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**SERIE G: SISTEMAS Y MEDIOS DE TRANSMISIÓN,
SISTEMAS Y REDES DIGITALES**

Equipos terminales digitales – Características de
operación, administración y mantenimiento de los equipos
de transmisión

**Jerarquía digital síncrona – Gestión de sistemas
de relevadores radioeléctricos desde el punto
de vista de los elementos de red**

Recomendación UIT-T G.774.8

(Anteriormente Recomendación del CCITT)

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Recomendación UIT-T G.774.8

Jerarquía digital síncrona – Gestión de sistemas de relevadores radioeléctricos desde el punto de vista de los elementos de red

Resumen

La presente Recomendación proporciona un modelo de información para los elementos de red de relevadores radioeléctricos de la jerarquía digital síncrona (SDH). Este modelo describe las clases de objetos gestionados y sus propiedades para la interfaz física síncrona radioeléctrica y la función de protección de las secciones que tienen esta interfaz física. Estos objetos son útiles para describir la información intercambiada a través de las interfaces definidas en UIT-T M.3010 sobre la arquitectura de la red de gestión de las telecomunicaciones (RGT) para la gestión de los elementos de red de relevadores radioeléctricos.

Historia del documento	
Versión	Notas
2001	La primera revisión incorpora las modificaciones documentadas en la Guía del Realizador.
4/1997	Versión inicial de la Recomendación.

Orígenes

La Recomendación UIT-T G.774.8, revisada por la Comisión de Estudio 15 (2001-2004) del UIT-T, fue aprobada por el procedimiento de la Resolución 1 de la AMNT el 9 de febrero de 2001.

PREFACIO

La UIT (Unión Internacional de Telecomunicaciones) es el organismo especializado de las Naciones Unidas en el campo de las telecomunicaciones. El UIT-T (Sector de Normalización de las Telecomunicaciones de la UIT) es un órgano permanente de la UIT. Este órgano estudia los aspectos técnicos, de explotación y tarifarios y publica Recomendaciones sobre los mismos, con miras a la normalización de las telecomunicaciones en el plano mundial.

La Asamblea Mundial de Normalización de las Telecomunicaciones (AMNT), que se celebra cada cuatro años, establece los temas que han de estudiar las Comisiones de Estudio del UIT-T, que a su vez producen Recomendaciones sobre dichos temas.

La aprobación de Recomendaciones por los Miembros del UIT-T es el objeto del procedimiento establecido en la Resolución 1 de la AMNT.

En ciertos sectores de la tecnología de la información que corresponden a la esfera de competencia del UIT-T, se preparan las normas necesarias en colaboración con la ISO y la CEI.

NOTA

En esta Recomendación, la expresión "Administración" se utiliza para designar, en forma abreviada, tanto una administración de telecomunicaciones como una empresa de explotación reconocida de telecomunicaciones.

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Recomendación UIT-T G.774.8

Jerarquía digital síncrona – Gestión de sistemas de relevadores radioeléctricos desde el punto de vista de los elementos de red

1 Alcance

La presente Recomendación proporciona un modelo de información para que se utilice en la interfaz entre elementos de red y sistemas de gestión, para la gestión de equipos de relevadores radioeléctricos que usen la jerarquía digital síncrona (SDH, *synchronous digital hierarchy*). Identifica las clases de objeto de la red de gestión de las telecomunicaciones (RGT) necesarias para la gestión de elementos de red de relevadores radioeléctricos de la jerarquía digital síncrona. Estos objetos son pertinentes para el intercambio de información entre interfaces normalizadas definidas en UIT-T M.3010 sobre arquitectura de la red de gestión de las telecomunicaciones

Estructura de esta Recomendación

Las cláusulas 5 y 6 describen el modelo de información utilizando los mecanismos de notación definidos en UIT-T X.722: Directrices para la definición de objetos gestionados. Las cláusulas 5.6 y 6.7 contienen las definiciones sintácticas de la información transportada en el protocolo, escritas en la notación de sintaxis abstracta uno (ASN.1), definida en UIT-T X.680-X.683. La denominación y la herencia se muestran en forma de diagramas en el apéndice I informativo.

2 Referencias

Las siguientes Recomendaciones del UIT-T y otras referencias contienen disposiciones que, mediante su referencia en este texto, constituyen disposiciones de la presente Recomendación. Al efectuar esta publicación, estaban en vigor las ediciones indicadas. Todas las Recomendaciones y otras referencias son objeto de revisiones por lo que se preconiza que los usuarios de esta Recomendación investiguen la posibilidad de aplicar las ediciones más recientes de las Recomendaciones y otras referencias citadas a continuación. Se publica periódicamente una lista de las Recomendaciones UIT-T actualmente vigentes.

- UIT-T G.707/Y.1322 (2000), *Interfaz de nodo de red para la jerarquía digital síncrona*.
- UIT-T G.773 (1993), *Series de protocolos de interfaces Q para la gestión de sistemas de transmisión*.
- UIT-T G.774 (2001), *Jerarquía digital síncrona – Modelo de información de gestión desde el punto de vista de los elementos de red*.
- UIT-T G.783 (2000), *Características de los bloques funcionales del equipo de la jerarquía digital síncrona*.
- UIT-T G.784 (1999), *Gestión de la jerarquía digital síncrona*.
- UIT-T G.803 (2000), *Arquitectura de redes de transporte basadas en la jerarquía digital síncrona*.
- UIT-T G.831 (2000), *Capacidades de gestión de las redes de transporte basadas en la jerarquía digital síncrona*.
- UIT-T G.958 (1994), *Sistemas de línea digitales basados en la jerarquía digital síncrona para utilización en cables de fibra óptica*.
- UIT-T M.60 (1993), *Terminología y definiciones relativas al mantenimiento*.

- UIT-T M.2120 (2000), *Procedimientos de detección y localización de averías en trayectos, secciones y sistemas de transmisión de la jerarquía digital plesiócrona y en trayectos y secciones de multiplexación de la jerarquía digital síncrona.*
- UIT-T M.3010 (2000), *Principios para una red de gestión de las telecomunicaciones.*
- UIT-T M.3013 (2000), *Consideraciones sobre una red de gestión de las telecomunicaciones.*
- UIT-T M.3100 (1995), *Modelo genérico de información de red.*
- UIT-T Q.811 (1997), *Perfiles de protocolo de capa inferior para las interfaces Q3 y X.*
- UIT-T Q.812 (1997), *Perfiles de protocolo de capa superior para las interfaces Q3 y X.*
- UIT-T Q.822 (1994), *Descripción de la etapa 1, de la etapa 2 y de la etapa 3 para el interfaz Q3 – Gestión de la calidad de funcionamiento.*
- UIT-T X.680 a X.683 (1997), *Tecnología de la información – Notación de sintaxis abstracta uno.*
- UIT-T X.701 (1997), *Tecnología de la información – Interconexión de sistemas abiertos – Visión general de la gestión de sistemas.*
- UIT-T X.710 (1997), *Tecnología de la información – Interconexión de sistemas abiertos – Servicio común de información de gestión.*
- UIT-T X.711 (1997), *Tecnología de la información – Interconexión de sistemas abiertos – Protocolo común de información de gestión: Especificación.*
- UIT-T X.720 (1992), *Tecnología de la información – Interconexión de sistemas abiertos – Estructura de la información de gestión: Modelo de información de gestión, plus Enm.1 (1995) y Corr.1 (1994).*
- UIT-T X.721 (1992), *Tecnología de la información – Interconexión de sistemas abiertos – Estructura de la información de gestión: Definición de información de gestión, plus Corr.1 (1994), Corr.2 (1996), Corr.3 (1998) y Corr.4 (2000).*
- UIT-T X.722 (1992), *Tecnología de la información – Interconexión de sistemas abiertos – Estructura de la información de gestión: Directrices para la definición de objetos gestionados, plus Enm.1 (1995), Enm.2 (1997) y Corr.1 (1996).*
- UIT-T X.730 (1992), *Tecnología de la información – Interconexión de sistemas abiertos – Gestión de sistemas: Función de gestión de objetos, plus Enm.1 (1995) y Enm.1/Corr.1 (1996).*
- UIT-T X.731 (1992), *Tecnología de la información – Interconexión de sistemas abiertos – Gestión de sistemas: Función de gestión de estados, plus Enm.1 (1995), Corr.1 (1995) y Enm.1/Corr.1 (1996).*
- UIT-T X.733 (1992), *Tecnología de la información – Interconexión de sistemas abiertos – Gestión de sistemas: Función señaladora de alarmas, plus Corr.1 (1994), Enm.1 (1995), Enm.1/Corr.1 (1996) y Corr.1 (1999).*
- UIT-T X.734 (1992), *Tecnología de la información – Interconexión de sistemas abiertos – Gestión de sistemas: Función de gestión de informes de eventos, plus Corr.1 (1994), Enm.1 (1995), Enm.1/Corr.1 (1996) y Corr.2 (1999).*
- UIT-T X.735 (1992), *Tecnología de la información – Interconexión de sistemas abiertos – Gestión de sistemas: Función control de ficheros registro cronológico, plus Enm.1 (1995) y Enm.1/Corr.1 (1996).*

3 Términos y definiciones

En la presente Recomendación se utilizan los términos y definiciones especificados en UIT-T G.774, UIT-T G.784 y UIT-T M.3100.

4 Abreviaturas

En esta Recomendación se utilizan las siguientes siglas.

AIS	Señal de indicación de alarma (<i>alarm indication signal</i>)
AP	Punto de acceso (<i>access point</i>)
CMIP	Protocolo común de información de gestión (<i>common management information protocol</i>)
CMIS	Servicio común de información de gestión (<i>common management information service</i>)
CP	Punto de conexión (<i>connection point</i>)
CTP	Punto de terminación de conexión (<i>connection termination point</i>)
DRR	Relevador radioeléctrico digital (<i>digital radio-relay</i>)
GTP	Punto de terminación de grupo (<i>group termination point</i>)
HPA	Adaptación de trayecto de orden superior (<i>higher order path adaptation</i>)
IA	Adaptador indirecto (<i>indirect adapter</i>)
IOS	Sección entre oficinas (<i>intra-office section</i>)
ISO	Organización Internacional de Normalización (<i>International Organization for Standardization</i>)
LOF	Pérdida de alineación de tramas (<i>loss of frame</i>)
LPA	Adaptación de trayecto de orden inferior (<i>lower order path adaptation</i>)
NE	Elemento de red (<i>network element</i>)
OS	Sistema de operaciones (<i>operations system</i>)
OSI	Interconexión de sistemas abiertos (<i>open systems interconnection</i>)
PDH	Jerarquía digital plesiócrona (<i>plesiochronous digital hierarchy</i>)
Pkg	Lote (<i>package</i>)
RF	Frecuencia radioeléctrica (<i>radio frequency</i>)
RGT	Red de gestión de las telecomunicaciones
RPS	Conmutación de protección radioeléctrica (<i>radio protection switching</i>)
RRR	Regenerador de relevador radioeléctrico (<i>radio-relay regenerator</i>)
RRT	Terminal de relevador radioeléctrico (<i>radio-relay terminal</i>)
RS	Sección de regeneración (<i>regenerator section</i>)
RSPI	Interfaz física síncrona radioeléctrica (<i>radio synchronous physical interface</i>)
SDH	Jerarquía digital síncrona (<i>synchronous digital hierarchy</i>)
Snk	Sumidero (<i>sink</i>)
Src	Fuente (<i>source</i>)
STM-N	Módulo de transporte síncrono N (<i>synchronous transport module N</i>)

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 Definiciones de lotes

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 *OUT*going 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 *OUT*going 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 Definiciones de atributos

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};

5.5 Relaciones de objetos

```
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 Producciones ASN.1 de soporte

```
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)}
```

```
g774-8Parameter OBJECT IDENTIFIER ::= {sdhRadioManagement parameter(5)}
```

```
END
```

```
SDHRadioTpASN1 {itu-t(0) recommendation(0) g(7) g774(774) hyphen(127)
sdhRadioIM(8) informationModel(0) asn1Module(2) sdhRadioTp(0)}
```

```
DEFINITIONS IMPLICIT TAGS ::= BEGIN
```

```
-- EXPORTS Everything
```

IMPORTS

```
NameType FROM ASN1DefinedTypesModule {itu-t(0) recommendation(0) m(13)
gnm(3100) informationModel(0) asn1Modules(2) asn1DefinedTypesModule(0)}
```

```
ProbableCause FROM Attribute-ASN1Module {joint-iso-ccitt ms(9) smi(3)
part2(2) asn1Module(2) 1};
```

```
RadioFrequency ::= SEQUENCE OF SEQUENCE {
    frequencyValue [0] INTEGER,
    frequencyUsage [1] FrequencyUsage,
    polarization [2] Polarization OPTIONAL
}
```

```
Boolean ::= BOOLEAN
```

```
Integer ::= INTEGER
```

```
Polarization ::= ENUMERATED {vertical (0), horizontal (1),unspecified (2)}
```

```
FrequencyUsage ::= ENUMERATED {receive (0), transmit (1)}
```

```
-- The following value assignments specify the Probable Cause value related to
-- Radio-Relay management within the TMN application context. The chosen values
-- are reserved by Recommendation M.3100 for communication alarm-related probable
-- causes.
```

```
rxFail ProbableCause ::= localValue : 30
rxLOS ProbableCause ::= localValue : 31
demodulationFail ProbableCause ::= localValue : 32
demLOS ProbableCause ::= localValue : 33
txFail ProbableCause ::= localValue : 34
txLOS ProbableCause ::= localValue : 35
modulationFail ProbableCause ::= localValue : 36
modLOS ProbableCause ::= localValue : 37
```

```
END
```

6 Fragmento de protección radioeléctrica de la SDH

Esta cláusula proporciona los objetos gestionados necesarios para modelar la función de conmutación de protección radioeléctrica.

6.1 Definiciones de clases de objetos

6.1.1 Definiciones de objetos genéricos

6.1.1.1 Grupo de protección radioeléctrica de la SDH

```
sdhRadioProtectionGroup MANAGED OBJECT CLASS
DERIVED FROM "Recommendation G.774.03":protectionGroupR1;
CHARACTERIZED BY
    sdhRadioProtectionGroupPkg PACKAGE
        BEHAVIOUR sdhRadioProtectionGroupBeh;
    ATTRIBUTES
        rpsSummaryStatus GET,
        "Recommendation G.774.03":protectionSwitchMode GET,
        hitless GET;
    NOTIFICATIONS
        "Recommendation G.774.03":protectionSwitchReportingR1
        radioProtectionStatusParameter;;;
```


CONDITIONAL PACKAGES

"Recommendation G.774.03":protectionMismatchStatusPkg PRESENT IF
"An APS protocol is used",
radioHoldOffTimePkg PRESENT IF "the hitless functionality is not present and
an instance supports it",
singleExercisePkg PRESENT IF "an instance supports it",
exerciseOnOffPkg PRESENT IF "an instance supports it";
REGISTERED AS {g774-8ObjectClass 4 } ;

sdhRadioProtectionGroupBeh BEHAVIOUR DEFINED AS

"This object class is used to model all radio protection schemes envisaged for the Radio Protection Switch function. This object class is the focal point for management operations and notifications related to management of the protection system.

The **protectionMismatchStatus** indicates a mismatch between the provisioned **protectionGroupType** of this **protectionGroup** and the provisioned **protectionGroupType** of the far-end. It also indicates mismatch of uni-directional versus bi-directional switch provisioning between the two protection groups.

Actual signal flow across any specific transport entity is reflected by the connectivity pointers of the TPs involved in the protection scheme represented by an instance of this class.

For instances of this managed object class the REPLACE operation on the attributes **revertive**, **waitToRestoreTime** and **protectionGroupType** is not mandatorily required.

When the **exerciseOnOffPkg** package is present, it is possible to start and to stop the exercise procedure on the RPS acting on the **exerciseOn** boolean attribute. When the exerciseOn attribute is TRUE, possible malfunctioning of the exercise procedure shall be signalled setting the 'degraded' component in the **availabilityStatus** attribute.

If the **attributeValueChangeNotification** package is present, then changes to the **exerciseOn** and **radioHoldOffTime** (if they are present) shall cause an **attributeValueChange** notification to be emitted.

The **protectionUnit** sub-field of the **protectionSwitchReportingInfo** has no meaning in **protectionSwitchReporting** notification emitted by instances of this managed object class. The conditions for emitting the **protectionSwitchReporting** notifications are specified in the behaviour of the **radioProtectionStatusParameter** parameter.";

6.1.1.2 Unidad de protección radioeléctrica de la SDH

sdhRadioProtectionUnit MANAGED OBJECT CLASS

DERIVED FROM "Recommendation G.774.03":protectionUnit;
CHARACTERIZED BY

sdhRadioProtectionUnitPkg PACKAGE

BEHAVIOUR sdhRadioProtectionUnitBeh ;

ATTRIBUTES

"Recommendation G.774.03":channelNumber GET,
radioProtectionStatus GET,

"Recommendation G.774.03":reliableResourcePointer PERMITTED VALUES

SDHRadioProtASN1.SDHRadioResourcePointer,

"Recommendation G.774.03":unreliableResourcePointer PERMITTED VALUES
SDHRadioProtASN1.SDHRadioResourcePointer ;;;

CONDITIONAL PACKAGES

"Recommendation G.774.03":extraTrafficControlPkg PRESENT IF " extra traffic may be suspended and resumed " ,
privilegedChannelPkg
PRESENT IF "an instance supports it and the instance is protecting";
REGISTERED AS {g774-8ObjectClass 5 } ;

sdhRadioProtectionUnitBeh BEHAVIOUR

DEFINED AS

"This object class is specific to SDH Radio Protection Systems. Instances of this object class are used to represent the assignment between an unreliable resource (termination point) and a reliable resource (termination point) for the purpose of protection of the transport entity involved in any particular RPS protection scheme.

If this is a protecting protection unit , the **reliableResourcePointer** points to the protected termination point for extra traffic or NULL if there is no extra traffic.

The **channelNumber** attribute value represents the number of the channel used by the automatic protection switching protocol, if any.";

6.1.2 Definiciones de objetos de protección de conexión en cascada de sección múltiplex

Esta cláusula proporciona los clases de objeto necesarios para modelar la protección de conexión en cascada de sección múltiplex.

6.1.2.1 CTP de conexión en cascada de MS

msTcCTPBidirectional MANAGED OBJECT CLASS

DERIVED FROM "Recommendation G.774":msCTPBidirectional,
msTcCTPSource,
msTcCTPSink ;

CHARACTERIZED BY

msTcCTPBidirectionalPkg PACKAGE

BEHAVIOUR msTcCTPBidirectionalBeh ;;;

REGISTERED AS {g774-8ObjectClass 6 } ;

msTcCTPBidirectionalBeh BEHAVIOUR

DEFINED AS

"The **msTcCTPBidirectional** object class is a class of objects that represents either the bidirectional protected resources or the bidirectional unprotected resources in a tandem connection made up of one or more link connections at multiplex section layer.

If a bidirectional SDH Radio Protection Switching function is present, this object class shall be supported."
;

msTcCTPSink MANAGED OBJECT CLASS

DERIVED FROM "Recommendation G.774": msCTPSink ;

CHARACTERIZED BY

"Recommendation M.3100": crossConnectionPointerPackage,

msTcCTPSinkPkg PACKAGE

BEHAVIOUR msTcCTPSinkBeh ;;;

REGISTERED AS {g774-8ObjectClass 7 } ;

msTcCTPSinkBeh BEHAVIOUR

DEFINED AS

"The **msTcCTPSink** object class is a class of objects that represents either the protected or the unprotected resources in a tandem connection made up of one or more link connections at multiplex section layer. An instance of this object class defines the tandem connection end-point which terminates a multiplex section connection.

An instance of this object class is pointed to by a **reliableResourcePointer** attribute or by an **unreliableResourcePointer** attribute in an instance of the **protectionUnit** object class according if it represents a protected or an unprotected tandem connection respectively.

The **crossConnectionObjectPointer** attribute in an instance of this object class points to its associated **sdhRadioProtectionUnit** instance which has the **reliableResourcePointer** or **unreliableResourcePointer** attribute pointing back to the instance of this object class.

If an instance of this object class represents a protected tandem connection, then the **downStreamConnectivityPointer** points to either null or its associated **msTcCTP** object instance(s) representing the unprotected tandem connection(s).

If an instance of this object class represents an unprotected tandem connection, then the **downStreamConnectivityPointer** points to either null or its associated **msTcCTP** or **msTcTTP** object instance representing the protected tandem connection.

When a signal is switched to another unit, the value of the pointer is updated." ;

```
msTcCTPSource  MANAGED OBJECT CLASS
  DERIVED FROM  "Recommendation G.774": msCTPSource ;
  CHARACTERIZED BY
  "Recommendation M.3100": crossConnectionPointerPackage,
  msTcCTPSourcePkg PACKAGE
  BEHAVIOUR msTcCTPSourceBeh ;;
REGISTERED AS {g774-8ObjectClass 8 } ;
```

```
msTcCTPSourceBeh BEHAVIOUR
DEFINED AS
```

"The **msTcCTPSource** object class is a class of objects that represents either the protected resources or the unprotected resources in a tandem connection made up of one or more link connections at multiplex section layer. An instance of this object class defines the tandem connection end-point which originates a multiplex section connection.

An instance of this object class is pointed to by a **reliableResourcePointer** attribute or by an **unreliableResourcePointer** attribute in an instance of the **sdhRadioProtectionUnit** object class according if it represents a protected or an unprotected tandem connection respectively.

The **crossConnectionObjectPointer** attribute in an instance of this object class points to its associated **sdhRadioProtectionUnit** instance which has the **reliableResourcePointer** or **unreliableResourcePointer** attribute pointing back to the instance of this object class.

If an instance of this object class represents a protected tandem connection, then the **upStreamConnectivityPointer** points to either null or its associated **msTcCTP** object instance representing the unprotected tandem connection.

If an instance of this object class represents an unprotected tandem connection, then the **upStreamConnectivityPointer** points to either null or its associated **msTcCTP** or **msTcTTP** object instance representing the protected tandem connection.

When a signal is switched to another unit, the value of the pointer is updated." ;

6.1.2.2 TTP de conexión en cascada de MS

msTcTTPBidirectional MANAGED OBJECT CLASS
DERIVED FROM "Recommendation G.774": **msTTPBidirectional**,
msTcTTPSource,
msTcTTPSink ;
CHARACTERIZED BY
msTcTTPBidirectionalPkg PACKAGE
BEHAVIOUR **msTcTTPBidirectionalBeh** ;;
REGISTERED AS {g774-8ObjectClass 9 } ;

msTcTTPBidirectionalBeh BEHAVIOUR
DEFINED AS

"The **msTcTTPBidirectional** object class is a class of objects that represents the bidirectional protected resources in a tandem connection made up of one or more link connections at multiplex section layer.

If a bidirectional SDH Radio Protection Switching function is present, this object class shall be supported."
;

msTcTTPSink MANAGED OBJECT CLASS
DERIVED FROM "Recommendation G.774": **msTTPSink** ;
CHARACTERIZED BY
"Recommendation M.3100": **crossConnectionPointerPackage**,
msTcTTPSinkPkg PACKAGE
BEHAVIOUR **msTcTTPSinkBeh** ;;
REGISTERED AS {g774-8ObjectClass 10 } ;

msTcTTPSinkBeh BEHAVIOUR
DEFINED AS

"The **msTcTTPSink** object class is a class of objects that represents the protected resources in a tandem connection made up of one or more link connections at multiplex section layer. An instance of this object class defines the tandem connection end-point which terminates a multiplex section trail. An instance of this object class is pointed to by a **reliableResourcePointer** attribute in a instance of the **sdhRadioProtectionUnit** object class.

The **crossConnectionObjectPointer** attribute in an instance of this object class points to its associated **sdhRadioProtectionUnit** instance which has the **reliableResourcePointer** attribute pointing back to the instance of this object class.

The **upStreamConnectivityPointer** in an instance of this object class points to either null or its associated **msTcCTP** object instance representing the unprotected tandem connection. It indicates the actual signal flow and when a signal is switched to another unit, the pointer is updated.

If the **attributeValueChangeNotification** package is present, then a change in the value of **supportedByObjectList** shall cause an **attributeValueChangeNotification**." ;

msTcTTPSource MANAGED OBJECT CLASS
DERIVED FROM "Recommendation G.774": **msTTPSource** ;
CHARACTERIZED BY
"Recommendation M.3100": **crossConnectionPointerPackage**,
msTcTTPSourcePkg PACKAGE
BEHAVIOUR **msTcTTPSourceBeh** ;;
REGISTERED AS {g774-8ObjectClass 11 } ;

**msTcTTPSourceBeh BEHAVIOUR
DEFINED AS**

"The **msTcTTPSource** object class is a class of objects that represents the protected resources in a tandem connection made up of one or more link connections at multiplex section layer. An instance of this object class defines the tandem connection end-point which originates a multiplex section trail. An instance of this object class is pointed to by a **reliableResourcePointer** attribute in a instance of the **sdhRadioProtectionUnit** object class.

The **crossConnectionObjectPointer** attribute in an instance of this object class points to its associated **sdhRadioProtectionUnit** instance which has the **reliableResourcePointer** attribute pointing back to the instance of this object class.

The **downStreamConnectivityPointer** in an instance of this object class points to either null or its associated **msTcCTP** object instance(s) representing the unprotected tandem connection(s). It indicates the actual signal flow and when a signal is switched to another unit, the pointer is updated.

If the **attributeValueChangeNotification** package is present, then a change in the value of **supportedByObjectList** shall cause an **attributeValueChangeNotification**."

6.1.3 Definiciones de objetos de protección de conexión de trayecto de orden superior

Esta cláusula proporciona las clases de objetos necesarias par modelar la protección de conexión de trayecto de orden superior.

6.1.3.1 CTP de conexión de trayecto de orden superior

au4HopcCTPBidirectional MANAGED OBJECT CLASS
DERIVED FROM "Recommendation G.774": **au4CTPBidirectionalR1**,
au4HopcCTPSource,
au4HopcCTPSink ;
CHARACTERIZED BY
au4HopcCTPBidirectionalPkg PACKAGE
BEHAVIOUR **au4HopcCTPBidirectionalBeh** ;;
REGISTERED AS {g774-8ObjectClass 12 } ;

au4HopcCTPBidirectionalBeh BEHAVIOUR
DEFINED AS

"The **au4HopcCTPBidirectional** object class is a class of objects that represents either the bidirectional protected resources or the bidirectional unprotected resources in a High Order Path Connection protected by an RPS function.

If a bidirectional SDH Radio Protection Switching function, acting as high order path connection protection, is present, this object class shall be supported."

au4HopcCTPSink MANAGED OBJECT CLASS
DERIVED FROM "Recommendation G.774": **au4CTPSinkR1** ;
CHARACTERIZED BY
"Recommendation M.3100" : **crossConnectionPointerPackage**,
au4HopcCTPSinkPkg PACKAGE
BEHAVIOUR **au4HopcCTPSinkBeh** ;;
REGISTERED AS {g774-8ObjectClass 13 } ;

**au4HopcCTPSinkBeh BEHAVIOUR
DEFINED AS**

"The **au4HopcCTPSink** object class is a class of objects that represents either the protected or the unprotected resources in a High Order Path Connection protected by an RPS function. An instance of this object class defines the path connection end-point which terminates a High Order Path Connection.

An instance of this object class is pointed to by a **reliableResourcePointer** attribute or by an **unreliableResourcePointer** attribute in an instance of the **sdhRadioProtectionUnit** object class according if it represents a protected or an unprotected path connection respectively.

The **crossConnectionObjectPointer** attribute in an instance of this object class points to its associated **sdhRadioProtectionUnit** instance which has the **reliableResourcePointer** or **unreliableResourcePointer** attribute pointing back to the instance of this object class.

If an instance of this object class represents a protected path connection, then the **downStreamConnectivityPointer** points to either null or to its associated **au4HopcCTP** object instance(s) representing the unprotected path connection(s).

If an instance of this object class represents an unprotected path connection, then the **downStreamConnectivityPointer** points to either null or to its associated **au4HopcCTP** or to the **vc4HopcTTP** object instance representing the protected path connection.

When a signal is switched to another unit, the value of the **downStreamConnectivityPointer** is updated."
;

au4HopcCTPSource MANAGED OBJECT CLASS
DERIVED FROM "Recommendation G.774": au4CTPSource ;
CHARACTERIZED BY
"Recommendation M.3100": crossConnectionPointerPackage,
au4HopcCTPSourcePkg PACKAGE
BEHAVIOUR au4HopcCTPSourceBeh ;;;
REGISTERED AS {g774-8ObjectClass 14 } ;

**au4HopcCTPSourceBeh BEHAVIOUR
DEFINED AS**

"The **au4HopcCTPSource** object class is a class of objects that represents either the protected resources or the unprotected resources in a High Order Path Connection protected by an RPS function. An instance of this object class defines the path connection end-point which originates a High Order Path Connection.

An instance of this object class is pointed to by a **reliableResourcePointer** attribute or by an **unreliableResourcePointer** attribute in an instance of the **sdhRadioProtectionUnit** object class according if it represents a protected or an unprotected path connection respectively.

The **crossConnectionObjectPointer** attribute in an instance of this object class points to its associated **sdhRadioProtectionUnit** instance which has the **reliableResourcePointer** or **unreliableResourcePointer** attribute pointing back to the instance of this object class.

If an instance of this object class represents a protected path connection then the **upStreamConnectivityPointer** points to either null or to its associated **au4HopcCTP** object instance representing the unprotected path connection.

If an instance of this object class represents an unprotected path connection, then the **upStreamConnectivityPointer** points to either null or to its associated **au4HopcCTP** or to the **vc4HopcTTP** object instance representing the protected path connection.

When a signal is switched to another unit, the value of the **upStreamConnectivityPointer** is updated." ;

6.1.3.2 TTP de conexión de trayecto de orden superior protegida

vc4HopcTTPBidirectional MANAGED OBJECT CLASS
DERIVED FROM "Recommendation G.774": **vc4TTPBidirectionalR1**,
vc4HopcTTPSource,
vc4HopcTTPSink ;
CHARACTERIZED BY
vc4HopcTTPBidirectionalPkg PACKAGE
BEHAVIOUR **vc4HopcTTPBidirectionalBeh** ;;
REGISTERED AS {g774-8ObjectClass 15 } ;

vc4HopcTTPBidirectionalBeh BEHAVIOUR
DEFINED AS

"The **vc4HopcTTPBidirectional** object class is a class of objects that represents the bidirectional protected resources in a High Order Path Connection protected by an RPS function.

If a bidirectional SDH Radio Protection Switching function, acting as high order path connection protection, is present, this object class shall be supported." ;

vc4HopcTTPSink MANAGED OBJECT CLASS
DERIVED FROM "Recommendation G.774": **vc4TTPSinkR1** ;
CHARACTERIZED BY
"Recommendation M.3100": **crossConnectionPointerPackage**,
vc4HopcTTPSinkPkg PACKAGE
BEHAVIOUR **vc4HopcTTPSinkBeh** ;;
REGISTERED AS {g774-8ObjectClass 16 } ;

vc4HopcTTPSinkBeh BEHAVIOUR
DEFINED AS

"The **vc4HopcTTPSink** object class is a class of objects that represents the protected resources in a High Order Path Connection protected by an RPS function. An instance of this object class defines the path end-point which terminates a High Order trail. An instance of this object class is pointed to by a **reliableResourcePointer** attribute in a instance of the **sdhRadioProtectionUnit** object class.

The **crossConnectionObjectPointer** attribute in an instance of this object class points to its associated **sdhRadioProtectionUnit** instance which has the **reliableResourcePointer** attribute pointing back to the instance of this object class.

The **upStreamConnectivityPointer** in an instance of this object class points to either null or to its associated **au4HopcCTP** object instance representing the unprotected path connection. It indicates the actual signal flow and, when a signal is switched to another unit, it is updated.

If the **attributeValueChangeNotification** package is present, then a change in the value of **supportedByObjectList** shall cause an **attributeValueChangeNotification**." ;

vc4HopcTTPSource MANAGED OBJECT CLASS
 DERIVED FROM "Recommendation G.774": **vc4TTPSourceR1** ;
 CHARACTERIZED BY
 "Recommendation M.3100": **crossConnectionPointerPackage**,
vc4HopcTTPSourcePkg PACKAGE
 BEHAVIOUR **vc4HopcTTPSourceBeh** ;;;
 REGISTERED AS {g774-8ObjectClass 17 } ;

vc4HopcTTPSourceBeh BEHAVIOUR
 DEFINED AS

"The **vc4HopcTTPSource** object class is a class of objects that represents the protected resources in a High Order Path Connection protected by an RPS function. An instance of this object class defines the path end-point which originates a high order trail. An instance of this object class is pointed to by a **reliableResourcePointer** attribute in a instance of the **sdhRadioProtectionUnit** object class.

The **crossConnectionObjectPointer** attribute in an instance of this object class points to its associated **sdhRadioProtectionUnit** instance which has the **reliableResourcePointer** attribute pointing back to the instance of this object class.

The **downStreamConnectivityPointer** in an instance of this object class points to either null or to its associated **au4HopcCTP** object instance(s) representing the unprotected tandem connection(s). It indicates the actual signal flow and when a signal is switched to another unit, it is updated.

If the **attributeValueChangeNotification** package is present, then a change in the value of **supportedByObjectList** shall cause an **attributeValueChangeNotification**." ;

6.1.4 Definiciones de objetos de protección de camino de sección múltiplex (por medio de RPS)

6.1.4.1 CTP radioeléctrico no protegido

radioUnprotectedCTPBidirectional MANAGED OBJECT CLASS
 DERIVED FROM "Recommendation M.3100":
connectionTerminationPointBidirectional,
radioUnprotectedCTPSource,
radioUnprotectedCTPSink;
 CHARACTERIZED BY
radioUnprotectedCTPBidirectionalPkg PACKAGE
 BEHAVIOUR **radioUnprotectedCTPBidirectionalBeh** ;;;
 REGISTERED AS {g774-8ObjectClass 18 } ;

radioUnprotectedCTPBidirectionalBeh BEHAVIOUR
 DEFINED AS

"The **radioUnprotectedCTPBidirectional** object class is a class of objects that represents the bidirectional unprotected resources in a protection scheme involving RPS function.";

radioUnprotectedCTPSink MANAGED OBJECT CLASS
 DERIVED FROM "Recommendation M.3100":**connectionTerminationPointSink**;
 CHARACTERIZED BY
 "Recommendation M.3100":**crossConnectionPointerPackage**,
radioUnprotectedCTPSinkPkg PACKAGE
 BEHAVIOUR **radioUnprotectedCTPSinkBeh**;
 ATTRIBUTES
radioUnprotectedCTPId GET;;;
 REGISTERED AS {g774-8ObjectClass 19 } ;

**radioUnprotectedCTPSinkBeh BEHAVIOUR
DEFINED AS**

"The **radioUnprotectedCTPSink** object class is a class of objects that represents the unprotected resources in a protection scheme involving RPS function. An instance of this object class is pointed to by the **unreliableResourcePointer** attribute in an instance of the **sdhRadioProtectionUnit** object class. The **crossConnectionObjectPointer** attribute in an instance of this object class points to its associated **sdhRadioProtectionUnit** object instance which has the **unreliableResourcePointer** attribute pointing back to the instance of this object class.";

radioUnprotectedCTPSource MANAGED OBJECT CLASS
DERIVED FROM "Recommendation M.3100":**connectionTerminationPointSink**;
CHARACTERIZED BY
"Recommendation M.3100":**crossConnectionPointerPackage**,
radioUnprotectedCTPSourcePkg PACKAGE
BEHAVIOUR **radioUnprotectedCTPSourceBeh**;
ATTRIBUTES
radioUnprotectedCTPId GET;;;
REGISTERED AS {g774-8ObjectClass 20 };

**radioUnprotectedCTPSourceBeh BEHAVIOUR
DEFINED AS**

"The **radioUnprotectedCTPSource** object class is a class of objects that represents the unprotected resources in a protection scheme involving RPS function. An instance of this object class is pointed to by the **unreliableResourcePointer** attribute in an instance of the **sdhRadioProtectionUnit** object class. The **crossConnectionObjectPointer** attribute in an instance of this object class points to its associated **sdhRadioProtectionUnit** object instance which has the **reliableResourcePointer** attribute pointing back to the instance of this object class.";

6.1.4.2 TTP radioeléctrico protegido

radioProtectedTTPBidirectional MANAGED OBJECT CLASS
DERIVED FROM "Recommendation M.3100":**trailTerminationPointBidirectional**,
radioProtectedTTPSource,
radioProtectedTTPSink;
CHARACTERIZED BY
radioProtectedTTPBidirectionalPkg PACKAGE
BEHAVIOUR **radioProtectedTTPBidirectionalBeh**;;;
REGISTERED AS {g774-8ObjectClass 21};

**radioProtectedTTPBidirectionalBeh BEHAVIOUR
DEFINED AS**

"The **radioProtectedTTPBidirectional** object class is a class of objects that represents the bidirectional protected resources in a protection scheme involving RPS function.";

radioProtectedTTPSink MANAGED OBJECT CLASS
DERIVED FROM "Recommendation M.3100":**trailTerminationPointSink**;
CHARACTERIZED BY
"Recommendation M.3100":**crossConnectionPointerPackage**,
radioProtectedTTPSinkPkg PACKAGE
BEHAVIOUR **radioProtectedTTPSinkBeh**;
ATTRIBUTES
radioProtectedTTPId GET;;;
REGISTERED AS {g774-8ObjectClass 22};

**radioProtectedTTPSinkBeh BEHAVIOUR
DEFINED AS**

"The **radioProtectedTTPSink** object class is a class of objects that represents the protected resources in a protection scheme involving RPS function. An instance of this object class is pointed to by the **reliableResourcePointer** attribute in an instance of the **sdhRadioProtectionUnit** object class. The **crossConnectionObjectPointer** attribute in an instance of this object class points to its associated **sdhRadioProtectionUnit** instance which has the **reliableResourcePointer** attribute pointing back to the instance of this object class. The **upstreamConnectivityPointer** in an instance of this object class points to either null or its associated unprotected CTP object instance; it indicates the actual signal flow, and when a signal is switched to another unit, the value of the **upstreamConnectivityPointer** is updated. If the **attributeValueChangeNotification** package is present, then a change in the value of the **supportedByObjectList** shall cause an **attributeValueChange** notification.";

radioProtectedTTPSource MANAGED OBJECT CLASS
DERIVED FROM "Recommendation M.3100":trailTerminationPointSource;
CHARACTERIZED BY
"Recommendation M.3100":crossConnectionPointerPackage,
radioProtectedTTPSourcePkg PACKAGE
BEHAVIOUR radioProtectedTTPSourceBeh;
ATTRIBUTES
radioProtectedTTPIId GET;;;
REGISTERED AS {g774-8ObjectClass 23};

**radioProtectedTTPSourceBeh BEHAVIOUR
DEFINED AS**

"The **radioProtectedTTPSource** object class is a class of objects that represents the protected resources in a protection scheme involving RPS function. An instance of this object class is pointed to by the **reliableResourcePointer** attribute in an instance of the **sdhRadioProtectionUnit** object class. The **crossConnectionObjectPointer** attribute in an instance of this object class points to its associated **sdhRadioProtectionUnit** object instance which has the **reliableResourcePointer** attribute pointing back to the instance of this object class. The **downstreamConnectivityPointer** in an instance of this object class points to either null or its associated unprotected CTP object instance(s); it indicates the actual signal flow, and when a signal is switched to another unit, the pointer is updated. If the **attributeValueChangeNotification** package is present, then a change in the value of the **supportedByObjectList** shall cause an **attributeValueChange** notification.";

6.2 Definiciones de lotes

exerciseOnOffPkg PACKAGE
BEHAVIOUR exerciseOnOffPkgBeh;
ATTRIBUTES
exerciseOn GET-REPLACE;
REGISTERED AS {g774-8Package 7};

exerciseOnOffPkgBeh BEHAVIOUR
DEFINED AS "This package is used to start or stop a continuous testing of the RPS functionality.";

singleExercisePkg PACKAGE
 BEHAVIOUR singleExercisePkgBeh;
 ACTIONS
 invokeRadioExercise;
REGISTERED AS {g774-8Package 8};

singleExercisePkgBeh BEHAVIOUR
DEFINED AS "This package is used to perform a single test operation of the RPS functionality.";

privilegedChannelPkg PACKAGE
 ATTRIBUTES
 privilegedChannel GET-REPLACE;
REGISTERED AS {g774-8Package 9};

radioHoldOffTimePkg PACKAGE
 ATTRIBUTES
 radioHoldOffTime GET-REPLACE;
REGISTERED AS {g774-8Package 10};

6.3 Definiciones de atributos

6.3.1 hitless

hitless ATTRIBUTE
 WITH ATTRIBUTE SYNTAX SDHRadioProtASN1.Boolean;
 MATCHES FOR EQUALITY ;
 BEHAVIOUR hitlessBehaviour ;
REGISTERED AS {g774-8Attribute 5 } ;

hitlessBehaviour BEHAVIOUR
DEFINED AS
 "This attribute specifies whether the hitless capability is present or not. A value of TRUE indicates that the hitless capability is present in the protection system. A value of FALSE indicates that the hitless capability is not present.";

6.3.2 radioHoldOffTime

radioHoldOffTime ATTRIBUTE
 WITH ATTRIBUTE SYNTAX SDHRadioProtASN1.Integer ;
 MATCHES FOR EQUALITY, ORDERING ;
 BEHAVIOUR radioHoldOffTimeBeh ;
REGISTERED AS { g774-8Attribute 6} ;

radioHoldOffTimeBeh BEHAVIOUR
DEFINED AS
 "This attribute specifies the amount of 10 ms. periods, within a valid range of 0... 10 s., which represents the time to wait before performing a protection switch after detection of an automatic switching initiation defect on either the protecting or protected **protectionUnit**.

The switch is performed only if the defect is still present after the **holdOffTime** has expired.";

6.3.3 rpsSummaryStatus

rpsSummaryStatus **ATTRIBUTE**
WITH ATTRIBUTE SYNTAX **SDHRadioProtASN1.RPSSummaryStatus;**
MATCHES FOR **EQUALITY;**
BEHAVIOUR **rpsSummaryStatusBeh;**
REGISTERED AS {g774-8Attribute 7 };

rpsSummaryStatusBeh **BEHAVIOUR**
DEFINED AS

"This single structured attribute represents the whole status of the RPS function. The **statusOfRxProtectionSwitches** sub-field allows to know the whole status of the bridges in the Rx side. This is achieved by listing all the protecting protection units which are carrying an extra traffic or traffic from a protected unit. If a protecting unit is not listed, it is intended to be free.

The **channelStatus** sub-field allows to know information about the highest priority automatic switch request currently active on this protection unit instance together with the last operator switch command accepted (if any) for each protection unit. This is achieved by listing all the protection units which have the value of the **channelASRequest** sub-field different from 'noOne' and the value of **radioSwitchStatus** sub-field different from **noRequest**. If a protection unit is not listed, the status shall be considered (**noOne, noRequest**).";

6.3.4 exerciseOn

exerciseOn **ATTRIBUTE**
WITH ATTRIBUTE SYNTAX **SDHRadioProtASN1.Boolean;**
MATCHES FOR **EQUALITY;**
BEHAVIOUR **exerciseOnBeh;**
REGISTERED AS {g774-8Attribute 8 };

exerciseOnBeh **BEHAVIOUR**
DEFINED AS

"This attribute is used to start/stop the exercise procedure on a RPS function. If the value is TRUE the procedure is activated, otherwise it is deactivated.";

6.3.5 privilegedChannel

privilegedChannel **ATTRIBUTE**
WITH ATTRIBUTE SYNTAX **SDHRadioProtASN1.Privileged;**
MATCHES FOR EQUALITY;
BEHAVIOUR **privilegedChannelBeh;**
REGISTERED AS {g774-8Attribute 9 };

privilegedChannelBeh **BEHAVIOUR**
DEFINED AS

"This attribute is used to indicate if the protected channel defined in the value of the attribute is permanently bridged in the TX side (in absence of any switching requests) to this protecting channel. A NULL value indicates that there is no bridge active.";

6.3.6 radioProtectionStatus

radioProtectionStatus **ATTRIBUTE**
WITH ATTRIBUTE SYNTAX **SDHRadioProtASN1.RadioProtectionStatus;**
MATCHES FOR EQUALITY;
BEHAVIOUR **radioProtectionStatusBeh;**
REGISTERED AS {g774-8Attribute 10 };

radioProtectionStatusBeh BEHAVIOUR

DEFINED AS

"This attribute is used to indicate the status of the radio protection switching in a **protectionUnit** instance.

The **protectionUnitStatus** sub-field contains information about the highest priority automatic switch request currently active on this protection unit instance together with the last operator switch command accepted (if any).

The **associatedChannel** sub-field indicates with the value 'itself' that there is no switch performed. In case of switch presence, the **fromPU** value is used for a protecting unit to indicate the protected unit which has been switched from; the **toPU** value is used for a protected unit to indicate the protecting unit which has been switched to.

The **requestSource** sub-field, when present, indicates if the switch request has been forwarded locally or remotely.";

6.3.7 radioUnprotectedCTPId

radioUnprotectedCTPId ATTRIBUTE

WITH ATTRIBUTE SYNTAX SDHRadioProtASN1.NameType;

MATCHES FOR EQUALITY;

BEHAVIOUR

radioUnprotectedCTPIdBehaviour BEHAVIOUR

DEFINED AS

"This attribute is used as a RDN for naming instances of the **radioUnprotectedCTP** object classes."

;;

REGISTERED AS { g774-8Attribute 11 };

6.3.8 radioProtectedTTPId

radioProtectedTTPId ATTRIBUTE

WITH ATTRIBUTE SYNTAX SDHRadioProtASN1.NameType;

MATCHES FOR EQUALITY;

BEHAVIOUR

radioProtectedTTPIdBehaviour BEHAVIOUR

DEFINED AS

"This attribute is used as a RDN for naming instances of the **radioProtectedTTP** object classes."

;;

REGISTERED AS { g774-8Attribute 12 };

6.4 Definiciones de acciones

invokeRadioExercise ACTION

BEHAVIOUR invokeRadioExerciseBeh ;

MODE CONFIRMED ;

WITH INFORMATION SYNTAX SDHRadioProtASN1.InvokeRadioExerciseArg ;

WITH REPLY SYNTAX SDHRadioProtASN1.InvokeRadioExerciseReply ;

REGISTERED AS { g774-8Action 1 } ;

invokeRadioExerciseBeh BEHAVIOUR

DEFINED AS

"The **invokeRadioExercise** action can be used to request a protection exercise routine to be performed on one or more **protectionUnit** instances contained in the **protectionGroup** object.

The action argument contains indications of the protected and protecting **protectionUnits** to which the request applies.

If a protecting **protectionUnit** is identified in the **protectedUnit** field or if a protected **protectionUnit** is identified in the **protectingUnit** field, the action fails.

The **protectionEntity** field may be absent, indicating that the request applies to all contained **protectionUnits**.

A single exercise consists in initiating a switching process without actually switching and, therefore, involves one protected and one protecting **protectionUnit**.

For an exercised protected **protectionUnit**, the exercise result contains the list of each protecting **protectionUnit** to which the switching process has been applied together with the respective obtained result.

For an exercised protecting **protectionUnit**, the exercise result contains the list of each protected **protectionUnit** to which the switching process has been applied together with the respective obtained result.

While an exercise is in progress the value of the **radioProtectionStatus** attribute for both the involved protected and protecting units shall indicate No Request, on the contrary the exercise result will indicate a denied value.";

6.5 Definiciones de parámetros

6.5.1 Parámetro de estado de protección radioeléctrica

```
radioProtectionStatusParameter PARAMETER
CONTEXT EVENT-INFO;
WITH SYNTAX SDHRadioProtASN1.RadioProtectionStatusParameter;
BEHAVIOUR radioProtectionStatusParameterBeh;
REGISTERED AS {g774-8Parameter 1 } ;
```

```
radioProtectionStatusParameterBeh BEHAVIOUR
DEFINED AS
```

"This parameter is included in the additional info parameters of the protection switching reporting notification.

The **protectionSwitchReporting** notification is emitted from the **sdhRadioProtectionGroup** object only in the following cases:

- a) when a failed protection switch request (an automatic request that cannot be satisfied) occurs and the severity of the alarm causing the request is **highBER** or **signalFail**.
- b) as a consequence of invoked or released switch requests sent by operator commands and successfully accepted.
- c) when a hardware forcing is performed or released locally on the NE.
- d) when a previously invoked manual switch is released by an automatic switch request.";

6.6 Definiciones de vinculaciones de nombres

6.6.1 augSink

```
augSink-msTcTTPSink NAME BINDING
SUBORDINATE OBJECT CLASS "Recommendation G.774":augSink AND SUBCLASSES;
NAMED BY
SUPERIOR OBJECT CLASS msTcTTPSink AND SUBCLASSES;
WITH ATTRIBUTE "Recommendation G.774":augId ;
BEHAVIOUR augSink-msTcTTPSinkBeh;
REGISTERED AS {g774-8NameBinding 5 } ;
```

augSink-msTcTTPSinkBeh BEHAVIOUR

DEFINED AS

"The subordinate managed objects are instantiated when the radio protection switching function is present.";

6.6.2 augSource

augSource-msTcTTPSource NAME BINDING

SUBORDINATE OBJECT CLASS "Recommendation G.774":augSource AND SUBCLASSES;

NAMED BY

SUPERIOR OBJECT CLASS msTcTTPSource AND SUBCLASSES;

WITH ATTRIBUTE "Recommendation G.774": augId ;

BEHAVIOUR augSource-msTcTTPSourceBeh;

REGISTERED AS {g774-8NameBinding 6 } ;

augSource-msTcTTPSourceBeh BEHAVIOUR

DEFINED AS

"The subordinate managed objects are instantiated when the radio protection switching function is present.";

6.6.3 msTcCTPSink

msTcCTPSink-rsTTPSink NAME BINDING

SUBORDINATE OBJECT CLASS msTcCTPSink AND SUBCLASSES;

NAMED BY SUPERIOR OBJECT CLASS "Recommendation G.774":rsTTPSink AND SUBCLASSES;

WITH ATTRIBUTE "Recommendation G.774": msCTPId ;

BEHAVIOUR msTcCTPSink-rsTTPSinkBeh;

REGISTERED AS {g774-8NameBinding 7 } ;

msTcCTPSink-rsTTPSinkBeh BEHAVIOUR

DEFINED AS

"The subordinate managed objects are instantiated when the radio protection switching function is present. Instances of this object may also be instantiated when other types of tandem connection protections in multiplex section layer are present.";

6.6.4 msTcCTP Source

msTcCTPSource-rsTTPSource NAME BINDING

SUBORDINATE OBJECT CLASS msTcCTPSource AND SUBCLASSES;

NAMED BY SUPERIOR OBJECT CLASS "Recommendation G.774": rsTTPSource AND SUBCLASSES;

WITH ATTRIBUTE "Recommendation G.774": msCTPId ;

BEHAVIOUR msTcCTPSource-rsTTPSourceBeh;

REGISTERED AS {g774-8NameBinding 8 } ;

msTcCTPSource-rsTTPSourceBeh BEHAVIOUR

DEFINED AS

"The subordinate managed objects are instantiated when the radio protection switching function is present. Instances of this object may also be instantiated when other types of tandem connection protections in multiplex section layer are present.";

6.6.5 msTcTTP Sink

msTcTTPSink-sdhNE NAME BINDING

SUBORDINATE OBJECT CLASS msTcTTPSink AND SUBCLASSES;

NAMED BY SUPERIOR OBJECT CLASS "Recommendation G.774":sdhNE;

WITH ATTRIBUTE "Recommendation G.774": msTTPId ;

BEHAVIOUR msTcTTPSink-sdhNEBeh;

REGISTERED AS {g774-8NameBinding 9 } ;

**msTcTTPSink-sdhNEBeh BEHAVIOUR
DEFINED AS**

"The subordinate managed objects are instantiated when the radio protection switching function is present. Instances of this object may also be instantiated when other types of tandem connection protections in multiplex section layer are present.";

6.6.6 msTcTTP Source

msTcTTPSource-sdhNE NAME BINDING

**SUBORDINATE OBJECT CLASS msTcTTPSource AND SUBCLASSES;
NAMED BY SUPERIOR OBJECT CLASS "Recommendation G.774":sdhNE;
WITH ATTRIBUTE "Recommendation G.774":msTTPId ;
BEHAVIOUR msTcTTPSource-sdhNEBeh;**

REGISTERED AS {g774-8NameBinding 10 } ;

msTcTTPSource-sdhNEBeh BEHAVIOUR

DEFINED AS

"The subordinate managed objects are instantiated when the radio protection switching function is present. Instances of this object may also be instantiated when other types of tandem connection protections in multiplex section layer are present.";

6.6.7 vc4HopcTTP Sink

vc4HopcTTPSink-sdhNE NAME BINDING

**SUBORDINATE OBJECT CLASS vc4HopcTTPSink AND SUBCLASSES;
NAMED BY SUPERIOR OBJECT CLASS "Recommendation G.774":sdhNE;
WITH ATTRIBUTE "Recommendation G.774":vc4TTPId ;
BEHAVIOUR vc4HopcTTPSink-sdhNEBeh;**

REGISTERED AS {g774-8NameBinding 11 } ;

vc4HopcTTPSink-sdhNEBeh BEHAVIOUR

DEFINED AS

"The subordinate managed objects are instantiated when the radio protection switching function is present. Instances of this object may also be instantiated when other types of tandem connection protections in multiplex section layer are present.";

6.6.8 vc4HopcTTP Source

vc4HopcTTPSource-sdhNE NAME BINDING

**SUBORDINATE OBJECT CLASS vc4HopcTTPSource AND SUBCLASSES;
NAMED BY SUPERIOR OBJECT CLASS "Recommendation G.774":sdhNE;
WITH ATTRIBUTE "Recommendation G.774":vc4TTPId ;
BEHAVIOUR vc4HopcTTPSource-sdhNEBeh;**

REGISTERED AS {g774-8NameBinding 12 } ;

vc4HopcTTPSource-sdhNEBeh BEHAVIOUR

DEFINED AS

"The subordinate managed objects are instantiated when the radio protection switching function is present. Instances of this object may also be instantiated when other types of tandem connection protections in multiplex section layer are present.";

6.6.9 au4HopcCTPSink

au4HopcCTPSink-augSink NAME BINDING

**SUBORDINATE OBJECT CLASS au4HopcCTPSink AND SUBCLASSES;
NAMED BY SUPERIOR OBJECT CLASS "Recommendation G.774":augSink AND SUBCLASSES;
WITH ATTRIBUTE "Recommendation G.774":au4CTPID ;
BEHAVIOUR au4HopcCTPSink-augSinkBeh;**

REGISTERED AS {g774-8NameBinding 13 } ;

**au4HopcCTPSink-augSinkBeh BEHAVIOUR
DEFINED AS**

"The subordinate managed objects are instantiated when the radio protection switching function is present. Instances of this object may also be instantiated when other types of tandem connection protections in multiplex section layer are present.";

6.6.10 au4HopcCTP Source

**au4HopcCTPSource-augSource NAME BINDING
SUBORDINATE OBJECT CLASS au4HopcCTPSource AND SUBCLASSES;
NAMED BY SUPERIOR OBJECT CLASS "Recommendation G.774":augSource AND
SUBCLASSES;
WITH ATTRIBUTE "Recommendation G.774": au4CTPId ;
BEHAVIOUR au4HopcCTPSource-augSourceBeh;
REGISTERED AS {g774-8NameBinding 14 } ;**

**au4HopcCTPSource-augSourceBeh BEHAVIOUR
DEFINED AS**

"The subordinate managed objects are instantiated when the radio protection switching function is present. Instances of this object may also be instantiated when other types of tandem connection protections in multiplex section layer are present.";

6.7 Producciones ASN.1 de soporte

**SDHRadioProtASN1 {itu-t(0) recommendation(0) g(7) g774(774) hyphen(127)
sdhRadioIM(8) informationModel(0) asn1Module(2) sdhRadioProtASN1(1)}**

DEFINITIONS IMPLICIT TAGS ::=

BEGIN

-- EXPORTS everything

IMPORTS

RelativeDistinguishedName

FROM

InformationFramework {joint-iso-ccitt ds(5) modules(1) informationFramework(1)}

NameType

FROM

ASN1DefinedTypesModule {itu-t(0)

recommendation(0) m(13) gnm(3100) informationModel(0)

asn1Modules(2) asn1DefinedTypesModule(0)}

ProtectionEntity,

ResourcePointer,

RequestSource,

InvokeExerciseArg

**FROM SDHProtASN1 { itu-t(0) recommendation(0) g(7) g774(774) hyphen(127) sdhProt(03)
informationModel(0) asn1Module(2) sdhmsp(0) };**

-- supporting productions

Boolean ::= BOOLEAN

Integer ::= INTEGER

InvokeRadioExerciseArg ::= InvokeExerciseArg

InvokeRadioExerciseReply ::= SET OF SEQUENCE {

exercisedPU RelativeDistinguishedName,

exerciseResult SEQUENCE OF SingleExerciseResult}

```

SingleExerciseResult ::= SEQUENCE {
    protectionUnit      RelativeDistinguishedName,
    result              Result }

Result ::= ENUMERATED { success (0), denied (1), failed (2) }
Privileged ::= CHOICE {
    noBridge            [0] NULL,
    privilegedUnit      [1] RelativeDistinguishedName
}

RadioProtectionStatusParameter ::= RPSSummaryStatus

SDHRRadioResourcePointer ::= ResourcePointer ( WITH COMPONENTS { ..., objectInstances (SIZE(1)) })

RPSSummaryStatus ::= SEQUENCE {
    statusOfRxProtectionSwitches  StatusOfRxProtectionSwitches,
    channelStatus                  ChannelStatus
}

StatusOfRxProtectionSwitches ::= SET OF SEQUENCE {
    protectingSectionId      RelativeDistinguishedName,
    protectingSectionStatus  ProtectingSectionStatus
}

ProtectingSectionStatus ::= CHOICE {
    extraTraffic            [0] NULL,
    protectedUnit          [1] RelativeDistinguishedName
}

ChannelStatus ::= SET OF SEQUENCE {
    protUnitId              RelativeDistinguishedName,
    protUnitStatus          ProtUnitStatus
}

ProtUnitStatus ::= SEQUENCE {
    channelASRequest        ChannelASRequest,
    radioSwitchStatus       RadioSwitchStatus
}

ChannelASRequest ::= ENUMERATED { noOne(0), waitToRestore(1), earlyWarning(2),
    lowBER(3), highBER(4), signalFail(5) }
RadioSwitchStatus ::= ENUMERATED { noRequest(0), manualSwitch(1),
    forcedSwitch(2), lockout(3), hwForcing(4) }

RadioProtectionStatus ::= SEQUENCE {
    protectionUnitStatus     [0] ProtUnitStatus,
    associatedChannel         [1] AssociatedChannel,
    requestSource            [2] RequestSource OPTIONAL
}

AssociatedChannel ::= CHOICE {
    itself                  [0] NULL,
    fromPU                  [1] RelativeDistinguishedName,
    toPU                    [2] RelativeDistinguishedName
}

END

```

APÉNDICE I

Figuras

Los diagramas de denominación y de herencia se representan en las figuras I.1 a I.8.

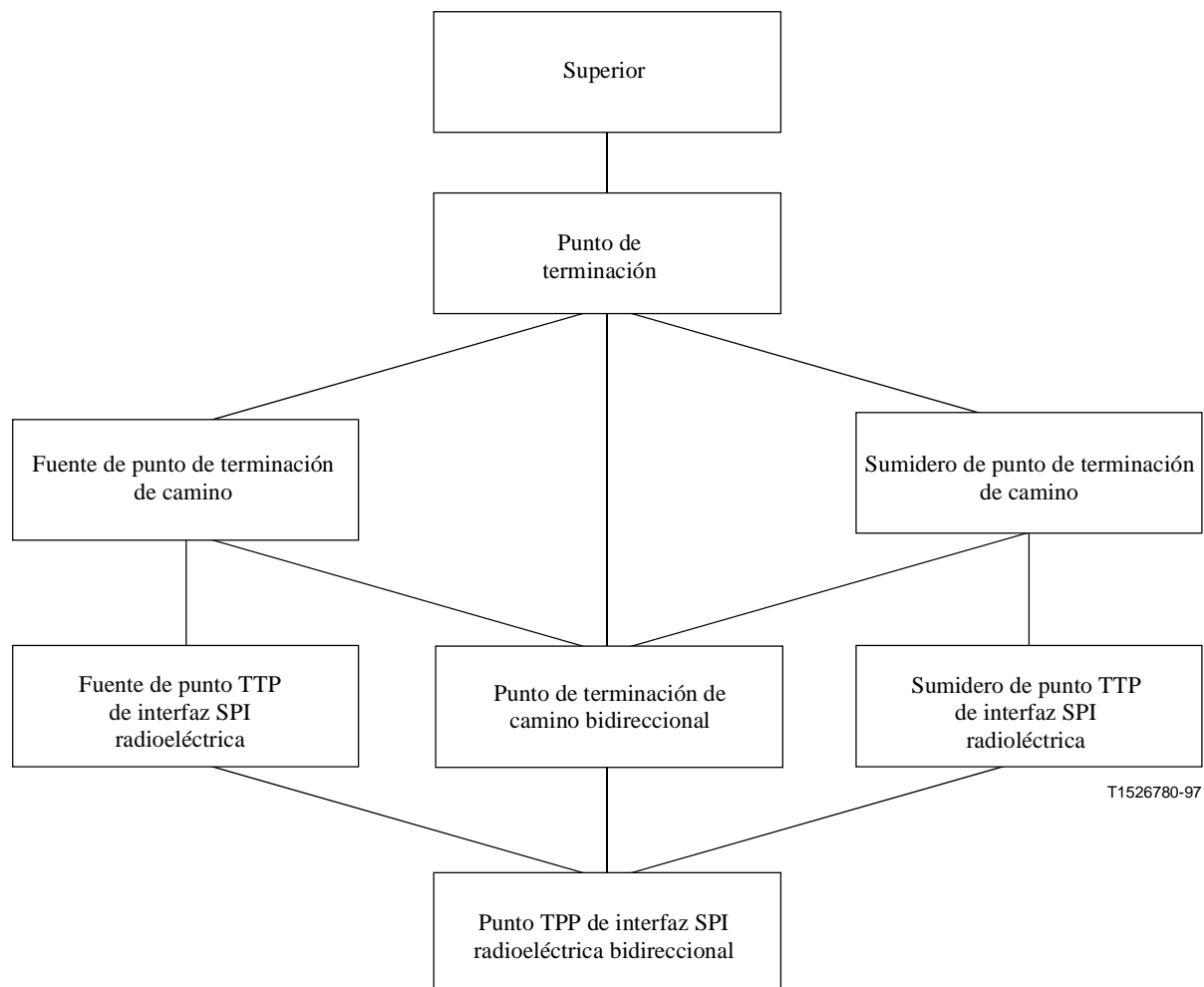
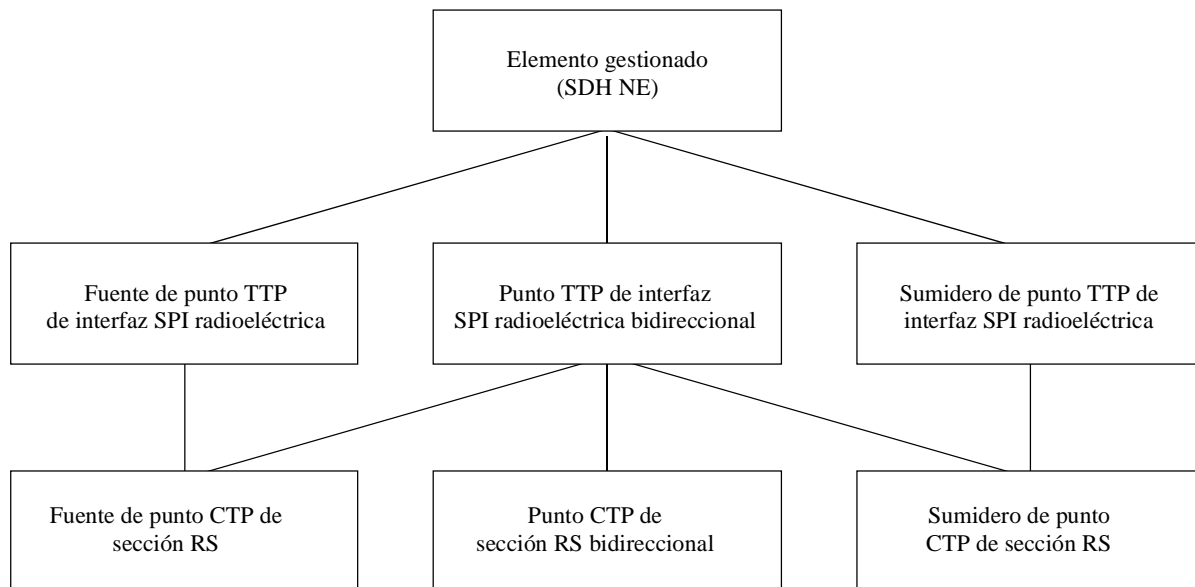
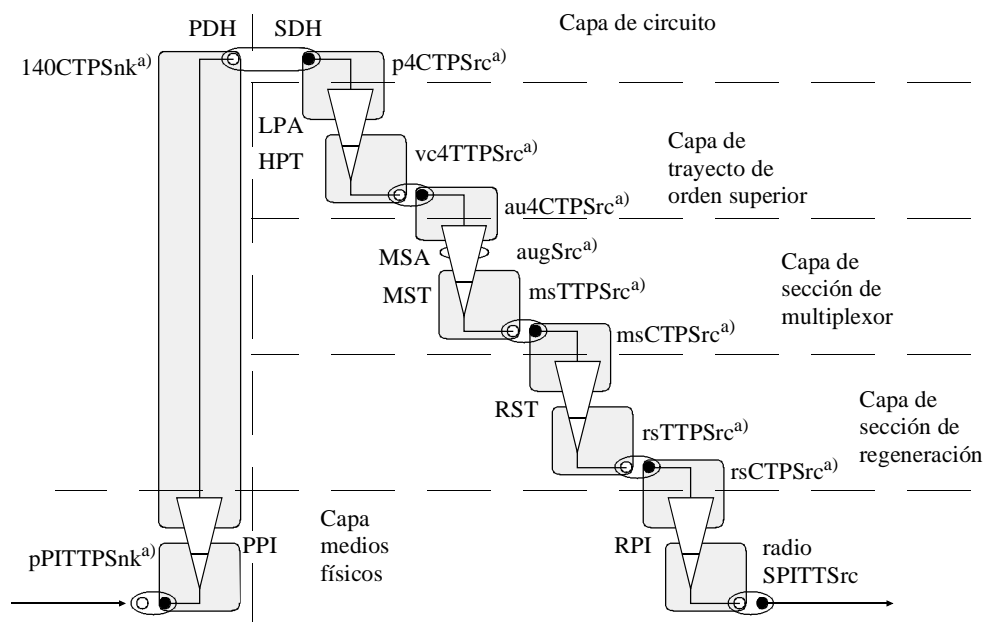


Figura I.1/G.774.8 – Herencia de objetos de fragmento radioeléctrico

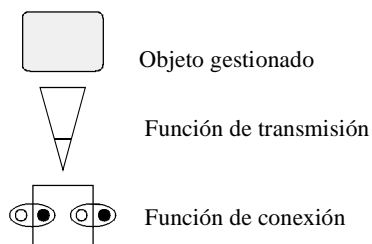


T1526790-97

Figura I.2/G.774.8 – Denominación de objetos de fragmento radioeléctrico

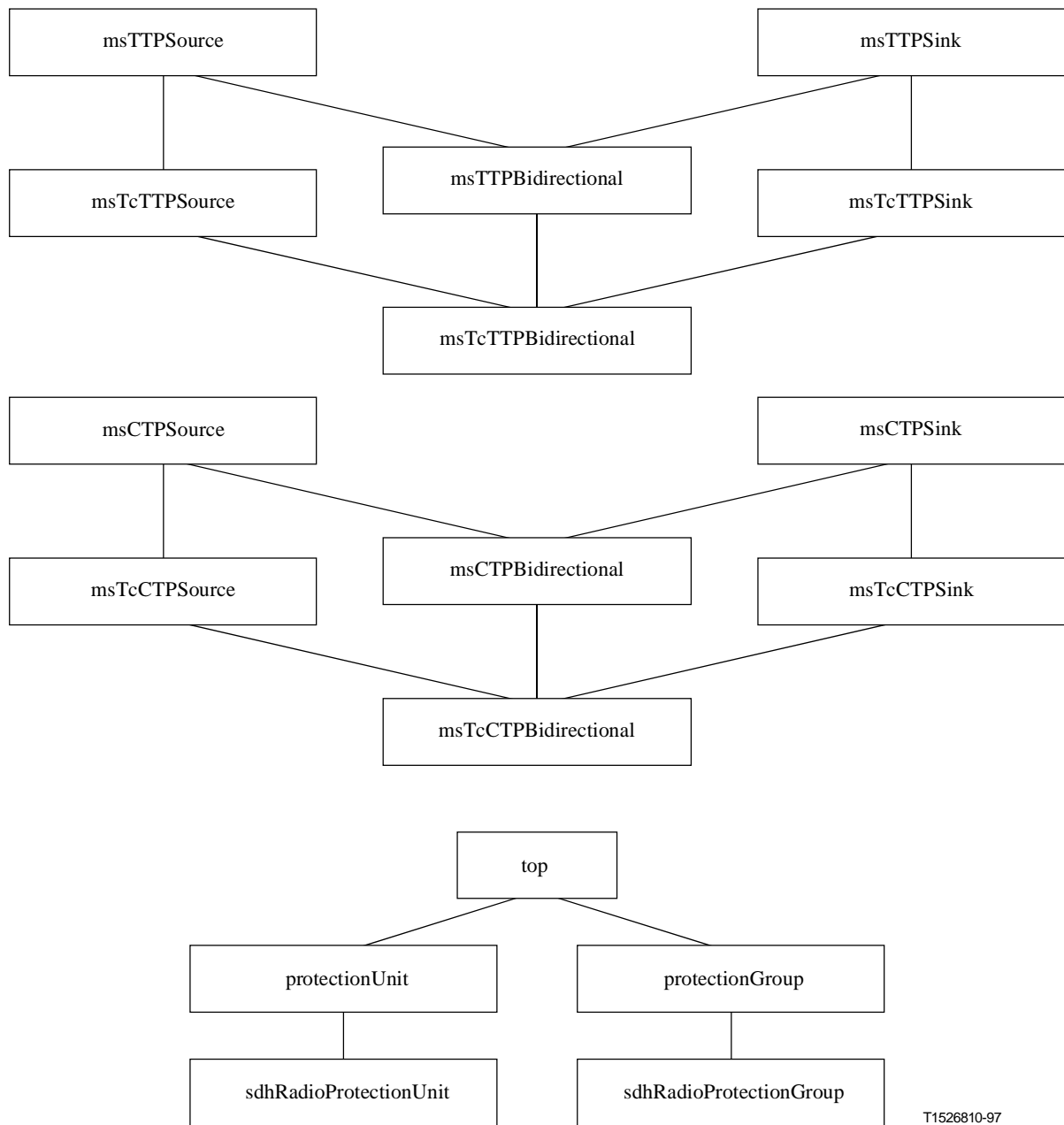


T1526800-97



a) No definido en esta Recomendación.

Figura I.3/G.774.8 – Ejemplo: Señales a 140 Mbit/s multiplexadas en señal STM-1



T1526810-97

Figura I.4/G.774.8 – Diagrama de herencia de protección radioeléctrica SDH

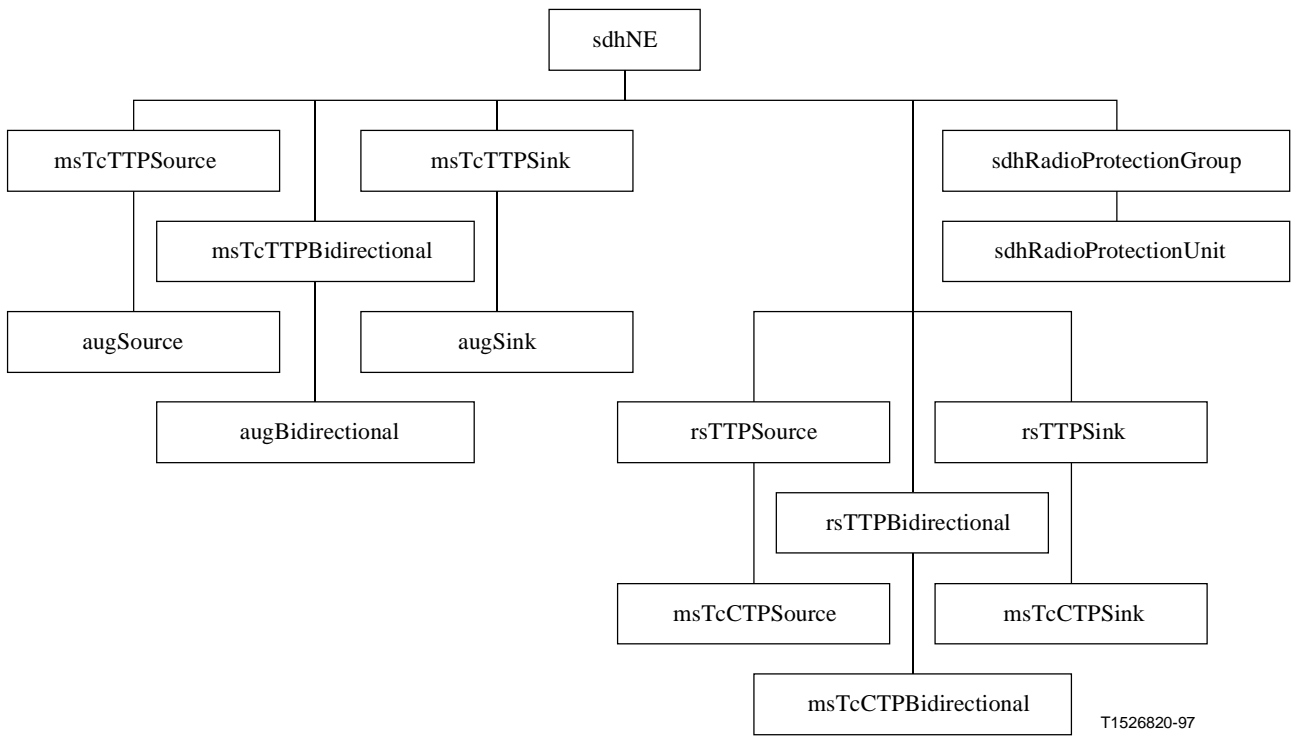


Figura I.5/G.774.8 – Diagrama de denominación de protección radioeléctrica SDH

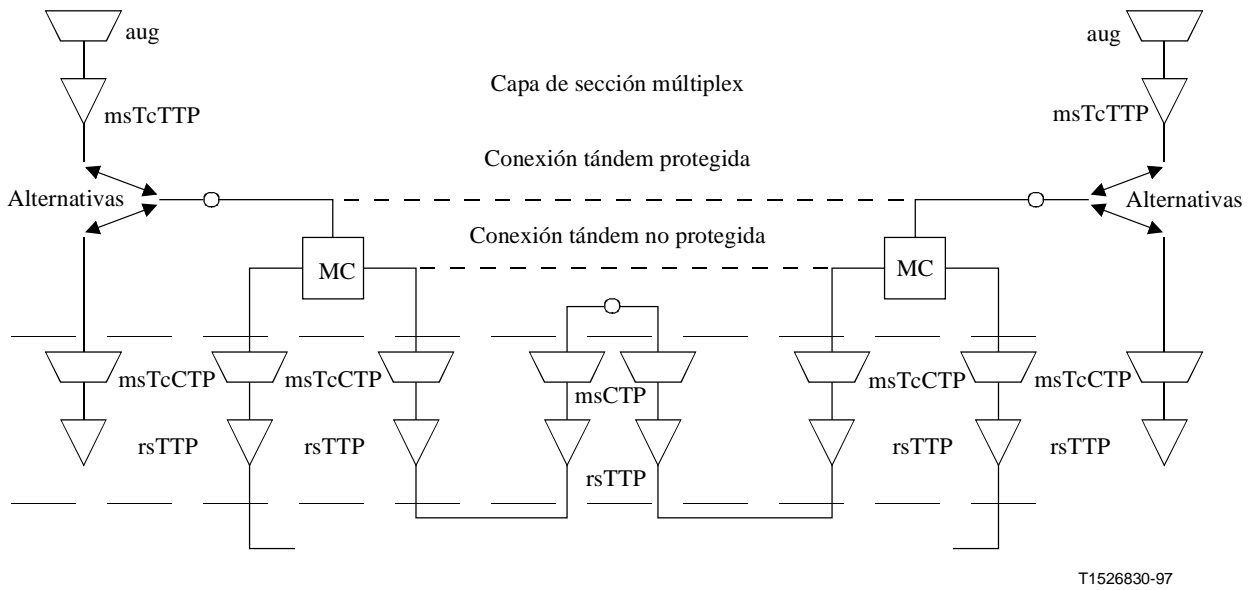
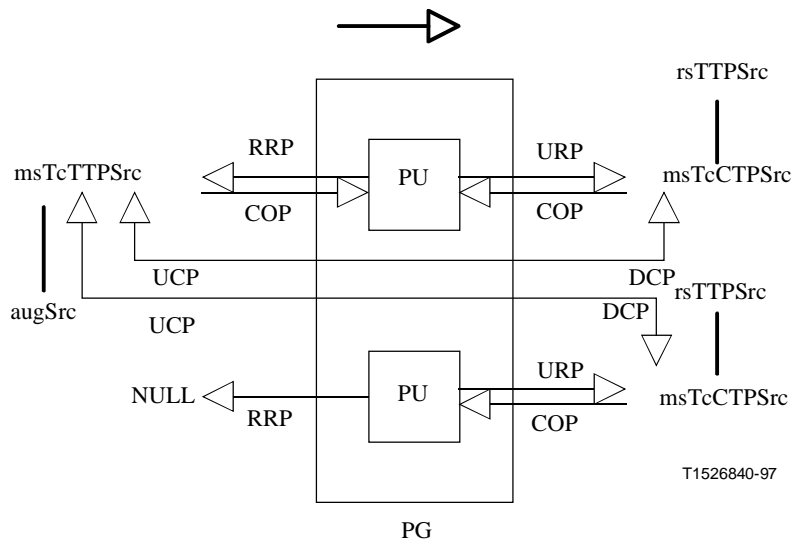


Figura I.6/G.774.8 – Aplicaciones RPS para protección de conexión en cascada de MS



- | | |
|---------|--|
| SK | Sumidero (<i>sink</i>) |
| Src | Fuente (<i>source</i>) |
| COP | Puntero de objeto en conexión (<i>cross connection</i>) |
| RRP | Puntero de recurso fiable (<i>reliable resource pointer</i>) |
| PU | Unidad de protección (<i>protection unit</i>) |
| PG | Grupo de protección (<i>protection group</i>) |
| URP | Puntero de recurso no fiable (<i>unreliable resource pointer object pointer</i>) |
| UCP/DCP | Puntero de conectividad flujo arriba/abajo (<i>up/downstream connectivity pointer</i>) |

Figura I.7/G.774.8 – Ejemplo: Sección radioeléctrica = sección múltiplex de protección 1 + 1 – extremo fuente

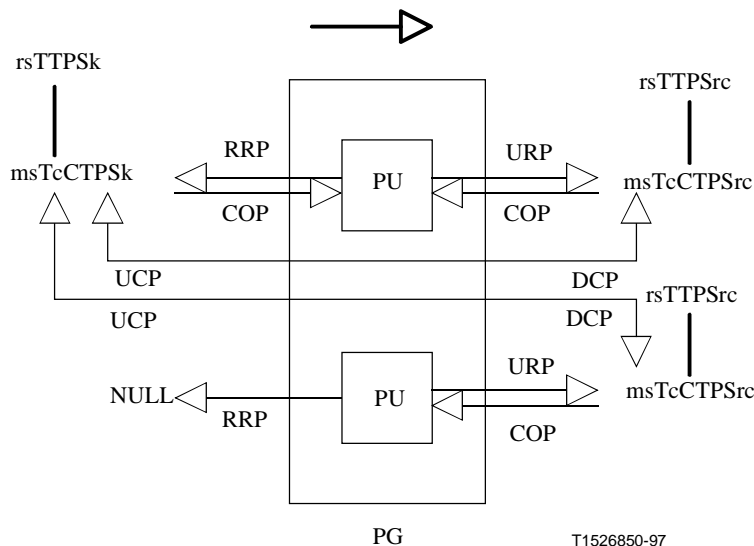


Figura I.8/G.774.8 – Ejemplo: Sección radioeléctrica = conexión en cascada de secciones de regeneración de protección 1 + 1 – extremo fuente

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