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*European Standard (Telecommunications series)*

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

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## Foreword

This European Standard (Telecommunications series) has been produced by ETSI Technical Committee Telecommunications Management Network (TMN), and is now submitted for the Voting phase of the ETSI standards Two-step Approval Procedure.

<b>Proposed national transposition dates</b>	
Date of latest announcement of this EN (doa):	3 months after ETSI publication
Date of latest publication of new National Standard or endorsement of this EN (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

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.

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# 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

```
pdhCurrentDataBi-directional  MANAGED OBJECT CLASS
DERIVED FROM "Recommendation Q.822: 1993": currentData;
CHARACTERIZED BY
"Recommendation Q.822: 1993": zeroSuppressionPkg,
pdhCurrentDataBi-directionalPkg PACKAGE
BEHAVIOUR pdhCurrentDataBi-directionalBehaviour;
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 { };

pdhCurrentDataBi-directionalBehaviour BEHAVIOUR
DEFINED AS
```

\*The pdhCurrentDataBi-directional 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      pdhCurrentDataBi-directional;
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, FECSSES).

### 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,
ePDHTTTPSinkR1
FROM ASN1TypeModule {itu(0) identified-organization(4) etsi(0) ets371(371) informationModel(0))
                        managedObjectClass (3)};
;
END

pdhCurrentDataBi-directional-eMonitoringCTPSink
SUBORDINATE OBJECT CLASS
    NAMED BY SUPERIOR OBJECT CLASS
    WITH ATTRIBUTE
    "ITU-T Recommendation X.739 [12]: 1993": scannerId;
CREATE
    WITH-AUTOMATIC-INSTANCE-NAMING;
DELETE
REGISTERED AS { }
pdhCurrentUnidirectional-eMonitoringCTPSink
SUBORDINATE OBJECT CLASS
    NAMED BY SUPERIOR OBJECT CLASS
    WITH ATTRIBUTE
    "ITU-T Recommendation X.739 [12]: 1993": scannerId;
CREATE
    WITH-AUTOMATIC-INSTANCE-NAMING;
DELETE
REGISTERED AS { }
pdhCurrentDataBi-directional-ePDHTTTPSinkR1
SUBORDINATE OBJECT CLASS
    NAMED BY SUPERIOR OBJECT CLASS
    WITH ATTRIBUTE
    "ITU-T Recommendation X.739 [12]: 1993": scannerId;
CREATE
    WITH-AUTOMATIC-INSTANCE-NAMING;
DELETE
REGISTERED AS { }
pdhCurrentDataUnidirectional-ePDHTTTPSinkR1
SUBORDINATE OBJECT CLASS
    NAMED BY SUPERIOR OBJECT CLASS
    WITH ATTRIBUTE
    "ITU-T Recommendation X.739 [12]: 1993": scannerId;
CREATE
    WITH-AUTOMATIC-INSTANCE-NAMING;
DELETE
REGISTERED AS { }
pdhPathHistoryDataFarEnd-pdhCurrentDataFarEnd
SUBORDINATE OBJECT CLASS
    NAMED BY SUPERIOR OBJECT CLASS
    WITH ATTRIBUTE
    Q.822 [6]:1993": historyDataId;
BEHAVIOUR
    pdhPathHistoryDataFarEnd-pdhCurrentDataFarEndBeh
    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
REGISTERED AS { };
pdhPathHistoryDataNearEnd-pdhCurrentDataNearEnd
SUBORDINATE OBJECT CLASS
    NAMED BY SUPERIOR OBJECT CLASS

```

```

NAME BINDING
    pdhCurrentDataBi-directional
    AND SUBCLASSES;
    eMonitoringCTPSink
    AND SUBCLASSES;
    WITH-REFERENCE-OBJECT,
    DELETES-CONTAINED-OBJECTS;

NAME BINDING
    pdhCurrentUnidirectional
    AND SUBCLASSES;
    eMonitoringCTPSink
    AND SUBCLASSES;
    WITH-REFERENCE-OBJECT,
    DELETES-CONTAINED-OBJECTS;

NAME BINDING
    pdhCurrentDataBi-directional
    AND SUBCLASSES;
    ePDHTTTPSinkR1
    AND SUBCLASSES;
    WITH-REFERENCE-OBJECT,
    DELETES-CONTAINED-OBJECTS;

NAME BINDING
    pdhCurrentDataUnidirectional
    AND SUBCLASSES;
    ePDHTTTPSinkR1
    AND SUBCLASSES;
    WITH-REFERENCE-OBJECT,
    DELETES-CONTAINED-OBJECTS;

NAME BINDING
    pdhPathHistoryDataFarEnd
    AND SUBCLASSES;
    pdhCurrentDataFarEnd
    AND SUBCLASSES;
    "ITU-T Recommendation
    Q.822 [6]:1993": historyDataId
    BEHAVIOUR
    BEHAVIOUR

NAME BINDING
    pdhPathHistoryDataNearEnd
    AND SUBCLASSES;
    pdhCurrentDataNearEnd

```

```

WITH ATTRIBUTE
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-pdhCurrentDataBi-directional NAME BINDING
SUBORDINATE OBJECT CLASS pdhPathHistoryData
AND SUBCLASSES;
NAMED BY SUPERIOR OBJECT CLASS pdhCurrentDataBi-directional
AND SUBCLASSES;
WITH ATTRIBUTE
Q.822 [6]:1993": historyDataId;
BEHAVIOUR pdhPathHistoryData-pdhCurrentDataBi-directionalBeh
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 pdhCurrentDataBi-directional 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)})

```

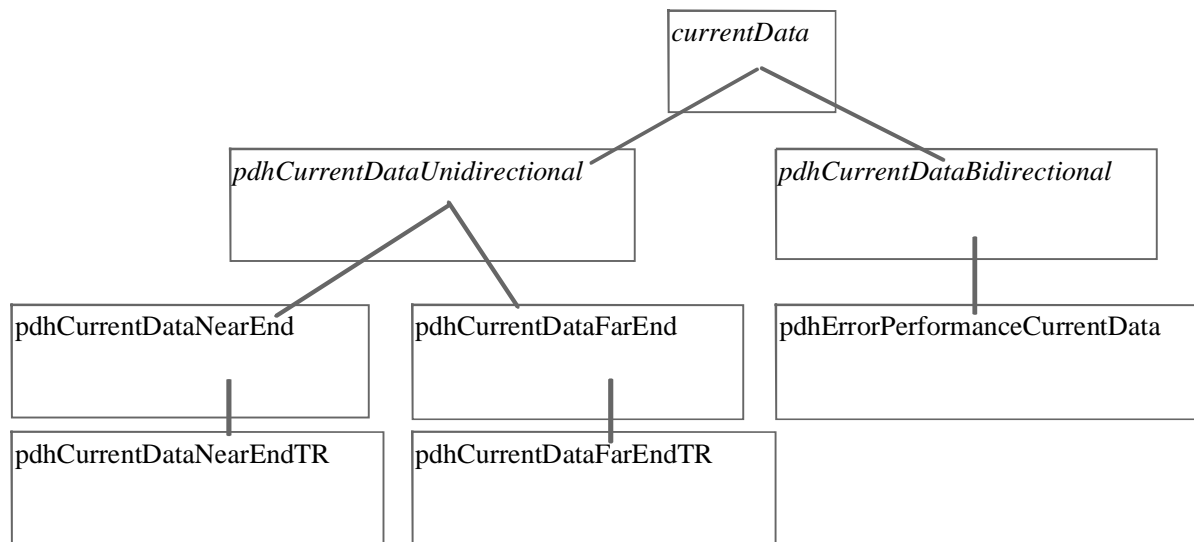
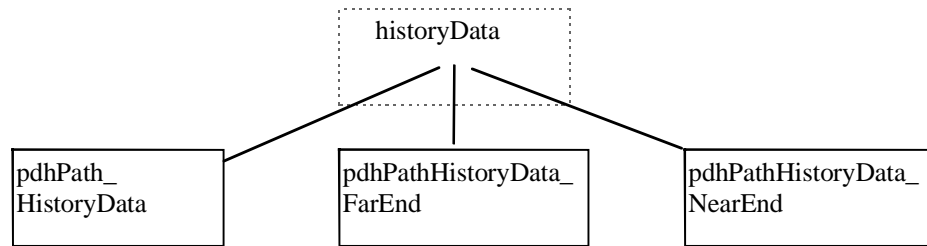
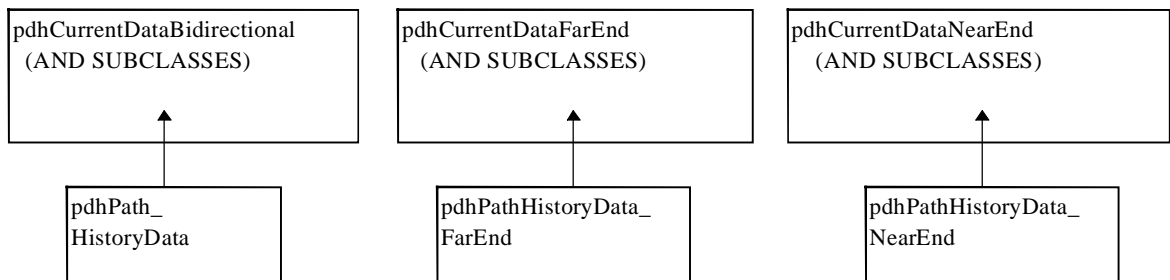


Figure 1: Inheritance of current data classes



**Figure 2: Inheritance of history data classes**



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



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## History

<b>Document history</b>				
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