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Digital terminal equipments – Operations, administration
and maintenance features of transmission equipment

Synchronous digital hierarchy (SDH) management of radio-relay systems for the network element view

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“SYNCHRONOUS DIGITAL HIERARCHY (SDH) MANAGEMENT OF RADIO-RELAY SYSTEMS FOR THE NETWORK ELEMENT VIEW”

Summary

This Recommendation provides an information model for the Synchronous Digital hierarchy (SDH) Radio-Relay Network Elements. This model describes the managed object classes and their properties for the Radio Synchronous Physical Interface and the protection function of sections having such a physical interface. These objects are useful to describe information exchanged across interfaces defined in Recommendation M.3010 Telecommunications Management Network (TMN) architecture for the management of the Radio-Relay Network Elements.

1. Scope

This Recommendation provides an information model to be used at the interface between Network Elements and Management Systems, for the management of radio-relays equipment which use the Synchronous Digital Hierarchy (SDH). It identifies the Telecommunications Management Network (TMN) object classes required for the management of the Radio-Relay SDH network elements. These objects are relevant to information exchanged across standardized interfaces defined in the M.3010 TMN architecture.

Structure of this Recommendation

Clauses 5 to 6 describe the information model using the notation mechanisms defined in Recommendation X.722: Guidelines for the Definition of Managed Objects. Subclauses 5.6 and 6.7 contain the syntax definitions of the information carried in the protocol using Abstract Syntax Notation One (ASN.1) defined in Recommendation X.680-683. Naming and Inheritance are diagrammatically shown in informative Appendix I.

2. References

The following Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision: all users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published.

- ITU-T Recommendation G.707 (2000), *Network-node interface for the synchronous digital hierarchy*.
- ITU-T Recommendation G.773 (1993), *Q-Interface protocols*
- ITU-T Recommendation G.774 (2000), *SDH management information model for the network element view*.
- ITU-T Recommendation G.783 (1998), *Characteristics of Synchronous Digital Hierarchy (SDH) equipment functional blocks*.
- ITU-T Recommendation G.784 (1999), *Synchronous Digital Hierarchy (SDH) management*.
- ITU-T Recommendation G.803 (1997), *Architectures of transport networks based on the synchronous digital hierarchy (SDH)*.

- ITU-T Recommendation G.831 (1996), *Management capabilities of transport networks based on the synchronous digital hierarchy (SDH)*.
- ITU-T Recommendation G.958 (1994), *Digital line systems based on SDH for use on optical fibre cables*.
- ITU-T Recommendation M.60 (1993), *Maintenance terminology and definitions*.
- ITU-T Recommendation M.2120 (1997), *Digital path, section and transmission system fault detection and localisation procedures*.
- ITU-T Recommendation M.3010 (2000), *Principles for a telecommunication management network*.
- ITU-T Recommendation M.3013 (2000), *Considerations for a Telecommunications Management Network*.
- ITU-T Recommendation M.3100 (1995), *Generic network information model*.
- ITU-T Recommendation Q.811 (1997), *Q3-Lower layers protocols*.
- ITU-T Recommendation Q.812 (1997), *Q3-Higher layers protocols*.
- ITU-T Recommendation Q.822 (1994), *Stage 1, Stage 2 and Stage 3 description for the Q3-interface: performance management*.
- ITU-T Recommendation X.680 - X.683 (1997), *Specification of Abstract Syntax Notation One (ASN.1)*.
- ITU-T Recommendation X.701 (1997), *Systems management overview*.
- ITU-T Recommendation X.710 (1997), *Common management information service*.
- ITU-T Recommendation X.711 (1997), *Common management information protocol*.
- ITU-T Recommendation X.720 (1992) and Amd.1 (95) and Corr.1 (94), *Information technology – OSI – Structure of Management Information: Management information model*.
- ITU-T Recommendation X.721 (1993) and Corr. 1, 2, 3, and 4, *Definition of management information*.
- ITU-T Recommendation X.722 (1992) and Amd.1 (95), Amd.2 (97), Amd.2 (97) and Corr.1 (96), *Information technology – OSI – Structure of management information: Guidelines for the definition of managed objects*.
- ITU-T Recommendation X.730 (1992) and Amd.1 (95) and Corr1Amd1 (96), *Object management function*.
- ITU-T Recommendation X.731 (1992) and Amd.1 (95), Corr.1 (95) and Corr1Amd1 (96), *State management function*.
- ITU-T Recommendation X.733 (1992) and Corr.1 (94), Amd1 (95), Corr1Amd1 (96) and Corr.2 (99), *Alarm reporting function*.
- ITU-T Recommendation X.734 (1992) and Corr.1 (94), Amd1 (95), Corr1Amd1 (96) and Corr.2 (99), *Event report management function*.
- ITU-T Recommendation X.735 (1992) and Amd.1 (95) and Corr1Amd1 (96), *Log control function*.

3. Terms and Definitions

This Recommendation uses the terms and definitions defined in Recommendations G.784, G.774 and M.3100.

4. Abbreviations

For the purpose of this Recommendation, the following abbreviations are used:

AIS	Alarm Indication Signal
AP	Access Point
ITU-T	International Telecommunication Union
CMIP	Common Management Information Protocol
CMIS	Common Management Information Service
CP	Connection Point
CTP	Connection Termination Point
DRR	Digital Radio-Relay
GTP	Group Termination Point
HPA	Higher order Path Adaptation
IA	Indirect Adapter
IOS	Intra-Office Section
ISO	International Organization for Standardization
LOF	Loss of Frame
LPA	Lower order Path Adaptation
NE	Network Element
OS	Operations System
OSI	Open Systems Interconnection
PDH	Plesiochronous Digital Hierarchy
Pkg	Package
RF	Radio Frequency
RPS	Radio Protection Switching
RRR	Radio-Relay Regenerator
RRT	Radio-Relay Terminal
RS	Regenerator Section
RSPI	Radio Synchronous Physical Interface
SDH	Synchronous Digital Hierarchy
Snk	Sink
Src	Source
STM-n	Synchronous Transport Module n
STM-RR	Synchronous Transport Module for Sub-STM-1 radio-relay
TMN	Telecommunications Management Network
TP	Termination Point
TTP	Trail Termination Point
VC-n	Virtual Container n

5. SDH Radio TP fragment

This clause provides Managed Objects required to model Radio SDH Physical Interfaces.



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5.1 Object classes definitions

5.1.1 Radio Synchronous Physical Interface

This subclause describes the object classes required to model the Radio SDH physical interface.

radioSPITTPBidirectional MANAGED OBJECT CLASS

DERIVED FROM "Recommendation M.3100":trailTerminationPointBidirectional,
radioSPITTPSink,
radioSPITTPSource;

REGISTERED AS { g774-8ObjectClass 1 };

radioSPITTPSink MANAGED OBJECT CLASS

DERIVED FROM "Recommendation M.3100":trailTerminationPointSink;

CHARACTERIZED BY

"Recommendation X.721":administrativeStatePackage,
"Recommendation M.3100":createDeleteNotificationsPackage,
"Recommendation M.3100":stateChangeNotificationPackage,
"Recommendation M.3100":tmnCommunicationsAlarmInformationPackage,
radioSPIPackage,
radioSPITTPSinkPkg **PACKAGE**

BEHAVIOUR

radioSPITTPSinkPkgBehaviour **BEHAVIOUR**

DEFINED AS

"This managed object class represents the process of converting the incoming radio frequency signal into an internal logic level STM-N signal and the recovering of the timing from the incoming signal.

The upstream connectivity pointer is NULL for an instance of this class.

The aforementioned process is composed of two subfunctions, namely the RX subfunction and the Demodulation subfunction.

A communicationsAlarm notification shall be issued if the RX subfunction fails. The probableCause parameter of the notification shall indicate rxFail.

A communicationsAlarm notification shall be issued if the Demodulation subfunction fails. The probableCause parameter of the notification shall indicate demodulationFail.

When an alarm is pending on an instance, its operationalState is disabled."

;;;

CONDITIONAL PACKAGES

rxLOSNotificationPackage **PRESENT IF** "an instance supports it",

demLOSNotificationPackage **PRESENT IF** "an instance supports it";

REGISTERED AS { g774-8ObjectClass 2 };

radioSPITTPSource MANAGED OBJECT CLASS

DERIVED FROM "Recommendation M.3100":trailTerminationPointSource;

CHARACTERIZED BY

"Recommendation X.721":administrativeStatePackage,
"Recommendation M.3100":createDeleteNotificationsPackage,
"Recommendation M.3100":stateChangeNotificationPackage,
"Recommendation M.3100":tmnCommunicationsAlarmInformationPackage,
radioSPIPackage,
radioSPITTPSourcePkg **PACKAGE**

BEHAVIOUR

radioSPITTPSourcePkgBehaviour **BEHAVIOUR**

DEFINED AS

"This managed object class represents the process of converting an outgoing internal logic level STM-N signal into a radio frequency signal.

The downstream connectivity pointer is NULL for an instance of this class.

The aforementioned process is composed of two subfunctions, namely the TX subfunction and the Modulation subfunction.

A communicationsAlarm notification shall be issued if the TX subfunction fails. The probableCause parameter of the notification shall indicate txFail.

A communicationsAlarm notification shall be issued if the Modulation subfunction fails. The probableCause parameter of the notification shall indicate modulationFail.

When an alarm is pending on an instance, its operationalState is disabled.";;

ATTRIBUTES atpcImplemented GET;;;

CONDITIONAL PACKAGES

atpcPackage PRESENT IF "the ATPC is implemented and an instance supports it",

txLOSNotificationPackage PRESENT IF "an instance supports it",

modLOSNotificationPackage PRESENT IF "an instance supports it";

REGISTERED AS { g774-8ObjectClass 3 };

5.2 Packages definitions

atpcPackage PACKAGE

ATTRIBUTES

atpcEnabled GET-REPLACE;

REGISTERED AS { g774-8Package 1 };

radioSPIPackage PACKAGE

ATTRIBUTES

radioSPITTPId GET,

radioFrequency GET,

"Recommendation G.774":stmLevel GET;

REGISTERED AS { g774-8Package 2 };

rxLOSNotificationPackage PACKAGE

BEHAVIOUR

rxLOSNotificationPackageBehaviour BEHAVIOUR

DEFINED AS

"A communicationsAlarm notification shall be issued if a loss of the incoming signal for the RX subfunctions is detected. The probableCause parameter of the notification shall indicate rxLOS. The rxLOS probableCause in the communicationsAlarm notification should be used only when the distinction between the fail of the RX subfunction and the loss of the incoming signal can be carried out with sufficient degree of confidence."

;;

REGISTERED AS { g774-8Package 3 };

demLOSNotificationPackage PACKAGE

BEHAVIOUR

demLOSNotificationPackageBehaviour BEHAVIOUR

DEFINED AS

"A communicationsAlarm notification shall be issued if a loss of the incoming signal for the Demodulation subfunctions is detected. The probableCause parameter of the notification shall indicate demLOS. The demLOS probableCause in the communicationsAlarm notification should be used only when the distinction between the fail of the Demodulation subfunction and the loss of the incoming signal can be carried out with sufficient degree of confidence."

;;

REGISTERED AS { g774-8Package 4 };

txLOSNotificationPackage PACKAGE

BEHAVIOUR

txLOSNotificationPackageBehaviour BEHAVIOUR

DEFINED AS

"A communicationsAlarm notification shall be issued if a loss of the OUTgoing signal for the TX subfunctions is detected. The probableCause parameter of the notification shall indicate txLOS. The

txLOS probableCause in the communicationsAlarm notification should be used only when the distinction between the fail of the TX subfunction and the loss of the incoming signal can be carried out with sufficient degree of confidence."

;;

REGISTERED AS { g774-8Package 5 };

modLOSNotificationPackage PACKAGE
BEHAVIOUR

modLOSNotificationPackageBehaviour BEHAVIOUR
DEFINED AS

"A communicationsAlarm notification shall be issued if a loss of the OUTgoing signal for the Modulation subfunctions is detected. The probableCause parameter of the notification shall indicate modLOS. The modLOS probableCause in the communicationsAlarm notification should be used only when the distinction between the fail of the Modulation subfunction and the loss of the incoming signal can be carried out with sufficient degree of confidence."

;;

REGISTERED AS { g774-8Package 6 };

5.3 Attributes definitions

atpcImplemented ATTRIBUTE
WITH ATTRIBUTE SYNTAX SDHRadioTpASN1.Boolean;
MATCHES FOR EQUALITY;
BEHAVIOUR

atpcImplementedBeh BEHAVIOUR
DEFINED AS

"This attribute specifies whether the ATPC capability is present or not.
A value of TRUE indicates that the ATPC capability is present and a value of FALSE indicates that the ATPC capability is not present." ;;

REGISTERED AS {g774-8Attribute 1};

atpcEnabled ATTRIBUTE
WITH ATTRIBUTE SYNTAX SDHRadioTpASN1.Boolean;
MATCHES FOR EQUALITY;
BEHAVIOUR

atpcEnabledBeh BEHAVIOUR
DEFINED AS

"This attribute specifies whether the ATPC device is currently allowed to work or not.
A value of TRUE indicates that the ATPC device is allowed to work and a value of FALSE indicates that the device is not allowed to work (i.e. the transmit power has a fixed value)." ;;

REGISTERED AS {g774-8Attribute 2};

radioFrequency ATTRIBUTE
WITH ATTRIBUTE SYNTAX SDHRadioTpASN1.RadioFrequency;
MATCHES FOR EQUALITY;
BEHAVIOUR

radioFrequencyBehaviour BEHAVIOUR
DEFINED AS

"This attribute is used to specify the carrier radio frequencies and optionally the related polarization states associated to instances of radioSPITTPSink, radioSPITTPSource and radioSPITTPBidirectional managed object Classes.

It also indicates if each specified radio frequency is used at transmit or receive side.

Frequency value are expressed in MHz.

For instances of radioSPITTPSink (radioSPITTPSource) managed object Class, the FrequencyUsage sub-field can take only the receive (transmit) value."

;;

REGISTERED AS {g774-8Attribute 3};



radioSPITTPId ATTRIBUTE
 WITH ATTRIBUTE SYNTAX SDHRadioTpASN1.NameType;
 MATCHES FOR EQUALITY;
 BEHAVIOUR
 radioSPITTPIdBehaviour BEHAVIOUR
 DEFINED AS
 "This attribute is used as a RDN for naming instances of the radioSPITTP object classes."
 ;;
 REGISTERED AS {g774-8Attribute 4};

5.4 Name bindings definitions

radioSPITTPSink-managedElement NAME BINDING
 SUBORDINATE OBJECT CLASS radioSPITTPSink AND SUBCLASSES;
 NAMED BY
 SUPERIOR OBJECT CLASS "Recommendation M.3100":managedElement AND
 SUBCLASSES;
 WITH ATTRIBUTE radioSPITTPId;
 BEHAVIOUR
 radioSPITTPSink-managedElementBehaviour BEHAVIOUR
 DEFINED AS
 "The subordinate managed object may be automatically instantiated when the superior managed
 object is instantiated, according to the make-up and mode of operation of the equipment."
 ;;
 REGISTERED AS { g774-8NameBinding 1};

radioSPITTPSource-managedElement NAME BINDING
 SUBORDINATE OBJECT CLASS radioSPITTPSource AND SUBCLASSES;
 NAMED BY
 SUPERIOR OBJECT CLASS "Recommendation M.3100":managedElement AND
 SUBCLASSES;
 WITH ATTRIBUTE radioSPITTPId;
 BEHAVIOUR
 radioSPITTPSource-managedElementBehaviour BEHAVIOUR
 DEFINED AS
 "The subordinate managed object may be automatically instantiated when the superior managed
 object is instantiated, according to the make-up and mode of operation of the equipment."
 ;;
 REGISTERED AS { g774-8NameBinding 2};

rsCTPSink-radioSPITTPSink NAME BINDING
 SUBORDINATE OBJECT CLASS "Recommendation G.774":rsCTPSink AND SUBCLASSES;
 NAMED BY
 SUPERIOR OBJECT CLASS radioSPITTPSink AND SUBCLASSES;
 WITH ATTRIBUTE "Recommendation G.774":rsCTPId;
 BEHAVIOUR
 rsCTPSink-radioSPITTPSinkBehaviour BEHAVIOUR
 DEFINED AS
 "The subordinate managed object may be automatically instantiated when the superior managed
 object is instantiated, according to the make-up and mode of operation of the equipment."
 ;;
 REGISTERED AS {g774-8NameBinding 3};

rsCTPSource-radioSPITTPSource NAME BINDING
 SUBORDINATE OBJECT CLASS "Recommendation G.774":rsCTPSource AND SUBCLASSES;
 NAMED BY
 SUPERIOR OBJECT CLASS radioSPITTPSource AND SUBCLASSES;
 WITH ATTRIBUTE "Recommendation G.774":rsCTPId;
 BEHAVIOUR
 rsCTPSource-radioSPITTPSourceBehaviour BEHAVIOUR

DEFINED AS

"The subordinate managed object may be automatically instantiated when the superior managed object is instantiated, according to the make-up and mode of operation of the equipment."

;;

REGISTERED AS {g774-8NameBinding 4};

5.5 Object relations

radioSPITTPBidirectionalSubordination SUBORDINATION RULE

SUPERIOR OBJECT CLASS

radioSPITTPBidirectional;

NAMES SUBORDINATES

rsCTPSink, rsCTPSource, rsCTPBidirectional;

ACCORDING TO RULE

SET SIZE(1) OF CHOICE {

rsCTPSink, rsCTPSource, rsCTPBidirectional };

;

radioSPITTPSinkSubordination SUBORDINATION RULE

SUPERIOR OBJECT CLASS

radioSPITTPSink;

NAMES SUBORDINATES

rsCTPSink;

ACCORDING TO RULE

SET SIZE(1) OF rsCTPSink;

;

radioSPITTPSourceSubordination SUBORDINATION RULE

SUPERIOR OBJECT CLASS

radioSPITTPSource;

NAMES SUBORDINATES

rsCTPSource;

ACCORDING TO RULE

SET SIZE(1) OF rsCTPSource;

;

5.6 Supporting ASN.1

SDHRadioManagement {itu-t(0) recommendation(0) g(7) g774(774) hyphen(127)
sdhRadioIM(8)}

DEFINITIONS IMPLICIT TAGS ::= BEGIN

-- EXPORTS Everything

sdhRadioManagement OBJECT IDENTIFIER ::= {itu-t(0) recommendation(0) g(7)
g774(774) hyphen(127) sdhRadioIM(8) informationModel(0)}

g774-8ObjectClass OBJECT IDENTIFIER ::= {sdhRadioManagement managedObjectClass(3)}

g774-8Attribute OBJECT IDENTIFIER ::= {sdhRadioManagement attribute(7)}

g774-8NameBinding OBJECT IDENTIFIER ::= {sdhRadioManagement nameBinding(6)}

g774-8Action OBJECT IDENTIFIER ::= {sdhRadioManagement action(9)}

g774-8Notification OBJECT IDENTIFIER ::= {sdhRadioManagement notification(10)}

g774-8Package OBJECT IDENTIFIER ::= {sdhRadioManagement package(4)}