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**Telecommunications Management Network (TMN);
Radio specific performance monitoring
information model for Synchronous Digital Hierarchy (SDH)
radio relay network element**

ETSI

Reference
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ETSI

Postal address
F-06921 Sophia Antipolis Cedex - FRANCE

Office address
650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00   Fax: +33 4 93 65 47 16
Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

Internet
secretariat@etsi.fr
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Contents

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Foreword

This ETSI Standard (ES) has been produced by ETSI Technical Committee Telecommunications Management Network (TMN), and is now submitted for the ETSI standards Membership Approval Procedure.

The present document describes the performance monitoring information model specific to Radio Relay Network Elements, which use the SDH multiplexing structure

1   Scope

The present document defines the information model to be used at the interface between network elements and management systems, for the management of SDH radio Network Element additional specific performance monitoring parameters.

Considering that:

- ETS 300 635 defines SDH Radio specific functional blocks for transmission at STM-N data rate,

- ETS 300 785 defines SDH Radio specific functional blocks for transmission at STM-0 data rate,

- EN 301 645 defines SDH Radio Relay equipment information model for use on Q interfaces,

- ETS 300 304 defines the SDH information model for the Network Element view,

- EN 301 167, ETS 300 417, ITU-T recommendations G.783 and G.784 define the performance monitoring architecture and requirements for generic functional blocks used also in DRRS,

- EN 301 129 defines additional radio specific performance monitoring parameters,

- ETS 300 411 defines the generic performance monitoring Information Model for SDH Network Element.

The present document defines:

- The information model for radio specific performance monitoring parameters for SDH radio Network Elements.

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 model for the generic performance monitoring Information Model for SDH Network Element.

The Information Model defined here (and the corresponding Message Set) is concerned with the management of network elements, the equipment by which they are implemented and the functions contained within them. More precisely, it applies to an Equipment Domain visible at the Element Manager to Element interface and is only concerned with information available within that domain. Information proper to the domain of a Network Level Management Process is not included within this model.

2   References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies.

- A non-specific reference to an ES shall also be taken to refer to later versions published as an EN with the same number.

[1]   ETS 300 635: "Transmission and Multiplexing (TM); Synchronous Digital Hierarchy (SDH); Radio specific functional blocks for transmission of M x STM-N".

[2]   ETS 300 785: "Transmission and Multiplexing (TM); Synchronous Digital Hierarchy (SDH); Radio specific functional blocks for transmission of M x sub-STM-1".

[3]   ETS 300 411: "Transmission and Multiplexing (TM); Performance monitoring; Information model for the Network Element (NE) view".

[4]   ETS 300 417: "Transmission and Multiplexing (TM); Generic functional requirements for Synchronous Digital Hierarchy (SDH) equipment; ….".

[5]   TR 101 035: "Transmission and Multiplexing (TM); Synchronous Digital Hierarchy (SDH) aspects regarding Digital Radio Relay Systems (DRRS)".

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

[7]   ITU-T Recommendation G.774.1: "Synchronous Digital Hierarchy (SDH) performance monitoring for the network element view".

[8]   ITU-T Recommendation G.774.8: "Synchronous Digital Hierarchy (SDH) management of radio-relay systems for the network element view".

[9]   ITU-T Recommendation X.721: "Information technology – Open Systems Interconnection – Structure of management information: Definition of management information".

[10]   ITU-T Recommendation M.3100: "Generic network information model".

[11]   ITU-T Recommendation X.720: "Information technology - Open Systems Interconnection - Structure of management information: Management information model".

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

[13]   ITU-T Recommendation X.722: "Information technology - Open Systems Interconnection - Structure of Management Information: Guidelines for the definition of managed objects".

[14]   ITU-T Recommendation X.701: "Information technology - Open Systems Interconnection - Systems management overview".

[15]   ITU-T Recommendation X.710: "Information technology – Open Systems Interconnection – Common Management Information Service".

[16]   ITU-T Recommendation X.711: "Information technology – Open Systems Interconnection – Common Management Information Protocol: Specification".

[17]   ITU-T Recommendation X.731: "Information technology - Open Systems Interconnection - Systems Management: State management function".

[18]   ITU-T Recommendation X.730: "Information technology - Open Systems Interconnection - Systems Management: Object management function".

[19]   ITU-T Recommendation X.733: "Information technology - Open Systems Interconnection - Systems Management: Alarm reporting function".

[20]   ITU-T Recommendation X.734: "Information technology - Open Systems Interconnection - Systems Management: Event report management function".

[21]   ITU-T Recommendation X.735: "Information technology - Open Systems Interconnection - Systems Management: Log control function".

[22]   EN 301 129: "Transmission and Multiplexing (TM); Digital Radio Relay Systems (DRRS); Synchronous Digital Hierarchy (SDH); System performance monitoring parameters of SDH DRRS".

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

3   Symbols and abbreviations

3.1   Symbols

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

dB   Decibel
dBm   Decibel relative to 1 milliWatt

3.2   Abbreviations

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

ATPC   Automatic Transmit Power Control
DEN   Draft European Norm
DRRS   Digital Radio Relay System
EN   European Norm
ES   Errored Second
ETS   European Telecommunication Standard
ETSI   European Telecommunications Standards Institute
IF   Intermediate Frequency
ITU-R   International Telecommunication Union Radio Sector (former CCIR)
ITU-T   International Telecommunication Union Telecommunication Sector
                (former CCITT)
NE   Network Element
POH   Path OverHead
PM   Performance Monitoring
QOS   Quality of Service
RF   Radio Frequency
ROHA   Radio OverHead Access
RPS   Radio Protection Switching
RRR   Radio Relay Regenerator
RRT   Radio Relay Terminal
RS   Regenerator Section
RSOH   Regenerator Section OverHead
RSPI   Radio Synchronous Physical Interface
RST   Regenerator Section Termination
SDH   Synchronous Digital Hierarchy
SES   Severely Errored Second
SEMF   Synchronous Element Management Function
SF   Signal Fail
STM-n   Synchronous Transport Module n
Sub-STM-1   Sub Synchronous Transport Module 1 (also defined as STM-0 in ITU-T Recommendation G.861)
TMN   Telecommunication Management Network
UAS   UnAvailable Second
VC-n   Virtual Container n

4   Registration supporting Abstract Syntax Notation No.1 (ASN.1)

```
Dentmn06 {itu(0) identified-organization(4) etsi(0) ets(xxx) informationModel(0) asn1Module(2)
dentmn06(0)}
DEFINITIONS IMPLICIT TAGS ::=
BEGIN
-- EXPORT Everything
dentmn06    OBJECT IDENTIFIER ::= {itu(0) identified-organization(4) etsi(0) ets(xxx)
informationModel(0)}
arppObjectClass     OBJECT IDENTIFIER ::= {dentmn06 managedObjectClass(3)}
arppNameBinding     OBJECT IDENTIFIER ::= {dentmn06 nameBinding(6)}
arppAttribute       OBJECT IDENTIFIER ::= {dentmn06 attribute(7)}
arppAction      OBJECT IDENTIFIER ::= {dentmn06 action(9)}
arppPackage         OBJECT IDENTIFIER ::= {dentmn06 package(4)}
arppNotification    OBJECT IDENTIFIER ::= {dentmn06 notification(10)}
IMPORT
    Count
        FROM Attribute-ASN1Module { joint-iso-itu(2) ms(9) smi(3) part2(2) asn1Module(2) 1 }
    SDHGranularityPeriod
FROM SDHPMASN1 { itu(0) recommendation(0) g(7) g774(774) hyphen(127) pm(1) informationModel(0)
asn1Module(2) sdhmsp(0) };
Counter ::= CHOICE      {    null       [0] NULL,
                   counter    [1] INTEGER }
NumberOfSupportedThresholds ::= INTEGER
PLThreshold ::= INTEGER
PLThresholdList ::= SEQUENCE OF PLThreshold
ThresholdRange ::= SEQUENCE{
            minValue  INTEGER,
            maxValue  INTEGER}
CounterList ::= SEQUENCE OF Count   -- Count imported from X721 Attribute-ASN1 Module
END
```

5   Information model of Radio specific Performance Monitoring

5.1   Void

5.2   Object class definitions

5.2.1   Radio SPI Current Data

```
radioSPICurrentData     MANAGED OBJECT CLASS
    DERIVED FROM sdhCurrentData ;
    CHARACTERIZED BY
        radioSPICurrentDataPackage  PACKAGE
            BEHAVIOUR  radioSPICurrentDataBeh ;
            ATTRIBUTES
                granularityPeriod REQUIRED VALUES SDHRadioPM.SDHGranularityPeriod,

                 pLThresholdList GET-REPLACE ;;;
REGISTERED AS { arppObjectClass 1} ;
radioSPICurrentDataBeh  BEHAVIOUR
DEFINED AS
"The radioSPICurrentData object class is not a instanciable superclass used to hold the monitoring
of the physical characteristics and the current register counts of the Radio Synchronous Physical
Interface during a collection period.
Subclasses of this managed object class have the capability to monitor power levels by using a
sequence of counters.
The conditions that define each counter behaviour are determined by associating the i-th counter to
the i-th threshold value contained in the pLThresholdList attribute. The length of the counter list
attribute shall always match the length of the pLThresholdList attribute. The pLThresholdList
attribute may contain unordered values.
A counter value is incremented if, during a one-second period, the power level exceeds the
associated threshold value.
Specific instances obtained by instanciation of subclasses of this managed object class shall be
explicitly created by the manager. The value of pLThresholdList attribute can be provided by the
manager in the creation request. If not specified by the manager it is taken from the default power
threshold list contained in the SDHRadioPMProperties object.
The create request will fail if:
- The length of the pLThresholdList sequence is greater than the value specified in the
numberOfSupportedThresholds attribute defined in the SDHRadioPMProperties object;
- Any of the threshold values of the pLThresholdList sequence is outside the limits defined in the
permittedThresholdRange attribute defined in the SDHRadioPMProperties object.
A QOS alarm notification may be emitted in association only to the first counter per performance
primitive. The presence of the rLSCounterList or tLSCounterList attribute ID in the field of the
CounterThresholdAttributeList attribute in a referenced thresholdData managed object class will
trigger the notification emission by comparing the threshold value with the counter value of the
first member of the rLSCounterList or tLSCounterList attribute.
The unavailableTimeAlarmPackage is not used in this class.";
```

5.2.2   Radio Sink Synchronous Physical Interface Current Data

```
radioSinkSPICurrentData     MANAGED OBJECT CLASS
    DERIVED FROM radioSPICurrentData ;
    CHARACTERIZED BY
        rxPowerLevelCurrentDataPackage,
        rLSCounterListPackage,
        radioSinkSPICurrentDataPackage  PACKAGE
            BEHAVIOUR  radioSinkSPICurrentDataBeh ;;;
    CONDITIONAL PACKAGES
        rxPowerLevelTideMarkPackage  PRESENT IF " An instance supports it " ;
REGISTERED AS { arppObjectClass 2} ;
radioSinkSPICurrentDataBeh  BEHAVIOUR
DEFINED AS
"Instances of this managed object class are used to hold the monitoring of the physical
characteristics and current register counts for an instance of the radioSPITTPSink ( or subclass )
managed object class during a collection period.
The observed performance primitive is the RL Received ( Power ) Level.
The monitored performance event is the RLTS Received (Power) Level Threshold Second.
This managed object class shall support at least two counters. A number greater than two is
optional. An instance of this managed object class uses an instance of the radioSinkSPIHistoryData
for data history retention." ;
```

5.2.3   Radio Sink Synchronous Physical Interface History Data

```
radioSinkSPIHistoryData  MANAGED OBJECT CLASS
    DERIVED FROM historyData ;
    CHARACTERIZED BY
        radioSinkSPIHistoryDataPackage   PACKAGE
            BEHAVIOUR radioSinkSPIHistoryDataBeh ;
            ATTRIBUTES
                rLSCounterList  GET ;;;
CONDITIONAL PACKAGES
        rxPowerLevelTideMarkPackage  PRESENT IF " The containing radioSinkSPICurrentData
    contains this package " ;
REGISTERED AS { arppObjectClass 3};
radioSinkSPIHistoryDataBeh  BEHAVIOUR
DEFINED AS
"Instances of this class are used to store the observed events of a radioSinkSPICurrentData object
at the end of an observation period.
An instance of this managed object class is contained by a radioSinkSPICurrentData managed object
instance. The threshold values associated with the counters recorded in the rLSCounterList attribute
are the ones contained in the pLThresholdList attribute of the containing current data instance." ;
```

5.2.4   Radio Source Synchronous Physical Interface Current Data

```
radioSourceSPICurrentData       MANAGED OBJECT CLASS
    DERIVED FROM radioSPICurrentData ;
    CHARACTERIZED BY
        txPowerLevelCurrentDataPackage,
        tLSCounterListPackage,
        radioSourceSPICurrentDataPackage  PACKAGE
            BEHAVIOUR  radioSourceSPICurrentDataBeh ;;;
    CONDITIONAL PACKAGES
        txPowerLevelTideMarkPackage  PRESENT IF " An instance supports it " ;
REGISTERED AS { arppObjectClass 4} ;
radioSourceSPICurrentDataBeh  BEHAVIOUR
DEFINED AS
"Instances of this managed object class are used to hold the monitoring of the physical
characteristics and current register counts for an instance of the radioSPITTPSource ( or subclass )
managed object class during a collection period.
The creation request of istances of this managed object class will fail if ATPC is not present.
The observed performance primitive is the TL Transmitted ( Power ) Level.
The monitored performance event is the TLTS Transmitted ( Power ) Level Threshold Second.
This managed object class will support at least one counter per performance primitive. An additional
one is optional.
An instance of this managed object class uses an instance of the radioSourceSPIHistoryData for data
history retention." ;
```

5.2.5   Radio Source Synchronous Physical Interface History Data

```
radioSourceSPIHistoryData  MANAGED OBJECT CLASS
    DERIVED FROM historyData ;
    CHARACTERIZED BY
        radioSourceSPIHistoryDataPackage   PACKAGE
            BEHAVIOUR radioSourceSPIHistoryDataBeh ;
            ATTRIBUTES
                tLSCounterList  GET;;;
    CONDITIONAL PACKAGES
        txPowerLevelTideMarkPackage   PRESENT IF " The containing radioSourceSPICurrentData
    contains this package " ;
REGISTERED AS { arppObjectClass 5};
radioSourceSPIHistoryDataBeh  BEHAVIOUR
DEFINED AS
" Instances of this class are used to store the observed events of a radioSourceSPICurrentData
object at the end of an observation period.
An instance of this managed object class is contained by a radioSourceSPICurrentData managed object
instance. The threshold values associated with the counters recorded in the tLSCounterList attribute
are the ones contained in the pLThresholdList attribute of the containing current data instance." ;
```

5.2.6   Radio Performance Monitoring Properties

```
sdhRadioPMProperties  MANAGED OBJECT CLASS
    DERIVED FROM top ;
    CHARACTERIZED BY
        sdhRadioPMPropertiesPackage   PACKAGE
            BEHAVIOUR sdhRadioPMPropertiesBeh ;
            ATTRIBUTES
                numberOfSupportedRxThresholds  GET,
                numberOfSupportedTxThresholds  GET,
                permittedRxThresholdsRange  GET,
                permittedTxThresholdsRange  GET,
                defaultRxThresholdsList  GET,
                defaultTxThresholdsList  GET,
                radioPMPropertiesId GET ;;;
REGISTERED AS { arppObjectClass 6};
sdhRadioPMPropertiesBeh  BEHAVIOUR
DEFINED AS
" Typically only one instance of this class is automatically instanciated by the agent (if the
additional radio performance parameters are supported). The values of the attributes of this class
define:
- the maximum number of  Rx/Tx thresholds supported by the NE;
- the permitted range of Rx/Tx thresholds;
- the thresholds default values when not specified by the manager in the creation request of current
data instances.
If  PM is only unidirectionally supported the supported thresholds number of the unsupported
direction is zero and the associated default threshold list is empty and the range attribute values
are meaningless" ;
```

5.2.7   SDH Radio Protection Current Data

```
sdhRadioProtectionCurrentData  MANAGED OBJECT CLASS
    DERIVED FROM  sdhCurrentData ;
    CHARACTERIZED BY
        sdhRadioProtectionCurrentDataPackage  PACKAGE
            BEHAVIOUR sdhRadioProtectionCurrentDataBeh ;
            ATTRIBUTES
                granularityPeriod REQUIRED VALUES SDHRadioPM.SDHGranularityPeriod,          pSAC
REPLACE-WITH-DEFAULT GET,
                fSRC   REPLACE-WITH-DEFAULT GET,
                pSAD   REPLACE-WITH-DEFAULT GET,
                fSRD REPLACE-WITH-DEFAULT GET ;;;
REGISTERED AS { arppObjectClass 7} ;
sdhRadioProtectionCurrentDataBeh    BEHAVIOUR
DEFINED AS
" Instances of the sdhRadioProtectionCurrentData managed object class are used to hold the current
register counts for a radio protection during a collection period. The following performance
primitives are observed:
PSA Protection Switch Actual
fSR failedSwitch Request.
For the PSA performance primitive, the following performance events are defined :
PSAC Protection Switch Actual Count
PSAD Protection Switch Actual Duration
For the fSR performance primitive, the following performance events are defined :
fSRC failed Switch Request Count
fSRD failed Switch Request Duration.
This managed object class will use the sdhRadioProtectionHistoryData managed object class for
history retention.
```

In [1] the meaningless of protection counters is defined for different cases of protection schemes.
This is reflected in this information model fragment by means of different syntax of the counter
attributes. A NULL value is used to indicated an meaningless measure. ";

5.2.8   SDH Radio Protection History Data

```
sdhRadioProtectionHistoryData   MANAGED OBJECT CLASS
    DERIVED FROM HistoryData ;
    CHARACTERIZED BY
        sdhRadioProtectionHistoryDataPackage   PACKAGE
            BEHAVIOUR   sdhRadioProtectionHistoryDataBeh ;
            ATTRIBUTES
                pSAC    GET,
                fSRC    GET,
                pSAD    GET,
                fSRD    GET ;;;
REGISTERED AS { arppObjectClass 8} ;
sdhRadioProtectionHistoryDataBeh    BEHAVIOUR
DEFINED AS
" Instances of this managed object class are used to store the observed events of a
sdhRadioProtectionCurrentData object at the end of an observation period.
An instance of this managed object class is contained in an instance of the
sdhRadioProtectionCurrentData. " ;
```

5.3   Package definitions

5.3.1   Received Level Second Counter List

```
rLSCounterListPackage  PACKAGE
    BEHAVIOUR
        rLSCounterListPackageBeh ;
    ATTRIBUTES
        rLSCounterList  REPLACE-WITH-DEFAULT GET ;
REGISTERED AS { arppPackage 1} ;
rLSCounterListPackageBeh   BEHAVIOUR
DEFINED AS
" This package is used to monitor the received power level by means of an ordered list of counters.
" ;
```

5.3.2   Received Power Level Current Data

```
rxPowerLevelCurrentDataPackage    PACKAGE
    BEHAVIOUR
        rxPowerLevelCurrentDataPackageBeh ;
    ATTRIBUTES
        rxPowerLevel  GET ;
REGISTERED AS { arppPackage 2} ;
rxPowerLevelCurrentDataPackageBeh  BEHAVIOUR
DEFINED AS
" This package is used to store the gauge of a received power level value " ;
```

5.3.3   Received Power Level Tide Mark

```
rxPowerLevelTideMarkPackage PACKAGE
    BEHAVIOUR
        rxPowerLevelTideMarkPackageBeh ;
    ATTRIBUTES
        rxPowerLevelTideMarkMax  GET ,
        rxPowerLevelTideMarkMin  GET ;
REGISTERED AS { arppPackage 3} ;
rxPowerLevelTideMarkPackageBeh    BEHAVIOUR
DEFINED AS
" This Package is used to store the minimum and the maximum values reached by the received power
level gauge during an observation period. " ;
```

5.3.4   Transmitted Level Second Counter List

```
tLSCounterListPackage  PACKAGE
    BEHAVIOUR
        tLSCounterListPackageBeh ;
    ATTRIBUTES
        tLSCounterList  REPLACE-WITH-DEFAULT GET ;
REGISTERED AS { arppPackage 4 } ;
tLSCounterListPackageBeh   BEHAVIOUR
DEFINED AS
" This package is used to monitor the transmitted power level by means of an ordered list of
counters. " ;
```

5.3.5   Transmitted Power Level Current Data

```
txPowerLevelCurrentDataPackage    PACKAGE
    BEHAVIOUR
        txPowerLevelCurrentDataPackageBeh ;
    ATTRIBUTES
        nomTxPowerLevel  GET ,
offsetTxPowerLevel GET ;
REGISTERED AS { arppPackage 5 } ;
txPowerLevelCurrentDataPackageBeh  BEHAVIOUR
DEFINED AS
" This package is used to store the gauge of two values :
- an integer fixed value expressed in dBm defining the nominal i.e. the maximum transmitted power
value which is equipment dependent,
- an integer offset value expressed in dB representing the variation with respect to the nominal
value." ;
```

5.3.6   Transmitted Power Level Tide Mark

```
txPowerLevelTideMarkPackage PACKAGE
    BEHAVIOUR
        txPowerLevelTideMarkPackageBeh ;
    ATTRIBUTES
        offsetTxPowerLevelTideMarkMax  GET ,
        offsetTxPowerLevelTideMarkMin  GET ;
REGISTERED AS { arppPackage 6 } ;
txPowerLevelTideMarkPackageBeh   BEHAVIOUR
DEFINED AS
" This Package is used to store the minimum and the maximum values reached by the transmitted power
level gauge (offset values) during an observation period. " ;
```

5.4   Attribute definitions

5.4.1   Number of Supported Tx Thresholds

```
numberOfSupportedTxThresholds  ATTRIBUTE
    WITH ATTRIBUTE SYNTAX SDHRadioPM.NumberOfSupportedThresholds;
    MATCHES FOR EQUALITY, ORDERING ;
    BEHAVIOUR numberOfSupportedTxThresholdsBeh ;
REGISTERED AS { arppAttribute 1 } ;
numberOfSupportedTxThresholdsBeh BEHAVIOUR
DEFINED AS
"This attribute is used to hold the maximum supported number of thresholds for TL performance
primitive monitoring ";
```

5.4.2   Number of Supported Rx Thresholds

```
numberOfSupportedRxThresholds  ATTRIBUTE
    WITH ATTRIBUTE SYNTAX SDHRadioPM.NumberOfSupportedThresholds;
    MATCHES FOR EQUALITY, ORDERING ;
    BEHAVIOUR numberOfSupportedRxThresholdsBeh ;
REGISTERED AS { arppAttribute 2 } ;
numberOfSupportedRxThresholdsBeh BEHAVIOUR
DEFINED AS
"This attribute is used to hold the maximum supported number of thresholds for RL performance
primitive monitoring " ;
```

5.4.3   Power Level Threshold List

```
pLThresholdList    ATTRIBUTE
    WITH ATTRIBUTE SYNTAX SDHRadioPM.PLThresholdList;
    MATCHES FOR EQUALITY ;
    BEHAVIOUR pLThresholdListBeh ;
REGISTERED AS { arppAttribute 3 } ;
pLThresholdListBeh BEHAVIOUR
DEFINED AS
" This attribute is used to define the threshold values that determine the associated counter
behaviour.
This is an ordered set valued attribute whose single members have a one to one relationship with
members of the rLSCounterList or tLSCounterList attributes.
The pLCounterThresholdAssignment sub-field defines the threshold values as a positive integer.
The associated measure unit will be interpreted as expressed in minus dBm when referred to RLS
counters or in dB (offset value) when referred to TLS counters" ;
```

5.4.4 Protection Switch Actual Count

```
pSAC  ATTRIBUTE
    WITH ATTRIBUTE SYNTAX SDHRadioPM.Counter ;
MATCHES FOR EQUALITY, ORDERING ;
    BEHAVIOUR pSACBeh ;
REGISTERED AS { arppAttribute 4 } ;
pSACBeh  BEHAVIOUR
DEFINED AS
" The value of the pSAC attribute represents the count of actual switches occurred on a protection
unit. For a protected protection unit it is the count of actual service switches to any protecting
protection unit. For a protecting protection unit it is the count of actual service switches from
any protected protection unit. " ;
```

5.4.5 Protection Switch Actual Duration

```
pSAD  ATTRIBUTE
    WITH ATTRIBUTE SYNTAX SDHRadioPM.Counter ;
    MATCHES FOR EQUALITY, ORDERING ;
    BEHAVIOUR pSADBeh ;
REGISTERED AS { arppAttribute 5 } ;
pSADBeh  BEHAVIOUR
DEFINED AS
" The value of the pSAD attribute represents the count of seconds during which the service was
actually switched on a protection unit. For a protected protection unit the service is switched if
it is carried on a protecting protection unit. For a protecting protection unit the service is
switched if it is carried on this protection unit. " ;
```

5.4.6 Failed Switch Request Count

```
fSRC  ATTRIBUTE
    WITH ATTRIBUTE SYNTAX SDHRadioPM.Counter ;
    MATCHES FOR EQUALITY, ORDERING ;
    BEHAVIOUR fSRCBeh ;
REGISTERED AS { arppAttribute 6 } ;
fSRCBeh  BEHAVIOUR
DEFINED AS
" The value of the fSRC attribute represents the number of the occurrences in a time period of the
following events:
- A:  a PSR is activated on a working channel and the protecting channels are not available.
- B: a working channel is restored from a protecting channel while a PSR is still active on the
channel.
A FSRC is defined only for working channels.
If a PSR is already present on a protection unit, toggling among different priority PSR on the same
unit, will not increment the counter. ";
```

5.4.7 Failed Switch Request Duration

```
fSRD  ATTRIBUTE
    WITH ATTRIBUTE SYNTAX SDHRadioPM.Counter ;
    MATCHES FOR EQUALITY, ORDERING ;
    BEHAVIOUR fSRDBeh ;
REGISTERED AS { arppAttribute 7 } ;
fSRDBeh  BEHAVIOUR
DEFINED AS
" The value of the fSRD attribute represents the count of seconds in a time period for which, at
least for a fraction of one second, a protection switch request is detected active on a channel
carrying regular traffic and the request cannot be serviced. " ;
```

5.4.8 Received Level Second Counter List

```
rLSCounterList    ATTRIBUTE
    WITH ATTRIBUTE SYNTAX SDHRadioPM. CounterList;
    MATCHES FOR EQUALITY ;
    BEHAVIOUR rLSCounterListBeh ;
REGISTERED AS { arppAttribute 8 } ;
rLSCounterListBeh  BEHAVIOUR
DEFINED AS
" This attribute is used to hold the count of the Received Level Second events during a collection
period.
This is an ordered set valued attribute whose single members have a one to one relationship with
members of the pLCounterThresholdAssignmentList attribute.
Each associated threshold determines the condition under which the count is activated. " ;
```

5.4.9   Received Power Level

```
rxPowerLevel  ATTRIBUTE
    DERIVED FROM  " Rec. X721 : 1992 " : gauge ;
    BEHAVIOUR rxPowerLevelBeh ;
REGISTERED AS { arppAttribute 9 }  ;
rxPowerLevelBeh  BEHAVIOUR
DEFINED AS
" The value of the rxPowerLevel attribute represents the received power level.
It is a positive integer with associated measure unit expressed in minus dBm. " ;
```

5.4.10   Received Power Level Tide Mark Maximum

```
rxPowerLevelTideMarkMax  ATTRIBUTE
    DERIVED FROM  " Rec. X721 : 1992 " : tideMark;
    BEHAVIOUR rxPowerLevelTideMarkMaxBeh ;
REGISTERED AS { arppAttribute 10 } ;
rxPowerLevelTideMarkMaxBeh  BEHAVIOUR
DEFINED AS
" This attribute is used to store the maximum value reached by the received power level gauge during
an observation period. " ;
```

5.4.11   Received Power Level Tide Mark Minimum

```
rxPowerLevelTideMarkMin  ATTRIBUTE
    DERIVED FROM  " Rec. X721 : 1992 " : tideMark;
    BEHAVIOUR rxPowerLevelTideMarkMinBeh ;
REGISTERED AS { arppAttribute 11 } ;
rxPowerLevelTideMarkMinBeh  BEHAVIOUR
DEFINED AS
" This attribute is used to store the minimum value reached by the received power level gauge during
an observation period. " ;
```

5.4.12   Transmitted Level Second Counter List

```
tLSCounterList    ATTRIBUTE
    WITH ATTRIBUTE SYNTAX SDHRadioPM.CounterList;
    MATCHES FOR EQUALITY ;
    BEHAVIOUR tLSCounterListBeh ;
REGISTERED AS { arppAttribute 12 } ;
tLSCounterListBeh  BEHAVIOUR
DEFINED AS
" This attribute is used to hold the count of the Transmitted Level Second events during a
collection period.
This is an ordered set valued attribute whose single members have a one to one relationship with
members of the pLCounterThresholdAssignmentList attribute.
Each associated threshold determines the condition under which the count is activated. " ;
```

5.4.13   Nominal Transmitted Power Level

```
nomTxPowerLevel  ATTRIBUTE
    DERIVED FROM  " Rec. X721 : 1992 " : gauge ;
    BEHAVIOUR nomTxPowerLevelBeh ;
REGISTERED AS { arppAttribute 13 } ;
nomTxPowerLevelBeh  BEHAVIOUR
DEFINED AS
" The value of the nomTxPowerLevel is represented by an integer fixed value expressed in dBm
defining the nominal i.e. the maximum transmitted power value which is equipment dependent." ;
```

5.4.14   Offset Transmitted Power Level

```
offsetTxPowerLevel  ATTRIBUTE
    DERIVED FROM  " Rec. X721 : 1992 " : gauge ;
    BEHAVIOUR offsetTxPowerLevelBeh ;
REGISTERED AS { arppAttribute 14 } ;
offsetTxPowerLevelBeh  BEHAVIOUR
DEFINED AS
" The value of the offsetTxPowerLevel is represented by an integer offset value expressed in dB
representing the variation with respect to the nominal value." ;
```

5.4.15   Offset Transmitted Power Level Tide Mark Maximum

```
offsetTxPowerLevelTideMarkMax  ATTRIBUTE
    DERIVED FROM  " Rec. X721 : 1992 " : tideMark;
    BEHAVIOUR offsetTxPowerLevelTideMarkMaxBeh ;
REGISTERED AS { arppAttribute 15 };
offsetTxPowerLevelTideMarkMaxBeh   BEHAVIOUR
DEFINED AS
" This attribute is used to store the maximum value reached by the transmitted power level gauge
during an observation period. " ;
```

5.4.16   Offset Transmitted Power Level Tide Mark Minimum

```
offsetTxPowerLevelTideMarkMin  ATTRIBUTE
    DERIVED FROM  " Rec. X721 : 1992 " : tideMark;
    BEHAVIOUR offsetTxPowerLevelTideMarkMinBeh ;
REGISTERED AS { arppAttribute 16 };
offsetTxPowerLevelTideMarkMinBeh   BEHAVIOUR
DEFINED AS
" This attribute is used to store the minimum value reached by the transmitted power level gauge
during an observation period. " ;
```

5.4.17   Permitted TX Thresholds Range

```
permittedTxThresholdsRange  ATTRIBUTE
    WITH ATTRIBUTE SYNTAX SDHRadioPM.ThresholdRange;
    MATCHES FOR EQUALITY ;
    BEHAVIOUR permittedTxThresholdsRangeBeh ;
REGISTERED AS { arppAttribute 17 } ;
permittedTxThresholdsRangeBeh BEHAVIOUR
DEFINED AS
"This attribute is used to define for the transmitter the maximum and minimum allowable values for a
threshold value expressed in dB " ;
```

5.4.18   Permitted RX Thresholds Range

```
permittedRxThresholdsRange  ATTRIBUTE
    WITH ATTRIBUTE SYNTAX SDHRadioPM.ThresholdRange;
    MATCHES FOR EQUALITY ;
    BEHAVIOUR permittedRxThresholdsRangeBeh ;
REGISTERED AS { arppAttribute 18 } ;
permittedRxThresholdsRangeBeh BEHAVIOUR
DEFINED AS
"This attribute is used to define for the receiver the maximum and minimum allowable values for a
threshold value expressed in - dBm " ;
```

5.4.19   Default TX Thresholds List

```
defaultTxThresholdsList  ATTRIBUTE
    WITH ATTRIBUTE SYNTAX SDHRadioPM.ThresholdList;
    MATCHES FOR EQUALITY ;
    BEHAVIOUR defaultTxThresholdsListBeh ;
REGISTERED AS { arppAttribute 19 } ;
defaultTxThresholdsListBeh BEHAVIOUR
DEFINED AS
"This attribute is used to define for the transmitter a threshold default value expressed in dB " ;
```

5.4.20   Default RX Thresholds List

```
defaultRxThresholdsList  ATTRIBUTE
    WITH ATTRIBUTE SYNTAX SDHRadioPM.ThresholdList;
    MATCHES FOR EQUALITY ;
    BEHAVIOUR defaultRxThresholdsListBeh ;
REGISTERED AS { arppAttribute 20 } ;
defaultRxThresholdsListBeh BEHAVIOUR
DEFINED AS
"This attribute is used to define for the receiver the default  threshold values expressed in -
dBm".
```

5.4.21   Radio PM Properties

```
radioPMPropertiesId  ATTRIBUTE
    WITH ATTRIBUTE SYNTAX SDHRadioPM.NameType ;
    MATCHES FOR EQUALITY ;
    BEHAVIOUR radioPMPropertiesIdBeh ;
REGISTERED AS { arppAttribute 21 } ;
radioPMPropertiesIdBeh BEHAVIOUR
DEFINED AS
"This attribute is used as a RDN for naming instances of the sdhRadioPMProperties object class " ;
```

5.5   Void

5.6   Void

5.7   Name binding definitions

5.7.1   Radio Sink SPI Current Data - Radio SPI TTP Sink

```
radioSinkSPICurrentData-radioSPITTPSink  NAME BINDING
    SUBORDINATE OBJECT CLASS radioSinkSPICurrentData  AND SUBCLASSES ;
    NAMED BY
     SUPERIOR OBJECT CLASS radioSPITTPSink  AND SUBCLASSES ;
    WITH ATTRIBUTE scannerId ;
    CREATE
    WITH-REFERENCE-OBJECT,
    WITH-AUTOMATIC-INSTANCE-NAMING ;
    DELETE
     DELETES-CONTAINED-OBJECTS ;
REGISTERED AS { ArppNameBinding 1  };
```

5.7.2   Radio Source SPI Current Data - Radio SPI TTP Source

```
radioSourceSPICurrentData-radioSPITTPSource  NAME BINDING
    SUBORDINATE OBJECT CLASS radioSourceSPICurrentData  AND SUBCLASSES ;
    NAMED BY
     SUPERIOR OBJECT CLASS radioSPITTPSource  AND SUBCLASSES ;
    WITH ATTRIBUTE scannerId ;
    CREATE
     WITH-REFERENCE-OBJECT,
     WITH-AUTOMATIC-INSTANCE-NAMING ;
    DELETE
     DELETES-CONTAINED-OBJECTS ;
REGISTERED AS { ArppNameBinding 2  };
```

5.7.3   SDH Radio Protection Current Data - Protection Unit

```
sdhRadioProtectionCurrentData-protectionUnit  NAME BINDING
    SUBORDINATE OBJECT CLASS sdhRadioProtectionCurrentData  AND SUBCLASSES ;
    NAMED BY
    SUPERIOR OBJECT CLASS protectionUnit AND SUBCLASSES ;
    WITH ATTRIBUTE  scannerId ;
    CREATE
    WITH-REFERENCE-OBJECT,
    WITH-AUTOMATIC-INSTANCE-NAMING ;
    DELETE
    DELETES-CONTAINED-OBJECTS ;
REGISTERED AS { ArppNameBinding  3 } ;
```

5.7.4   Radio Performance Properties - SDH NE

```
sdhRadioPMProperties-sdhNE  NAME BINDING
    SUBORDINATE OBJECT CLASS  sdhRadioPMProperties AND SUBCLASSES ;
    NAMED BY
     SUPERIOR OBJECT CLASS sdhNE AND SUBCLASSES ;
    WITH ATTRIBUTE  radioPMPropertiesId ;
REGISTERED AS { ArppNameBinding  4 } ;
```

Annex A (informative):
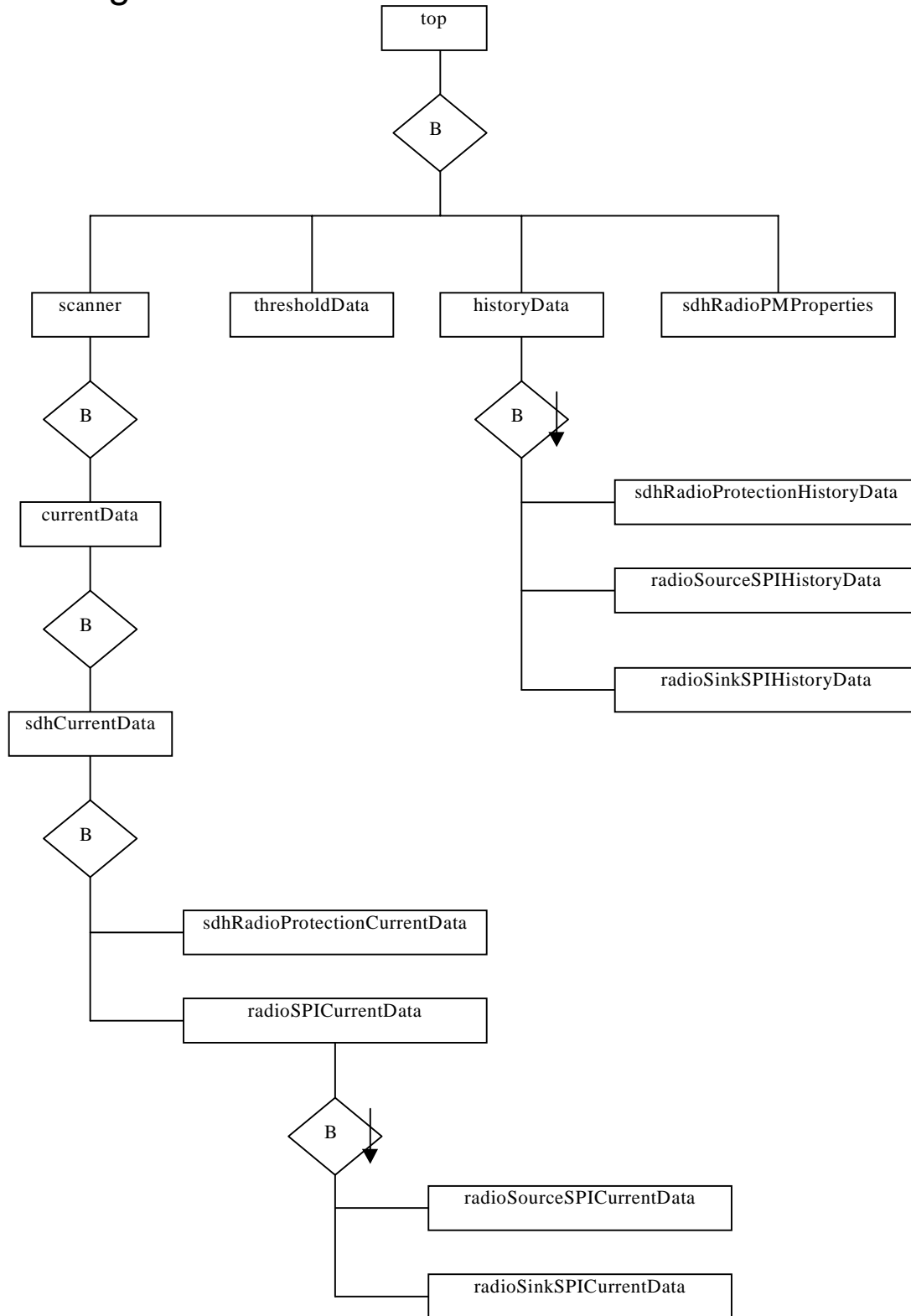# Inheritance Relationship of Radio Performance Management

Figure A.1

Annex B (informative):
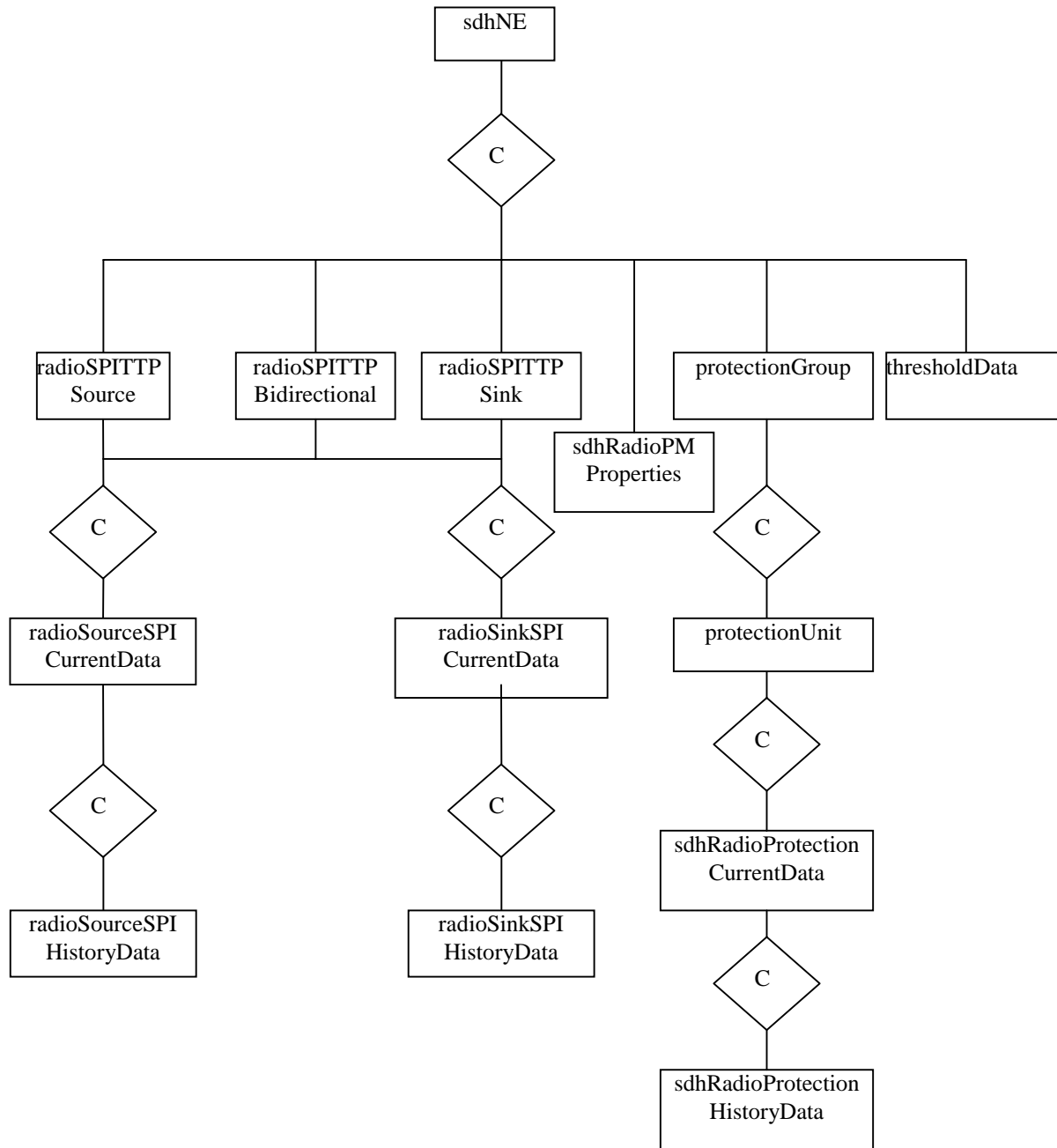# Containment Relationship of Radio Performance Management

Figure B.1

History

Document history			
V1.1.1	March 1999	Membership Approval Procedure	MV 9922: 1999-03-30 to 1999-05-28