

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



Reference

DES/TMN-00043 (fb000icp.PDF)

Keywords

SDH, NE

ETSI

Postal address

F-06921 Sophia Antipolis Cedex - FRANCE

Office address

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

Internet

secretariat@etsi.fr
Individual copies of this ETSI deliverable
can be downloaded from
<http://www.etsi.org>
If you find errors in the present document, send your
comment to: editor@etsi.fr

Copyright Notification

No part may be reproduced except as authorized by written permission.
The copyright and the foregoing restriction extend to reproduction in all media.

© European Telecommunications Standards Institute 1999.
All rights reserved.

Contents

Intellectual Property Rights.....	5
Foreword	5
1 Scope.....	6
2 References.....	6
3 Abbreviations.....	7
4 Information model of Trail non intrusive Monitoring and Supervisory Unequipped Monitoring	8
4.1 Overview	8
4.2 Object class definitions	8
4.2.1 NON-INTRUSIVE MONITORING FRAGMENT.....	8
4.2.1.1 trailMonitor	8
4.2.2 SUPPERVISORY-UNEQUIPPED FRAGMENT.....	9
4.2.2.1 supervisedUnequippedBidirectional	9
4.2.2.2 supervisedUnequippedSink.....	9
4.2.2.3 supervisedUnequippedSource	10
4.3 Attribute definitions.....	10
4.3.1 unequippedTrailIndication.....	10
4.3.2 monitoringDirection.....	11
4.3.3 trailMonitorId	11
4.3.4 trailTIAccepted.....	11
4.3.5 trailTIExpected	11
4.3.6 supervisedUnequippedId	11
4.3.7 trailTISend.....	11
4.4 Package definitions.....	12
4.4.1 unequippedTrailIndicationPackage.....	12
4.4.2 thresholdForBurstyPackage	12
4.5 Name binding definitions	12
4.5.1 For SDH Path Overhead (Non-Intrusive) Monitoring	12
4.5.1.1 trailMonitor-au4CTPSinkR1	12
4.5.1.2 trailMonitor-au4CTPSource.....	12
4.5.1.3 trailMonitor-au3CTPSinkR1	13
4.5.1.4 trailMonitor-au3CTPSource.....	13
4.5.1.5 trailMonitor-tu3CTPSinkR1.....	13
4.5.1.6 trailMonitor-tu3CTPSource	13
4.5.1.7 trailMonitor-tu2CTPSinkR1.....	14
4.5.1.8 trailMonitor-tu2CTPSource	14
4.5.1.9 trailMonitor-tu12CTPSinkR1.....	14
4.5.1.10 trailMonitor-tu12CTPSource	14
4.5.1.11 trailMonitor-tu11CTPSinkR1.....	14
4.5.1.12 trailMonitor-tu11CTPSource	15
4.5.1.13 pathTerminationCurrentData-trailMonitor	15
4.5.1.14 pathTerminationCurrentDataFarEnd-trailMonitor	15
4.5.1.15 pathTerminationCurrentDataFarEndTR-trailMonitor	15
4.5.1.16 pathTerminationCurrentDataNearEnd-trailMonitor.....	15
4.5.1.17 pathTerminationCurrentDataNearEndTR-trailMonitor.....	16
4.5.2 For SDH Supervisory Unequipped	16
4.5.2.1 supervisedUnequippedSink-au4CTPSinkR1	16
4.5.2.2 supervisedUnequippedSink-au4CTPSource.....	16
4.5.2.3 supervisedUnequippedSource-au4CTPSource.....	16
4.5.2.4 supervisedUnequippedSink-au3CTPSinkR1	17
4.5.2.5 supervisedUnequippedSink-au3CTPSource.....	17
4.5.2.6 supervisedUnequippedSource-au3CTPSource.....	17
4.5.2.7 supervisedUnequippedSink-tu3CTPSinkR1	17
4.5.2.8 supervisedUnequippedSink-tu3CTPSource	17
4.5.2.9 supervisedUnequippedSource-tu3CTPSource	18

4.5.2.10	supervisedUnequippedSink-tu2CTPSinkR1	18
4.5.2.11	supervisedUnequippedSink-tu2CTPSource	18
4.5.2.12	supervisedUnequippedSource-tu2CTPSource	18
4.5.2.13	supervisedUnequippedSink-tu12CTPSink	18
4.5.2.14	supervisedUnequippedSink-tu12CTPSource	19
4.5.2.15	supervisedUnequippedSource-tu12CTPSource	19
4.5.2.16	supervisedUnequippedSink-tu11CTPSinkR1	19
4.5.2.17	supervisedUnequippedSink-tu11CTPSource	19
4.5.2.18	supervisedUnequippedSource-tu11CTPSource	19
4.5.2.19	pathTerminationCurrentData-supervisedUnequippedSink.....	20
4.5.2.20	pathTerminationCurrentDataFarEnd-supervisedUnequippedSink	20
4.5.2.21	PathTerminationCurrentDataFarEndTR-supervisedUnequippedSink.....	20
4.5.2.22	pathTerminationCurrentDataNearEnd-supervisedUnequippedSink.....	20
4.5.2.23	pathTerminationCurrentDataNearEndTR-supervisedUnequippedSink.....	20
4.6	Supporting ASN.1	21
5	Figures.....	21
	Bibliography	23
	History	24

Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available **free of charge** from the ETSI Secretariat. Latest updates are available on the ETSI Web server (<http://www.etsi.org/ipr>).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Foreword

This ETSI Standard (ES) has been produced by ETSI Technical Committee Telecommunications Management Network (TMN), and is now submitted for the ETSI standards Membership Approval Procedure.

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. Furthermore, 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 [24]) 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 trailTIEExpected attribute matches with any value of path trace received (no dTIM detection).

- If mode1 choice of trailTIEExpected is in place, dTIM is declared whenever the path trace accepted (content of trailTIAccepted attribute) does not match the path trace expected (content of trailTIEExpected 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 SUPERVISORY-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
    trailTIEExpected                       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 trailTIEExpected attribute matches with any value of path trace received (no dTIM detection).

- If mode1 choice of trailTIEExpected is in place, dTIM is declared whenever the path trace accepted (content of trailTIAccepted attribute) does not match the path trace expected (content of trailTIEExpected 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 [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 model 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 Model 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
    SUBORDINATE OBJECT CLASS    trailMonitor
    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
    SUBORDINATE OBJECT CLASS    trailMonitor
    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
    SUBORDINATE OBJECT CLASS    trailMonitor
    NAMED BY
    SUPERIOR OBJECT CLASS      "ITU-T Recommendation G.774 [15]: 1996": tu3CTPSinkR1 AND SUBCLASSES;
    WITH ATTRIBUTE             trailMonitorId;
    BEHAVIOUR                  trailMonitor-tu3CTPSinkR1Behaviour
    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
    SUBORDINATE OBJECT CLASS    trailMonitor
    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": tullCTPSinkR1 AND SUBCLASSES;
  WITH ATTRIBUTE trailMonitorId;
  BEHAVIOUR trailMonitor-tullCTPSinkR1Behaviour
  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-tullCTPSource NAME BINDING
SUBORDINATE OBJECT CLASS trailMonitor AND SUBCLASSES;
NAMED BY
SUPERIOR OBJECT CLASS "ITU-T Recommendation G.774 [4]: 1992": tullCTPSource AND SUBCLASSES;
  WITH ATTRIBUTE trailMonitorId;
  BEHAVIOUR trailMonitor-tullCTPSourceBehaviour
  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
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
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
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
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
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
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": tullCTPSource 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

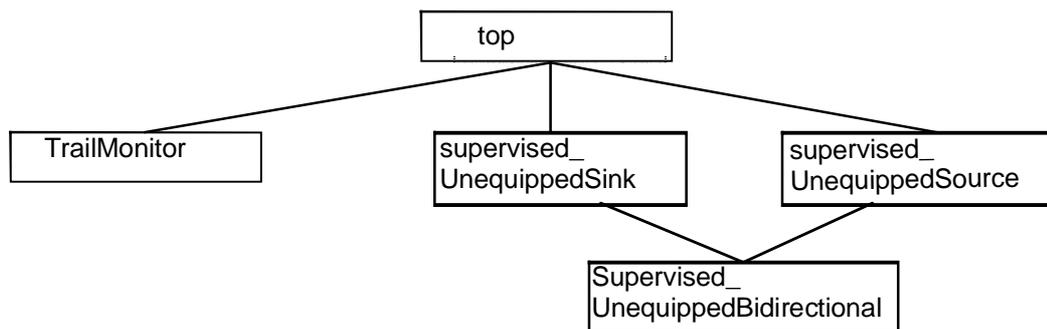


Figure 1: Inheritance tree

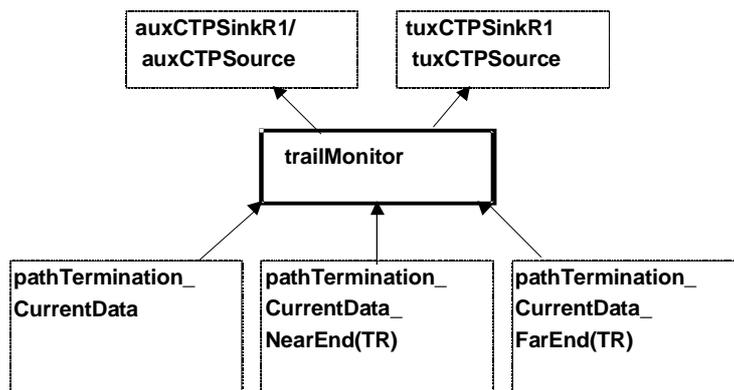


Figure 2: Naming hierarchy of the object trailMonitor (AND SUBCLASSES)

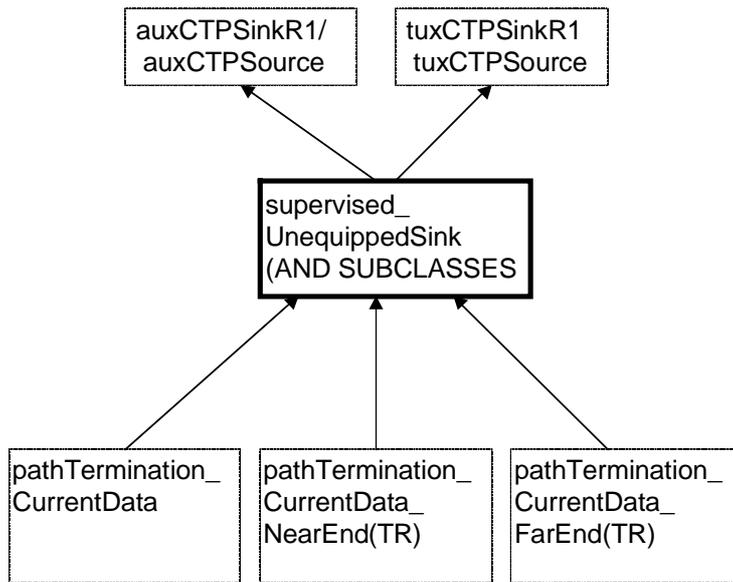


Figure 3: Naming hierarchy of the object supervisedUnequippedSink (AND SUBCLASSES)

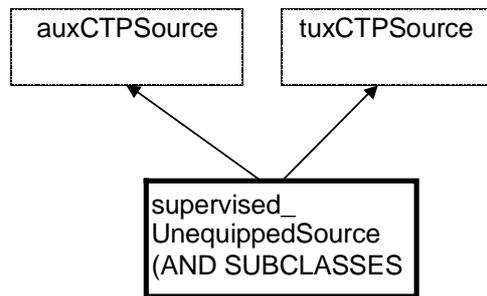


Figure 4: Naming hierarchy of the object supervisedUnequippedSource (AND SUBCLASSES)

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

Document history		
V1.1.1	March	Membership Approval Procedure MV 9922: 1999-03-30 to 1999-05-28