

RECOMMENDATION ITU-R S.1251

**NETWORK MANAGEMENT – PERFORMANCE MANAGEMENT OBJECT CLASS
DEFINITIONS FOR SATELLITE SYSTEMS NETWORK ELEMENTS
FORMING PART OF SDH TRANSPORT NETWORKS
IN THE FIXED-SATELLITE SERVICE**

(Question ITU-R 201/4)

(1997)

The ITU Radiocommunication Assembly,

considering

- a) that digital satellite systems will remain as constituents elements of public/private networks in a technologically independent way;
- b) that ITU-T Recommendation G.707 (1996) specifies the Synchronous Digital Hierarchy (SDH);
- c) that ITU-T Recommendations G.803 and G.805 define the architecture of SDH transport networks which should be reflected in to the management functionality definitions;
- d) that ITU-T Recommendation G.783 specifies the general characteristics and functions of synchronous multiplexing equipment which have to be measured and controlled via the management system;
- e) that ITU-T Recommendations G.831 and G.784 define the management principles and capabilities of SDH transport networks with which this Recommendation has to be compatible;
- f) that ITU-T Recommendation G.774 defines the managed objects for terrestrial SDH transport networks which form the precedents for the object definitions in this Recommendation;
- g) that compatibility with the Telecommunications Management Network (TMN) as defined in ITU-T Recommendation M.3000 is desirable;
- h) that ITU-T Recommendation G.861 defines the principles and guidelines for the integration of satellite and radio systems in SDH transport networks including their management capabilities;
- j) that Recommendation ITU-R S.1149 specifies aspects of satellite-based SDH transport networks,

recommends

that digital satellite systems in the fixed-satellite service (FSS) comply with the management functionality defined in this Recommendation to facilitate their integration with SDH transport networks.

1 Scope

The scope of this Recommendation is the definition of the performance management features of satellite specific SDH functions as defined in ITU-R Recommendation S.1149 – Network Architecture and Equipment functional aspects of Digital Satellite Systems in the FSS forming part of SDH transport networks.

One objective is to ensure that these features are compatible with terrestrial SDH transport network management systems.

This Recommendation is concerned with the lowest level details of the network management concept. This level is referred to as the “Network Element” level.

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1.1 Introduction to Performance Management (PM)

1.1.1 Background

The definition of performance management for SDH transport systems is contained in ITU-T Recommendation G.774 Part 01 and Part 06. The satellite system object class definitions contained in this Recommendation are closely aligned with the latest **unidirectional** based version of G.774-06. ITU-T Recommendations G.774-01 and 06 are based upon ITU-T Recommendation Q.822 “Stage 1, 2 and 3 Description for the Q3 Interface, Performance Management”.

1.1.2 Examples of performance parameters which may be captured by PM

The following list contains examples of parameters which may be captured via the PM functions defined in this Recommendation. The list is not exhaustive and is not intended to limit the choice of parameters which a network operator may implement.

- Errored seconds Separate parameters are recorded for the near end and the far end
- Severely errored seconds Separate parameters are recorded for the near end and the far end
- Unavailable seconds Separate parameters are recorded for the near end and the far end
- Controlled slips Separate parameters are recorded for the near end and the far end
- Threshold transgressions Separate parameters are recorded for the near end and the far end

The conditions, under which any parameters are recorded, are important and the control of these conditions is included in the definition of the PM functions.

2 PM requirements list

The PM requirements list from ITU-T Recommendation G.774-01 is summarized below:

- Supports PM event generation by Network Elements (NEs).
- Supports PM event collection from NEs by management systems.
- Supports manager control of start/suspend/resume/reset/stop of PM functions.
- Supports notification reports of PM collection from NEs to managers.
- Supports NE storage of results for delayed collection by managers.
- Supports historical data collection and storage by NEs.
- Supports editing of this historical data.
- Supports the changing of thresholds in NEs by managers.
- Supports the sending of Quality of Service (QoS) notifications from NEs when thresholds are crossed.

These requirements are satisfied in the terrestrial environment defined by ITU-T Recommendations G.774-01 and 06 by creating the SDH managed object classes listed in Table 1 which also shows the developments required to update the Recommendation from a bidirectional to a unidirectional basis.

TABLE 1

ITU-T Recommendation G.774 terrestrial environment managed object classes

Existing ITU-T Recommendation G.774-01	Revised ITU-T Recommendation G.774-06 (1996)	Comments
sdhCurrentData	sdhCurrentDataUnidirectional	Use for new work
msCurrentData	msCurrentDataNearEnd	Use for new work
	msCurrentDataFarEnd	Continue to use
msCurrentDataTR	msCurrentDataNearEndTR	Use for new work
	msCurrentDataFarEndTR	Continue to use
pathTerminationCurrentData	pathTerminationCurrentDataNearEnd	Use for new work
	pathTerminationCurrentDataFarEnd	Continue to use

TABLE 1 (continued)

Existing ITU-T Recommendation G.774-01	Revised ITU-T Recommendation G.774-06 (1996)	Comments
pathTerminationCurrentDataTR	pathTerminationCurrentDataNearEndTR	Use for new work
	pathTerminationCurrentDataFarEndTR	Continue to use
msHistoryData	msHistoryDataNearEnd	Use for new work
	msHistoryDataFarEnd	Continue to use
pathTerminationHistoryData	pathTerminationHistoryDataNearEnd	Use for new work
	pathTerminationHistoryDataFarEnd	Continue to use
rsSectionCurrentData		Use for near end PM only
rsSectionCurrentDataTR		Use for near end PM only
rsHistoryData		Use for near end PM only
msAdaptationCurrentData		No change
msAdaptationHistoryData		No change

NOTE 1 – The letters TR refer to threshold reset.

NOTE 2 – The object class `sdhCurrentDataR1`, which was defined in the first issue of ITU-T Recommendation G.774-06 has been replaced by a new class `sdhCurrentDataUnidirectional`, because it was considered to be an extension of the PM concept but not a revision.

The requirements list was considered to be sufficiently general to encompass the satellite environment apart from an additional requirement for different durations of recording intervals. It was considered to be necessary to create specific managed object classes to support the specialized satellite SDH equipment, and these object classes are listed in Table 2.

TABLE 2

Satellite specific managed object classes

Satellite object class	Equivalent terrestrial object class
<code>satSDHCurrentDataUnidirectional</code>	<code>sdhCurrentDataUnidirectional</code>
<code>satMSCurrentDataNearEnd</code>	<code>msCurrentDataNearEnd</code>
<code>satMSCurrentDataNearEndTR</code>	<code>msCurrentDataNearEndTR</code>

TABLE 2 (continued)

Satellite object class	Equivalent terrestrial object class
satPathTermCurrentDataNearEnd	pathTerminationCurrentDataNearEnd
satPathTermCurrentDataNearEndTR	pathTerminationCurrentDataNearEndTR
satMScurrentDataFarEnd	msCurrentDataFarEnd
satMSCurrentDataFarEndTR	msCurrentDataFarEndTR
satPathTermCurrentDataFarEnd	pathTerminationCurrentDataFarEnd
satPathTermCurrentDataFarEndTR	pathTerminationCurrentDataTR
satMSHistoryDataNearEnd	msHistoryDataNearEnd
satPathTermHistoryDataNearEnd	pathTerminationHistoryDataNearEnd
satMSHistoryDataFarEnd	msHistoryDataFarEnd
satPathTermHistoryDataFarEnd	pathTerminationHistoryDataFarEnd
satMSAdaptCurrentData	msAdaptationCurrentData
satMSAdaptHistoryData	msAdaptationHistoryData

The full text of these satellite object class definitions, in GDMO format as defined in ITU-T Recommendation X.722, follows the tables. All satellite specific object classes start with the letters “**sat**” to distinguish them from terrestrial object classes.

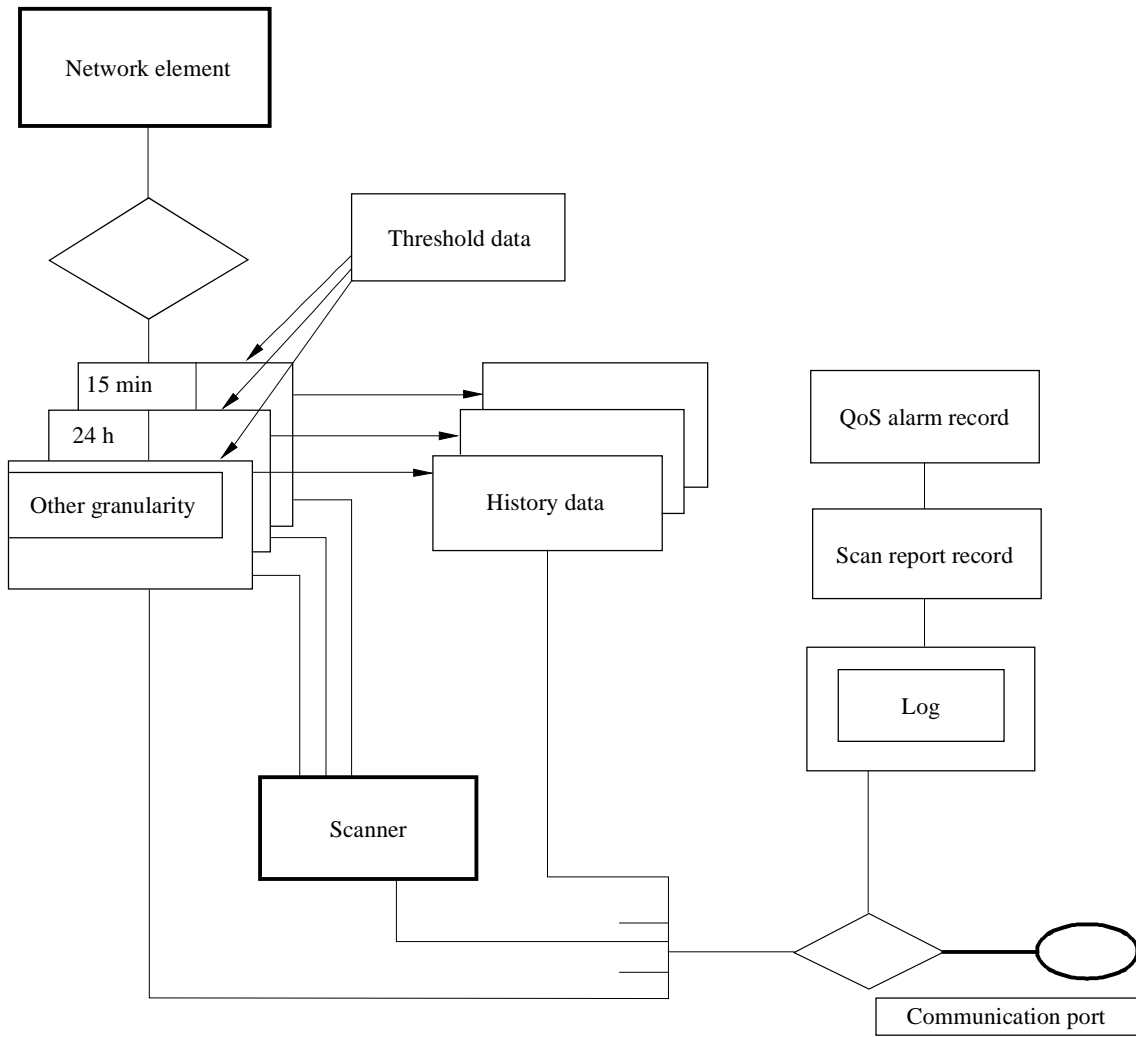
Terrestrial SDH PM managed objects may be employed in SDH equipment located in satellite earth stations, particularly for the SDH functions near to the terrestrial interface.

If the physical hardware is highly integrated, then managed objects from both environments might be deployed in the same piece of equipment.

3 The performance management model

The performance management services are modelled as illustrated in Fig. 1. This shows current PM data being collected from a monitored Network Element (NE) via a currentData object for a defined period called the granularity period. At the end of each measurement period a summary report (scanReport) may be issued and the result is also forwarded to the historyData object.

FIGURE 1
The performance management information model



Thresholds are controlled via `thresholdData` objects and when a threshold is transgressed a PM alarm may be generated by the `currentData` object issuing a notification message. All events may be logged for future reference in an `eventRecord` stored in the log function and any performance measurement may be statistically processed by the use of scanner objects.

The scanner reports may include several types of content: e.g. a time series of measurements from one NE, or a number of measurements across a number of objects, or general statistics for single or multiple objects across single or multiple time instances.

CSES events are only managed in the `sdhCurrentData` subclass instances that employ 15 min granularity periods. This is to avoid information duplication.

Bidirectional monitoring information which might be required for backward compatibility may be derived from the unidirectional measurements so it is considered that there is no need for extra objects to provide bidirectional monitoring.

3.1 Description of object classes in the model

The `currentData` object will be an instantiation of the object class of `currentDataR1` and will perform the accumulation or other measurement of the parameter being monitored for the specified interval, called the granularity period. At the end of each interval the object will inform the corresponding `historyData` object of the result for storage. It may also emit a `scanReport` notification which may result in a corresponding event report being sent to a managing system (it is not mandatory that the discriminator construct in the log be configured such that this notification is logged).

The `currentData` object may contain a pointer to a `thresholdData` object if any of the thresholds are variable. When a threshold is transgressed a QoS alarm notification is sent to the managing system. This event may be logged.

The `historyData` object contains a copy of the results for each granularity period.

The `thresholdData` object contains a set of threshold values and is referenced from the `currentData` object by a pointer.

There are several types of scanners defined in ITU-T Recommendation X.738 and any of these may be used. The scanner function may be employed to aggregate sets of measurements from a number of `currentData` or `historyData` objects. The scanner may prepare a `scanReport` for bulk transfer of information to a managing system, or it may undertake some local processing to minimize the amount of data that needs to be transferred. e.g. derive mean values or calculate variances. The `scanReport` may also be stored in the log for future reference.

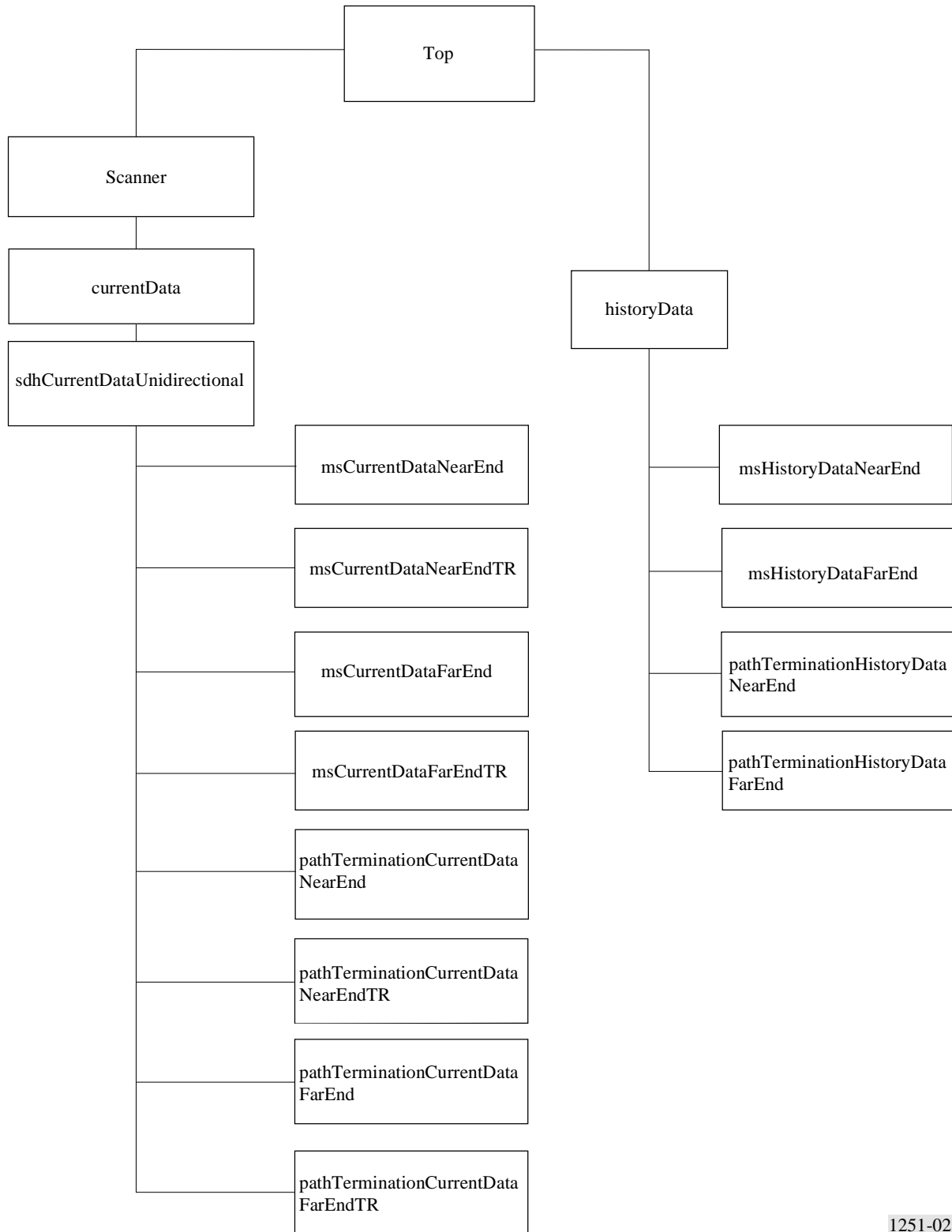
The type of scanners which may be employed, for example, are; the `simpleScanner` or the `dynamicSimpleScanner`. Scanners which can perform calculations are; the `meanScanner`, the `meanVarianceScanner` and the `minMaxScanner`.

For detailed analysis of a difficult problem it may be better to access the `historyData` object directly rather than the derived statistics in the `scanReport`. Also the `scanReport` in the generic log may have been overwritten if a significant amount of time has passed or the log has had to accept a large number of entries.

4 Inheritance hierarchy for PM object classes

The PM inheritance hierarchy for SDH transport systems is specialized for SDH technology as distinct from the general PM hierarchy as defined in ITU-T Recommendation Q.822.

FIGURE 2
The inheritance hierarchy for SDH PM



5 Performance management object class definitions in GDMO format

ITU-T Recommendation Q.822 (1994) contains the definitions of the basic object classes involved in PM i.e. currentData, thresholdData and historyData. These object definitions are reproduced here to assist with the comprehension of PM but the reference source remains ITU-T Recommendation Q.822.

5.1 ITU-T Recommendation Q.822 definitions

currentData **MANAGED OBJECT CLASS**

DERIVED FROM "ITU-T Recommendation X.739:1993":scanner;

CHARACTERIZED BY currentDataPkg **PACKAGE**

BEHAVIOUR currentDataBehaviour **BEHAVIOUR**

DEFINED AS

“The currentData object class is a class of managed support objects that contain the current performance data. This object class is a particular type of scanner that scans its own attributes (see ITU-T Recommendation X.739).

Performance parameters are modelled as attributes. These attributes appear either explicitly in the definition of sub-classes of currentData or they are contained in the measurementListPkg if the instantiated object class is currentData.

Typically, performance attributes are derived from counter or gauge attributes and both of these attributes are defined in ITU-T Recommendation X.721. All attributes with a 'Count' type syntax (e.g. errored seconds) shall be cleared (reset) locally at the end of the granularity period. To provide continuous counts, the granularityPeriod can be set to an arbitrarily large value using CHOICE.

If the administrativeState is locked or the operationalState is disabled or the currentData object is scheduled off-duty, then the values of the counters are undefined and historyData objects, if employed, are not created at the end of the granularity period.”;

ATTRIBUTES

suspectIntervalFlag **REPLACE-WITH-DEFAULT GET,**
 DEFAULT VALUE Q822-PM-ASN1Module.defaultCurrentDataSuspectIntervalFlag **GET,**
 elapsedTime **GET;;;**

CONDITIONAL PACKAGES

filterSuppressionPkg	PRESENT IF "an instance supports it and the zeroSuppressionPkg is not present.",
historyRetentionPkg	PRESENT IF "historyData objects are to be created at the end of an interval.",
maxSuppressionIntervalsPkg	PRESENT IF "an instance supports it and at least one of zeroSuppressionPkg or filterSuppressionPkg is present.",
measurementListPkg	PRESENT IF "an instance supports it or the object class is currentData.",
numSuppressedIntervalsPkg	PRESENT IF "suppression counts are required and the filterSuppressionPkg or the zeroSuppressionPkg is present.",
observedManagedObjectPkg	PRESENT IF "an instance supports it.",
scheduledPMReportPkg	PRESENT IF "scheduled notifications are to be emitted.",
thresholdPkg	PRESENT IF "a quality of service alarm notification is to be emitted at threshold crossing.",
zeroSuppressionPkg	PRESENT IF "an instance supports it and the filterSuppressionPkg is not present.";

REGISTERED AS {q822ObjectClass 1};

historyData **MANAGED OBJECT CLASS**

DERIVED FROM "ITU-T Recommendation X.721:1992":top;

CHARACTERIZED BY historyDataPkg **PACKAGE**

BEHAVIOUR historyDataBehaviour **BEHAVIOUR**

DEFINED AS

“Attribute values stored in a historyData object are an exact copy of the values in the corresponding currentData object at the end of the measurement period.

The time at the end of the measurement period is indicated by the value of the attribute periodEndTime.”;

DEFINED AS

“The `sdhCurrentDataUnidirectional` class defines generic characteristics for unidirectional SDH performance monitoring. Sub-classes are derived from this class to hold performance event counts for specified monitoring points and to support PM of SDH trails at the various layers described in ITU-T Recommendation G.805.

Events are defined in ITU-T Recommendation G.826 namely:

- Errored Seconds (ES),
- Severely Errored Seconds (SES),
- Background Block Errors (BBE).

These events are monitored in two mandatory time intervals, 15 min and 24 h, which are referred to as granularity periods. The `granularityPeriod` attribute can only be assigned a value when the object is created.

This class can contain only one reference to a `thresholdData` object in the `thresholdDataInstance` attribute. If a threshold is reached or crossed then the `currentProblemList` attribute shall indicate it with the probable cause “Threshold Crossed”.

Sub-classes of this class are used to monitor the near-end or far-end performance data of a trail.

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

The unavailability conditions are kept separate for near-end and far-end monitoring. This means that 10 consecutive SES at the near-end affect only the near-end unavailability and *vice versa*.

For threshold reset sub-classes of this class the following rules apply:

No more than one QoS alarm shall be generated until there has been a 15 min continuous window with no unavailable time and an error count below the low error count threshold.

The `counterThresholdAttributeList` attribute of a Q.822 `thresholdDataInstance` is used to provide the high and low threshold values.

If the `unavailableTimeAlarmPackage` is in use then an alarm is generated with a probable cause of Unavailable when this condition is detected and the condition shall be indicated in the `currentProblemList` attribute. When the unavailable condition ends, a communication alarm is emitted with a probable cause of Unavailable and a severity marking of “Cleared”.

An available condition is indicated by the absence of the Unavailable condition in the `currentProblemList`. The unavailable condition has no effect upon the `operationalState` but performance event counts are inhibited for the direction of transmission which is marked as unavailable.

The following conditional packages are not used in this class; `filterSuppressionPkg` and `observedManagedObjectPkg`.

The following rule applies to sub-classes of this object class:

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

ATTRIBUTES

`currentProblemList` "ITU-T Recommendation M.3100:1992" **GET**;;

CONDITIONAL PACKAGES

<code>unavailableTimeAlarmPackage</code>	"Recommendation G.774-01:1993"	PRESENT IF "It is required that a report is generated at the starting and ending of an unavailable period and the granularity period is 24 h.",
<code>historyPackage</code>	"Recommendation G.774-01:1993"	PRESENT IF "an instance does not support flexible assignment of the history length.";

REGISTERED AS {g774-06MObjectClass 1};



`msCurrentDataNearEnd` **MANAGED OBJECT CLASS**

DERIVED FROM `sdhCurrentDataUnidirectional`;

CHARACTERIZED BY

`msCurrentDataNearEndPackage` **PACKAGE**

BEHAVIOUR `msCurrentDataNearEndBehaviour` **BEHAVIOUR**

DEFINED AS

“Instances of this object class are used to hold the current near end register counts for a multiplex section trail termination point during a collection period.

The following performance primitives are observed:

- Errored Block (EB).

The performance event is the BBE, the Background Block Error.

For the EB and the MS-AIS and Excessive Error defects the following performance events are defined:

- Errored Seconds (ES),
- Severely Errored Seconds (SES),
- Unavailable seconds (UAS), this counter records near-end unavailability only.

In addition, the following optional performance events are defined:

- Failure Counts (FC) (near-end),
- Errored Seconds A (ESA) (near-end),
- Errored Seconds B (ESB) (near-end).

Only one threshold value per performance counter will be supported.

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, providing that there are no other outstanding QoS alarms, and threshold crossing is removed from the the currentProblemList (i.e. no notification is emitted). If the threshold is reached or crossed again during the next granularity period a new QoS alarm shall be sent.

This object class uses the msHistoryDataNearEnd object class for storage.”;;

ATTRIBUTES

granularityPeriod "ITU-T Recommendation X.739:1993"	REQUIRED VALUES
	SDHPMUNIASN1.SDHGranularityPeriod,
bBE "Recommendation G.774-01:1993"	REPLACE-WITH-DEFAULT GET,
eS "Recommendation G.774-01:1993"	REPLACE-WITH-DEFAULT GET,
sES "Recommendation G.774-01:1993"	REPLACE-WITH-DEFAULT GET;;;

CONDITIONAL PACKAGES

nearEndUASCurrentDataPackage	PRESENT IF "If an instance supports it.",
cSESCurrentDataPackage	
"Recommendation G.774-01:1993"	PRESENT IF "an instance supports it and the granularity period is 15 min.",
failureCountsNearEndPackage	PRESENT IF "an instance supports it.",
eSANearEndPackage	PRESENT IF "an instance supports it.",
eSBNearEndPackage	PRESENT IF "an instance supports it.";

REGISTERED AS {g774-06MObjectClass 2};

5.2.2 Satellite specific PM object classes**5.2.2.1 Satellite SDH current data unidirectional**

satSDHCurrentDataUnidirectional **MANAGED OBJECT CLASS**

DERIVED FROM "ITU-T Recommendation Q.822 1994":currentData;

CHARACTERIZED BY

"ITU-T Recommendation Q.822 1994":zeroSuppressionPackage,

"ITU-T Recommendation Q.822 1994":thresholdPackage,

satSDHCurrentDataUnidirectionalPackage **PACKAGE**

BEHAVIOUR satSDHCurrentDataUnidirectionalBehaviour **BEHAVIOUR**

DEFINED AS

“This object class defines generic characteristics for unidirectional performance monitoring of SDH satellite systems.

Sub-classes of this class are used to monitor near-end or far-end performance individually.

Sub-classes undertake performance event counts for specified monitoring points. PM events are defined in ITU-T Recommendation G.826 and Recommendation ITU-R S.1062, typical PM events are:

- Errored Seconds (ES),
- Severely Errored Seconds (SES),
- Background Block Errors (BBE).

These events are monitored in two mandatory time intervals, 15 min and 24 h which are referred to as granularity periods. Other granularity periods maybe employed, on an optional basis, by changing the **granularityPeriod** attribute but the 15 min and 24 h counts must always be kept running.

This class can only contain one reference to a thresholdData object in the thresholdDataInstance attribute. Counter/gauges are automatically reset at the end of the measurement period. The results from the measurements are transferred to an associated historyData storage object for long term retention.

Counters and gauges are defined in ITU-T Recommendation X.721.

When a threshold is reached or crossed it is reported immediately via the **thresholdCrossed** parameter of the **currentProblemList** attribute.

Unavailable time is defined in ITU-T Recommendation G.826.

If the **unavailableTimeAlarmPackage** is in use then an alarm is generated with a probable cause of Unavailable when this condition is detected and the condition shall be indicated in the **currentProblemList**. When the unavailable condition ends, a communication alarm is emitted with a probable cause of Unavailable and a severity marking of "Cleared".

An available condition is indicated by the absence of the Unavailable condition in the **currentProblemList**. The unavailable condition has no effect upon the **operationalState** but performance event counts are inhibited for the corresponding direction of transmission during unavailable time.”;

ATTRIBUTES

currentProblemList "ITU-T Recommendation M.3100:1992": **GET;;;**

CONDITIONAL PACKAGES

unavailableTimeAlarmPackage **PRESENT IF** "It is required that a report is generated at the starting and ending of an unavailable period and the granularity period is 24 h.",

historyPackage "Recommendation G.774-01:1993" **PRESENT IF** "an instance does not support flexible assignment of the history length.";

REGISTERED AS {rRecS.1251ManagedObjectClass 01};

5.2.2.2 Near end object classes

Satellite multiplex section – current data – near end

satMSCurrentDataNearEnd **MANAGED OBJECT CLASS**

DERIVED FROM satSDHCurrentDataUnidirectional;

CHARACTERIZED BY

satMSCurrentDataNearEndPackage **PACKAGE**

BEHAVIOUR satMSCurrentDataNearEndBehaviour **BEHAVIOUR**

DEFINED AS

“Instances of this class hold the current register counts for a multiplex section near end.

It is mandatory that the following performance primitives as defined in ITU-T Recommendation G.826 and Recommendation ITU-R S.1062 are counted in 15 min and 24 h blocks:

- Errored Seconds (ES),
- Severely Errored Seconds (SES),
- Background Block Errors (BBE).

Optionally, the following additional performance parameters may be counted:

- Unavailable Seconds (UAS),
- Contiguous Severely Errored Seconds (CSES),
- Errored Seconds type A (ESA),
- Errored Seconds type B (ESB),
- Failure Counts,
- Additional Current Data.

These events use the satMShistoryDataNearEnd managed object class for history retention.

When a threshold is reached or crossed a QoS alarm shall be sent. This alarm is implicitly cleared at the end of the granularity period, providing that no other QoS alarms have been generated.”;;

ATTRIBUTES

granularityPeriod "ITU-T Recommendation X.739 1993":	REQUIRED VALUES	SDHMASN1.SDHGranularityPeriod,
bBE	REPLACE-WITH-DEFAULT	GET,
eS	REPLACE-WITH-DEFAULT	GET,
sES	REPLACE-WITH-DEFAULT	GET;;;

CONDITIONAL PACKAGES

msCSESNearEndCurrentDataPackage	PRESENT IF "Required",
msUASNearEndCurrentDataPackage	PRESENT IF "Required",
msESANearEndCurrentDataPackage	PRESENT IF "Required",
msESBNearEndCurrentDataPackage	PRESENT IF "Required",
msFailureCountsNearEndCurrentDataPackage	PRESENT IF "Required",
satMSAdditionalNearEndCurrentDataPackage	PRESENT IF "Required";

REGISTERED AS {rRecS.1251ManagedObjectClass 02};

Satellite multiplex section – current data – near end – threshold control

satMSCurrentDataNearEndTR **MANAGED OBJECT CLASS**

DERIVED FROM satSDHCurrentDataUnidirectional;

CHARACTERIZED BY

"ITU-T Recommendation G.774-01:1993": thresholdResetPackage,

satMSCurrentDataNearEndTRPackage **PACKAGE**

BEHAVIOUR satMSCurrentDataTRPackageBehaviour **BEHAVIOUR**

DEFINED AS

“The following rules apply to the threshold setting mechanism:

– Errored Seconds (ES) thresholds.

Two thresholds are defined, an upper and a lower threshold. This is to support the mode of operation defined in the satMSCurrentData objects with respect to sending and clearing of QoS alarms.

– Severely Errored Seconds (SES).

Only one threshold is defined. This is to support the simpler mode of operation defined in the satMSCurrentData objects for handling SES conditions. i.e.

Initial conditions, only one QoS alarm shall be sent until there has been a 15 min interval with zero SESs. After this clear interval a QoS clear condition shall be sent.

Normal operation, at the end of the first clear 15 min interval an alarm shall be sent if the count reaches or crosses the threshold.

– Background Block Errors (BBE),

This has the same mode of operation as that of the ES so two threshold values are required.

For any of the thresholds, a QoS clear condition will not be sent if the Performance Monitoring Data is suspect as indicated by the **suspectIntervalFlag** attribute.”;;

ATTRIBUTES

granularityPeriod	REQUIRED VALUES	SDHPMUNIASN.1SDHGranularityPeriod,
msBBETR1	REPLACE	GET,
msBBETR2	REPLACE	GET,
msESTR1	REPLACE	GET,
msESTR2	REPLACE	GET,
msSESTR	REPLACE	GET;;;

CONDITIONAL PACKAGES

msUASNearEndCurrentDataTR	PRESENT IF "Required",
msCSESNearEndCurrentDataTR	PRESENT IF "Required",
msESANearEndCurrentDataTR	PRESENT IF "Required",
msESBNearEndCurrentDataTR	PRESENT IF "Required",
msFailureCountsNearEndCurrentDataTR	PRESENT IF "Required",
satMSAdditionalNearEndCurrentDataTR	PRESENT IF "Required";

REGISTERED AS {rRec.1251ManagedObjectClass 03};

Satellite path termination – current data – near end

satPathTermCurrentDataNearEnd **MANAGED OBJECT CLASS**

DERIVED FROM satSDHCurrentDataUnidirectional;

CHARACTERIZED BY

satPathTermCurrentDataNearEndPackage **PACKAGE**

BEHAVIOUR satPathTermCurrentDataNearEndBehaviour **BEHAVIOUR**

DEFINED AS

“Instances of this class collect the current register counts for the near-ends of High Order Paths and Low Order Paths.

The following performance primitives as defined in ITU-T Recommendation G.826 and Recommendation ITU-R S.1062 are counted in 15 min and 24 h blocks:

- Errored Seconds (ES),
- Severely Errored Seconds (SES),
- Background Block Errors (BBE),
- Unavailable Seconds (UAS) at the near end,
- AU-AIS/TU-AIS,
- Path Trace Mismatch,
- Signal Label Mismatch,
- Loss of TU Multiframe.

In addition, the following optional events may be counted:

- Failure Counts (FC) (near-end),
- Errored Seconds A (ESA) (near-end),
- Errored Seconds B (ESB) (near-end).

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

When a threshold is reached or crossed a QoS alarm shall be sent. This alarm is implicitly cleared at the end of the granularity period, providing that no other QoS alarms have been triggered.”;

ATTRIBUTES

granularityPeriod "ITU-T Recommendation X.739 1993":	REQUIRED VALUES
	SDHMASN1.SDHGranularityPeriod,
bBE	REPLACE-WITH-DEFAULT GET,
eS	REPLACE-WITH-DEFAULT GET,
sES	REPLACE-WITH-DEFAULT GET;;;

CONDITIONAL PACKAGES

pathCSESNearEndCurrentDataPackage	PRESENT IF "Required",
pathUASNearEndCurrentDataPackage	PRESENT IF "Required",
pathESANearEndCurrentDataPackage	PRESENT IF "Required",
pathESBNearEndCurrentDataPackage	PRESENT IF "Required",
pathFailureCountNearEndCurrentDataPackage	PRESENT IF "Required",
satPathAdditionalNearEndCurrentDataPackage	PRESENT IF "Required";

REGISTERED AS {rRecS.1251ManagedObjectClass 04};

Satellite path termination – current data – near end – threshold control

satPathTermCurrentDataNearEndTR **MANAGED OBJECT CLASS**

DERIVED FROM satSDHCurrentDataUnidirectional;

CHARACTERIZED BY

thresholdResetPackage,
satPathTermCurrentDataNearEndTRPackage **PACKAGE**

BEHAVIOUR satPathTermCurrentDataNearEndTRBehaviour **BEHAVIOUR**

DEFINED AS

“See satMSCurrentDataNearEnd for definition of threshold usage. Changing the thresholds may be undertaken via the attributes listed below. This leaves open the question as to what happens to the contents of the counters at the instant of the change of threshold. This is an implementation matter.”;

ATTRIBUTES

pathBBETR1	GET REPLACE,
pathBBETR2	GET REPLACE,
pathESTR1	GET REPLACE,
pathESTR2	GET REPLACE,
pathSESTR	GET REPLACE;;;

CONDITIONAL PACKAGES

pathCSESCurrentDataNearEndTR	PRESENT IF "Required",
pathUASCcurrentDataNearEndTR	PRESENT IF "Required",
pathESACurrentDataNearEndTR	PRESENT IF "Required",
pathESBCurrentDataNearEndTR	PRESENT IF "Required",
pathFailureCountCurrentDataNearEndTR	PRESENT IF "Required",
satPathAdditionalCurrentDataNearEndTR	PRESENT IF "Required";

REGISTERED AS {rRecS.1251ManagedObjectClass 05};

5.2.2.3 Far end object classes**Satellite multiplex section – current data – far end**satMSCurrentDataFarEnd **MANAGED OBJECT CLASS****DERIVED FROM** satSDHCurrentDataUnidirectional;**CHARACTERIZED BY**

satMSCurrentDataFarEndPackage	PACKAGE
BEHAVIOUR satMSCurrentDataFarEndBehaviour	BEHAVIOUR

DEFINED AS

“Instances of this class collect the current register counts for a multiplex section far end. The following performance primitives as defined in ITU-T Recommendation G.826 and Recommendation ITU-R S.1062 are counted in 15 min and 24 h blocks:

- Far End Errored Seconds (FEES),
- Far End Severely Errored Seconds (FESES),
- Far End Background Block Errors (FEBBE),
- Far End Unavailable Second (FEUAS).

In addition, the following optional performance parameters may be recorded:

- Far End Failure Counts (FEFC),
- Far End Contiguous severely errored Seconds (FECSES),
- Far End Additional Current Data (FEACD),
- Far End Errored Seconds A (FEESA),
- Far End Errored Seconds B (FEESB).

This object class uses the satMSHistoryDataFarEnd object class for history retention.

When a threshold is reached or crossed a QoS alarm shall be sent. This alarm is implicitly cleared at the end of the granularity period, providing that no other QoS alarms have been generated.”;

ATTRIBUTES

granularityPeriod "ITU-T Recommendation X.739:1993":	REQUIRED VALUES
	SDHMASN1.SDHGranularityPeriod,
fEBBE	REPLACE-WITH-DEFAULT GET,
fEES	REPLACE-WITH-DEFAULT GET,
fESES	REPLACE-WITH-DEFAULT GET;;;

CONDITIONAL PACKAGES

msUASFarEndCurrentDataPackage	PRESENT IF "Required",
msCSESFarEndCurrentDataPackage	PRESENT IF "Required",
msESAFarEndCurrentDataPackage	PRESENT IF "Required",
msESBFarEndCurrentDataPackage	PRESENT IF "Required",
msFailureCountsFarEndCurrentDataPackage	PRESENT IF "Required",
satMSAdditionalFarEndCurrentDataPackage	PRESENT IF "Required";

REGISTERED AS {rRecS.1251ManagedObjectClass 06};

Satellite multiplex section – current data – far end – threshold controlsatMSCurrentDataFarEndTR **MANAGED OBJECT CLASS****DERIVED FROM** satSDHCurrentDataUnidirectional;**CHARACTERIZED BY**

thresholdResetPackage

satMSCurrentDataFarEndTRPackage	PACKAGE
BEHAVIOUR satMSCurrentDataFarEndTRPackageBehaviour	BEHAVIOUR

DEFINED AS

“See satMSCurrentDataNearEnd for definition of threshold usage. Changing the thresholds may be undertaken via the attributes listed below. This leaves open the question as to what happens to the contents of the counters at the instant of the change of threshold. This is an implementation matter”;

ATTRIBUTES

granularityPeriod	"ITU-T Recommendation X.739:1993":	REQUIRED VALUES
		SDHMASN1.SDHGranularityPeriod,
msFEBBETR1		REPLACE GET,
msFEBBETR2		REPLACE GET,
msFEESTR1		REPLACE GET,
msFEESTR2		REPLACE GET,
msFESESTR		REPLACE GET;;;

CONDITIONAL PACKAGES

msUASCurrentDataFarEndTR	PRESENT IF "Required",
msCSESCurrentDataFarEndTR	PRESENT IF "Required",
msESACurrentDataFarEndTR	PRESENT IF "Required",
msESBCurrentDataFarEndTR	PRESENT IF "Required",
msFailureCountsCurrentDataFarEndTR	PRESENT IF "Required",
satMSAdditionalCurrentDataFarEndTR	PRESENT IF "Required";

REGISTERED AS {rRecS.1251ManagedObjectClass 07};

Satellite path termination – current data – far end

satPathTermCurrentDataFarEnd **MANAGED OBJECT CLASS**

DERIVED FROM satSDHCurrentDataUnidirectional;

CHARACTERIZED BY

satPathTermCurrentDataFarEndPackage	PACKAGE
BEHAVIOUR	satPathTermCurrentDataFarEndBehaviour BEHAVIOUR

DEFINED AS

“Instances of this class collect the current register counts for the far end High Order Paths and Low Order Paths. The following performance primitives as defined in ITU-T Recommendation G.826 and Recommendation ITU-R S.1062 are counted in 15 min and 24 h blocks:

- Far End Errored Seconds (FEES),
- Far End Severely Errored Seconds (FESES),
- Far End Background Block Errors (FEBBE).

Optional features:

- Far End Unavailable Seconds (FEUAS),
- Far End Contiguous Severely Errored Seconds (FECSES),
- Far End Additional Current Data (FEACD).

This object class uses the satPathTermHistoryDataFarEnd managed object class for history retention.”;

ATTRIBUTES

granularityPeriod	"ITU-T Recommendation X.739 1993":	REQUIRED VALUES
		SDHMASN1.SDHGranularityPeriod,
fEBBE		REPLACE-WITH-DEFAULT GET,
fEES		REPLACE-WITH-DEFAULT GET,
fESES		REPLACE-WITH-DEFAULT GET;;;

CONDITIONAL PACKAGES

pathCSESFarEndCurrentDataPackage	PRESENT IF "Required",
pathUASFarEndCurrentDataPackage	PRESENT IF "Required",
pathESAFarEndCurrentDataPackage	PRESENT IF "Required",
pathESBFarEndCurrentDataPackage	PRESENT IF "Required",
pathFailureCountFarEndCurrentDataPackage	PRESENT IF "Required",
satPathAdditionalFarEndCurrentDataPackage	PRESENT IF "Required";

REGISTERED AS {rRecS.1251ManagedObjectClass 08};

Satellite path termination – current data – threshold controlsatPathTermCurrentDataFarEndTR **MANAGED OBJECT CLASS****DERIVED FROM** satSDHCurrentDataUnidirectional;**CHARACTERIZED BY**

thresholdResetPackage

satPathTermCurrentDataFarEndTRPackage **PACKAGE****BEHAVIOUR** satPathTermCurrentDataFarEndBehaviour **BEHAVIOUR****DEFINED AS**

“See satMSCurrentDataNearEnd for definition of threshold usage. Changing the thresholds may be undertaken via the attributes listed below. This leaves open the question as to what happens to the contents of the counters at the instant of the change of threshold. This is an implementation matter.”;

ATTRIBUTES

granularityPeriod	"ITU-T Recommendation X.739 1993":	REQUIRED VALUES
		SDHMASN1.SDHGranularityPeriod,
pathFEBBETR1		REPLACE GET,
pathFEBBETR2		REPLACE GET,
pathFEESTR1		REPLACE GET,
pathFEESTR2		REPLACE GET,
pathFESESTR		REPLACE GET;;;

CONDITIONAL PACKAGES

pathCSESCurrentDataFarEndTR	PRESENT IF "Required",
pathUASCcurrentDataFarEndTR	PRESENT IF "Required",
pathESACurrentDataFarEndTR	PRESENT IF "Required",
pathESBCurrentDataFarEndTR	PRESENT IF "Required",
pathFailureCountCurrentDataFarEndTR	PRESENT IF "Required",
satPathAdditionalCurrentDataFarEndTR	PRESENT IF "Required";

REGISTERED AS {rRecS.1251ManagedObjectClass 09};

Satellite multiplex section adaptation – current datasatMSAdaptCurrentData **MANAGED OBJECT CLASS****DERIVED FROM** indirectAdaptor "ITU-T Recommendation G.774 1992":**CHARACTERIZED BY**satMSAdaptCurrentDataPackage **PACKAGE****BEHAVIOUR** satMSAdaptCurrentDataBehaviour **BEHAVIOUR****DEFINED AS**

“Instances of this class collect the pointer justification events (PJE), positive and negative PJE are counted separately. The following performance primitives are observed:

- pJCHigh,
- pJCLow.

This object class uses the satMSAdaptHistoryData object class for history retention.”;

ATTRIBUTES

pCJHigh	REPLACE GET,
pCJLow	REPLACE GET;;;

REGISTERED AS {rRecS.1251ManagedObjectClass 10};

5.2.2.4 History data object classes**Satellite multiplex section – history data – near end**satMSHistoryDataNearEnd **MANAGED OBJECT CLASS****DERIVED FROM** "ITU-T Recommendation Q.822 1994":historyData;**CHARACTERIZED BY**satMSHistoryDataNearEndPackage **PACKAGE****BEHAVIOUR** satMSHistoryDataNearEndBehaviour **BEHAVIOUR**

DEFINED AS

“Instances of this class store a history of the register counts from instances of the satMSCurrentDataNearEnd object class. The following performance primitives are stored:

- Errored Seconds (ES),
- Severely Errored Seconds (SES),
- Background Block Errors (BBE).

Conditionally the following are also stored:

- msCSES
- msUAS
- msESA
- msESB
- msFC
- msACD.”;;

ATTRIBUTES

bBE **GET,**
 eS **GET,**
 sES **GET;;;**

CONDITIONAL PACKAGES

msCSESNearEndHistoryDataPackage	PRESENT IF "Required and present in the source currentData object",
msUASNearEndHistoryDataPackage	PRESENT IF "Required and present in the source currentData object",
msESANearEndHistoryDataPackage	PRESENT IF "Required and present in the source currentData object",
msESBNearEndHistoryDataPackage	PRESENT IF "Required and present in the source currentData object",
msFailureCountsNearEndHistoryDataPackage	PRESENT IF "Required and present in the source currentData object",
satMSAdditionalNearEndHistoryDataPackage	PRESENT IF "Required and present in the source currentData object";

REGISTERED AS {rRecS.1251ManagedObjectClass 11};

Satellite path termination – history data – near end

satPathTermHistoryDataNearEnd **MANAGED OBJECT CLASS**

DERIVED FROM "ITU-T Recommendation Q.822 1994":historyData;

CHARACTERIZED BY

satPathTermHistoryDataNearEndPackage **PACKAGE**
BEHAVIOUR satPathTermHistoryDataNearEndBehaviour **BEHAVIOUR**

DEFINED AS

“Instances of this class store a history of the register counts from instances of the satPathTermCurrentDataNearEnd object class. The following performance primitives are stored:

- Errored Seconds (ES),
- Severely Errored Seconds (SES),
- Background Block Errors (BBE).

Conditionally the following are also stored:

- pathCSES
- pathUAS
- pathACD
- pathESA
- pathESB
- pathFC
- satPathAC.”;;

ATTRIBUTES

bBE **GET,**
 eS **GET,**
 sES **GET;;;**

CONDITIONAL PACKAGES

pathCSESNearEndHistoryDataPackage	PRESENT IF "Required and present in the source currentData object",
pathUASNearEndHistoryDataPackage	PRESENT IF "Required and present in the source currentData object",
pathESANearEndHistoryDataPackage	PRESENT IF "Required and present in the source currentData object",
pathESBNearEndHistoryDataPackage	PRESENT IF "Required and present in the source currentData object",
pathFailureCountNearEndHistoryDataPackage	PRESENT IF "Required and present in the source currentData object",
satPathAdditionalNearEndHistoryDataPackage	PRESENT IF "Required and present in the source currentData object";

REGISTERED AS {rRecS.1251ManagedObjectClass 12};

Satellite multiplex section – history data – far end

satMSHistoryDataFarEnd **MANAGED OBJECT CLASS**

DERIVED FROM "ITU-T Recommendation Q.822 1994":historyData;

CHARACTERIZED BY

satMSHistoryDataFarEndPackage	PACKAGE
BEHAVIOUR	satMSHistoryDataFarEndBehaviour BEHAVIOUR

DEFINED AS

“Instances of this class store a history of the register counts from instances of the satMSCurrentDataFarEnd object class. The following performance primitives are stored:

- Far End Errored Seconds (FEES),
- Far End Severely Errored Seconds (FESES),
- Far End Background Block Errors (FEBBE).

Conditionally the following are also stored:

- msFECSES
- msFEUAS
- msFEACD
- msFEESA
- msFEESB
- msFEFC
- satMSFEAC.”;;

ATTRIBUTES

fEBBE	GET,
fEES	GET,
fESES	GET;;;

CONDITIONAL PACKAGES

msCSESFarEndHistoryDataPackage	PRESENT IF "Required and present in the source currentData object",
msUASFarEndHistoryDataPackage	PRESENT IF "Required and present in the source currentData object",
msESAFarEndHistoryDataPackage	PRESENT IF "Required and present in the source currentData object",
msESBFarEndHistoryDataPackage	PRESENT IF "Required and present in the source currentData object",
msFailureCountsFarEndHistoryDataPackage	PRESENT IF "Required and present in the source currentData object",
satMSAdditionalFarEndHistoryDataPackage	PRESENT IF "Required and present in the source currentData object";

REGISTERED AS {rRecS.1251ManagedObjectClass 13};

Satellite path termination – history data – far end

satPathTermHistoryDataFarEnd **MANAGED OBJECT CLASS**
DERIVED FROM "ITU-T Recommendation Q.822 1994":historyData;
CHARACTERIZED BY

satPathTermHistoryDataFarEndPackage **PACKAGE**
BEHAVIOUR satPathTermHistoryDataFarEndBehaviour **BEHAVIOUR**

DEFINED AS

“Instances of this class store a history of the register counts from instances of the satPathTermCurrentDataFarEnd object class. The following performance primitives are stored:

- Far End Errored Seconds (FEES),
- Far End Severely Errored Seconds (FESES),
- Far End Background Block Errors (FEBBE).

Conditionally the following are also stored:

- pathFECSSES
- pathFEUAS
- pathFEACD
- pathFEESA
- pathFEESB
- pathFEFC
- satPathFEAC.”;

ATTRIBUTES

fEBBE **GET,**
fEES **GET,**
fESES **GET;;;**

CONDITIONAL PACKAGES

pathCSESFarEndHistoryDataPackage	PRESENT IF "Required and present in the source currentData object",
pathUASFarEndHistoryDataPackage	PRESENT IF "Required and present in the source currentData object",
pathESAFarEndHistoryDataPackage	PRESENT IF "Required and present in the source currentData object",
pathESBFarEndHistoryDataPackage	PRESENT IF "Required and present in the source currentData object",
pathFailureCountFarEndHistoryDataPackage	PRESENT IF "Required and present in the source currentData object",
satPathAdditionalFarEndHistoryDataPackage	PRESENT IF "Required and present in the source currentData object";

REGISTERED AS {rRecS.1251ManagedObjectClass 14};

Satellite multiplex section adaptation – history data

satMSAdaptHistoryData **MANAGED OBJECT CLASS**
DERIVED FROM "ITU-T Recommendation Q.822 1994":historyData;
CHARACTERIZED BY

satMSAdaptHistoryDataPackage **PACKAGE**
BEHAVIOUR satMSAdaptHistoryDataBehaviour **BEHAVIOUR**

DEFINED AS

“Instances of this class store a history of the register counts from instances of the satMSAdaptCurrentData object class. The following performance primitives are stored:

- PJE High History counts,
- PJE Low History counts.”;

ATTRIBUTES

pJCHigh **GET,**
pJCLow **GET;;;**

REGISTERED AS {rRecS.1251ManagedObjectClass 15};

5.2.2.5 Regenerator section – current data

There is no object class for satellite regenerator section monitoring as regenerator sections are not used in Recommendation ITU-R S.1149.

5.2.2.6 Satellite synchronous physical interface – current data

There is no PM object class for the satellite synchronous physical interface as this is considered to be completely digital. The object classes referring to this interface in ITU-T Recommendation G.774-01 are only concerned with the analogue parameters such as the laser temperature.

5.3 Package definitions

Far end unavailable second – current data – package

farEndUASCurrentDataPackage **PACKAGE**

BEHAVIOUR

farEndUASCurrentDataPackageBehaviour **BEHAVIOUR**

DEFINED AS

“This package defines a function which is used to store the count of one second intervals of UnavailableTime at the far end.”;;

ATTRIBUTES

fEUAS **REPLACE-WITH-DEFAULT GET;**

REGISTERED AS {rRecS.1251Package 01};

Far end unavailable second – history data – package

farEndUASHistoryDataPackage **PACKAGE**

BEHAVIOUR

farEndUASHistoryDataPackageBehaviour **BEHAVIOUR**

DEFINED AS

“This package defines a function which is used to store the history of the counts of one second intervals of UnavailableTime at the far end.”;;

ATTRIBUTES

fEUAS **REPLACE-WITH-DEFAULT GET;**

REGISTERED AS {rRecS.1251Package 02};

Multiplex section consecutive severely errored seconds – near end – current data

msCSESCurrentDataNearEndPackage **PACKAGE**

BEHAVIOUR

msCSESCurrentDataNearEndPackageBehaviour **BEHAVIOUR**

DEFINED AS

“Holds the count of the multiplex section near end consecutive severely errored second CSES events. A CSES is recorded every time X consecutive SESs appear where X is the msNCSES attribute and is in the range 2 to 9. CSESs are not detected during unavailable time.

The msCSESEvent attribute contains at least 6 events with their time of occurrence and the running total of CSES events. when the msCSESEvent attribute is full it automatically wraps around with the oldest event being discarded.”;;

ATTRIBUTES

msCSESEvent **REPLACE-WITH-DEFAULT (ZERO) GET,**

msNCSES **PERMITTED VALUES SDHMASN1.NCSESRange GET-REPLACE;**

REGISTERED AS {rRecS.1251Package 03};

Satellite path termination consecutive severely errored seconds – current data – near end – package

pathCSESCurrentDataNearEndPackage **PACKAGE**

BEHAVIOUR

pathCSESCurrentDataNearEndPackageBehaviour **BEHAVIOUR**

DEFINED AS

“Holds the path termination consecutive severely errored second CSES events at the near end. A CSES is recorded every time *X* consecutive SESs appear where *X* is the pathNCSES attribute and is in the range 2 to 9. CSESs are not detected during unavailable time.

The pathCSESEvent attribute contains at least 6 events with their time of occurrence and the running total of CSES events. when the pathCSESEvent attribute is full it automatically wraps around with the oldest event being discarded.”;;

ATTRIBUTES

pathCSESEvent	REPLACE-WITH-DEFAULT(ZERO)	GET,
pathNCSES	PERMITTED VALUES SDHMASN1.NCSESRange	REPLACE GET;

REGISTERED AS {rRecS.1251Package 04};

Unavailable time alarm package

unavailableTimeAlarmPackage **PACKAGE**

BEHAVIOUR

unavailableTimeAlarmPackageBehaviour **BEHAVIOUR**

DEFINED AS

“This package is used when a communications alarm notification with a probable cause of unavailable is to be emitted to indicate the start of an unavailable period. The end of the unavailable period is indicated by clearing this alarm condition.”;;

NOTIFICATIONS

"ITU-T Recommendation X.733 1992":communicationsAlarm;

REGISTERED AS {rRecS.1251Package 05};

satMSAdditionalCurrentDataPackage NE & FE

FFS.

satPathAdditionalCurrentDataPackage NE & FE

FFS.

satMSAdditionalHistoryDataPackage NE & FE

FFS.

satPathAdditionalHistoryDataPackage NE & FE

FFS.

5.4 Attributes

Multiplex section background block errors

msBBE **ATTRIBUTE**

DERIVED FROM "ITU-T Recommendation X.721":counter;

BEHAVIOUR

msBBEBehaviour **BEHAVIOUR**

DEFINED AS

“This attribute represents the Background Block Error Count BBE which is a count of errored blocks not occurring as part of an SES over the measurement interval. The BBE is described in Recommendation ITU-R S.1062.”;;

REGISTERED AS {rRecS.1251Attribute 01};

Multiplex section errored secondsmsES **ATTRIBUTE****DERIVED FROM** "ITU-T Recommendation X.721":counter;**BEHAVIOUR**msESBehaviour **BEHAVIOUR****DEFINED AS**

“This attribute represents the Errored Second Count (ES) which is a count of seconds with one or more errored blocks during available time over the measurement interval. The ES is defined in Recommendation ITU-R S.1062.”;

REGISTERED AS {rRecS.1251Attribute 02};

Multiplex section severely errored secondsmsSES **ATTRIBUTE****DERIVED FROM** "ITU-T Recommendation X.721":counter;**BEHAVIOUR**msSESBehaviour **BEHAVIOUR****DEFINED AS**

“This attribute represents the Severely Errored Second Count (SES) which is a count of seconds containing 30% or more errored blocks during available time or one or more severely disturbed periods over the measurement interval. A SES is also counted as an ES.

The SES and severely disturbed period are defined in Recommendation ITU-R S.1062.”;

REGISTERED AS {rRecS.1251Attribute 03};

Multiplex section threshold controlmsBBETR1 **ATTRIBUTE****DERIVED FROM** "ITU-T Recommendation Q.822":thresholdData;**BEHAVIOUR**msBBETR1Behaviour **BEHAVIOUR****DEFINED AS**

“This attribute represents the lower threshold setting for BBE alarm condition.

A parameter with an integer value is used.”;

PARAMETERS msBBETR1

WITH INFORMATION SYNTAX SDHConfASN1.thresholdDefinition

REGISTERED AS {rRecS.1251Attribute 04};

msBBETR2 **ATTRIBUTE****DERIVED FROM** "ITU-T Recommendation Q.822":thresholdData;**BEHAVIOUR**msBBETR2Behaviour **BEHAVIOUR****DEFINED AS**

“This attribute represents the higher threshold setting for BBE alarm condition.

A parameter with an integer value is used.”;

PARAMETERS msBBETR2

WITH INFORMATION SYNTAX SDHConfASN1.thresholdDefinition

REGISTERED AS {rRecS.1251Attribute 05};

msESTR1 **ATTRIBUTE****DERIVED FROM** "ITU-T Recommendation Q.822":thresholdData;**BEHAVIOUR**msESTR1Behaviour **BEHAVIOUR**

DEFINED AS

“This attribute represents the lower threshold setting for ES alarm condition.

A parameter with an integer value is used.”;

PARAMETERS msESTR1

WITH INFORMATION SYNTAX SDHConfASN1.thresholdDefinition

REGISTERED AS {rRecS.1251Attribute 06};

msESTR1 **ATTRIBUTE**

DERIVED FROM "ITU-T Recommendation Q.822":thresholdData;

BEHAVIOUR

msBBETR1Behaviour **BEHAVIOUR**

DEFINED AS

“This attribute represents the higher threshold setting for ES alarm condition.

A parameter with an integer value is used.”;

PARAMETERS msESTR1

WITH INFORMATION SYNTAX SDHConfASN1.thresholdDefinition

REGISTERED AS {rRecS.1251Attribute 07};

msSESTR1 **ATTRIBUTE**

DERIVED FROM "ITU-T Recommendation Q.822":thresholdData;

BEHAVIOUR

msSESTR1Behaviour **BEHAVIOUR**

DEFINED AS

“This attribute represents the threshold setting for SES alarm condition.

A parameter with an integer value is used.”;

PARAMETERS msSESTR1

WITH INFORMATION SYNTAX SDHConfASN1.thresholdDefinition

REGISTERED AS {rRecS.1251Attribute 08};

Path termination – threshold reset control

pathBBETR1 **ATTRIBUTE**

DERIVED FROM "ITU-T Recommendation Q.822":thresholdData;

BEHAVIOUR

pathBBETR1Behaviour **BEHAVIOUR**

DEFINED AS

“This attribute represents the lower threshold setting for path BBE alarm condition.

A parameter with an integer value is used.”;

PARAMETERS pathBBETR1

WITH INFORMATION SYNTAX SDHConfASN1.thresholdDefinition

REGISTERED AS {rRecS.1251Attribute 09};

pathBBETR2 **ATTRIBUTE**

DERIVED FROM "ITU-T Recommendation Q.822":thresholdData;

BEHAVIOUR

pathBBETR1Behaviour **BEHAVIOUR**

DEFINED AS

“This attribute represents the higher threshold setting for path BBE alarm condition.

A parameter with an integer value is used.”;

PARAMETERS pathBBETR2

WITH INFORMATION SYNTAX SDHConfASN1.thresholdDefinition

REGISTERED AS {rRecS.1251Attribute 10};

pathESTR1 **ATTRIBUTE**
DERIVED FROM "ITU-T Recommendation Q.822":thresholdData;
BEHAVIOUR
pathESTR1Behaviour **BEHAVIOUR**
DEFINED AS
"This attribute represents the lower threshold setting for path ES alarm condition.
A parameter with an integer value is used.";;
PARAMETERS pathESTR1
 WITH INFORMATION SYNTAX SDHConfASN1.thresholdDefinition
REGISTERED AS {rRecS.1251Attribute 11};

pathESTR1 **ATTRIBUTE**
DERIVED FROM "ITU-T Recommendation Q.822":thresholdData;
BEHAVIOUR
pathBBETR1Behaviour **BEHAVIOUR**
DEFINED AS
"This attribute represents the higher threshold setting for path ES alarm condition.
A parameter with an integer value is used.";;
PARAMETERS pathESTR1
 WITH INFORMATION SYNTAX SDHConfASN1.thresholdDefinition
REGISTERED AS {rRecS.1251Attribute 12};

pathSESTR1 **ATTRIBUTE**
DERIVED FROM "ITU-T Recommendation Q.822":thresholdData;
BEHAVIOUR
pathSESTR1Behaviour **BEHAVIOUR**
DEFINED AS
"This attribute represents the threshold setting for path SES alarm condition.
A parameter with an integer value is used.";;
PARAMETERS pathSESTR1
 WITH INFORMATION SYNTAX SDHConfASN1.thresholdDefinition
REGISTERED AS {rRecS.1251Attribute 13};

Far end unavailable seconds

fEUAS **ATTRIBUTE**
DERIVED FROM "ITU-T Recommendation X.721 1992":counter;
BEHAVIOUR fEUASBehaviour
DEFINED AS
"The value of the fEUAS attribute represents the count of one second intervals of unavailable time at the far end.";;
REGISTERED AS {rRecS.1251Attribute 14};

Satellite granularity period

satGranularityPeriod **ATTRIBUTE**
DERIVED FROM "ITU-T Recommendation X.739":granularityPeriod;
BEHAVIOUR
satGranularityPeriodBehaviour **BEHAVIOUR**
DEFINED AS
"This attribute supports the setting up of an extra register to record errored seconds ESs at intervals of less than 15 min.
An extra register is required because the 15 min and 24 hour counts must be maintained as a mandatory feature.
The units are seconds.";;
REGISTERED AS {rRecS.1251Attribute 15};

5.5 Supporting ASN.1 Productions

```

SATSDHPMUNIASN1 {itu(0)recommendation(0)s(19)1251(1251)satPMUni(xx)informationModel(0)asn1Module(2)
satSDHPMUni(0)}
DEFINITIONS IMPLICIT TAGS ::=
BEGIN
-   EXPORTS everything
IMPORTS
ProbableCause FROM Attribute-ASN1Module {joint-iso-itu ms(9) smi(3) part2(2) asnModule(2)}
TimePeriod FROM MetricModule {joint-iso-itu ms(9) function(2) part11(11) asnModule(2)}
CSES, Integer, SDHGranularityPeriod, SDHPVGranularityPeriod FROM SDHPMASN1
    {itu(0) recommendation(0) g(7) 774(774) hyphen(127) 01(01)
        PMinformationModel(0) asn1Module(2) sdhpm(0)}
satSDHPMUni OBJECT IDENTIFIER ::= {itu(0) recommendation(0) s(19) 1251(1251)satPMUni(01)
        PMinformationModel(0)}
s1251ManagedObjectClass OBJECT IDENTIFIER ::= {satSDHPMUniManagedObjectClass(3)}
s1251Package OBJECT IDENTIFIER ::= {satSDHPMUniPackage(4)}
s1251Attribute OBJECT IDENTIFIER ::= {satSDHPMUniAttribute(7)}
s1251NameBinding OBJECT IDENTIFIER ::= {satSDHPMUniNameBinding(6)}
End -- end of SDHPMUNIASN1

```

6 Naming hierarchy for PM object classes

The name binding for the terrestrial object classes can be found in ITU-T Recommendation G.774-01 and its amendment to include unidirectional PM in ITU-T Recommendation G.774-06 also the extension of ITU-T Recommendation G.774-01 which adds details for unidirectional operation. Figure 3 illustrates the name binding hierarchy of SDH PM.

6.1 Near end name bindings

satMSCurrentDataNearEnd -- msTTPSink

```

satMSCurrentDataNearEnd – msTTPSink  NAME BINDING
SUBORDINATE OBJECT CLASS satMSCurrentDataNearEnd  AND SUBCLASSES;
NAMED BY
    SUPERIOR OBJECT CLASS "ITU-T Recommendation G.774: 1992": msTTPSink  AND SUBCLASSES;
    WITH ATTRIBUTE "ITU-T Recommendation X.739: 1993": scannerId;
CREATE
    WITH-REFERENCE-OBJECT,
    WITH-AUTOMATIC-INSTANCE-NAMING;
DELETE
    DELETES-CONTAINED-OBJECTS;
REGISTERED AS      {rRecS.1251NameBinding 01};

```

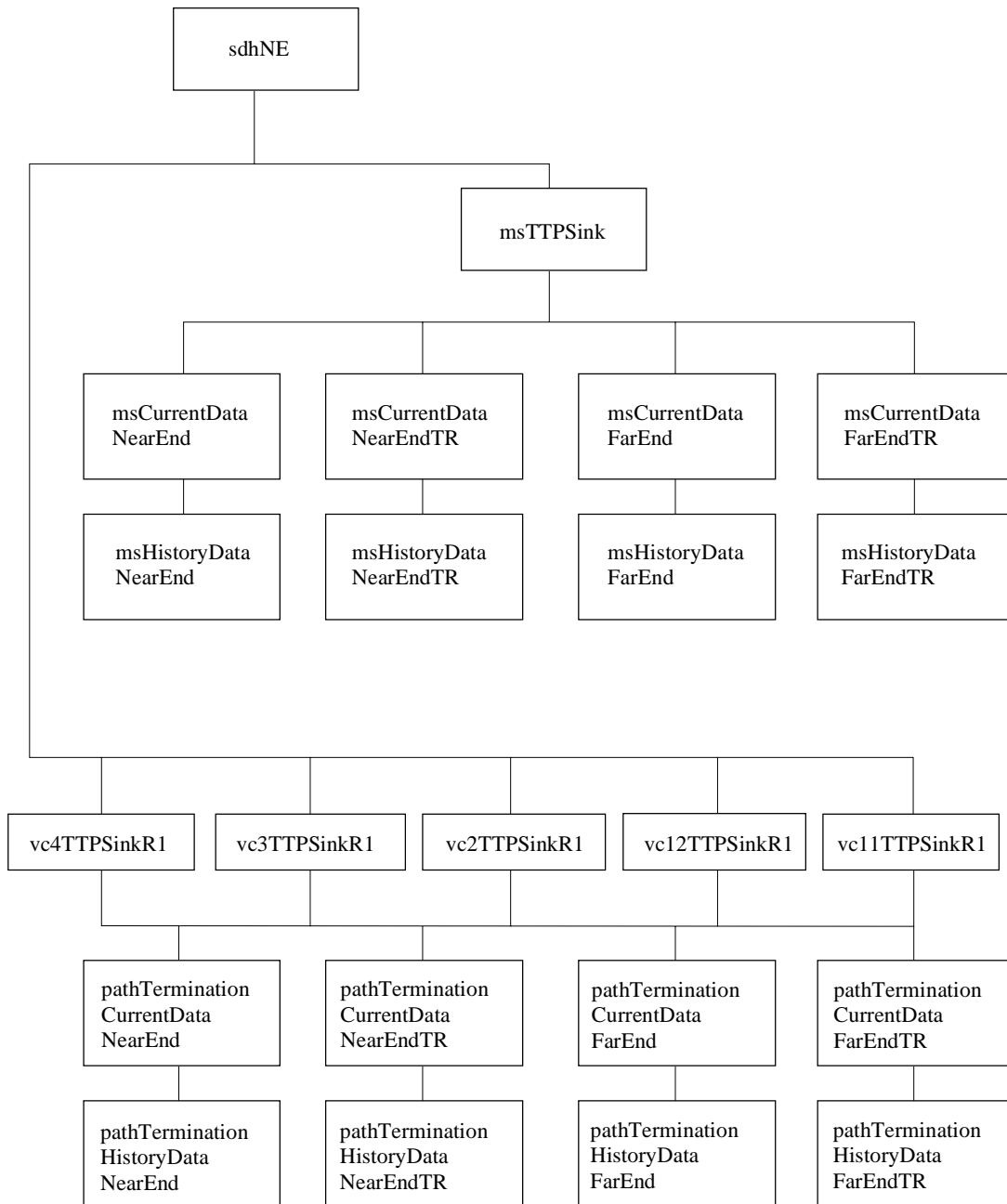
satMSCurrentDataNearEndTR --- msTTPSink

```

satMSCurrentDataNearEndTR – msTTPSink  NAME BINDING
SUBORDINATE OBJECT CLASS satMSCurrentDataNearEndTR  AND SUBCLASSES;
NAMED BY
    SUPERIOR OBJECT CLASS "ITU-T Recommendation G.774: 1992": msTTPSink  AND SUBCLASSES;
    WITH ATTRIBUTE "ITU-T Recommendation X.739: 1993": scannerId;
CREATE
    WITH-REFERENCE-OBJECT,
    WITH-AUTOMATIC-INSTANCE-NAMING;
DELETE
    DELETES-CONTAINED-OBJECTS;
REGISTERED AS      {rRecS.1251NameBinding 02};

```

FIGURE 3
 Naming hierarchy from ITU-T Recommendation G.774



1251-03

6.1.1 Naming policy

The vcxxTTPSink object classes were updated at the end of the 1996 plenary session to revision 1 status and this latest version has been adopted herein.

satPathTermCurrentDataNearEnd --- vc4TTPSinkR1

satPathTermCurrentDataNearEnd – vc4TTPSinkR1 NAME BINDING

SUBORDINATE OBJECT CLASS satPathTermCurrentDataNearEnd AND SUBCLASSES;

NAMED BY

SUPERIOR OBJECT CLASS "ITU-T Recommendation G.774": vc4TTPSinkR1 AND SUBCLASSES;
 WITH ATTRIBUTE "ITU-T Recommendation X.739: 1993": scannerId;

```

CREATE
    WITH-REFERENCE-OBJECT,
    WITH-AUTOMATIC-INSTANCE-NAMING;
DELETE
    DELETES-CONTAINED-OBJECTS;
REGISTERED AS      {rRecS.1251NameBinding 03};

```

```

satpathTermCurrentDataNearEnd --- vc3TTPSinkR1
satpathTermCurrentDataNearEnd – vc3TTPSinkR1  NAME BINDING
SUBORDINATE OBJECT CLASS satPathTermCurrentDataNearEnd  AND SUBCLASSES;
NAMED BY
    SUPERIOR OBJECT CLASS "ITU-T Recommendation G.774": vc3TTPSinkR1  AND SUBCLASSES;
    WITH ATTRIBUTE "ITU-T Recommendation X.739: 1993": scannerId;
CREATE
    WITH-REFERENCE-OBJECT,
    WITH-AUTOMATIC-INSTANCE-NAMING;
DELETE
    DELETES-CONTAINED-OBJECTS;
REGISTERED AS      {rRecS.1251NameBinding 04};

```

```

satPathTermCurrentDataNearEnd --- vc2TTPSinkR1
satPathTermCurrentDataNearEnd – vc2TTPSinkR1  NAME BINDING
SUBORDINATE OBJECT CLASS satPathTermCurrentDataNearEnd  AND SUBCLASSES;
NAMED BY
    SUPERIOR OBJECT CLASS "ITU-T Recommendation G.774": vc2TTPSinkR1  AND SUBCLASSES;
    WITH ATTRIBUTE "ITU-T Recommendation X.739: 1993": scannerId;
CREATE
    WITH-REFERENCE-OBJECT,
    WITH-AUTOMATIC-INSTANCE-NAMING;
DELETE
    DELETES-CONTAINED-OBJECTS;
REGISTERED AS      {rRecS.1251NameBinding 05};

```

```

satPathTermCurrentDataNearEnd --- vc12TTPSinkR1
satPathTermCurrentDataNearEnd – vc12TTPSinkR1  NAME BINDING
SUBORDINATE OBJECT CLASS satPathTermCurrentDataNearEnd  AND SUBCLASSES;
NAMED BY
    SUPERIOR OBJECT CLASS "ITU-T Recommendation G.774": vc12TTPSinkR1  AND SUBCLASSES;
    WITH ATTRIBUTE "ITU-T Recommendation X.739: 1993": scannerId;
CREATE
    WITH-REFERENCE-OBJECT,
    WITH-AUTOMATIC-INSTANCE-NAMING;
DELETE
    DELETES-CONTAINED-OBJECTS;
REGISTERED AS      {rRecS.1251NameBinding 06};

```

```

satPathTermCurrentDataNearEnd --- vc11TTPSinkR1
satPathTermCurrentDataNearEnd – vc11TTPSinkR1  NAME BINDING
SUBORDINATE OBJECT CLASS satPathTermCurrentDataNearEnd  AND SUBCLASSES;
NAMED BY
    SUPERIOR OBJECT CLASS "ITU-T Recommendation G.774": vc11TTPSinkR1  AND SUBCLASSES;
    WITH ATTRIBUTE "ITU-T Recommendation X.739: 1993": scannerId;

```

```

CREATE
    WITH-REFERENCE-OBJECT,
    WITH-AUTOMATIC-INSTANCE-NAMING;
DELETE
    DELETES-CONTAINED-OBJECTS;
REGISTERED AS      {rRecS.1251NameBinding 07};
-----

```

6.2 Far end name bindings

satMSCurrentDataFarEnd -- msTTPSink

```

satMSCurrentDataFarEnd – msTTPSink  NAME BINDING
SUBORDINATE OBJECT CLASS satMSCurrentDataFarEnd  AND SUBCLASSES;
NAMED BY
    SUPERIOR OBJECT CLASS "ITU-T Recommendation G.774: 1992": msTTPSink  AND SUBCLASSES;
    WITH ATTRIBUTE "ITU-T Recommendation X.739: 1993": scannerId;
CREATE
    WITH-REFERENCE-OBJECT,
    WITH-AUTOMATIC-INSTANCE-NAMING;
DELETE
    DELETES-CONTAINED-OBJECTS;
REGISTERED AS      {rRecS.1251NameBinding 08};
-----

```

satMSCurrentDataFarEndTR --- msTTPSink

```

satMSCurrentDataFarEndTR – msTTPSink  NAME BINDING
SUBORDINATE OBJECT CLASS satMSCurrentDataFarEndTR  AND SUBCLASSES;
NAMED BY
    SUPERIOR OBJECT CLASS "ITU-T Recommendation G.774: 1992": msTTPSink  AND SUBCLASSES;
    WITH ATTRIBUTE "ITU-T Recommendation X.739: 1993": scannerId;
CREATE
    WITH-REFERENCE-OBJECT,
    WITH-AUTOMATIC-INSTANCE-NAMING;
DELETE
    DELETES-CONTAINED-OBJECTS;
REGISTERED AS      {rRecS.1251NameBinding 09};
-----

```

6.2.1 Naming policy

The vcxxTTPSink object classes were updated at the end of the 1996 Plenary session to revision 1 status and this latest version has been adopted herein.

satPathTermCurrentDataFarEnd --- vc4TTPSinkR1

```

satPathTermCurrentDataFarEnd – vc4TTPSinkR1  NAME BINDING
SUBORDINATE OBJECT CLASS satPathTermCurrentDataFarEnd  AND SUBCLASSES;
NAMED BY
    SUPERIOR OBJECT CLASS "ITU-T Recommendation G.774": vc4TTPSinkR1  AND SUBCLASSES;
    WITH ATTRIBUTE "ITU-T Recommendation X.739: 1993": scannerId;
CREATE
    WITH-REFERENCE-OBJECT,
    WITH-AUTOMATIC-INSTANCE-NAMING;
DELETE
    DELETES-CONTAINED-OBJECTS;
REGISTERED AS      {rRecS.1251NameBinding 10};
-----

```

satpathTermCurrentDataFarEnd --- vc3TTPSinkR1

```

satpathTermCurrentDataFarEnd – vc3TTPSinkR1  NAME BINDING
SUBORDINATE OBJECT CLASS satPathTermCurrentDataFarEnd  AND SUBCLASSES;
NAMED BY
    SUPERIOR OBJECT CLASS "ITU-T Recommendation G.774": vc3TTPSinkR1  AND SUBCLASSES;
    WITH ATTRIBUTE "ITU-T Recommendation X.739: 1993": scannerId;
CREATE
    WITH-REFERENCE-OBJECT,
    WITH-AUTOMATIC-INSTANCE-NAMING;
DELETE
    DELETES-CONTAINED-OBJECTS;
REGISTERED AS      {rRecS.1251NameBinding 11};
-----

```

satPathTermCurrentDataFarEnd --- vc2TTPSinkR1

```

satPathTermCurrentDataFarEnd – vc2TTPSinkR1  NAME BINDING
SUBORDINATE OBJECT CLASS satPathTermCurrentDataFarEnd  AND SUBCLASSES;
NAMED BY
    SUPERIOR OBJECT CLASS "ITU-T Recommendation G.774": vc2TTPSinkR1  AND SUBCLASSES;
    WITH ATTRIBUTE "ITU-T Recommendation X.739: 1993": scannerId;
CREATE
    WITH-REFERENCE-OBJECT,
    WITH-AUTOMATIC-INSTANCE-NAMING;
DELETE
    DELETES-CONTAINED-OBJECTS;
REGISTERED AS      {rRecS.1251NameBinding 12};
-----

```

satPathTermCurrentDataFarEnd --- vc12TTPSinkR1

```

satPathTermCurrentDataFarEnd – vc12TTPSinkR1  NAME BINDING
SUBORDINATE OBJECT CLASS satPathTermCurrentDataFarEnd  AND SUBCLASSES;
NAMED BY
    SUPERIOR OBJECT CLASS "ITU-T Recommendation G.774": vc12TTPSinkR1  AND SUBCLASSES;
    WITH ATTRIBUTE "ITU-T Recommendation X.739: 1993": scannerId;
CREATE
    WITH-REFERENCE-OBJECT,
    WITH-AUTOMATIC-INSTANCE-NAMING;
DELETE
    DELETES-CONTAINED-OBJECTS;
REGISTERED AS {rRecS.1251NameBinding 13};
-----

```

satPathTermCurrentDataFarEnd --- vc11TTPSinkR1

```

satPathTermCurrentDataFarEnd – vc11TTPSinkR1  NAME BINDING
SUBORDINATE OBJECT CLASS satPathTermCurrentDataFarEnd  AND SUBCLASSES;
NAMED BY
    SUPERIOR OBJECT CLASS "ITU-T Recommendation G.774": vc11TTPSinkR1  AND SUBCLASSES;
    WITH ATTRIBUTE "ITU-T Recommendation X.739: 1993": scannerId;
CREATE
    WITH-REFERENCE-OBJECT,
    WITH-AUTOMATIC-INSTANCE-NAMING;
DELETE
    DELETES-CONTAINED-OBJECTS;
REGISTERED AS      {rRecS.1251NameBinding 14};
-----

```

satPathTermCurrentDataNearEnd – au4SupervisedCTPSink

satPathTermCurrentDataNearEnd – au4SupervisedCTPSink NAME BINDING
 SUBORDINATE OBJECT CLASS satPathTermCurrentDataNearEnd AND SUBCLASSES;
 NAMED BY
 SUPERIOR OBJECT CLASS "ITU-T Recommendation G.774-05:1995": au4SupervisedCTPSink
 AND SUBCLASSES;
 WITH ATTRIBUTE "ITU-T Recommendation X.739: 1993": scannerId;
 CREATE
 WITH-REFERENCE-OBJECT,
 WITH-AUTOMATIC-INSTANCE-NAMING;
 DELETE
 DELETES-CONTAINED-OBJECTS;
 REGISTERED AS {rRecS.1251NameBinding 15};

satPathTermCurrentDataNearEnd – au3SupervisedCTPSink

satPathTermCurrentDataNearEnd - au3SupervisedCTPSink NAME BINDING
 SUBORDINATE OBJECT CLASS satPathTermCurrentDataNearEnd AND SUBCLASSES;
 NAMED BY
 SUPERIOR OBJECT CLASS "ITU-T Recommendation G.774-05:1995": au3SupervisedCTPSink
 AND SUBCLASSES;
 WITH ATTRIBUTE "ITU-T Recommendation X.739: 1993": scannerId;
 CREATE
 WITH-REFERENCE-OBJECT,
 WITH-AUTOMATIC-INSTANCE-NAMING;
 DELETE
 DELETES-CONTAINED-OBJECTS;
 REGISTERED AS {rRecS.1251NameBinding 16};

satPathTermCurrentDataNearEnd – tu3SupervisedCTPSink

satPathTermCurrentDataNearEnd – tu3SupervisedCTPSink NAME BINDING
 SUBORDINATE OBJECT CLASS satPathTermCurrentDataNearEnd AND SUBCLASSES;
 NAMED BY
 SUPERIOR OBJECT CLASS "ITU-T Recommendation G.774-05:1995": tu3SupervisedCTPSink
 AND SUBCLASSES;
 WITH ATTRIBUTE "ITU-T Recommendation X.739: 1993": scannerId;
 CREATE
 WITH-REFERENCE-OBJECT,
 WITH-AUTOMATIC-INSTANCE-NAMING;
 DELETE
 DELETES-CONTAINED-OBJECTS;
 REGISTERED AS {rRecS.1251NameBinding 17};

satPathTermCurrentDataNearEnd – tu2SupervisedCTPSink

satPathTermCurrentDataNearEnd – tu2SupervisedCTPSink NAME BINDING
 SUBORDINATE OBJECT CLASS satPathTermCurrentDataNearEnd AND SUBCLASSES;
 NAMED BY
 SUPERIOR OBJECT CLASS "ITU-T Recommendation G.774-05:1995": tu2SupervisedCTPSink
 AND SUBCLASSES;
 WITH ATTRIBUTE "ITU-T Recommendation X.739: 1993": scannerId;
 CREATE
 WITH-REFERENCE-OBJECT,
 WITH-AUTOMATIC-INSTANCE-NAMING;
 DELETE
 DELETES-CONTAINED-OBJECTS;
 REGISTERED AS {rRecS.1251NameBinding 18};

satPathTermCurrentDataNearEnd – tu12SupervisedCTPSink

satPathTermCurrentDataNearEnd – tu12SupervisedCTPSink NAME BINDING
 SUBORDINATE OBJECT CLASS satPathTermCurrentDataNearEnd AND SUBCLASSES;
 NAMED BY
 SUPERIOR OBJECT CLASS "ITU-T Recommendation G.774-05:1995": tu12SupervisedCTPSink
 AND SUBCLASSES;
 WITH ATTRIBUTE "ITU-T Recommendation X.739: 1993": scannerId;
 CREATE
 WITH-REFERENCE-OBJECT,
 WITH-AUTOMATIC-INSTANCE-NAMING;
 DELETE
 DELETES-CONTAINED-OBJECTS;
 REGISTERED AS {rRecS.1251NameBinding 19};

satPathTermCurrentDataNearEnd – tu11SupervisedCTPSink

satPathTermCurrentDataNearEnd – tu11SupervisedCTPSink NAME BINDING
 SUBORDINATE OBJECT CLASS satPathTermCurrentDataNearEnd AND SUBCLASSES;
 NAMED BY
 SUPERIOR OBJECT CLASS "ITU-T Recommendation G.774-05:1995": tu11SupervisedCTPSink
 AND SUBCLASSES;
 WITH ATTRIBUTE "ITU-T Recommendation X.739: 1993": scannerId;
 CREATE
 WITH-REFERENCE-OBJECT,
 WITH-AUTOMATIC-INSTANCE-NAMING;
 DELETE
 DELETES-CONTAINED-OBJECTS;
 REGISTERED AS {rRecS.1251NameBinding 20};

satPathTermCurrentDataFarEnd – au4SupervisedCTPSink

satPathTermCurrentDataFarEnd – au4SupervisedCTPSink NAME BINDING
 SUBORDINATE OBJECT CLASS satPathTermCurrentDataFarEnd AND SUBCLASSES;
 NAMED BY
 SUPERIOR OBJECT CLASS "ITU-T Recommendation G.774-05:1995": au4SupervisedCTPSink
 AND SUBCLASSES;
 WITH ATTRIBUTE "ITU-T Recommendation X.739: 1993": scannerId;
 CREATE
 WITH-REFERENCE-OBJECT,
 WITH-AUTOMATIC-INSTANCE-NAMING;
 DELETE
 DELETES-CONTAINED-OBJECTS;
 REGISTERED AS {rRecS.1251NameBinding 21};

satPathTermCurrentDataFarEnd – au3SupervisedCTPSink

satPathTermCurrentDataFarEnd – au3SupervisedCTPSink NAME BINDING
 SUBORDINATE OBJECT CLASS satPathTermCurrentDataFarEnd AND SUBCLASSES;
 NAMED BY
 SUPERIOR OBJECT CLASS "ITU-T Recommendation G.774-05:1995": au3SupervisedCTPSink
 AND SUBCLASSES;
 WITH ATTRIBUTE "ITU-T Recommendation X.739: 1993": scannerId;
 CREATE
 WITH-REFERENCE-OBJECT,
 WITH-AUTOMATIC-INSTANCE-NAMING;
 DELETE
 DELETES-CONTAINED-OBJECTS;
 REGISTERED AS {rRecS.1251NameBinding 22};

satPathTermCurrentDataFarEnd – tu3SupervisedCTPSink

```

satPathTermCurrentDataFarEnd – tu3SupervisedCTPSink  NAME BINDING
SUBORDINATE OBJECT CLASS satPathTermCurrentDataFarEnd  AND SUBCLASSES;
NAMED BY
    SUPERIOR OBJECT CLASS "ITU-T Recommendation G.774-05:1995": tu3SupervisedCTPSink
    AND SUBCLASSES;
    WITH ATTRIBUTE "ITU-T Recommendation X.739: 1993": scannerId;
CREATE
    WITH-REFERENCE-OBJECT,
    WITH-AUTOMATIC-INSTANCE-NAMING;
DELETE
    DELETES-CONTAINED-OBJECTS;
REGISTERED AS      {rRecS.1251NameBinding 23};

```

satPathTermCurrentDataFarEnd – tu2SupervisedCTPSink

```

satPathTermCurrentDataFarEnd – tu2SupervisedCTPSink  NAME BINDING
SUBORDINATE OBJECT CLASS satPathTermCurrentDataFarEnd  AND SUBCLASSES;
NAMED BY
    SUPERIOR OBJECT CLASS "ITU-T Recommendation G.774-05:1995": tu2SupervisedCTPSink
    AND SUBCLASSES;
    WITH ATTRIBUTE "ITU-T Recommendation X.739: 1993": scannerId;
CREATE
    WITH-REFERENCE-OBJECT,
    WITH-AUTOMATIC-INSTANCE-NAMING;
DELETE
    DELETES-CONTAINED-OBJECTS;
REGISTERED AS      {rRecS.1251NameBinding 24};

```

satPathTermCurrentDataFarEnd – tu12SupervisedCTPSink

```

satPathTermCurrentDataFarEnd – tu12SupervisedCTPSink  NAME BINDING
SUBORDINATE OBJECT CLASS satPathTermCurrentDataFarEnd  AND SUBCLASSES;
NAMED BY
    SUPERIOR OBJECT CLASS "ITU-T Recommendation G.774-05:1995": tu12SupervisedCTPSink
    AND SUBCLASSES;
    WITH ATTRIBUTE "ITU-T Recommendation X.739: 1993": scannerId;
CREATE
    WITH-REFERENCE-OBJECT,
    WITH-AUTOMATIC-INSTANCE-NAMING;
DELETE
    DELETES-CONTAINED-OBJECTS;
REGISTERED AS      {rRecS.1251NameBinding 25};

```

satPathTermCurrentDataFarEnd – tu11SupervisedCTPSink

```

satPathTermCurrentDataFarEnd – tu11SupervisedCTPSink  NAME BINDING
SUBORDINATE OBJECT CLASS satPathTermCurrentDataFarEnd  AND SUBCLASSES;
NAMED BY
    SUPERIOR OBJECT CLASS "ITU-T Recommendation G.774-05:1995": tu11SupervisedCTPSink
    AND SUBCLASSES;
    WITH ATTRIBUTE "ITU-T Recommendation X.739: 1993": scannerId;
CREATE
    WITH-REFERENCE-OBJECT,
    WITH-AUTOMATIC-INSTANCE-NAMING;
DELETE
    DELETES-CONTAINED-OBJECTS;
REGISTERED AS      {rRecS.1251NameBinding 26};

```

6.3 Name bindings for additional satellite multiplex hierarchy performance monitoring points

Where $N = 1$ to 6 and $K = 1$ to 2.

satPathTermCurrentDataNearEnd – stug2NSupervisedTTPSink

```
satPathTermCurrentDataNearEnd – stug2NSupervisedTTPSink    NAME BINDING
SUBORDINATE OBJECT CLASS satPathTermCurrentDataNearEnd    AND SUBCLASSES;
NAMED BY
    SUPERIOR OBJECT CLASS "Recommendation ITU-R S.1250:1997": stug2NSupervisedTTPSink
    AND SUBCLASSES;
    WITH ATTRIBUTE "ITU-T Recommendation X.739: 1993": scannerId;
CREATE
    WITH-REFERENCE-OBJECT,
    WITH-AUTOMATIC-INSTANCE-NAMING;
DELETE
    DELETES-CONTAINED-OBJECTS;
REGISTERED AS          {rRecS.1251NameBinding 27};
```

satPathTermCurrentDataNearEnd – stug1KSupervisedTTPSink

```
satPathTermCurrentDataNearEnd – stug1KSupervisedTTPSink    NAME BINDING
SUBORDINATE OBJECT CLASS satPathTermCurrentDataNearEnd    AND SUBCLASSES;
NAMED BY
    SUPERIOR OBJECT CLASS "Recommendation ITU-R S.1250:1997": stug1KSupervisedTTPSink
    AND SUBCLASSES;
    WITH ATTRIBUTE "ITU-T Recommendation X.739: 1993": scannerId;
CREATE
    WITH-REFERENCE-OBJECT,
    WITH-AUTOMATIC-INSTANCE-NAMING;
DELETE
    DELETES-CONTAINED-OBJECTS;
REGISTERED AS          {rRecS.1251NameBinding 28};
```

The name bindings for the threshold reset object classes naturally follow the same pattern.

historyData – satSDHCurrentDataUnidirectional

```
historyData – satSDHCurrentDataUnidirectional    NAME BINDING
SUBORDINATE OBJECT CLASS satSDHCurrentDataUnidirectional    AND SUBCLASSES;
NAMED BY
    SUPERIOR OBJECT CLASS "ITU-T Recommendation Q.822: 1994": historyData    AND SUBCLASSES;
    WITH ATTRIBUTE "ITU-T Recommendation Q.822: 1994: 1994": historyDataId;
CREATE
    WITH-REFERENCE-OBJECT,
    WITH-AUTOMATIC-INSTANCE-NAMING;
DELETE
    DELETES-CONTAINED-OBJECTS;
REGISTERED AS          {rRecS.1251NameBinding 29};
```

7 Subordination rules

None.

8 Pointer constraints

None.
