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Transmission and Multiplexing (TM); Synchronous Digital Hierarchy (SDH) information model; Connection supervision function (Higher order Connection Supervision / Lower order Connection Supervision (HCS/LCS)) for the Network Element (NE) view

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Foreword

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

The ETS describes managed object classes of the information model for Network Elements (NEs), which provide the connection supervision function (Higher order Connection Supervision / Lower order Connection Supervision (HCS/LCS)).

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

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1 Scope

This final draft European Telecommunication Standard (ETS) defines the information model to be used at the interface between Network Elements (NEs) and management systems, for the management of NEs which use the connection supervision function (Higher Order Connection Supervision / Lower Order Connection Supervision (HCS/LCS)).

This ETS defines:

- the information model for Synchronous Digital Hierarchy (SDH) NEs using connection supervision function.

This ETS does not define:

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

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

The HCS and LCS functional blocks (connection supervision) are specified as optional components and a standardized modelling at the Q3 interface is provided by this ETS. The connection supervision functionality is included into subclasses of SDH connection termination points.

2 Normative references

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

[1] ITU-T Recommendation G.774 (1992): "Synchronous digital hierarchy (SDH) management information model for the network element view".

[2] ITU-T Recommendation G.774.05 (1995): "Synchronous digital hierarchy (SDH) management of connection supervision functionality (HCS/LCS) for the network element view".

[3] ITU-T Recommendation G.783 (1993): "Characteristics of synchronous digital hierarchy (SDH) equipment functional blocks".

3 Abbreviations

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

CTP	Connection Termination Point
HCS	Higher order Connection Supervision
HPA	Higher order Path Adaptation
HPC	Higher order Path Connection
HPOM	Higher order Path Overhead Monitor
HUG	Higher order Unequipped Generator
LCS	Lower order Connection Supervision
LPC	Lower order Path Connection
LPOM	Lower order Path Overhead Monitor
LUG	Lower order Unequipped Generator
MSA	Multiplex Section Adaptation
NE	Network Element
SDH	Synchronous Digital Hierarchy
TTP	Trail Termination Point
VC	Virtual Container

4 Information model of connection supervision

4.1 Overview

a) HCS and LCS may be provided in the case of an open HPC resp. LPC (unused connection). This case is modelled by not connected AU4CTP resp. TUxCTP. Therefore:

- the HCS is modelled by "supervisedAU4CTP". These classes are subclasses of AU4CTP of ITU-T Recommendation G.774 [1] which currently model only the Multiplex Section Adaptation (MSA) function;

- the LCS is modelled by "supervisedTU3/2/12/11CTP". These classes are subclasses of TU3/2/12/11CTP of ITU-T Recommendation G.774 [1] which currently model only the Higher order Path Adaptation (HPA) function.

b) If an instance of an AU4CTP or TUxCTP has to be created (only possible as a consequence of the creation of a superior Trail Termination Point (TTP) or because of actions (re-) configuring the SDH structure) and the equipment is able to provide HCS/LCS functionality (see requirement 3, subclause 4.2), instead of (ITU-T Recommendation G.774 [1]) CTPs the proposed supervised CTPs should be created automatically.

c) The (de-)activation of HCS/LCS is modelled using the attribute generatorEnabled for the unequipped generator part and using the attribute monitorActive for the path overhead monitor part. These attributes allow the independent management of both subfunctions (requirement 4, subclause 4.2).

d) The (de-)activation of HCS/LCS in the supervised CTP objects does not influence the behaviour derived from ITU-T Recommendation G.774 [1] (MSA, HPA). A SET-operation of generatorEnabled to TRUE or of monitorActive to TRUE may be rejected dependent from the dynamic situation of the specific NE if it supports the connection supervision function with less than 100%. This results from requirement 5, subclause 4.2.

e) Performance measurement of the connection supervision functionality of supervised CTPs (Sink or Bi-directional) can be done using a subclass of currentData which is applicable for path termination. This subclass provides the parameters background block errors, errored seconds, severely errored seconds and unavailable seconds (some are optional and are also provided for the far end). If the attribute monitorActive of a CTP has the value FALSE during a part of a PM period the performance data is not reliable. This should be indicated by the attribute suspectIntervalFlag in the currentData object.

4.2 Requirements

The features of HCS/LCS (defined in ITU-T Recommendation G.783 [3]) which influence the modelling approach are summarized below:

Requirement 1: The connection supervision function includes the monitoring of parts of higher order resp. lower order path overhead to get alarms and performance information about the path segment (sub function HPOM resp. LPOM (Path Overhead Monitors)).

Requirement 2: The connection supervision function includes the generation of supervisory unequipped higher resp. lower order path overhead with a certain Path Trace (sub function HUG resp. LUG (Unequipped Generators)).

Requirement 3: The connection supervision function may be optional.

Requirement 4: The connection supervision function shall be able to be set into the INACTIVE state and the ACTIVE state (independent for HPOM and HUG resp. LPOM and LUG).

Requirement 5: The connection supervision function may be supported for a specific equipment at the same time in the range of 0% to 100%.

5 Managed object class definitions

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

```
BEGIN
IMPORTS
au4SupervisedCTPBidirectional,
au4SupervisedCTPSink,
au4SupervisedCTPSource,
tu3SupervisedCTPBidirectional,
tu3SupervisedCTPSink,
tu3SupervisedCTPSource,
tu2SupervisedCTPBidirectional,
tu2SupervisedCTPSink,
tu2SupervisedCTPSource,
tu12SupervisedCTPBidirectional,
tu12SupervisedCTPSink,
tu12SupervisedCTPSource
FROM {itu(0) recommendation(0) g(7) g774(774) hyphen(127) g77405(5)
informationModel(0)
   managedObjectClass(3) }
,
END
```

6 Package definitions

```
BEGIN
IMPORTS
vc11-2SupervisionBidirectionalPackage,
vc11-2SupervisionSinkPackage,
vc11-2SupervisionSourcePackage,
vc3-4SupervisionBidirectionalPackage,
vc3-4SupervisionSinkPackage,
vc3-4SupervisionSourcePackage
FROM {itu(0) recommendation(0) g(7) g774(774) hyphen(127) g77405(5)
informationModel(0)
   package(4) }
;
END
```

7 Attribute definitions

```
BEGIN
IMPORTS
generatorEnabled,
monitorActive,
j2PathTraceExpected,
j2PathTraceReceive,
j2PathTraceSend
FROM {itu(0) recommendation(0) g(7) g774(774) hyphen(127) g77405(5)
informationModel(0)
   attribute(7) }
;
END
```

NOTE: Attribute definitions related to J2 path trace are expected to be shifted from ITU-T Recommendation G.774.05 [2] to ITU-Recommendation G.774 [1]; then they will be imported from that document.

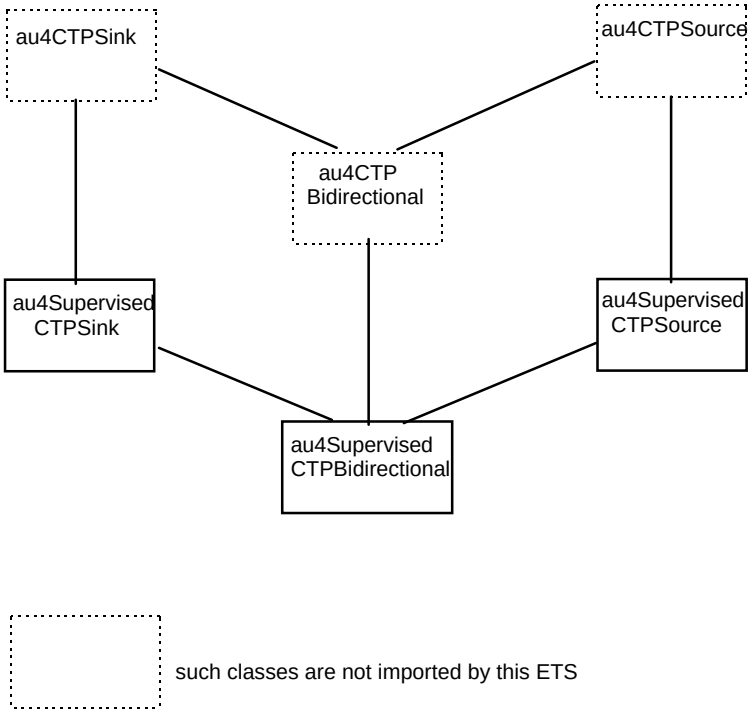
The attributes related to J1, C2 and V5 bytes (see definition of imported packages) are imported by the ETS 300 304 from ITU-Recommendation G.774 [1].

8 Name binding definitions

For performance monitoring name bindings are defined which has supervised CTPs (sink or bi-directional) as superior class and the subclass of currentData for path termination as subordinate class.

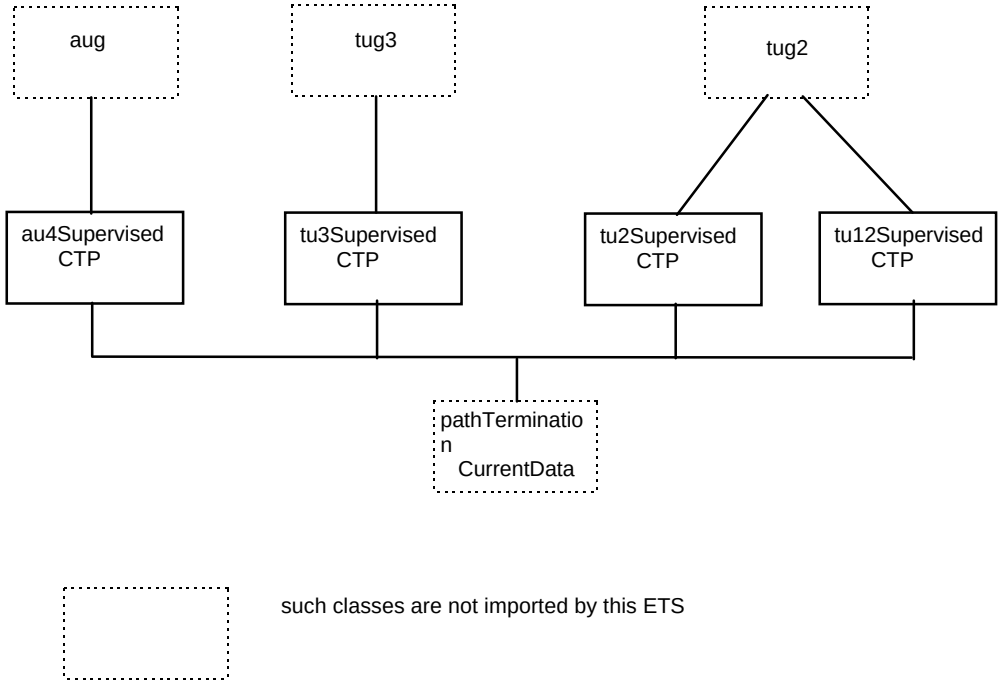
```
BEGIN
IMPORTS
pathTerminationCurrentData-au4SupervisedCTPSink,
pathTerminationCurrentData-tu3SupervisedCTPSink,
pathTerminationCurrentData-tu2SupervisedCTPSink,
pathTerminationCurrentData-tu12SupervisedCTPSink
FROM {itu(0) recommendation(0) g(7) g774(774) hyphen(127) g77405(5)
informationModel(0)
   nameBinding(6) }
;
END
```

Annex A (informative): Figures



NOTE: The inheritance scheme for supervised tu3 / 2 / 12 CTPs is analogous to this figure.

Figure A.1: Inheritance relationship for supervised au4CTPs



NOTE: Sink / Source and Bi-directional classes are not distinguished in this figure. Instances of Source classes cannot contain pathTerminationCurrentData.

Figure A.2: Containment relationship for supervised CTPs

Annex B (informative): Bibliography

- CCITT Recommendation X.701: "Information technology - Open Systems Inteconnection - Systems management overview".

- CCITT Recommendation X.710 : "Common management information service definition for CCITT applications".

- CCITT Recommendation X.711: "Common management information protocol specification for CCITT applications".

- CCITT Recommendation X.720: "Information technology - Open Systems Inteconnection - Structure of management information: Management information model".

- CCITT Recommendation X.721: "Information technology - Open Systems Inteconnection - Structure of management information: Definition of management information".

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

- CCITT Recommendation X.733: "Information technology - Open Systems Inteconnection - Systems Management: Alarm reporting function".

- CCITT Recommendation G.784: "Synchronous digital hierarchy (SDH) management".

- ITU-T Recommendation G.803: "Architectures of transport networks based on the synchronous digital hierarchy (SDH)".

- CCITT Recommendation M.3010: "Principles for a telecommunications management network".

- CCITT Recommendation M.3100: "Generic network information model".

- ETS 300 150: "Transmission and Multiplexing (TM); Protocol suites for Q interfaces for management of transmission systems".

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

- ETS 300 417-1-1: "Transmission and Multiplexing (TM); Generic functional requirements for Synchronous Digital Hierarchy (SDH) equipment; Part 1-1: Generic processes and performance".

History

Document history			
April 1996	Public Enquiry	PE 82:	1995-04-10 to 1995-09-01
May 1996	Vote	V 102:	1996-05-06 to 1996-08-09