegradeConsecutiveattribute is reached, a communicationsAlarm notification
shall be issued. The probableCause parameter of the notification shall indicate degradedSignal.
A communicationsAlarm notification shall be issued if all "1" code is detected on VC PSL (Payload
Signal
Label). The probableCause parameter of the notification shall indicate aIS.
If monitoring of one (or multiple) cause(s) (cSSF, cRDI, cTIM, cUNEQ, cAIS and/or cDEG) is/are
disabled, the corresponding outstanding alarm(s) related this/these cause(s) for the connection
supervision is/are cleared and removed from the currentProblemList.
The detection of anyone of the above defects should not affect the operationalState of any
supervised superior object, whose state is only related with the status of the supporting hardware.
For performance monitoring purposes, a currentData subclass could be automatically instantiated
or alternatively created by management operation*.
```

4.2.2 SUPPERVISORY-UNEQUIPPED FRAGMENT

4.2.2.1 supervisedUnequippedBidirectional

```
supervisedUnequippedBidirectional                    MANAGED OBJECT CLASS
    DERIVED FROM                                supervisedUnequippedSink,
                                                    supervisedUnequippedSource;
    CHARACTERIZED BY
    supervisedUnequippedBdirectionalPackage PACKAGE
BEHAVIOUR                           supervisedUnequippedBidPackageBehaviour;;
REGISTERED AS {etsSDHObjectClass 1001}; -- Warning, only for compilation purposes
supervisedUnequippedBidPackageBehaviour              BEHAVIOUR
    DEFINED AS
*If supervisory-unequipped capability -bidirectional functionality - is to be provided (for unused
link connection(s) supervision), an instance of this class should be created (automatically of by
means of a management operation)*.
```

4.2.2.2 supervisedUnequippedSink

```
supervisedUnequippedSink                         MANAGED OBJECT CLASS
    DERIVED FROM                                "ITU-T Recommendation X.721 [1]: 1992": top;
    CHARACTERIZED BY
-   "ITU-T Recommendation M.3100 [2]: 1995": alarmSeverityAssignmentPointerPackage,
-   "ITU-T Recommendation M.3100 [2]: 1995": createDeleteNotificationsPackage,
-   "ITU-T Recommendation M.3100 [2]: 1995": stateChangeNotificationPackage,
-   "ITU-T Recommendation M.3100 [2]: 1995": tmnCommunicationsAlarmInformationPackage,
-   thresholdsForBurstyPackage.
-   supervisedUnequippedSinkPackage     PACKAGE
    BEHAVIOUR               "Draft REN/TMN-39: 1998": alarmReportingControlBehaviour,
supervisedUnequippedSinkPackageBehaviour;
    ATTRIBUTES
    trailTIExpected                 GET-REPLACE,
    trailTIAccepted                 GET,
    monitoringDirection             GET,
    supervisedUnequippedId      GET;;
    CONDITIONAL                          PACKAGES
    "Draft REN/TMN-39: 1998": tpSpecificPersistenceTimePkg      PRESENT IF
```

```
    *the persistence 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 {etsSDHObjectClass 1002}; -- Warning, only for compilation purposes
supervisedUnequippedSinkPackageBehaviour        BEHAVIOUR
    DEFINED AS
    *If supervisory-unequipped capability sink functionality is to be provided (for unused link
connection(s) supervision), an instance of this class should be created (automatically of by means
of a management operation).
    The MON/NMON condition for all the involved probableCauses should be complaint with the
principles stated on alarmReportingControlBehaviour.
    A communicationsAlarm notification shall be issued if both, the received signal label and the
path trace received contain the all "0"s code. The probableCause parameter of the notification shall
indicate unequipped.
For dTIM detection the following behaviour applies:
-   The null choice for the trailTIExpected attribute matches with any value of path trace received
(no dTIM detection).
-   If mode1 choice of trailTIExpected is in place, dTIM is declared whenever the path trace
accepted (content of trailTIAccepted attribute) does not match the path trace expected (content of
trailTIExpected attribute).
-   If mode2 is the selected choice, a dTIM is detected whenever the trailTIAccepted attribute does
not contain a repeated single byte.
On dTIM detection, a communicationsAlarm notification shall be issued. The probableCause parameter
of the notification shall indicate pathTraceMismatch. A dTIM detection when the mode2 is the
selected one, should be taken as an indication of mis-connection with a other new equipment when
expecting the signal from an old equipment.
On detection of a Server Signal Fail (due to AIS or LOP), a communicationsAlarm notification shall
be issued. The probableCause parameter of the notification shall indicate serverSignalFailure.
A communicationsAlarm notification shall be issued whenever a RDI (Remote Defect Indication) is
detected. The probableCause parameter of the notification shall indicate farEndReceiverFailure.
At the end of every second, the number of errored blocks should be compared with the value of
burstyDegradeThreshold attribute; if it is greater or equal that such value, then the second should
be considered as BAD. If a number of consecutive BAD seconds greater or equal than the value
contained in the burstyDegradeConsecutive attribute is reached, a communicationsAlarm notification
shall be issued. The probableCause parameter of the notification shall indicate degradedSignal. If
monitoring of one (or multiple) cause(s) (cSSF, cRDI, cTIM, cUNEQ and/or cDEG) is/are disabled, the
corresponding outstanding alarm(s) related this/these cause(s) for the connection supervision is/are
cleared and removed from the currentProblemList.
The detection of anyone of the above defects should not affect the operationalState of any
supervised superior object, whose state is only related with the status of the supporting hardware.
For performance monitoring purposes, a currentData subclass could be automatically instantiated or
alternatively created by management operation*.
```

4.2.2.3 supervisedUnequippedSource

```
supervisedUnequippedSource                          MANAGED OBJECT CLASS
    DERIVED FROM                          "ITU-T Recommendation X.721 [1]: 1992": top;
    CHARACTERIZED BY
    "ITU-T Recommendation M.3100 [2]: 1995": createDeleteNotificationsPackage,
    supervisedUnequippedSourcePackage       PACKAGE
    BEHAVIOUR                   supervisedUnequippedSourcePackageBehaviour;
    ATTRIBUTES
    trailTISend                     GET-REPLACE,
    supervisedUnequippedId      GET;;
REGISTERED AS {etsSDHObjectClass 1003}; -- Warning, only for compilation purposes
supervisedUnequippedSourcePackageBehaviour      BEHAVIOUR
    DEFINED AS
    *If supervisory-unequipped capability -source functionality - is to be provided (for unused link
connection(s) supervision), an instance of this class should be created (automatically of by means
of a management operation).
    For non-intentionally released cross-connections detection anywhere along the route, a
supervisoryUNEQ signal shall be generated whenever the superior connection termination point is
disconnected. The trailTISend attribute is used to transport the Access Point Identifier (APId) of
the trail source. It should conform with the definitions of Mode 1 and Mode 2 in
EN 300 417-1-1 [22]*.
```

4.3 Attribute definitions

4.3.1 unequippedTrailIndication

```
unequippedTrailIndication                               ATTRIBUTE
    WITH ATTRIBUTE SYNTAX              SDH.Boolean;
    MATCHES FOR                             EQUALITY;
    BEHAVIOUR                               unequippedTrailIndicationBehaviour;
REGISTERED AS {etsSDHAttribute 1006}; -- Warning, only for compilation purposes
unequippedTrailIndicationBehaviour                  BEHAVIOUR
    DEFINED AS
    *This attribute indicates if also unused link connections should be supervised. By default, only
trails with an equipped payload are supervised (FALSE value)*.
```

4.3.2 monitoringDirection

```
monitoringDirection                                 ATTRIBUTE
    WITH ATTRIBUTE SYNTAX          SDH1015Alignment.MonitoringDirection;
    MATCHES FOR                            EQUALITY;
    BEHAVIOUR                              monitoringDirectionBehaviour;
REGISTERED AS {etsSDHAttribute 1000}; -- Warning, only for compilation purposes
monitoringDirectionBehaviour                        BEHAVIOUR
    DEFINED AS
    *The monitoringDirection is an attribute used to indicate what signal (ingress or egress) is
being monitored by the object instance that contains the attribute (two layer monitoring instances,
at the most, would be instantiated per TP per layer). For monitoring of bidirectional points, the
value of this attribute should be specified at trailMonitor instantiation time*.
```

4.3.3 trailMonitorId

```
trailMonitorId                                      ATTRIBUTE
    WITH ATTRIBUTE SYNTAX          ASN1DefinedTypesModule.NameType;
    MATCHES FOR                            EQUALITY;
    BEHAVIOUR                              trailMonitorIdBehaviour;
REGISTERED AS {etsSDHAttribute 1003}; -- Warning, only for compilation purposes
trailMonitorIdBehaviour                BEHAVIOUR
    DEFINED AS
    *The trailMonitorId is an attribute type whose distinguished value can be used as a RDN when
naming instances of the trailMonitor object classes*.
```

4.3.4 trailTIAccepted

```
trailTIAccepted                                 ATTRIBUTE
    WITH ATTRIBUTE SYNTAX       SDH1015Alignment.TrailTI;
    MATCHES FOR                        EQUALITY;
    BEHAVIOUR                          trailTIAcceptedBehaviour;
REGISTERED AS {etsSDHAttribute 1004}; -- Warning, only for compilation purposes
trailTIAcceptedBehaviour                        BEHAVIOUR
    DEFINED AS
    *This attribute is used to indicate the value of the incoming VC path trace byte message that
has been accepted for instances monitoring the VCs in higher-order and lower-order path layers.
    The TTI values shall be in accordance with Mode 1 and Mode 2 in EN 300 417-1-1 [22]*.
```

4.3.5 trailTIExpected

```
trailTIExpected                                     ATTRIBUTE
    WITH ATTRIBUTE SYNTAX          SDH1015Alignment.TrailTIExpected;
    MATCHES FOR                            EQUALITY;
    BEHAVIOUR                              trailTIExpectedBehaviour;
REGISTERED AS {etsSDHAttribute 1005}; -- Warning, only for compilation purposes
trailTIExpectedBehaviour                            BEHAVIOUR
    DEFINED AS
    *This attribute is used to specify the value of expected path trace for instances monitoring the
VCs in higher-order and lower-order path layers. If the first choice is selected (null), then any
accepted path trace shall be considered to match. If the mode1 choice is selected, then the byte
frames defined for the transmission of Path Access Point Identifiers are these conform to the
specification in section 3 of ITU-T Recommendation G.831 [21] which are in accordance with Mode1
defined in EN 300 417-1-1 [22]. For backward compatibility, to support VCs not containing TTIs (from
old equipment), the mode2 choice is provided. In mode2 the accepted TTI is assumed to be a
"constantly repeating single byte"*.
```

4.3.6 supervisedUnequippedId

```
supervisedUnequippedId                          ATTRIBUTE
    WITH ATTRIBUTE SYNTAX          ASN1DefinedTypesModule.NameType;
    MATCHES FOR                            EQUALITY;
    BEHAVIOUR                              supervisedUnequippedIdBehaviour;
REGISTERED AS {etsSDHAttribute 1007}; -- Warning, only for compilation purposes
supervisedUnequippedIdBehaviour                 BEHAVIOUR
    DEFINED AS
    *The supervisedUnequippedId is an attribute type whose distinguished value can be used as a RDN
when naming instances of the supervisoryUnequippedSink/Source/Bidirectional object classes*.
```

4.3.7 trailTISend

```
trailTISend                                     ATTRIBUTE
    WITH ATTRIBUTE SYNTAX          SDH1015Alignment.TrailTI;
    MATCHES FOR                            EQUALITY;
    BEHAVIOUR                              trailTISendBehaviour;
REGISTERED AS {etsSDHAttribute 1008}; -- Warning, only for compilation purposes
trailTISendBehaviour                            BEHAVIOUR
    DEFINED AS
```

```
    *This attribute is used to indicate the value of the outgoing VC path trace byte message that
has to be sent for instances monitoring the VCs in higher-order and lower-order path layers. The TTI
values shall be in accordance with Mode 1 and Mode 2 in EN 300 417-1-1 [22]*.
```

4.4 Package definitions

4.4.1 unequippedTrailIndicationPackage

```
unequippedTrailIndicationPackage                    PACKAGE
    BEHAVIOUR                               unequippedTrailIndicationPackageBehaviour;
    ATTRIBUTES
    unequippedTrailIndication               REPLACE-WITH-DEFAULT
                                    DEFAULT VALUE
                                            SDH1015Alignment.defaultToEquippedMon
                                    GET-REPLACE;
REGISTERED AS {etsSDHPackage 1000}; -- Warning, only for compilation purposes
unequippedTrailIndicationPackageBehaviour       BEHAVIOUR
    DEFINED AS
    *This package defines the unequippedTrailIndication attribute. If this package is not
instantiated, the trailMonitor instance is targeted for monitoring trails with an equipped payload*.
```

4.4.2 thresholdForBurstyPackage

```
thresholdsForBurstyPackage              PACKAGE
    BEHAVIOUR                       thresholdsForBurstyPackageBehaviour;
    ATTRIBUTES
        "Draft REN/TMN-39: 1998": burstyDegradeThreshold    GET-REPLACE,
        "Draft REN/TMN-39: 1998": burstyDegradeConsecutive  DEFAULT VALUE
                                SDH1015Alignment.burstyDegradeConsecutiveDefault
                                                            GET-REPLACE;
REGISTERED AS {etsSDHPackage 1001}; -- Warning, only for compilation purposes
thresholdsForBurstyPackageBehaviour BEHAVIOUR
    DEFINED AS
    *The distribution of errors is assumed to be a bursty one.
The attribute burstyDegradeThreshold contains the value that should be compared with errored blocks
in every second, in order to consider that second as a GOOD one or a BAD one.
The attribute burstyDegradeConsecutive indicates the number of consecutive BAD seconds that should
be counted before the declaration of degraded Signal. It indicates also the number of consecutive
GOOD seconds that are necessary for the degraded Signal clearing. It defaults to 6*.
```

4.5 Name binding definitions

4.5.1 For SDH Path Overhead (Non-Intrusive) Monitoring

4.5.1.1 trailMonitor-au4CTPSinkR1

```
trailMonitor-au4CTPSinkR1                                           NAME BINDING
    SUBORDINATE OBJECT CLASS    trailMonitor            AND SUBCLASSES;
    NAMED BY
SUPERIOR OBJECT CLASS   "ITU-T Recommendation G.774 [15]: 1996": au4CTPSinkR1 AND SUBCLASSES;
    WITH ATTRIBUTE                      trailMonitorId;
    BEHAVIOUR                           trailMonitor-au4CTPSinkR1Behaviour
    BEHAVIOUR
    DEFINED AS
"At most, two instances of layer monitoring object might be instantiated for CTP. This maximum case
corresponds to bi-directional CTPs being monitored for ingress/egress signals.";
    CREATE
                                WITH-REFERENCE-OBJECT,
                                WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
                                DELETES-CONTAINED-OBJECTS;
REGISTERED AS {etsSDHNameBinding 1000}; -- Warning, only for compilation purposes
```

4.5.1.2 trailMonitor-au4CTPSource

```
trailMonitor-au4CTPSource                                           NAME BINDING
    SUBORDINATE OBJECT CLASS    trailMonitor            AND SUBCLASSES;
    NAMED BY
 SUPERIOR OBJECT CLASS  "ITU-T Recommendation G.774 [4]: 1992": au4CTPSource AND SUBCLASSES;
    WITH ATTRIBUTE              trailMonitorId;
    BEHAVIOUR                   trailMonitor-au4CTPSourceBehaviour
    BEHAVIOUR
    DEFINED AS
"At most, two instances of layer monitoring object might be instantiated for CTP. This maximum case
corresponds to bi-directional CTPs being monitored for ingress/egress signals.";
```

```
    CREATE
                        WITH-REFERENCE-OBJECT,
                        WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
                        DELETES-CONTAINED-OBJECTS;
REGISTERED AS {etsSDHNameBinding 1001}; -- Warning, only for compilation purposes
```

4.5.1.3 trailMonitor-au3CTPSinkR1

```
trailMonitor-au3CTPSinkR1                                       NAME BINDING
    SUBORDINATE OBJECT CLASS    trailMonitor            AND SUBCLASSES;
    NAMED BY
SUPERIOR OBJECT CLASS   "ITU-T Recommendation G.774 [15]: 1996": au3CTPSinkR1 AND SUBCLASSES;
    WITH ATTRIBUTE              trailMonitorId;
    BEHAVIOUR                   trailMonitor-au3CTPSinkR1Behaviour
    BEHAVIOUR
    DEFINED AS
"At most, two instances of layer monitoring object might be instantiated for CTP. This maximum case
corresponds to bi-directional CTPs being monitored for ingress/egress signals.";
    CREATE
                        WITH-REFERENCE-OBJECT,
                        WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
                        DELETES-CONTAINED-OBJECTS;
REGISTERED AS {etsSDHNameBinding 1002}; -- Warning, only for compilation purposes
```

4.5.1.4 trailMonitor-au3CTPSource

```
trailMonitor-au3CTPSource                               NAME BINDING
SUBORDINATE OBJECT CLASS    trailMonitor            AND SUBCLASSES;
NAMED BY
SUPERIOR OBJECT CLASS   "ITU-T Recommendation G.774 [4]: 1992": au3CTPSource AND SUBCLASSES;
    WITH ATTRIBUTE              trailMonitorId;
    BEHAVIOUR                   trailMonitor-au3CTPSourceBehaviour
    BEHAVIOUR
    DEFINED AS
"At most, two instances of layer monitoring object might be instantiated for CTP. This maximum case
corresponds to bidirectional CTPs being monitored for ingress/egress signals.";
    CREATE
                            WITH-REFERENCE-OBJECT,
                            WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
                            DELETES-CONTAINED-OBJECTS;
REGISTERED AS {etsSDHNameBinding 1003}; -- Warning, only for compilation purposes
```

4.5.1.5 trailMonitor-tu3CTPSinkR1

```
trailMonitor-tu3CTPSinkR1                                   NAME BINDING
SUBORDINATE OBJECT CLASS    trailMonitor            AND SUBCLASSES;
NAMED BY
SUPERIOR OBJECT CLASS   "ITU-T Recommendation G.774 [15]: 1996": tu3CTPSinkR1 AND SUBCLASSES;
    WITH ATTRIBUTE              trailMonitorId;
    BEHAVIOUR                   trailMonitortu3CTPSinkR1Behaviour
    BEHAVIOUR
    DEFINED AS
    "At most, two instances of layer monitoring object might be instantiated for CTP. This maximum
case corresponds to bidirectional CTPs being monitored for ingress/egress signals.";
    CREATE
                        WITH-REFERENCE-OBJECT,
                        WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
                        DELETES-CONTAINED-OBJECTS;
REGISTERED AS {etsSDHNameBinding 1004}; -- Warning, only for compilation purposes
```

4.5.1.6 trailMonitor-tu3CTPSource

```
trailMonitor-tu3CTPSource                               NAME BINDING
SUBORDINATE OBJECT CLASS    trailMonitor            AND SUBCLASSES;
NAMED BY
SUPERIOR OBJECT CLASS   "ITU-T Recommendation G.774 [4]: 1992": tu3CTPSource AND SUBCLASSES;
WITH ATTRIBUTE                  trailMonitorId;
BEHAVIOUR                       trailMonitor-tu3CTPSourceBehaviour
BEHAVIOUR
    DEFINED AS
    "At most, two instances of layer monitoring object might be instantiated for CTP. This maximum
case corresponds to bidirectional CTPs being monitored for ingress/egress signals.";
    CREATE
                            WITH-REFERENCE-OBJECT,
                            WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
                            DELETES-CONTAINED-OBJECTS;
REGISTERED AS {etsSDHNameBinding 1005}; -- Warning, only for compilation purposes
```

4.5.1.7 trailMonitor-tu2CTPSinkR1

```
trailMonitor-tu2CTPSinkR1                                   NAME BINDING
SUBORDINATE OBJECT CLASS    trailMonitor            AND SUBCLASSES;
NAMED BY
SUPERIOR OBJECT CLASS   "ITU-T Recommendation G.774 [15]: 1996": tu2CTPSinkR1 AND SUBCLASSES;
    WITH ATTRIBUTE              trailMonitorId;
    BEHAVIOUR                   trailMonitor-tu2CTPSinkR1Behaviour
    BEHAVIOUR
    DEFINED AS
    "At most, two instances of layer monitoring object might be instantiated for CTP. This maximum
case corresponds to bidirectional CTPs being monitored for ingress/egress signals.";
    CREATE
                        WITH-REFERENCE-OBJECT,
                        WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
                        DELETES-CONTAINED-OBJECTS;
REGISTERED AS {etsSDHNameBinding 1006}; -- Warning, only for compilation purposes
```

4.5.1.8 trailMonitor-tu2CTPSource

```
trailMonitor-tu2CTPSource                               NAME BINDING
SUBORDINATE OBJECT CLASS    trailMonitor            AND SUBCLASSES;
NAMED BY
SUPERIOR OBJECT CLASS   "ITU-T Recommendation G.774 [4]: 1992": tu2CTPSource AND SUBCLASSES;
    WITH ATTRIBUTE              trailMonitorId;
    BEHAVIOUR                   trailMonitor-tu2CTPSourceBehaviour
    BEHAVIOUR
    DEFINED AS
"At most, two instances of layer monitoring object might be instantiated for CTP. This maximum case
corresponds to bidirectional CTPs being monitored for ingress/egress signals.";
    CREATE
                            WITH-REFERENCE-OBJECT,
                            WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
                            DELETES-CONTAINED-OBJECTS;
REGISTERED AS {etsSDHNameBinding 1007}; -- Warning, only for compilation purposes
```

4.5.1.9 trailMonitor-tu12CTPSinkR1

```
trailMonitor-tu12CTPSinkR1                              NAME BINDING
SUBORDINATE OBJECT CLASS    trailMonitor            AND SUBCLASSES;
NAMED BY
SUPERIOR OBJECT CLASS   "ITU-T Recommendation G.774 [15]: 1996": tu12CTPSinkR1 AND SUBCLASSES;
    WITH ATTRIBUTE              trailMonitorId;
    BEHAVIOUR                   trailMonitor-tu12CTPSinkR1Behaviour
    BEHAVIOUR
    DEFINED AS
"At most, two instances of layer monitoring object might be instantiated for CTP. This maximum case
corresponds to bidirectional CTPs being monitored for ingress/egress signals.";
    CREATE
                            WITH-REFERENCE-OBJECT,
                            WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
                            DELETES-CONTAINED-OBJECTS;
REGISTERED AS {etsSDHNameBinding 1008}; -- Warning, only for compilation purposes
```

4.5.1.10 trailMonitor-tu12CTPSource

```
trailMonitor-tu12CTPSource                                      NAME BINDING
    SUBORDINATE OBJECT CLASS    trailMonitor            AND SUBCLASSES;
    NAMED BY
SUPERIOR OBJECT CLASS   "ITU-T Recommendation G.774 [4]: 1992": tu12CTPSource AND SUBCLASSES;
    WITH ATTRIBUTE              trailMonitorId;
    BEHAVIOUR                   trailMonitor-tu12CTPSourceBehaviour
    BEHAVIOUR
    DEFINED AS
"At most, two instances of layer monitoring object might be instantiated for CTP. This maximum case
corresponds to bi-directional CTPs being monitored for ingress/egress signals.";
    CREATE
                        WITH-REFERENCE-OBJECT,
                        WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
                        DELETES-CONTAINED-OBJECTS;
REGISTERED AS {etsSDHNameBinding 1009}; -- Warning, only for compilation purposes
```

4.5.1.11 trailMonitor-tu11CTPSinkR1

```
trailMonitor-tu11CTPSinkR1                                    NAME BINDING
    SUBORDINATE OBJECT CLASS    trailMonitor            AND SUBCLASSES;
    NAMED BY
SUPERIOR OBJECT CLASS   "ITU-T Recommendation G.774 [15]: 1996": tu11CTPSinkR1 AND SUBCLASSES;
    WITH ATTRIBUTE              trailMonitorId;
    BEHAVIOUR                   trailMonitor-tu11CTPSinkR1Behaviour
    BEHAVIOUR
    DEFINED AS
"At most, two instances of layer monitoring object might be instantiated for CTP. This maximum case
corresponds to bidirectional CTPs being monitored for ingress/egress signals.";
    CREATE
                        WITH-REFERENCE-OBJECT,
                        WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
                        DELETES-CONTAINED-OBJECTS;
REGISTERED AS {etsSDHNameBinding 1010}; -- Warning, only for compilation purposes
```

4.5.1.12 trailMonitor-tu11CTPSource

```
trailMonitor-tu11CTPSource                                    NAME BINDING
SUBORDINATE OBJECT CLASS    trailMonitor            AND SUBCLASSES;
NAMED BY
SUPERIOR OBJECT CLASS   "ITU-T Recommendation G.774 [4]: 1992": tu11CTPSource AND SUBCLASSES;
    WITH ATTRIBUTE              trailMonitorId;
    BEHAVIOUR                   trailMonitor-tu11CTPSourceBehaviour
    BEHAVIOUR
    DEFINED AS
"At most, two instances of layer monitoring object might be instantiated for CTP. This maximum case
corresponds to bidirectional CTPs being monitored for ingress/egress signals.";
    CREATE
                               WITH-REFERENCE-OBJECT,
                               WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
                               DELETES-CONTAINED-OBJECTS;
REGISTERED AS {etsSDHNameBinding 1011}; -- Warning, only for compilation purposes
```

4.5.1.13 pathTerminationCurrentData-trailMonitor

```
pathTerminationCurrentData-trailMonitor                    NAME BINDING
    SUBORDINATE OBJECT CLASS
    "ITU-T Recommendation G.774-01 [11]: 1994": pathTerminationCurrentData      AND SUBCLASSES;
    NAMED BY
    SUPERIOR OBJECT CLASS       trailMonitor    AND SUBCLASSES;
    WITH ATTRIBUTE                  "ITU-T Recommendation X.739 [20]: 1993": scannerId;
    CREATE
                               WITH-REFERENCE-OBJECT,
                               WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
                               DELETES-CONTAINED-OBJECTS;
REGISTERED AS {etsSDHNameBinding 1012}; -- Warning, only for compilation purposes
```

4.5.1.14 pathTerminationCurrentDataFarEnd-trailMonitor

```
pathTerminationCurrentDataFarEnd-trailMonitor                  NAME BINDING
    SUBORDINATE OBJECT CLASS
    "ITU-T Recommendation G.774-06 [14]: 1996": pathTerminationCurrentDataFarEnd AND SUBCLASSES;
    NAMED BY
    SUPERIOR OBJECT CLASS       trailMonitor             AND SUBCLASSES;
    WITH ATTRIBUTE              "ITU-T Recommendation X.739 [20]: 1993": scannerId;
    CREATE
                               WITH-REFERENCE-OBJECT,
                               WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
                               DELETES-CONTAINED-OBJECTS;
REGISTERED AS {etsSDHNameBinding 1013}; -- Warning, only for compilation purposes
```

4.5.1.15 pathTerminationCurrentDataFarEndTR-trailMonitor

```
pathTerminationCurrentDataFarEndTR-trailMonitor                NAME BINDING
    SUBORDINATE OBJECT CLASS
    "ITU-T Recommendation G.774-06 [14]: 1996": pathTerminationCurrentDataFarEndTR AND SUBCLASSES;
    NAMED BY
    SUPERIOR OBJECT CLASS       trailMonitor            AND SUBCLASSES;
    WITH ATTRIBUTE              "ITU-T Recommendation X.739 [20]: 1993": scannerId;
    CREATE
                               WITH-REFERENCE-OBJECT,
                               WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
                               DELETES-CONTAINED-OBJECTS;
```

```
REGISTERED AS {etsSDHNameBinding 1014}; -- Warning, only for compilation purposes
```

4.5.1.16 pathTerminationCurrentDataNearEnd-trailMonitor

```
pathTerminationCurrentDataNearEnd-trailMonitor                  NAME BINDING
    SUBORDINATE OBJECT CLASS
    "ITU-T Recommendation G.774-06 [14]: 1996": pathTerminationCurrentDataNearEnd AND SUBCLASSES;
    NAMED BY
    SUPERIOR OBJECT CLASS       trailMonitor             AND SUBCLASSES;
    WITH ATTRIBUTE                  "ITU-T Recommendation X.739 [20]: 1993": scannerId;
    CREATE
                            WITH-REFERENCE-OBJECT,
                            WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
                            DELETES-CONTAINED-OBJECTS;
REGISTERED AS {etsSDHNameBinding 1015}; -- Warning, only for compilation purposes
```

4.5.1.17 pathTerminationCurrentDataNearEndTR-trailMonitor

```
pathTerminationCurrentDataNearEndTR-trailMonitor                NAME BINDING
    SUBORDINATE OBJECT CLASS
    "ITU-T Recommendation G.774-06 [14]: 1996": pathTerminationCurrentDataNearEndTR AND SUBCLASSES;
    NAMED BY
    SUPERIOR OBJECT CLASS       trailMonitor             AND SUBCLASSES;
    WITH ATTRIBUTE                  "ITU-T Recommendation X.739 [20]: 1993": scannerId;
    CREATE
                            WITH-REFERENCE-OBJECT,
                            WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
                            DELETES-CONTAINED-OBJECTS;
REGISTERED AS {etsSDHNameBinding 1016}; -- Warning, only for compilation purposes
```

4.5.2 For SDH Supervisory Unequipped

4.5.2.1 supervisedUnequippedSink-au4CTPSinkR1

```
supervisedUnequippedSink-au4CTPSinkR1                                   NAME BINDING
    SUBORDINATE OBJECT CLASS    supervisedUnequippedSink            AND SUBCLASSES;
    NAMED BY
 SUPERIOR OBJECT CLASS  "ITU-T Recommendation G.774 [15]: 1996": au4CTPSinkR1 AND SUBCLASSES;
    WITH ATTRIBUTE              supervisedUnequippedId;
    BEHAVIOUR               supervisedUnequippedSink-au4CTPSinkR1Behaviour  BEHAVIOUR
    DEFINED AS
    "At most, two instances of layer monitoring object might be instantiated for CTP. This maximum
case corresponds to bidirectional CTPs being monitored for ingress/egress signals.";
    CREATE
                                WITH-REFERENCE-OBJECT,
                                WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
                                DELETES-CONTAINED-OBJECTS;
REGISTERED AS {etsSDHNameBinding 1017}; -- Warning, only for compilation purposes
```

4.5.2.2 supervisedUnequippedSink-au4CTPSource

```
supervisedUnequippedSink-au4CTPSource                                   NAME BINDING
    SUBORDINATE OBJECT CLASS    supervisedUnequippedSink        AND SUBCLASSES;
    NAMED BY
 SUPERIOR OBJECT CLASS  "ITU-T Recommendation G.774 [4]: 1992": au4CTPSource AND SUBCLASSES;
    WITH ATTRIBUTE              supervisedUnequippedId;
    BEHAVIOUR               supervisedUnequippedSink-au4CTPSourceBehaviour  BEHAVIOUR
    DEFINED AS
    "At most, two instances of layer monitoring object might be instantiated for CTP. This maximum
case corresponds to bidirectional CTPs being monitored for ingress/egress signals.";
    CREATE
                                WITH-REFERENCE-OBJECT,
                                WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
                                DELETES-CONTAINED-OBJECTS;
REGISTERED AS {etsSDHNameBinding 1018}; -- Warning, only for compilation purposes
```

4.5.2.3 supervisedUnequippedSource-au4CTPSource

```
supervisedUnequippedSource-au4CTPSource                                 NAME BINDING
    SUBORDINATE OBJECT CLASS    supervisedUnequippedSource      AND SUBCLASSES;
    NAMED BY
SUPERIOR OBJECT CLASS   "ITU-T Recommendation G.774 [4]: 1992": au4CTPSource AND SUBCLASSES;
    WITH ATTRIBUTE              supervisedUnequippedId;
    CREATE
                        WITH-REFERENCE-OBJECT,
                        WITH-AUTOMATIC-INSTANCE-NAMING;
```

```
    DELETE
                        DELETES-CONTAINED-OBJECTS;
REGISTERED AS {etsSDHNameBinding 1019}; -- Warning, only for compilation purposes
```

4.5.2.4 supervisedUnequippedSink-au3CTPSinkR1

```
supervisedUnequippedSink-au3CTPSinkR1                                   NAME BINDING
    SUBORDINATE OBJECT CLASS    supervisedUnequippedSink        AND SUBCLASSES;
NAMED BY
SUPERIOR OBJECT CLASS   "ITU-T Recommendation G.774 [15]: 1996": au3CTPSinkR1 AND SUBCLASSES;
    WITH ATTRIBUTE              supervisedUnequippedId;
    BEHAVIOUR               supervisedUnequippedSink-au3CTPSinkR1Behaviour
    BEHAVIOUR
    DEFINED AS
    "At most, two instances of layer monitoring object might be instantiated for CTP. This maximum
case corresponds to bidirectional CTPs being monitored for ingress/egress signals.";
    CREATE
                            WITH-REFERENCE-OBJECT,
                            WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
                            DELETES-CONTAINED-OBJECTS;
REGISTERED AS {etsSDHNameBinding 1020}; -- Warning, only for compilation purposes
```

4.5.2.5 supervisedUnequippedSink-au3CTPSource

```
supervisedUnequippedSink-au3CTPSource                                   NAME BINDING
    SUBORDINATE OBJECT CLASS    supervisedUnequippedSink        AND SUBCLASSES;
NAMED BY
SUPERIOR OBJECT CLASS   "ITU-T Recommendation G.774 [4]: 1992": au3CTPSource AND SUBCLASSES;
    WITH ATTRIBUTE              supervisedUnequippedId;
    BEHAVIOUR               supervisedUnequippedSink-au3CTPSourceBehaviour  BEHAVIOUR
    DEFINED AS
    "At most, two instances of layer monitoring object might be instantiated for CTP. This maximum
case corresponds to bidirectional CTPs being monitored for ingress/egress signals.";
    CREATE
                                WITH-REFERENCE-OBJECT,
                                WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
                                DELETES-CONTAINED-OBJECTS;
REGISTERED AS {etsSDHNameBinding 1021}; -- Warning, only for compilation purposes
```

4.5.2.6 supervisedUnequippedSource-au3CTPSource

```
supervisedUnequippedSource-au3CTPSource                                 NAME BINDING
    SUBORDINATE OBJECT CLASS    supervisedUnequippedSource      AND SUBCLASSES;
    NAMED BY
SUPERIOR OBJECT CLASS   "ITU-T Recommendation G.774 [4]: 1992": au3CTPSource AND SUBCLASSES;
    WITH ATTRIBUTE                  supervisedUnequippedId;
    CREATE
                            WITH-REFERENCE-OBJECT,
                            WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
                            DELETES-CONTAINED-OBJECTS;
REGISTERED AS {etsSDHNameBinding 1022}; -- Warning, only for compilation purposes
```

4.5.2.7 supervisedUnequippedSink-tu3CTPSinkR1

```
supervisedUnequippedSink-tu3CTPSinkR1                                   NAME BINDING
    SUBORDINATE OBJECT CLASS    supervisedUnequippedSink        AND SUBCLASSES;
    NAMED BY
SUPERIOR OBJECT CLASS   "ITU-T Recommendation G.774 [15]: 1996": tu3CTPSinkR1 AND SUBCLASSES;
    WITH ATTRIBUTE              supervisedUnequippedId;
    BEHAVIOUR               supervisedUnequippedSink-tu3CTPSinkR1Behaviour  BEHAVIOUR
    DEFINED AS
    "At most, two instances of layer monitoring object might be instantiated for CTP. This maximum
case corresponds to bi-directional CTPs being monitored for ingress/egress signals.";
    CREATE
                                WITH-REFERENCE-OBJECT,
                                WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
                                DELETES-CONTAINED-OBJECTS;
REGISTERED AS {etsSDHNameBinding 1023}; -- Warning, only for compilation purposes
```

4.5.2.8 supervisedUnequippedSink-tu3CTPSource

```
supervisedUnequippedSink-tu3CTPSource                                   NAME BINDING
    SUBORDINATE OBJECT CLASS    supervisedUnequippedSink        AND SUBCLASSES;
    NAMED BY
SUPERIOR OBJECT CLASS   "ITU-T Recommendation G.774 [4]: 1992": tu3CTPSource AND SUBCLASSES;
    WITH ATTRIBUTE              supervisedUnequippedId;
    BEHAVIOUR               supervisedUnequippedSink-tu3CTPSourceBehaviour  BEHAVIOUR
```

```
    DEFINED AS
    "At most, two instances of layer monitoring object might be instantiated for CTP. This maximum
case corresponds to bi-directional CTPs being monitored for ingress/egress signals.";
    CREATE
                        WITH-REFERENCE-OBJECT,
                        WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
                        DELETES-CONTAINED-OBJECTS;
REGISTERED AS {etsSDHNameBinding 1024}; -- Warning, only for compilation purposes
```

4.5.2.9 supervisedUnequippedSource-tu3CTPSource

```
supervisedUnequippedSource-tu3CTPSource                                    NAME BINDING
    SUBORDINATE OBJECT CLASS    supervisedUnequippedSource      AND SUBCLASSES;
    NAMED BY
SUPERIOR OBJECT CLASS   "ITU-T Recommendation G.774 [4]: 1992": tu3CTPSource AND SUBCLASSES;
    WITH ATTRIBUTE              supervisedUnequippedId;
    CREATE
                        WITH-REFERENCE-OBJECT,
                        WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
                        DELETES-CONTAINED-OBJECTS;
REGISTERED AS {etsSDHNameBinding 1025}; -- Warning, only for compilation purposes
```

4.5.2.10 supervisedUnequippedSink-tu2CTPSinkR1

```
supervisedUnequippedSink-tu2CTPSinkR1                                      NAME BINDING
    SUBORDINATE OBJECT CLASS    supervisedUnequippedSink        AND SUBCLASSES;
    NAMED BY
SUPERIOR OBJECT CLASS   "ITU-T Recommendation G.774 [15]: 1996": tu2CTPSinkR1 AND SUBCLASSES;
    WITH ATTRIBUTE              supervisedUnequippedId;
    BEHAVIOUR                   supervisedUnequippedSink-tu2CTPSinkR1Behaviour  BEHAVIOUR
    DEFINED AS
    "At most, two instances of layer monitoring object might be instantiated for CTP. This maximum
case corresponds to bi-directional CTPs being monitored for ingress/egress signals.";
    CREATE
                        WITH-REFERENCE-OBJECT,
                        WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
                        DELETES-CONTAINED-OBJECTS;
REGISTERED AS {etsSDHNameBinding 1026}; -- Warning, only for compilation purposes
```

4.5.2.11 supervisedUnequippedSink-tu2CTPSource

```
supervisedUnequippedSink-tu2CTPSource                                      NAME BINDING
    SUBORDINATE OBJECT CLASS    supervisedUnequippedSink        AND SUBCLASSES;
    NAMED BY
SUPERIOR OBJECT CLASS   "ITU-T Recommendation G.774 [4]: 1992": tu2CTPSource AND SUBCLASSES;
    WITH ATTRIBUTE              supervisedUnequippedId;
    BEHAVIOUR                   supervisedUnequippedSink-tu2CTPSourceBehaviour
    BEHAVIOUR
    DEFINED AS
    "At most, two instances of layer monitoring object might be instantiated for CTP. This maximum
case corresponds to bi-directional CTPs being monitored for ingress/egress signals.";
    CREATE
                        WITH-REFERENCE-OBJECT,
                        WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
                        DELETES-CONTAINED-OBJECTS;
REGISTERED AS {etsSDHNameBinding 1027}; -- Warning, only for compilation purposes
```

4.5.2.12 supervisedUnequippedSource-tu2CTPSource

```
supervisedUnequippedSource-tu2CTPSource                                    NAME BINDING
    SUBORDINATE OBJECT CLASS    supervisedUnequippedSource      AND SUBCLASSES;
    NAMED BY
SUPERIOR OBJECT CLASS   "ITU-T Recommendation G.774 [4]: 1992": tu2CTPSource AND SUBCLASSES;
    WITH ATTRIBUTE              supervisedUnequippedId;
    CREATE
                        WITH-REFERENCE-OBJECT,
                        WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
                        DELETES-CONTAINED-OBJECTS;
REGISTERED AS {etsSDHNameBinding 1028}; -- Warning, only for compilation purposes
```

4.5.2.13 supervisedUnequippedSink-tu12CTPSink

```
supervisedUnequippedSink-tu12CTPSink                                                    NAME BINDING
    SUBORDINATE OBJECT CLASS    supervisedUnequippedSink        AND SUBCLASSES;
    NAMED BY
SUPERIOR OBJECT CLASS   "ITU-T Recommendation G.774 [15]: 1996": tu12CTPSinkR1 AND SUBCLASSES;
```

```
    WITH ATTRIBUTE              supervisedUnequippedId;
    BEHAVIOUR                   supervisedUnequippedSink-tu12CTPSinkR1Behaviour BEHAVIOUR
    DEFINED AS
    "At most, two instances of layer monitoring object might be instantiated for CTP. This maximum
case corresponds to bidirectional CTPs being monitored for ingress/egress signals.";
    CREATE
                        WITH-REFERENCE-OBJECT,
                        WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
                        DELETES-CONTAINED-OBJECTS;
REGISTERED AS {etsSDHNameBinding 1029}; -- Warning, only for compilation purposes
```

4.5.2.14 supervisedUnequippedSink-tu12CTPSource

```
supervisedUnequippedSink-tu12CTPSource                                          NAME BINDING
    SUBORDINATE OBJECT CLASS    supervisedUnequippedSink        AND SUBCLASSES;
    NAMED BY
SUPERIOR OBJECT CLASS   "ITU-T Recommendation G.774 [4]: 1992": tu12CTPSource AND SUBCLASSES;
    WITH ATTRIBUTE              supervisedUnequippedId;
    BEHAVIOUR                   supervisedUnequippedSink-tu12CTPSourceBehaviour
    BEHAVIOUR
    DEFINED AS
    "At most, two instances of layer monitoring object might be instantiated for CTP. This maximum
case corresponds to bidirectional CTPs being monitored for ingress/egress signals.";
    CREATE
                        WITH-REFERENCE-OBJECT,
                        WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
                        DELETES-CONTAINED-OBJECTS;
REGISTERED AS {etsSDHNameBinding 1030}; -- Warning, only for compilation purposes
```

4.5.2.15 supervisedUnequippedSource-tu12CTPSource

```
supervisedUnequippedSource-tu12CTPSource                                        NAME BINDING
    SUBORDINATE OBJECT CLASS    supervisedUnequippedSource      AND SUBCLASSES;
    NAMED BY
SUPERIOR OBJECT CLASS   "ITU-T Recommendation G.774 [4]: 1992": tu12CTPSource AND SUBCLASSES;
    WITH ATTRIBUTE                      supervisedUnequippedId;
    CREATE
                            WITH-REFERENCE-OBJECT,
                            WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
                            DELETES-CONTAINED-OBJECTS;
REGISTERED AS {etsSDHNameBinding 1031}; -- Warning, only for compilation purposes
```

4.5.2.16 supervisedUnequippedSink-tu11CTPSinkR1

```
supervisedUnequippedSink-tu11CTPSinkR1                                          NAME BINDING
    SUBORDINATE OBJECT CLASS    supervisedUnequippedSink        AND SUBCLASSES;
    NAMED BY
SUPERIOR OBJECT CLASS   "ITU-T Recommendation G.774 [15]: 1996": tu11CTPSinkR1 AND SUBCLASSES;
    WITH ATTRIBUTE                      supervisedUnequippedId;
    BEHAVIOUR                           supervisedUnequippedSink-tu11CTPSinkR1Behaviour BEHAVIOUR
    DEFINED AS
    "At most, two instances of layer monitoring object might be instantiated for CTP. This maximum
case corresponds to bi-directional CTPs being monitored for ingress/egress signals.";
    CREATE
                            WITH-REFERENCE-OBJECT,
                            WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
                            DELETES-CONTAINED-OBJECTS;
REGISTERED AS {etsSDHNameBinding 1032}; -- Warning, only for compilation purposes
```

4.5.2.17 supervisedUnequippedSink-tu11CTPSource

```
supervisedUnequippedSink-tu11CTPSource                                  NAME BINDING
    SUBORDINATE OBJECT CLASS    supervisedUnequippedSink        AND SUBCLASSES;
    NAMED BY
SUPERIOR OBJECT CLASS   "ITU-T Recommendation G.774 [4]: 1992": tu11CTPSource AND SUBCLASSES;
    WITH ATTRIBUTE              supervisedUnequippedId;
    BEHAVIOUR                   supervisedUnequippedSink-tu11CTPSourceBehaviour BEHAVIOUR
    DEFINED AS
    "At most, two instances of layer monitoring object might be instantiated for CTP. This maximum
case corresponds to bidirectional CTPs being monitored for ingress/egress signals.";
    CREATE
                        WITH-REFERENCE-OBJECT,
                        WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
                        DELETES-CONTAINED-OBJECTS;
REGISTERED AS {etsSDHNameBinding 1033}; -- Warning, only for compilation purposes
```

4.5.2.18 supervisedUnequippedSource-tu11CTPSource

```
supervisedUnequippedSource-tu11CTPSource                                    NAME BINDING
    SUBORDINATE OBJECT CLASS    supervisedUnequippedSource      AND SUBCLASSES;
    NAMED BY
SUPERIOR OBJECT CLASS   "ITU-T Recommendation G.774 [4]: 1992": tu11CTPSource AND SUBCLASSES;
    WITH ATTRIBUTE                      supervisedUnequippedId;
    CREATE
                                WITH-REFERENCE-OBJECT,
                                WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
                                DELETES-CONTAINED-OBJECTS;
REGISTERED AS {etsSDHNameBinding 1034}; -- Warning, only for compilation purposes
```

4.5.2.19 pathTerminationCurrentData-supervisedUnequippedSink

```
pathTerminationCurrentData-supervisedUnequippedSink                 NAME BINDING
    SUBORDINATE OBJECT CLASS
    "ITU-T Recommendation G.774-01 [11]: 1994": pathTerminationCurrentData      AND SUBCLASSES;
    NAMED BY
    SUPERIOR OBJECT CLASS       supervisedUnequippedSink            AND SUBCLASSES;
    WITH ATTRIBUTE              "ITU-T Recommendation X.739 [20]: 1993": scannerId;
    CREATE
                                WITH-REFERENCE-OBJECT,
                                WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
                                DELETES-CONTAINED-OBJECTS;
REGISTERED AS {etsSDHNameBinding 1035}; -- Warning, only for compilation purposes
```

4.5.2.20 pathTerminationCurrentDataFarEnd-supervisedUnequippedSink

```
pathTerminationCurrentDataFarEnd-supervisedUnequippedSink                   NAME BINDING
    SUBORDINATE OBJECT CLASS
    "ITU-T Recommendation G.774-06 [14]: 1996": pathTerminationCurrentDataFarEnd AND SUBCLASSES;
    NAMED BY
    SUPERIOR OBJECT CLASS       supervisedUnequippedSink         AND SUBCLASSES;
    WITH ATTRIBUTE                  "ITU-T Recommendation X.739 [20]: 1993": scannerId;
    CREATE
                            WITH-REFERENCE-OBJECT,
                            WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
                            DELETES-CONTAINED-OBJECTS;
REGISTERED AS {etsSDHNameBinding 1036}; -- Warning, only for compilation purposes
```

4.5.2.21 PathTerminationCurrentDataFarEndTR-supervisedUnequippedSink

```
pathTerminationCurrentDataFarEndTR-supervisedUnequippedSink         NAME BINDING
    SUBORDINATE OBJECT CLASS
    "ITU-T Recommendation G.774-06 [14]: 1996": pathTerminationCurrentDataFarEndTR AND SUBCLASSES;
    NAMED BY
    SUPERIOR OBJECT CLASS       supervisedUnequippedSink         AND SUBCLASSES;
    WITH ATTRIBUTE                  "ITU-T Recommendation X.739 [20]: 1993": scannerId;
    CREATE
                            WITH-REFERENCE-OBJECT,
                            WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
                            DELETES-CONTAINED-OBJECTS;
REGISTERED AS {etsSDHNameBinding 1037}; -- Warning, only for compilation purposes
```

4.5.2.22 pathTerminationCurrentDataNearEnd-supervisedUnequippedSink

```
pathTerminationCurrentDataNearEnd-supervisedUnequippedSink      NAME BINDING
    SUBORDINATE OBJECT CLASS
    "ITU-T Recommendation G.774-06 [14]: 1996": pathTerminationCurrentDataNearEnd AND SUBCLASSES;
    NAMED BY
    SUPERIOR OBJECT CLASS           supervisedUnequippedSink         AND SUBCLASSES;
    WITH ATTRIBUTE                      "ITU-T Recommendation X.739 [20]: 1993": scannerId;
    CREATE
                                WITH-REFERENCE-OBJECT,
                                WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
                                DELETES-CONTAINED-OBJECTS;
REGISTERED AS {etsSDHNameBinding 1038}; -- Warning, only for compilation purposes
```

4.5.2.23 pathTerminationCurrentDataNearEndTR-supervisedUnequippedSink

```
pathTerminationCurrentDataNearEndTR-supervisedUnequippedSink            NAME BINDING
    SUBORDINATE OBJECT CLASS
    "ITU-T Recommendation G.774-06 [14]: 1996": pathTerminationCurrentDataNearEndTR AND SUBCLASSES;
    NAMED BY
    SUPERIOR OBJECT CLASS       supervisedUnequippedSink         AND SUBCLASSES;
```

```
    WITH ATTRIBUTE                  "ITU-T Recommendation X.739 [20]: 1993": scannerId;
    CREATE
                            WITH-REFERENCE-OBJECT,
                            WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE
                            DELETES-CONTAINED-OBJECTS;
REGISTERED AS {etsSDHNameBinding 1039}; -- Warning, only for compilation purposes
```

4.6 Supporting ASN.1

```
SDH1015Alignment {itu(0) identified-organization(4) etsi(0) ets(304) informationModel(0)
asn1Module(2) prETS300417Alig(7)} -- Warning, only for compilation purposes
DEFINITIONS IMPLICIT TAGS:: = BEGIN
-- EXPORT Everything --
MonitoringDirection:: = ENUMERATED {
    ingress(0), -- signal coming in
    egress(1)} -- signal going out (coming to the after matrix point from the before matrix point
burstyDegradeConsecutiveDefault NCSBSRange:: =  6
defaultToEquippedMon            BOOLEAN:: =     FALSE -- only equipped monitoring
NCSBSRange:: =              INTEGER (2..10)
TrailTI:: =                     OCTET STRING
TrailTIExpected:: =             CHOICE {
    null            [0]     NULL,
    mode1       [1]     OCTET STRING,   -- String of 16 bytes in accordance with Mode 1
                        -- defined in EN 300 417-1-1 [22]
    mode2       [2]     NULL }          -- for a constantly repeating single byte in accordance
                        -- with Mode 2 defined in EN 300 417-1-1 [22]
END -- end of SDH1015Alignment registration supporting ASN.1 --
```

5 Figures

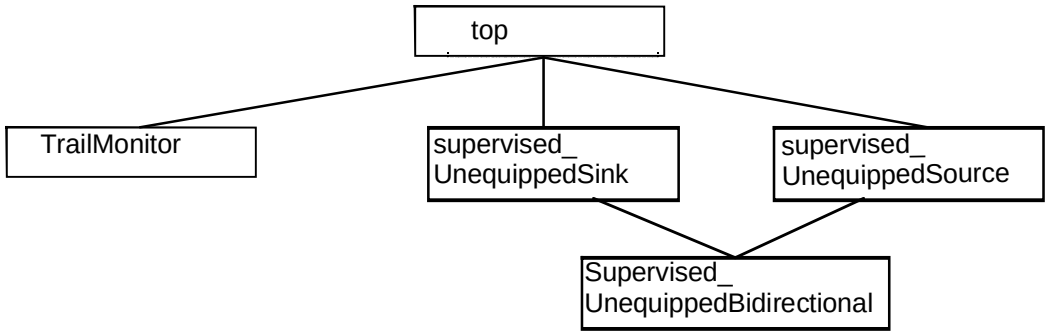

Figure 1: Inheritance tree

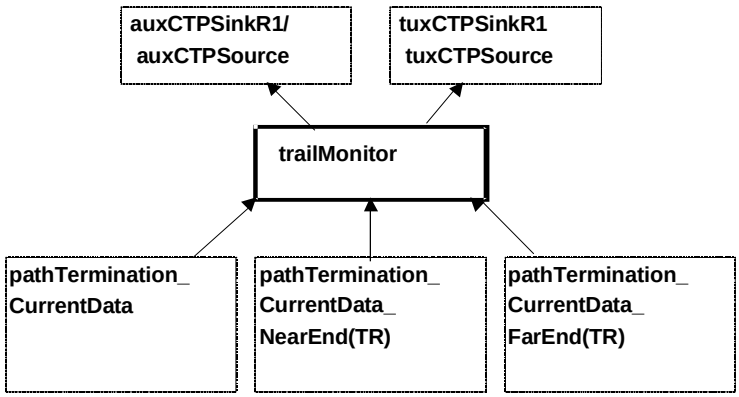

Figure 2: Naming hierarchy of the object trailMonitor (AND SUBCLASSES)

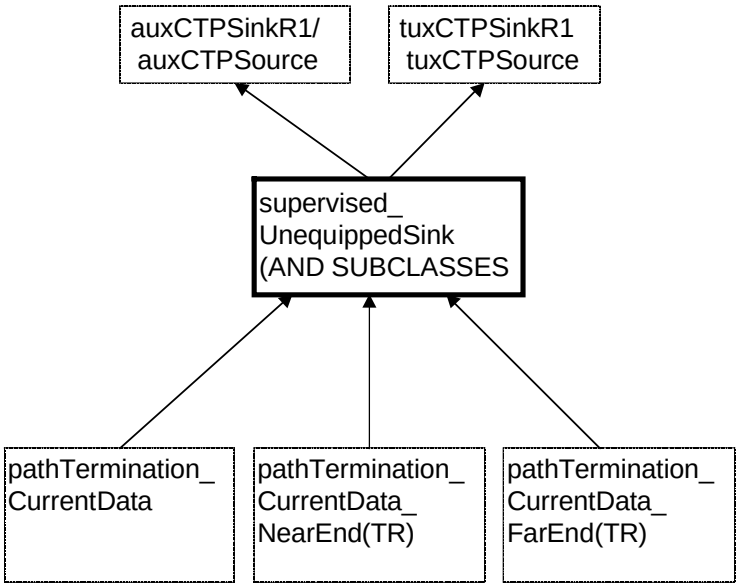

Figure 3: Naming hierarchy of the object supervisedUnequippedSink (AND SUBCLASSES)

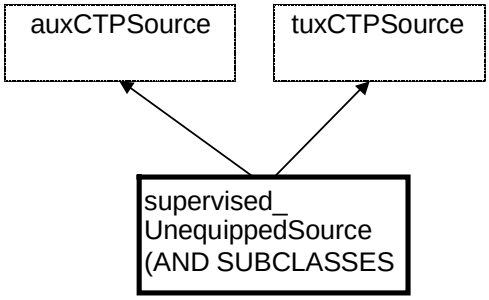

Figure 4: Naming hierarchy of the object supervisedUnequippedSource (AND SUBCLASSES)

Bibliography

The following material, though not specifically referenced in the body of the present document (or not publicly available), gives supporting information.

ITU-T Recommendation X.720: "Information technology - Open Systems Interconnection - Structure of management information: Management information model".

ITU-T Recommendation X.701: "Information technology - Open Systems Interconnection - Systems management overview".

ITU-T Recommendation X.731: "Information technology - Open Systems Interconnection - Systems Management: State management function".

ITU-T Recommendation X.730: "Information technology - Open Systems Interconnection - Systems Management: Object management function".

ITU-T Recommendation X.733: "Information technology - Open Systems Interconnection - Systems Management: Alarm reporting function".

ETS 300 304: "Transmission and Multiplexing (TM); Synchronous Digital Hierarchy (SDH); SDH information model for the Network Element (NE) view".

ITU-T Recommendation G.774-02: Synchronous Digital Hierarchy (SDH) configuration of the payload structure for the network element view".

ITU-T Recommendation G.707: "Network node interface for the Synchronous Digital Hierarchy (SDH)".

ITU-T Recommendation G.803: "Architecture of transport networks based on the Synchronous Digital Hierarchy (SDH)".

ITU-T Recommendation G.783: "Characteristics of Synchronous Digital Hierarchy (SDH) equipment functional blocks".

ITU-T Recommendation M.3010: "Principles for a Telecommunications management network".

ITU-T Corrigendum to G.774-01: "Synchronous Digital Hierarchy (SDH) Performance Monitoring for the Network Element View".

History

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