EN 301 384 V1.1.1 (1999-05)

European Standard (Telecommunications series)

Telecommunications Management Network (TMN); Performance monitoring for Plesynchronous Digital Hierarchy (PDH) interfaces; Information model for the Network Element (NE) view

ETSI

Reference
DEN/TMN-00040 (ctc00ico.PDF)

Keywords
NE, PDH, performance, Q3 interface,
transmission

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

ETSI

Contents

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 European Standard (Telecommunications series) has been produced by ETSI Technical Committee Telecommunications Management Network (TMN).

National transposition dates	
Date of adoption of this EN:	14 May 1999
Date of latest announcement of this EN (doa):	31 August 1999
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	29 February 2000
Date of withdrawal of any conflicting National Standard (dow):	29 February 2000

1   Scope

The present document provides an information model for the performance monitoring of Synchronous Digital Hierarchy (SDH) network. This model describes the managed object classes and their properties for the performance monitoring function, as defined in ITU-T Recommendation G.784 [1] and EN 301 167 [2] and as related to SDH Network Elements (NEs). These objects are useful to describe information exchanged across interfaces defined in ITU-T Recommendation M.3010 [3] Telecommunications Management Network (TMN) architecture for the management of the performance monitoring function.

PDH performance monitoring functions are used to monitor specified performance events of specified termination points managed objects as defined in EN 300 371 [4] and to report these performance data, as well as quality of service alarms to its managing system according to a given schedule.

ITU-T Recommendation M.2120 [5] defines maintenance of transport network,
ITU-T Recommendation G.784 [1] defines the management of SDH based NE. The present document defines the object model based on ITU-T Recommendation Q.822 [6] according to the requirements described in
ITU-T Recommendation G.784 [1], EN 301 167 [2] and ITU-T Recommendation M.2120 [5]. This model uses generic mechanism defined in ITU-T Recommendation Q.822 [6].

The present document defines:

- an information model, as related to the performance monitoring function for the Plesynchronous Digital Hierarchy (PDH).

The present document does not define:

- the protocol stack to be used for message communication;

- the network level management processes;

- the application contexts;

- the conformance requirements to be met by an implementation of this information model;

- information models for other systems or equipment.

The information model defined here (and the corresponding message set) is concerned with the management of NEs, the equipment by which they are implemented and the functions contained within them. More precisely, it applies to an equipment domain visible at the element manager to 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 G.784 (1994): "Synchronous Digital Hierarchy (SDH) Management".

[2]   EN 301 167: "Transmission and Multiplexing (TM); Management of Synchronous Digital Hierarchy (SDH) transmission equipment; Fault management and performance monitoring; Functional description".

[3]   ITU-T Recommendation M.3010 (1996): "Principles for a Telecommunications Management Network".

[4]   EN 300 371: "Telecommunications Management Network (TMN); Plesiochronous Digital Hierarchy (PDH) information model for the Network Element (NE) view".

[5]   ITU-T Recommendation M.2120 (1997): "PDH path, section and transmission system and SDH path and multiplex section fault detection and localization procedures".

[6]   ITU-T Recommendation Q.822 (1994): "Stage 1, stage 2 and stage 3 description for the Q3 interface - Performance Management".

[7]   ITU-T Recommendation G.774-01 (1996): "Synchronous Digital Hierarchy (SDH) performance monitoring for the network element view".

[8]   ITU-T Recommendation G.774-06 (1997): "Synchronous Digital Hierarchy (SDH) unidirectional performance monitoring for the network element view".

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

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

[11]   ITU-T Recommendation G.826 (1996): "Error performance parameters and objectives for international, constant bit rate digital paths at or above the primary rate".

[12]   ITU-T Recommendation X.739 (1993): "Information technology - Open Systems Interconnection - Systems Management: Metric objects and attributes".

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

3   Abbreviations

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

BBE   Background Block Error
CSES   Consecutive Severely Errored Seconds
CTP   Connection Termination Point
ES   Errored Second
FEBBE   Far End Background Block Error
FEES   Far End Errored Second
FESES   Far End Severely Errored Seconds
NE   Network Element
PDH   Plesynchronous Digital Hierarchy
SDH   Synchronous Digital Hierarchy
SEMF   Synchronous Equipment Management Function
SES   Severely Errored Second
TMN   Telecommunications Management Network
TR   Threshold Reset
TTP   Trail Termination Point
UAS   Unavailable Seconds

4   Performance Monitoring Management Model

The performance monitoring requirements to be met by the SDH Equipment Management Function (SEMF) are described in ITU-T Recommendation G.784 [1], subclause 5.3 and in EN 301 167 [2], subclauses 5.1 to 5.2. The functional model given in the SEMF for performance monitoring of SDH signals is basically applicable for PDH signals as well.

5   Managed object class definitions

In the context of the present document, the IMPORTS clause specifies the object classes which can be instantiated in the Scope of the present document. The IMPORTS clause does not include uninstantiated superclasses.

```
BEGIN
IMPORTS
currentData,
historyData
FROM Q822-PM-ASN1Module {itu(0) recommendation(0) q(17) q822(822) informationModel(0)
managedObjectClass(3)}
;
END
```

PDH Current Data Unidirectional

```
pdhCurrentDataUnidirectional    MANAGED OBJECT CLASS
DERIVED FROM  "Recommendation Q.822: 1993": currentData;
CHARACTERIZED  BY
-    "Recommendation Q.822: 1993": zeroSuppressionPkg,
-    "Recommendation Q.822: 1993": thresholdPkg,
pdhCurrentDataUnidirectionalPackage   PACKAGE
-    BEHAVIOUR pdhCurrentDataUnidirectionalBehaviour;
-    ATTRIBUTES
-    "Recommendation M.3100: 1995": currentProblemList   GET,
-    "Recommendation X.739: 1993": granularityPeriod   PERMITTED VALUES
                              PDHPMASN1.UniDGranularityPeriod;;;

CONDITIONAL  PACKAGES
-    "Recommendation G.774-01: 1994":  historyPackage     PRESENT IF
            "an instance does not support flexible assignment of the history length",
-    "Recommendation G.774-01: 1994":  unavailableTimeAlarmPackage  PRESENT IF
            "starting and ending of unavailable period has to be reported and the
-    granularity period is 24 hours";
REGISTERED AS {};

pdhCurrentDataUnidirectionalBehaviour BEHAVIOUR
DEFINED AS
"The pdhCurrentDataUnidirectional class is used to define generic characteristic for unidirectional
PDH performance monitoring from which subclasses are defined in order to hold performance event
counts for a specific monitoring point. Subclasses of this class are used in order to support
performance monitoring of PDH trails at various layers as described in EN  300 417-5-1. The
performance monitoring events ES, SES and BBE which are monitored by some of the subclasses of this
subclass are defined in annex B/G.826 and are based on the performance event primitives specified in
EN  300 417-1-1 and EN  300 417-5-1. The granularityPeriod attribute can only be assigned a value at
creation time.
```

This class can only contain one reference to an instance of the thresholdData object class in the thresholdDataInstance attribute.

If a threshold is reached or crossed then the currentProblemList attribute shall indicate it with the probable cause thresholdCrossed. Subclass of this class is used to monitor the near-end or far-end performance data of the trail.

A period of unavailable time begins at the onset of 10 consecutive SES events. These ten seconds are considered to be part of unavailable time. A new period of available time begins at the onset of ten consecutive non-SES events. These ten seconds are considered to be part of available time.

The unavailability conditions are kept separate for near end and far end monitoring. This means that near end unavailability is deduced from near end conditions only (e.g. 10 consecutive SES at the near end) and far end unavailability is deduced from far end conditions only (e.g. 10 consecutive SES at the far end).

For threshold reset subclasses of this object class the following rules apply:

- No more than one QOS alarm shall be generated until there has been a 15 minutes rectangular fixed window with less error count than the low error count threshold and no unavailable period exists.

- To provision the high and low threshold value, the counterThresholdAttributList attribute of the ITU-T Recommendation Q.822 [6] - thresholdDataInstance is used. In this attribute all the thresholds (high and low) for each necessary counter are stored in a list. This means for example, that the high threshold for ES and the low threshold for ES are individually stored in the same list. It is up to the network element to recognize which is the high and which is the low one.

If the unavailableTimeAlarmPackage is present and if an unavailable period starts then a communication alarm shall be sent with a probable cause of Unavailable and the presence of this unavailable condition is indicated by the currentProblemList attribute. If an unavailable period is ending then a communication alarm shall be sent with a probable cause of Unavailable and a severity of Cleared. An available condition is indicated by the absence of the unavailable condition in the current problem list. The unavailable condition has no effect on the operationalState. Each subclass of this class shall define the performance attributes required to hold the mandatory or optional performance events. These performance event counts (except UAS) are inhibited during unavailable time of its own direction (at the near end or at the far end).

Attributes which are defined in a subclass of this class shall be included in history information using the historyData, or one of its subclass, unless it is explicitly specified in the subclass of this class that a particular attribute be not included. Each subclass of this class shall indicate which subclass of the history data is used for history retention. The following conditional packages are not used in this class: filterSuppressionPkg, observedManagedObjectPkg.

Concerning the subclasses of this class the following rule applies:

If a subclass of this class has a granularity period of 15 minutes, it should be either an instance with the threshold reset functionality or an instance without this functionality instantiated (per termination point), but not both.";

PDH Current Data Near End

```
pdhCurrentDataNearEnd   MANAGED OBJECT CLASS
DERIVED FROM     pdhCurrentDataUnidirectional;
CHARACTERIZED  BY
pdhCurrentDataNearEndPackage  PACKAGE
              BEHAVIOUR  pdhCurrentDataNearEndBehaviour;
              ATTRIBUTES
              "Recommendation G.774-01: 1994":  bBE  REPLACE-WITH-DEFAULT  GET,
              "Recommendation G.774-01: 1994":  eS   REPLACE-WITH-DEFAULT  GET,
              "Recommendation G.774-01: 1994":  sES  REPLACE-WITH-DEFAULT  GET;;;
CONDITIONAL  PACKAGES
    "Recommendation G.774-06: 1997":  nearEndUASCurrentDataPackage  PRESENT IF
    "an instance supports it",
    "Recommendation G.774-01: 1994":  cSESCurrentDataPackage  PRESENT IF
          " the granularity period is 15 minutes and an instance supports it";
REGISTERED AS   { } ;

pdhCurrentDataNearEndBehaviour  BEHAVIOUR
DEFINED AS

"Instances of the pdhCurrentDataNearEnd managed object class are used to hold the current near end
register counts for a PDH path during a collection period.
```

The following performance primitives are observed: Defect Seconds (pN_DS) and Errored Blocks (nN_B). These primitives are provided by monitoring functions represented in superior PDH termination points and are defined in PDH path layers according EN 300 417-5-1 [10].

For these performance primitives the following performance events are defined:

BBE	Background Block Error.
ES	Errored Second.
SES	Severely Errored Second.
UAS	Unavailable Second: This counter is used to store one second intervals pertaining to an unavailable time period at the near end.

In addition, the optional performance event CSES (Consecutive SES) is defined.

This managed object class uses the pdhPathHistoryDataNearEnd managed object class for history retention.

A QOS alarm shall be sent as soon as a threshold is reached or crossed. At the end of the granularity period the QOS alarm is implicitly cleared and, providing there are no other outstanding threshold crossing QOS alarms, thresholdCrossing is removed from the currentProblemList (i.e. no notification is sent). A new QOS alarm shall be sent if the threshold is reached or crossed again during the next granularity period. Only one threshold value per performance counter will be supported.";

PDH Current Data Near End Threshold Reset

```
pdhCurrentDataNearEndTR    MANAGED OBJECT CLASS
DERIVED FROM         pdhCurrentDataNearEnd;
CHARACTERIZED  BY
"Recommendation G.774-01: 1994": thresholdResetPackage,
pdhCurrentDataNearEndTRPackage  PACKAGE
                ATTRIBUTES
                "Recommendation X.739: 1993":  granularityPeriod  PERMITTED VALUES
                    PDHPMASN1.TRGranularityPeriod;;;
REGISTERED AS   { } ;
```

PDH Current Data Far End

```
pdhCurrentDataFarEnd   MANAGED OBJECT CLASS
DERIVED FROM    pdhCurrentDataUnidirectional;
CHARACTERIZED  BY
pdhFarEndCurrentDataPkg,
pdhCurrentDataFarEndPackage  PACKAGE
                BEHAVIOUR  pdhCurrentDataFarEndBehaviour;;;
CONDITIONAL  PACKAGES
    "Recommendation G.774-06: 1997": farEndUASCurrentDataPackage  PRESENT IF
    "an instance supports it",
    "Recommendation G.774-01: 1994":  farEndCSESCurrentDataPackage PRESENT  IF
            " the granularity period is 15 minutes and an instance supports it",
    farEndBBEPackage    PRESENT IF
    "an instance of this class is subordinate of a PDH-termination point monitoring a frame and
block
    structured path according Recommendation G.826 (e.g. framed 2MBit/s
    signal with CRC4-submultiframe) and pdhFarEndCurrentDataPkg is instantiated";

REGISTERED AS   {} ;

pdhCurrentDataFarEndBehaviour  BEHAVIOUR
DEFINED AS

"Instances of the pdhCurrentDataFarEnd managed object class are used to hold the current far end
register counts for a PDH path during a collection period.
```

The following performance primitives are observed: Defect Seconds (pF_DS) and conditionally Errored Blocks (nF_B). The Errored Blocks are count in the attribute fEBBE if an instance of this class is subordinate of a PDH-termination point monitoring a frame and block structured paths. These primitives are provided by monitoring functions represented in superior PDH termination points and are defined in PDH path layers according to EN 300 417-5-1 [10].

For these performance primitives the following performance events are defined:

FEES   Far End Errored Second.

FESES   Far End Severely Errored Second.

In addition, the following optional performance events are defined:

FEUAS   Far End Unavailable Second: This counter is used to store one second intervals pertaining to an unavailable time period at the far end.

FEBBE   Far End Errored Blocks for frame and block structured paths.

FECSES   Far End Consecutive SES.

This managed object class uses the pdhPathHistoryDataFarEnd managed object class for history retention.

A QOS alarm shall be sent as soon as a threshold is reached or crossed. At the end of the granularity period the QOS alarm is implicitly cleared and, providing there are no other outstanding threshold crossing QOS alarms, thresholdCrossing removed from the currentProblemList (i.e. No Notification is Sent). A new QOS alarm shall be sent if the threshold is reached or crossed again during the next granularity period. Only one threshold value per performance counter will be supported.";

PDH Current Data Far End Threshold Reset

```
pdhCurrentDataFarEndTR     MANAGED OBJECT CLASS
DERIVED FROM          pdhCurrentDataFarEnd;
CHARACTERIZED  BY
"Recommendation G.774-01: 1994":  thresholdResetPackage,
pdhCurrentDataFarEndTRPackage  PACKAGE
    ATTRIBUTES
    "Recommendation X.739: 1993": granularityPeriod  PERMITTED VALUES
                        PDHPMASN1.TRGranularityPeriod;;;
REGISTERED AS    {} ;
```

PDH Current Data Bi-directional

```
pdhCurrentDataBidirectional MANAGED OBJECT CLASS
    DERIVED FROM  "Recommendation Q.822: 1993": currentData;
    CHARACTERIZED  BY
    "Recommendation Q.822: 1993": zeroSuppressionPkg,
    pdhCurrentDataBidirectionalPkg  PACKAGE
        BEHAVIOUR pdhCurrentDataBidirectionalBehaviour;
        ATTRIBUTES
        "Recommendation X.739: 1993": granularityPeriod  PERMITTED VALUES
                            PDHPMASN1.BiDGranularityPeriod,

        "Recommendation M.3100: 1992": currentProblemList  GET;;;
    CONDITIONAL  PACKAGES
        "Recommendation G.774-01: 1994": historyPackage PRESENT IF
        "an instance does not support flexible assignment of the history length",
        "Recommendation G.774-01: 1994": unavailableTimeAlarmPackage PRESENT IF
        "starting and ending of unavailable period has to be reported ";
REGISTERED AS { };

pdhCurrentDataBidirectionalBehaviour BEHAVIOUR
DEFINED AS

*The pdhCurrentDataBidirectional class is used to define generic characteristic for PDH performance
monitoring from which subclasses are defined in order to hold performance event counts for a
specific monitoring point. Subclasses of this class are used in order to support performance
monitoring of PDH trails at various layers as described in the Standard EN  300 417-5-1. The
performance monitoring events ES, SES and BBE which are monitored by some of the subclasses of this
subclass are defined in annexB/G.826 and are based on the performance event primitives specified in
EN  300 417-1-1 and EN  300 417-5-1. The granularityPeriod attribute can only be assigned a value at
creation time.
```

Subclass of this class is used to monitor the near end of the trail, and in case of bi-directional trail the far end of the trail shall be supported additionally. In case of monitoring of a bi-directional trail an unavailable period starts if either the near end or the far end is in a unavailable condition. In case of monitoring of a unidirectional trail only the near end is considered.

An unavailable condition starts when 10 consecutive severely errored seconds have been detected; these 10 seconds belong to the unavailable time. An unavailable condition ends when 10 consecutive seconds with no severely errored second are detected. These 10 seconds belong to the available time. The unavailable period entry / exit criteria are described in ITU-T Recommendation G.826 [11] annex 1.

If the unavailableTimeAlarmPackage is present and if an unavailable period starts then a communication alarm shall be sent with a probable cause of "Unavailable" and the presence of this unavailable condition is indicated by the currentProblemList attribute. If an unavailable period is ending then a communication alarm shall be sent with a probable cause of "Unavailable" and a severity of "Cleared". An available condition is indicated by the absence of the unavailable condition in the current problem list. The unavailable condition has no effect on the operationalState.

Each subclass of this class shall define the performance attributes required to hold the mandatory or optional performance events. These performance event counts (except UAS) are inhibited during unavailable time. Attributes which are defined in a subclass of this class shall be included in history information using the historyData, or one of its subclass, unless it is explicitly specified in the subclass of this class that a particular attribute be not included. Each subclass of this class shall indicate which subclass of the history data is used for history retention.

The following conditional packages are not used in this class: filterSuppressionPkg, observedManagedObjectPkg and thresholdPkg.*;

PDH Error Performance Current Data

```
pdhErrorPerformanceCurrentData       MANAGED OBJECT CLASS
    DERIVED FROM        pdhCurrentDataBidirectional;
    CHARACTERIZED  BY
    pdhErrorPerformanceCurrentDataPackage  PACKAGE
        BEHAVIOUR  pdhErrorPerformanceCurrentDataBehaviour;
        ATTRIBUTES
        "Recommendation G.774-01: 1994":  bBE  REPLACE-WITH-DEFAULT  GET,
        "Recommendation G.774-01: 1994":  eS   REPLACE-WITH-DEFAULT  GET,
        "Recommendation G.774-01: 1994":  sES  REPLACE-WITH-DEFAULT  GET;;;
    CONDITIONAL PACKAGES
        "Recommendation G.774-01: 1994": cSESCurrentDataPackage PRESENT IF
        "an instance supports it",
        "Recommendation G.774-01: 1994": farEndCSESCurrentDataPackage PRESENT IF
        "an instance supports it" ,
        "Recommendation G.774-01: 1994": uASCurrentDataPackage  PRESENT IF
        "an instance supports it",

        pdhFarEndCurrentDataPkg PRESENT IF
        " the monitored point is Bi-directional",
        farEndBBEPackage     PRESENT IF
        "an instance of this class is subordinate of a PDH-termination point monitoring a frame and
block
        structured path according Recommendation G.826 (e.g. framed 2MBit/s signal with CRC4-
        submultiframe) and pdhFarEndCurrentDataPkg is instantiated";

REGISTERED AS   { } ;

pdhErrorPerformanceCurrentDataBehaviour  BEHAVIOUR
DEFINED AS

*Instances of the pdhErrorPerformanceCurrentData managed object Class are used to hold the current
register counts for a PDH Path during a collection period. An instance of this object class, for a
monitored managed object instance, holds the current register counts of each performance events
(BBE, ES, SES, FEES, FESES, and optionally UAS, FEBBE, CSES, FECSES).
```

Near End Monitoring

The following performance primitives are observed: Defect Seconds (pN_DS) and Errored Blocks (nN_B). These primitives are provided by monitoring functions represented in superior PDH termination points and are defined in PDH path layers according to EN 300 417-5-1 [10].

For these performance primitives the following performance events are defined:

BBE   Background Block Error.

ES   Errored Second.

SES   Severely Errored Second.

Far End Monitoring.

The following performance primitives are observed: Defect Seconds (pF_DS) and Errored Blocks (nF_B) in case of frame and block structured paths. These primitives are provided by monitoring functions represented in superior PDH termination points and are defined in PDH path layers according to EN 300 417-5-1 [10].

For these performance primitives the following performance events are defined:

FEBBE   Far End Background Block Error (in case of frame and block structured paths only).

FEES   Far End Errored Second.

FESES   Far End Severely Errored Second.

This managed object class uses the pdhPathHistoryData managed object class for history retention.*;

PDH Path History Data

For the sake of backward compatibility with its corresponding class pathTerminationHistoryData the attribute elapsedTime is optional (contained in a conditional package).

```
pdhPathHistoryData  MANAGED OBJECT CLASS
    DERIVED FROM     "Recommendation Q.822: 1993":historyData;
    CHARACTERIZED BY
    pdhPathHistoryDataPackage PACKAGE
        BEHAVIOUR pdhPathHistoryDataBehaviour;
                  ATTRIBUTES
            bBE          GET,
                         eS          GET,
                         sES         GET ;;;
    CONDITIONAL  PACKAGES
        elapsedTimePkg PRESENT IF
        "an instance supports it",

        "Recommendation G.774-01: 1994": uASHistoryDataPackage PRESENT IF
              "the  superior object contains the uASCurrentDataPackage ",

        pdhFarEndHistoryDataPkg PRESENT IF
              "the superior object contains  the pdhFarEndCurrentDataPkg ",

        farEndBBEHistoryPkg  PRESENT IF
    "an instance of this class is subordinate of a PDH-termination point monitoring a frame and
block
     structured path according Recommendation G.826 (e.g. framed 2MBit/s  signal with CRC4-
    submultiframe) and pdhFarEndHistoryDataPkg is instantiated";

REGISTERED AS { } ;

pathTerminationHistoryDataR1Behaviour BEHAVIOUR
DEFINED AS
"Instances of this class are used to store the observed events of a pdhErrorPerformanceCurrentData
object at the end of an observation interval. An instance of this managed  object is contained by
any of the managed object instances specified above";
```

pdhPathHistoryDataFarEnd

```
pdhPathHistoryDataFarEnd    MANAGED OBJECT CLASS
    DERIVED FROM        "Recommendation Q.822: 1993":historyData;
    CHARACTERIZED  BY
    pdhFarEndHistoryDataPkg,
    pdhPathHistoryDataFarEndPackage    PACKAGE
        BEHAVIOUR        pdhPathHistoryDataFarEndBehaviour;
    CONDITIONAL  PACKAGES
        elapsedTimePkg                               PRESENT IF
        "an instance supports it",
        "Recommendation G.774-06: 1997": farEndUASHistoryDataPackage    PRESENT IF
              "the superior object contains the farEndUASCurrentDataPackage ",
        farEndBBEHistoryPkg                         PRESENT IF
    "an instance of this class is subordinate of a PDH-termination point monitoring a frame and
block
     structured path according Recommendation G.826 (e.g. framed 2MBit/s signal with CRC4-
    submultiframe)";

REGISTERED AS { } ;

pdhPathHistoryDataFarEndBehaviour BEHAVIOUR
DEFINED AS
"Instances of this class are used to store the observed events of a pdhCurrentDataFarEnd(TR) object
at the end of an observation interval. An instance of this managed object is contained by any of the
managed object instances specified above";
```

PDH Path History DataNearEnd

```
pdhPathHistoryDataNearEnd   MANAGED OBJECT CLASS
    DERIVED FROM    "Recommendation Q.822: 1993":historyData;
    CHARACTERIZED  BY
    pdhPathHistoryDataNearEndPackage  PACKAGE
        BEHAVIOUR  pdhPathHistoryDataNearEndBehaviour;
                    ATTRIBUTES
            bBE        GET,
                       eS         GET,
                       sES        GET ;;;
    CONDITIONAL  PACKAGES
        elapsedTimePkg                            PRESENT IF
        "an instance supports it",
        "Recommendation G.774-06: 1996": nearEndUASHistoryDataPackage   PRESENT IF
        "the superior object contains the nearEndUASCurrentDataPackage ";
REGISTERED AS { } ;

pdhPathHistoryDataNearEndBehaviour BEHAVIOUR
DEFINED AS
"Instances of this class are used to store the observed events of a pdhCurrentDataNearEnd(TR) object
at the end of an observation interval. An instance of this managed object is contained by any of the
managed object instances specified above";
```

6   Packages

All packages are imported from relevant Recommendations. The following special packages are defined for the PDH-PM fragment:

```
elapsedTimePkg  PACKAGE
    ATTRIBUTES
    "Recommendation Q.822:1993": elapsedTime    GET;
REGISTERED AS {   };

pdhFarEndCurrentDataPkg PACKAGE
    ATTRIBUTES
    "Recommendation G.774-01: 1994":  fEES   REPLACE-WITH-DEFAULT  GET,
    "Recommendation G.774-01: 1994":  fESES  REPLACE-WITH-DEFAULT  GET;
REGISTERED AS { };

farEndBBEPackage    PACKAGE
    ATTRIBUTES
    "Recommendation G.774-01: 1994":  fEBBE  REPLACE-WITH-DEFAULT  GET;
REGISTERED AS { };

pdhFarEndHistoryDataPkg PACKAGE
    ATTRIBUTES
    "Recommendation G.774-01: 1994": fEES       GET,
    "Recommendation G.774-01: 1994": fESES         GET;
REGISTERED AS { };

farEndBBEHistoryPkg PACKAGE
    ATTRIBUTES
    "Recommendation G.774-01: 1994": fEBBE       GET;
REGISTERED AS { };
```

7   Attributes

All attributes are imported from relevant Recommendations.

8   Actions

None.

9   Notifications

None.

10 Name bindings

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

```
BEGIN
IMPORTS
eMonitoringCTPSink,
ePDHTTPSinkR1
FROM ASN1TypeModule {itu(0) identified-organization(4) etsi(0) ets371(371) informationModel(0))
                         managedObjectClass (3)};
;
END

pdhCurrentDataBidirectional-eMonitoringCTPSink                    NAME BINDING
    SUBORDINATE OBJECT CLASS                           pdhCurrentDataBidirectional
                                                                 AND SUBCLASSES;
    NAMED BY SUPERIOR OBJECT CLASS                     eMonitoringCTPSink
                                                                 AND SUBCLASSES;
    WITH ATTRIBUTE
    "ITU-T Recommendation X.739 [12]: 1993": scannerId;
    CREATE                                                       WITH-REFERENCE-OBJECT,

    WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE                                                       DELETES-CONTAINED-OBJECTS;
REGISTERED AS {  }
pdhCurrentUnidirectional-eMonitoringCTPSink                      NAME BINDING
    SUBORDINATE OBJECT CLASS                           pdhCurrentUnidirectional
                                                                 AND SUBCLASSES;
    NAMED BY SUPERIOR OBJECT CLASS                     eMonitoringCTPSink
                                                                 AND SUBCLASSES;
    WITH ATTRIBUTE
    "ITU-T Recommendation X.739 [12]: 1993": scannerId;
    CREATE                                                       WITH-REFERENCE-OBJECT,

    WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE                                                       DELETES-CONTAINED-OBJECTS;
REGISTERED AS {   }
pdhCurrentDataBidirectional-ePDHTTPSinkR1                        NAME BINDING
    SUBORDINATE OBJECT CLASS                           pdhCurrentDataBidirectional
                                                                 AND SUBCLASSES;
    NAMED BY SUPERIOR OBJECT CLASS                     ePDHTTPSinkR1
                                                                 AND SUBCLASSES;
    WITH ATTRIBUTE
    "ITU-T Recommendation X.739 [12]: 1993": scannerId;
    CREATE                                                       WITH-REFERENCE-OBJECT,

    WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE                                                       DELETES-CONTAINED-OBJECTS;
REGISTERED AS {  }
pdhCurrentDataUnidirectional-ePDHTTPSinkR1                       NAME BINDING
    SUBORDINATE OBJECT CLASS                           pdhCurrentDataUnidirectional
                                                                 AND SUBCLASSES;
    NAMED BY SUPERIOR OBJECT CLASS                     ePDHTTPSinkR1
                                                                 AND SUBCLASSES;
    WITH ATTRIBUTE
    "ITU-T Recommendation X.739 [12]: 1993": scannerId;
    CREATE                                                       WITH-REFERENCE-OBJECT,

    WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE                                                       DELETES-CONTAINED-OBJECTS;
REGISTERED AS {   }
pdhPathHistoryDataFarEnd-pdhCurrentDataFarEnd                    NAME BINDING
    SUBORDINATE OBJECT CLASS                           pdhPathHistoryDataFarEnd
                                                                 AND SUBCLASSES;
    NAMED BY SUPERIOR OBJECT CLASS                     pdhCurrentDataFarEnd
                                                                 AND SUBCLASSES;
    WITH ATTRIBUTE                                     "ITU-T Recommendation
Q.822 [6]:1993": historyDataId;
    BEHAVIOUR
    pdhPathHistoryDataFarEnd-pdhCurrentDataFarEndBeh       BEHAVIOUR
    DEFINED AS
*Instance of the pdhPathHistoryDataFarEnd object class or one of its subclasses is created at the
end of the granularity period of an instance of the pdhCurrentDataFarEnd object or one of its
subclass and is directly contained by that instance*;;
    DELETE                DELETES-CONTAINED-OBJECTS;
REGISTERED AS {   };
pdhPathHistoryDataNearEnd-pdhCurrentDataNearEnd                  NAME BINDING
    SUBORDINATE OBJECT CLASS                           pdhPathHistoryDataNearEnd
                                                                 AND SUBCLASSES;
    NAMED BY SUPERIOR OBJECT CLASS                     pdhCurrentDataNearEnd
```

```
                                                            AND SUBCLASSES;
    WITH ATTRIBUTE                                          "ITU-T Recommendation
Q.822 [6]:1993": historyDataId;
    BEHAVIOUR
    pdhPathHistoryDataNearEnd-pdhCurrentDataNearEndBeh      BEHAVIOUR
    DEFINED AS
*Instance of the pdhPathHistoryDataNearEnd object class or one of its subclasses is created at the
end of the granularity period of an instance of the pdhCurrentDataNearEnd object or one of its
subclass and is directly   contained by that instance*;;
    DELETE                                                  DELETES-CONTAINED-OBJECTS;
REGISTERED AS {  };
pdhPathHistoryData-pdhCurrentDataBidirectional              NAME BINDING
    SUBORDINATE OBJECT CLASS                                pdhPathHistoryData
                                                            AND SUBCLASSES;
    NAMED BY SUPERIOR OBJECT CLASS                          pdhCurrentDataBidirectional
                                                            AND SUBCLASSES;
    WITH ATTRIBUTE                                          "ITU-T Recommendation
Q.822 [6]:1993": historyDataId;
    BEHAVIOUR                                pdhPathHistoryData-pdhCurrentDataBidirectionalBeh
BEHAVIOUR
    DEFINED AS
    *Instance of the pdhPathHistoryData object class or one of its subclasses is created at the end
of the
    granularity period of an instance of the pdhCurrentDataBidirectional object or one of its
subclass and is
    directly contained by that instance*;;
    DELETE                                                  DELETES-CONTAINED-OBJECTS;
REGISTERED AS {  };
```

11   ASN.1 definitions

```
PDHPMASN1 { }
DEFINITION IMPLICIT TAGS::=
BEGIN
EXPORTS everything
IMPORTS
TimePeriod
FROM MetricModule {joint-iso-itu(2) ms(9) function(2) part11(11) asn1Module(2) 0};

UniDGranularityPeriod::=    TimePeriod (WITH COMPONENTS {minutes(15), days(1)})
BiDGranularityPeriod::=     TimePeriod (WITH COMPONENTS {days(1)})
TRGranularityPeriod::=      TimePeriod (WITH COMPONENTS {minutes(15)})
```
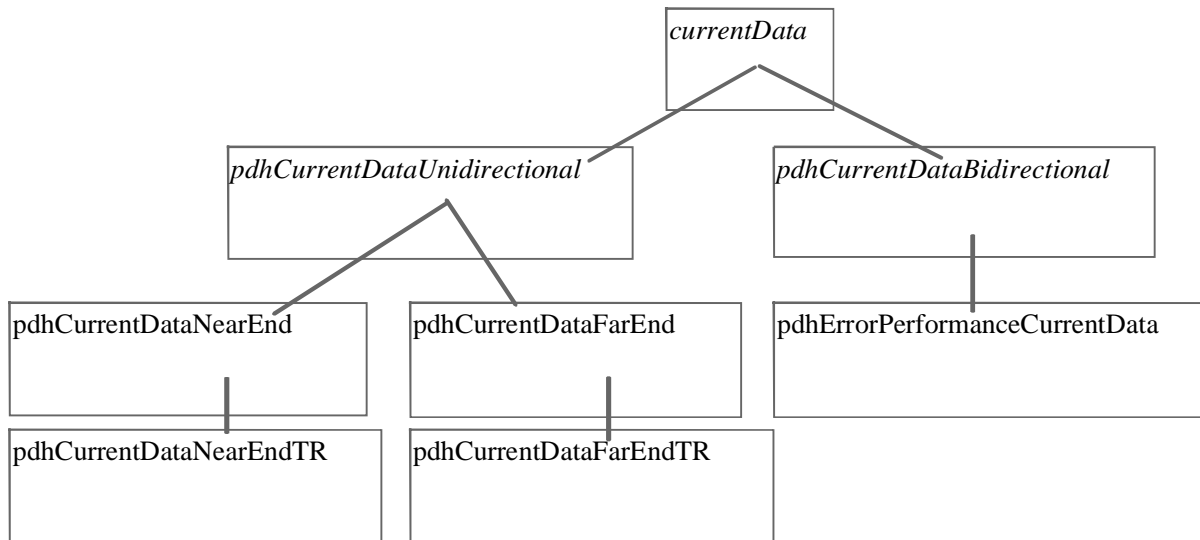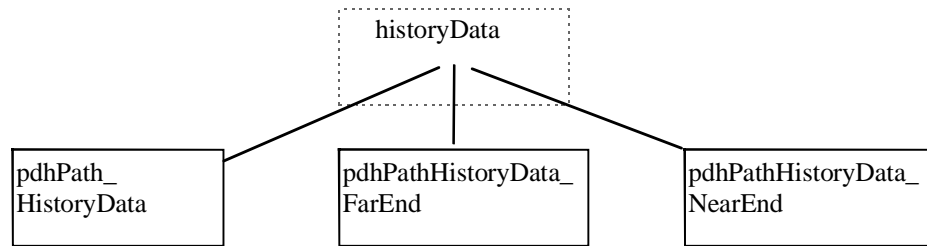

Figure 1: Inheritance of current data classes
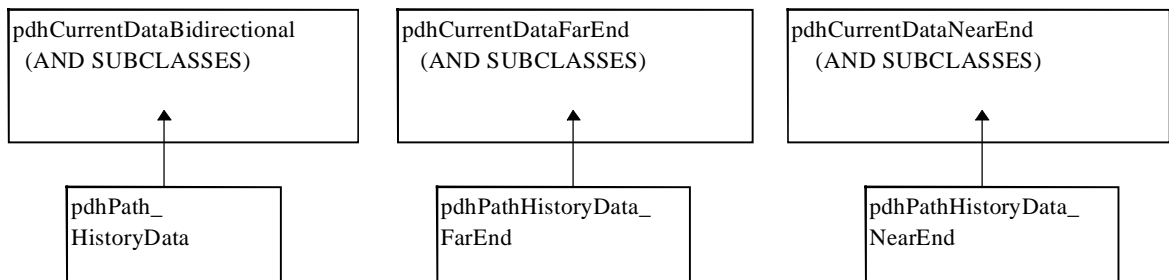
Figure 2: Inheritance of history data classes

Figure 3: Naming tree of classes relevant for PDH Performance Management

History

Document history				
V1.1.1	October 1998	Public Enquiry	PE 9907:	1998-10-16 to 1999-02-12
V1.1.1	March 1999	Vote	V 9919:	1999-03-09 to 1999-05-07
V1.1.1	May 1999	Publication		