UNIÓN INTERNACIONAL DE TELECOMUNICACIONES

# UIT-T                                    G.774.8

SECTOR DE NORMALIZACIÓN
DE LAS TELECOMUNICACIONES
DE LA UIT

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

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

# Gestión de la jerarquía digital síncrona desde el punto de vista de los elementos de red de sistemas de relevadores radioeléctricos

Recomendación UIT-T G.774.8

(Anteriormente Recomendación del CCITT)

# RECOMENDACIONES DE LA SERIE G DEL UIT-T

## SISTEMAS Y MEDIOS DE TRANSMISIÓN, SISTEMAS Y REDES DIGITALES

*Para más información, véase la Lista de Recomendaciones del UIT-T.*

# RECOMENDACIÓN UIT-T G.774.8

## GESTIÓN DE LA JERARQUÍA DIGITAL SÍNCRONA DESDE EL PUNTO DE VISTA DE LOS ELEMENTOS DE RED DE SISTEMAS DE RELEVADORES RADIOELÉCTRICOS

**Resumen**

Esta Recomendación proporciona un modelo de información para elementos de red de relevadores radioeléctricos de la jerarquía digital síncrona (SDH). Este modelo describe las clases de objeto gestionado y sus propiedades para la interfaz física síncrona radioeléctrica y la función de protección de secciones que tengan dicha interfaz física. Estos objetos son útiles para describir el intercambio de información a través de las interfaces definidas en la Recomendación M.3010 [2] Arquitectura de la red de gestión de las telecomunicaciones (RGT) para la gestión de elementos de red de relevadores radioeléctricos.

**Palabras clave**

Acción, ASN.1, atributo, clase de objeto gestionado, jerarquía digital síncrona, modelo de información, notificación, sistemas digitales de relevadores radioeléctricos (DRRS).

PREFACIO

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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 G.774.8

## GESTIÓN DE LA JERARQUÍA DIGITAL SÍNCRONA DESDE EL PUNTO DE VISTA DE LOS ELEMENTOS DE RED DE SISTEMAS DE RELEVADORES RADIOELÉCTRICOS

*(Ginebra, 1997)*

La UIT-T,

*considerando*

a)     que la Recomendación G.707 es una especificación de la jerarquía digital síncrona (SDH) y de la interfaz de nodo de red (NNI) ;

b)     que las Recomendaciones G.783 y G.784 forman un conjunto coherente de especificaciones para las funciones y gestión de equipos múltiplex de la jerarquía digital síncrona;

c)     que la Recomendación M.3010 define los principios de la red de gestión de las telecomunicaciones;

d)     que la Recomendación G.773 define las series de protocolos para las interfaces Q;

e)     que la Recomendación M.3100 define un modelo genérico de información de red para el intercambio de información de gestión;

f)     que la Recomendación G.774 define un modelo de información de gestión de la jerarquía digital síncrona desde el punto de vista de elementos de red,

*recomienda*

que la gestión de equipos de jerarquía digital síncrona de relevadores radioeléctricos  se realice utilizando el modelo de información definido de acuerdo con las especificaciones detalladas de esta Recomendación.

## 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 red digital síncrona (SDH). 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 SDH. Estos objetos son importantes para el intercambio de información entre interfaces normalizadas definidas en la Recomendación M.3010 sobre arquitectura de la RGT [2].

## 1.1     Estructura de la Recomendación

Las cláusulas 5 y 6 describen el modelo de información utilizando los mecanismos de notación definidos en la Recomendación X.722 : directrices para la definición de objetos gestionados [6]. Las subcláusulas 5.6 y 6.7 contienen las definiciones sintácticas de la información transportada en el protocolo, escritas en la notación de sintaxis abstracta 1 (ASN.1), definida en la

Recomendación X.208 [7]. La denominación y la herencia se muestran en forma de diagramas en el apéndice informativo I.

## 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.

[1]     Recomendación UIT-T G.707 (1996), *Interfaz de nodo de red para la jerarquía digital síncrona*.

[2]     Recomendación UIT-T M.3010 (1996), *Principios para una red de gestión de las telecomunicaciones*.

[3]     Recomendación UIT-T M.3100 (1995), *Modelo genérico de información de red*.

[4]     Recomendación UIT-T G.783 (1997), *Características de los equipos de la jerarquía digital síncrona*.

[5]     Recomendación UIT-T G.784 (1994), *Gestión de jerarquía digital síncrona*.

[6]     Recomendación X.722 del CCITT (1992), *Tecnología de la información – Interconexión de sistemas abiertos – Estructura de la información de gestión: Directrices para la definición de objetos gestionados*.

[7]     Recomendación X.208 del CCITT (1988), *Especificación de la notación de sintaxis abstracta uno*.

[8]     Recomendación X.720 del CCITT (1992), *Tecnología de la información – Interconexión de sistemas abiertos – Estructura de la información de gestión: Modelo de información de gestión*.

[9]     Recomendación G.774 del CCITT (1992)/Corr.1 (1996), *Modelo de información de gestión de la jerarquía digital síncrona desde el punto de vista de los elementos de red*.

[10]     Recomendación UIT-T G.803 (1997), *Arquitecturas de redes de transporte basadas en la jerarquía digital síncrona*.

[11]     Recomendación UIT-T X.721 (1992), *Tecnología de la información – Interconexión de sistemas abiertos – Estructura de la información de gestión: Definición de la información de gestión*.

## 3 Definiciones

Ninguna.

## 4 Abreviaturas

En esta Recomendación se utilizan las siguientes siglas.

AIS          Señal de indicación de alarma (*alarm indication signal*)

AP           Punto de acceso (*access point*)

| CMIP | Protocolo de información de gestión común (*common management information protocol*) |
|---|---|
| CMIS | Servicios de información de gestión común (*common management information service*) |
| CP | Punto de conexión (*connection point*) |
| CTP | Punto de terminación de conexión (*connection termination point*) |
| DRR | Relevador radioeléctrico digital (*digital radio-relay*) |
| GTP | Punto de terminación de grupo (*group termination point*) |
| HPA | Adaptación de trayecto de orden superior (*higher order path adaptation*) |
| IA | Adaptador indirecto (*indirect adapter*) |
| IOS | Sección entre oficinas (*intra-office section*) |
| ISO | Organización Internacional de Normalización (*International Organization for Standardization*) |
| LOF | Pérdida de tramas (*loss of frame*) |
| LPA | Adaptación de trayecto de orden inferior (*lower order path adaptation*) |
| NE | Elemento de red (*network element*) |
| OS | Sistema de operación (*operation system*) |
| OSI | Interconexión de sistemas abiertos (*open systems interconection*) |
| PDH | Jerarquía digital plesiócrona (*plesiochronous digital hierarchy*) |
| Pkg | Paquete (*package*) |
| RF | Frecuencia radioeléctrica (*radio frequency*) |
| RGT | Red de gestión de las telecomunicaciones |
| RPS | Conmutación de protección radioeléctrica (*radio protection switching*) |
| RRR | Regenerador de relevador radioeléctrico (*radio-relay regenerator*) |
| RRT | Terminal de relevador radioeléctrico (*radio-relay terminal*) |
| RS | Sección de regenerador (*regenerator section*) |
| RSPI | Interfaz física síncrona radioeléctrica (*radio synchronous physical interface*) |
| SDH | Jerarquía digital síncrona (*synchronous digital hierarchy*) |
| Snk | Sumidero (*sink*) |
| Src | Fuente (*source*) |
| STM-n | Módulo n de transporte síncrono (*synchronous transport module n*) |
| STM-RR | Módulo de transporte síncrono para relevadores radioeléctricos sub-STM-1 (*synchronous transport module for sub-STM-1 radio-relay*) |
| TP | Punto de terminación (*termination point*) |
| TTP | Punto de terminación de camino (*trail termination point*) |
| UIT | Unión Internacional de Telecomunicaciones |
| VC-n | Contenedor virtual n (*virtual container n*) |

## 5 Fragmento de punto de terminación radioeléctrica de la SDH

Esta cláusula proporciona los objetos gestionados necesarios para modelizar interfaces físicas radioeléctricas de la SDH.

## 5.1    Definiciones de clases de objeto

### 5.1.1    Interfaz física síncrona radioeléctrica

Esta subcláusula describe las clases de objeto necesarias para modelizar la interfaz física Radioeléctrica de la SDH.

**radioSPITTPBidirectional MANAGED OBJECT CLASS**
**DERIVED FROM "Recommendation M.3100:1995":trailTerminationPointBidirectional,**
                                              **radioSPITTPSink,**
                                              **radioSPITTPSource;**
**REGISTERED AS { g774-8ObjectClass 1 };**


**radioSPITTPSink MANAGED OBJECT CLASS**
**DERIVED FROM "Recommendation M.3100:1995":trailTerminationPointSink;**
**CHARACTERIZED BY**
        **"Recommendation X.721":administrativeStatePackage,**
        **"Recommendation M.3100:1995":createDeleteNotificationsPackage,**
        **"Recommendation M.3100:1995":stateChangeNotificationPackage,**
        **"Recommendation M.3100:1995":tmnCommunicationsAlarmInformationPackage,**
        **radioSPIPackage,**
        **radioSPITTPSinkPkg  PACKAGE**
                **BEHAVIOUR**
                **radioSPITTPSinkPkgBehaviour BEHAVIOUR**
                        **DEFINED AS**
                                **"This managed object class represents the process of converting the incoming radio**
                                **frequency signal into an internal logic level STM-N signal and the recovering of the**
                                **timing from the incoming signal.**

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

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

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

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

                                **When an alarm is pending on an instance, its operationalState is disabled."**
**;;;;**
        **CONDITIONAL PACKAGES**
                **rxLOSNotificationPackage PRESENT IF "an instance supports it",**
                **demLOSNotificationPackage PRESENT IF "an instance supports it";**
**REGISTERED AS { g774-8ObjectClass 2 };**


**radioSPITTPSource MANAGED OBJECT CLASS**
**DERIVED FROM "Recommendation M.3100:1995":trailTerminationPointSource;**
**CHARACTERIZED BY**
        **"Recommendation X.721":administrativeStatePackage,**
        **"Recommendation M.3100:1995":createDeleteNotificationsPackage,**
        **"Recommendation M.3100:1995":stateChangeNotificationPackage,**
        **"Recommendation M.3100:1995":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 Definición de paquetes

atpcPackage PACKAGE
     ATTRIBUTES
        atpcEnabled GET-REPLACE;
REGISTERED AS { g774-8Package 1 };
radioSPIPackage        PACKAGE
  ATTRIBUTES
     radioSPITTPId        GET,
     radioFrequency       GET,
     "Recommendation G.774:1996":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 <u>OUT</u>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 <u>OUT</u>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};


## 5.4   Definiciones de vinculaciones de nombre

radioSPITTPSink-managedElement          NAME BINDING
  SUBORDINATE OBJECT CLASS          radioSPITTPSink AND SUBCLASSES;
  NAMED BY
  SUPERIOR OBJECT CLASS          "Recommendation M.3100:1995":managedElement AND
                                 SUBCLASSES;
  WITH ATTRIBUTE     radioSPITTPId;
  BEHAVIOUR
    radioSPITTPSink-managedElementBehaviour     BEHAVIOUR
    DEFINED AS
      "The subordinate managed object may be automatically instantiated when the superior managed
      object is instantiated, according to the make-up and mode of operation of the equipment."
    ;;
REGISTERED AS { g774-8NameBinding 1};


radioSPITTPSource-managedElement          NAME BINDING
  SUBORDINATE OBJECT CLASS          radioSPITTPSource AND SUBCLASSES;
  NAMED BY
  SUPERIOR OBJECT CLASS          "Recommendation M.3100:1995":managedElement AND
                                 SUBCLASSES;
  WITH ATTRIBUTE     radioSPITTPId;
  BEHAVIOUR
    radioSPITTPSource-managedElementBehaviour          BEHAVIOUR
    DEFINED AS
      "The subordinate managed object may be automatically instantiated when the superior managed
      object is instantiated, according to the make-up and mode of operation of the equipment."
    ;;
REGISTERED AS { g774-8NameBinding 2};


rsCTPSink-radioSPITTPSink          NAME BINDING
  SUBORDINATE OBJECT CLASS          "Recommendation G.774:1996":rsCTPSink AND SUBCLASSES;
  NAMED BY
  SUPERIOR OBJECT CLASS          radioSPITTPSink AND SUBCLASSES;
  WITH ATTRIBUTE     "Recommendation G.774:1996":rsCTPId;
  BEHAVIOUR
    rsCTPSink-radioSPITTPSinkBehaviour     BEHAVIOUR
    DEFINED AS
      "The subordinate managed object may be automatically instantiated when the superior managed
      object is instantiated, according to the make-up and mode of operation of the equipment."
    ;;

**REGISTERED AS {g774-8NameBinding 3};**

rsCTPSource-radioSPITTPSource        **NAME BINDING**
  **SUBORDINATE OBJECT CLASS**        **"Recommendation G.774:1996":rsCTPSource AND
                                   SUBCLASSES;**
  **NAMED BY**
  **SUPERIOR OBJECT CLASS**        radioSPITTPSource AND SUBCLASSES;**
  **WITH ATTRIBUTE**      "Recommendation G.774:1996":rsCTPId;**
  **BEHAVIOUR**
    **rsCTPSource-radioSPITTPSourceBehaviour**     **BEHAVIOUR**
    **DEFINED AS**
      **"The subordinate managed object may be automatically instantiated when the superior managed
      object is instantiated, according to the make-up and mode of operation of the equipment."**
  **;;**
**REGISTERED AS {g774-8NameBinding 4};**


## 5.5      Relaciones de objeto

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      ASN.1 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 modelizar la función de conmutación de protección radioeléctrica.

## 6.1 Definiciones de clases de objeto

## 6.1.1 Definiciones de objeto genérico

### 6.1.1.1 Grupo de protección radioeléctrica de la SDH

sdhRadioProtectionGroup MANAGED OBJECT CLASS
DERIVED FROM "Recommendation G.774.03:1996":protectionGroup;
    CHARACTERIZED BY
        sdhRadioProtectionGroupPkg PACKAGE
          BEHAVIOUR sdhRadioProtectionGroupBeh;
          ATTRIBUTES
              rpsSummaryStatus        GET,
              "Recommendation G.774.03:1996":protectionSwitchMode  GET,
              hitless GET;
          NOTIFICATIONS
              "Recommendation G.774.03:1996":protectionSwitchReporting
                            radioProtectionStatusParameter;;;
        CONDITIONAL PACKAGES
          "Recommendation G.774.03:1996":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.774.03:1996":protectionUnit;
 CHARACTERIZED BY
  sdhRadioProtectionUnitPkg PACKAGE
 BEHAVIOUR sdhRadioProtectionUnitBeh ;
 ATTRIBUTES
  "Recommendation G.774.03:1996":channelNumber  GET,
  radioProtectionStatus GET,
  "Recommendation G.774.03:1996":reliableResourcePointer PERMITTED VALUES
  SDHRadioProtASN1.SDHRadioResourcePointer,
  "Recommendation G.774.03:1996":unreliableResourcePointer PERMITTED VALUES
   SDHRadioProtASN1.SDHRadioResourcePointer ;;;
 CONDITIONAL PACKAGES
 "Recommendation G.774.03:1996":extraTrafficControlPkg  PRESENT IF " extra traffic may be
 suspended and resumed " ,
 privileged ChannelPkg
 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 objeto de protección de conexión en tándem MS

Esta subcláusula proporciona las clases de objeto necesarias para modelizar la protección de las
conexiones en tándem de sección múltiplex.

## 6.1.2.1    CTP de conexión en tándem MS

msTcCTPBidirectional   MANAGED OBJECT CLASS
 DERIVED FROM   "Recommendation G.774:1996":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.774:1996": msCTPSink ;
CHARACTERIZED BY
"Recommendation M.3100:1995": 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.774:1996": msCTPSource ;
        CHARACTERIZED BY
        "Recommendation M.3100:1995": 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 tándem MS

msTcTTPBidirectional    MANAGED OBJECT CLASS
        DERIVED FROM    "Recommendation G.774:1996": 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.774:1996": msTTPSink ;
        CHARACTERIZED BY
        "Recommendation M.3100:1995": 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.774:1996": msTTPSource ;
        CHARACTERIZED BY
        "Recommendation M.3100:1995": 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 objeto de protección de conexión de trayecto de orden superior

Esta subcláusula proporciona las clases de objeto necesarias para 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.774:1996":  au4CTPBidirectional,**
               **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.774:1996": au4CTPSink ;**
    **CHARACTERIZED BY**
    **"Recommendation M.3100:1995": 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.774:1996": au4CTPSource ;
    CHARACTERIZED BY
    "Recommendation M.3100:1995": 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.774:1996": vc4TTPBidirectional,
                    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.774:1996": vc4TTPSink ;**
     **CHARACTERIZED BY**
     **"Recommendation M.3100:1995": 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.774:1996": vc4TTPSource ;**
     **CHARACTERIZED BY**
     **"Recommendation M.3100:1995": 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 objeto de protección (mediante RPS) de camino de sección múltiple

### 6.1.4.1    CTP radioeléctrico no protegido

radioUnprotectedCTPBidirectional MANAGED OBJECT CLASS
    DERIVED FROM    "Recommendation M.3100:1995":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.3100:1995":connectionTerminationPointSink;
    CHARACTERIZED BY
        "Recommendation M.3100:1995":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.3100:1995":connectionTerminationPointSink;
    CHARACTERIZED BY
        "Recommendation M.3100:1995":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 con protección radioeléctrica

```
radioProtectedTTPBidirectional MANAGED OBJECT CLASS
      DERIVED FROM    "Recommendation M.3100:1995":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.3100:1995":trailTerminationPointSink;
      CHARACTERIZED BY
             "Recommendation M.3100:1995":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.3100:1995":trailTerminationPointSource;
      CHARACTERIZED BY
             "Recommendation M.3100:1995":crossConnectionPointerPackage,
             radioProtectedTTPSourcePkg PACKAGE
      BEHAVIOUR radioProtectedTTPSourceBeh;
      ATTRIBUTES
             radioProtectedTTPId       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 paquetes

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 continous 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 ASN1DefinedTypesModule.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 ASN1DefinedTypesModule.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    Definición 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 nombre

### 6.6.1 augSink

augSink-msTcTTPSink NAME BINDING
SUBORDINATE OBJECT CLASS "Recommendation G.774:1996":augSink AND SUBCLASSES;
    NAMED BY
     SUPERIOR OBJECT CLASS msTcTTPSink AND SUBCLASSES;
    WITH ATTRIBUTE "Recommendation G.774:1996":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.774:1996":augSource  AND SUBCLASSES;**
    **NAMED BY**
    **SUPERIOR OBJECT CLASS msTcTTPSource  AND SUBCLASSES;**
    **WITH ATTRIBUTE "Recommendation G.774:1996": 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.774:1996":rsTTPSink AND SUBCLASSES;**
    **WITH ATTRIBUTE "Recommendation G.774:1996": 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.774:1996": rsTTPSource AND SUBCLASSES;**
    **WITH ATTRIBUTE "Recommendation G.774:1996": 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.774:1996":sdhNE;**
    **WITH ATTRIBUTE "Recommendation G.774:1996": 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.774:1996":sdhNE;**
> **WITH ATTRIBUTE " Recommendation G.774:1996":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.774:1996":sdhNE;**
> **WITH ATTRIBUTE "Recommendation G.774:1996": 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.774:1996":sdhNE;**
> **WITH ATTRIBUTE "Recommendation G.774:1996": 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.774:1996":augSink AND SUBCLASSES;**
> **WITH ATTRIBUTE "Recommendation G.774:1996": 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.774:1996":augSource AND SUBCLASSES;**
      **WITH ATTRIBUTE "Recommendation G.774:1996": 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      ASN.1 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)}**

**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

SDHRadioResourcePointer ::= ResourcePointer (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

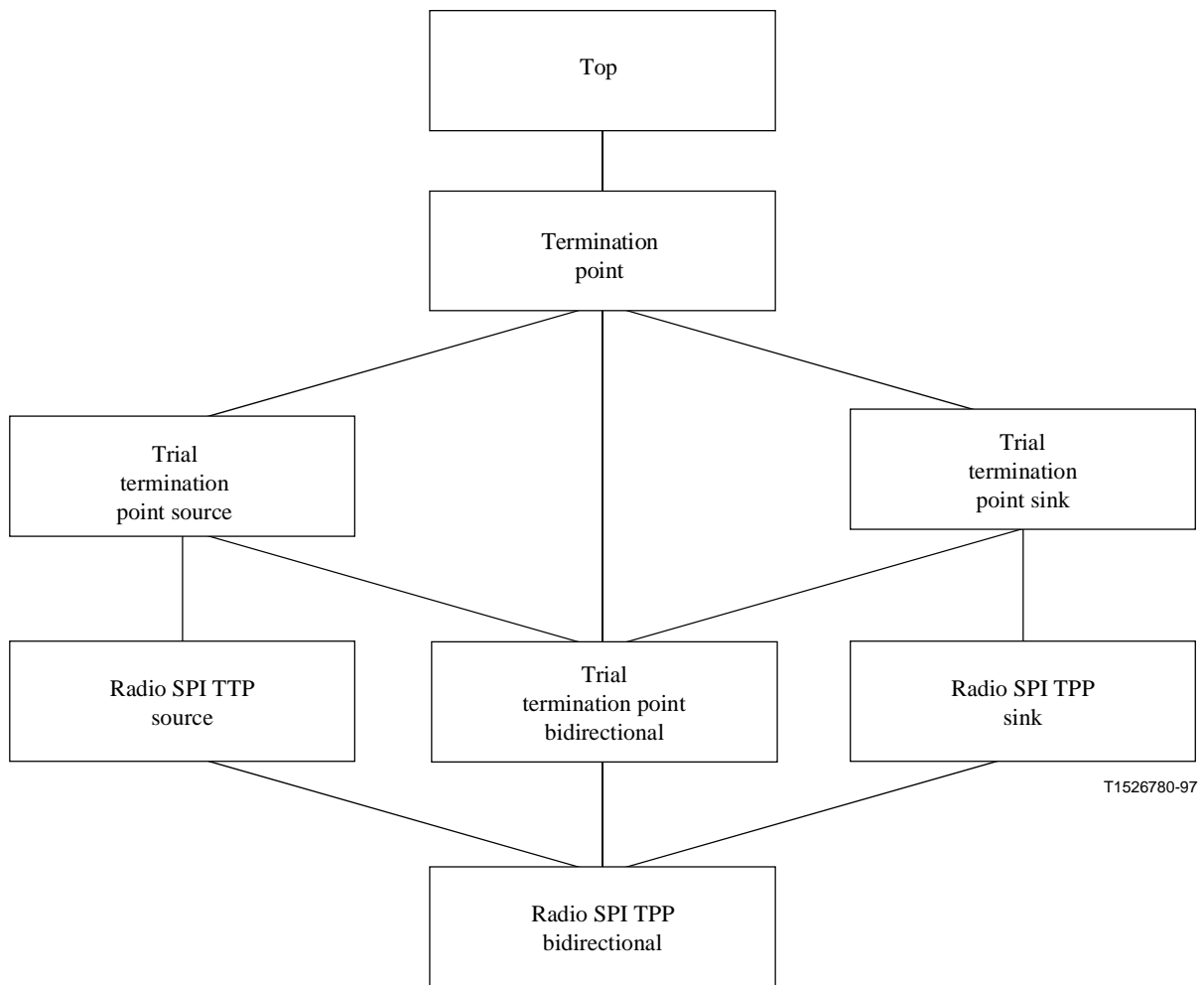Los diagramas de denominación y de herencia se representan en las figuras I.1 a I.8.

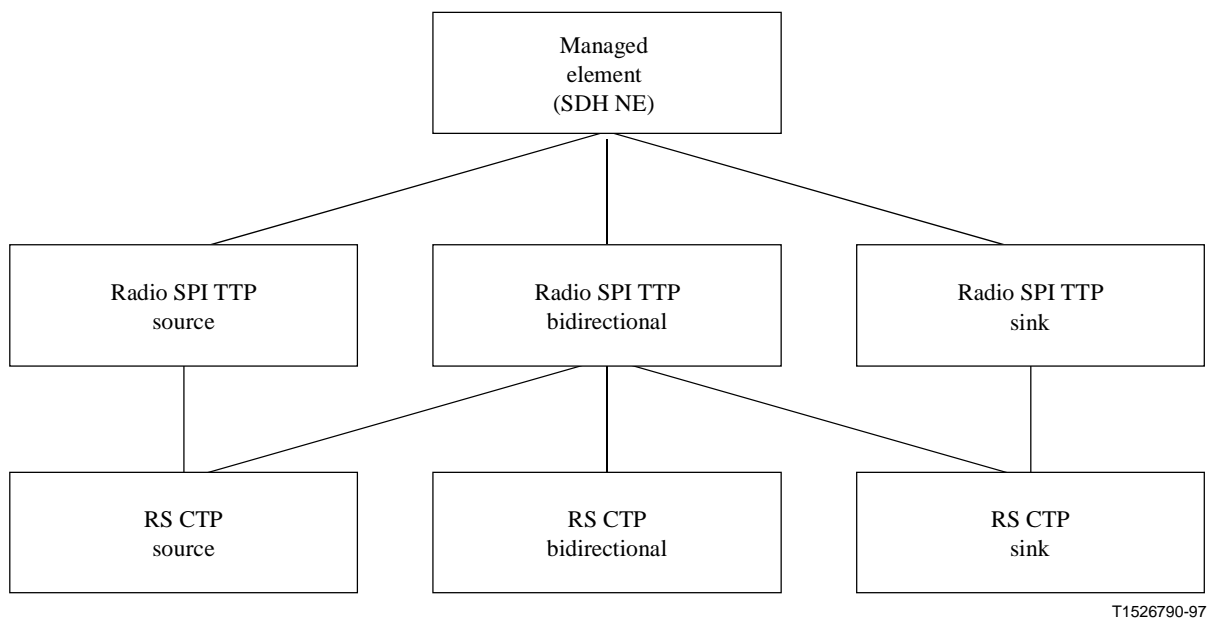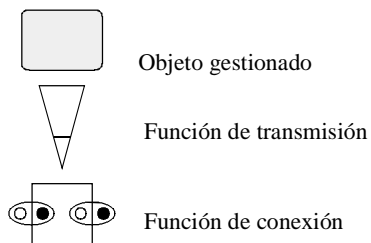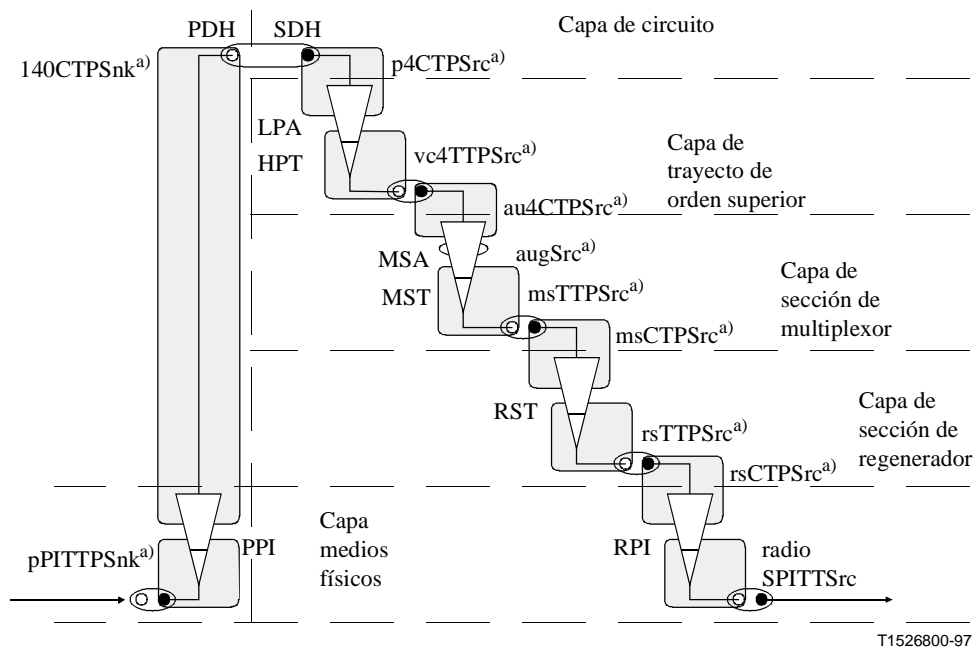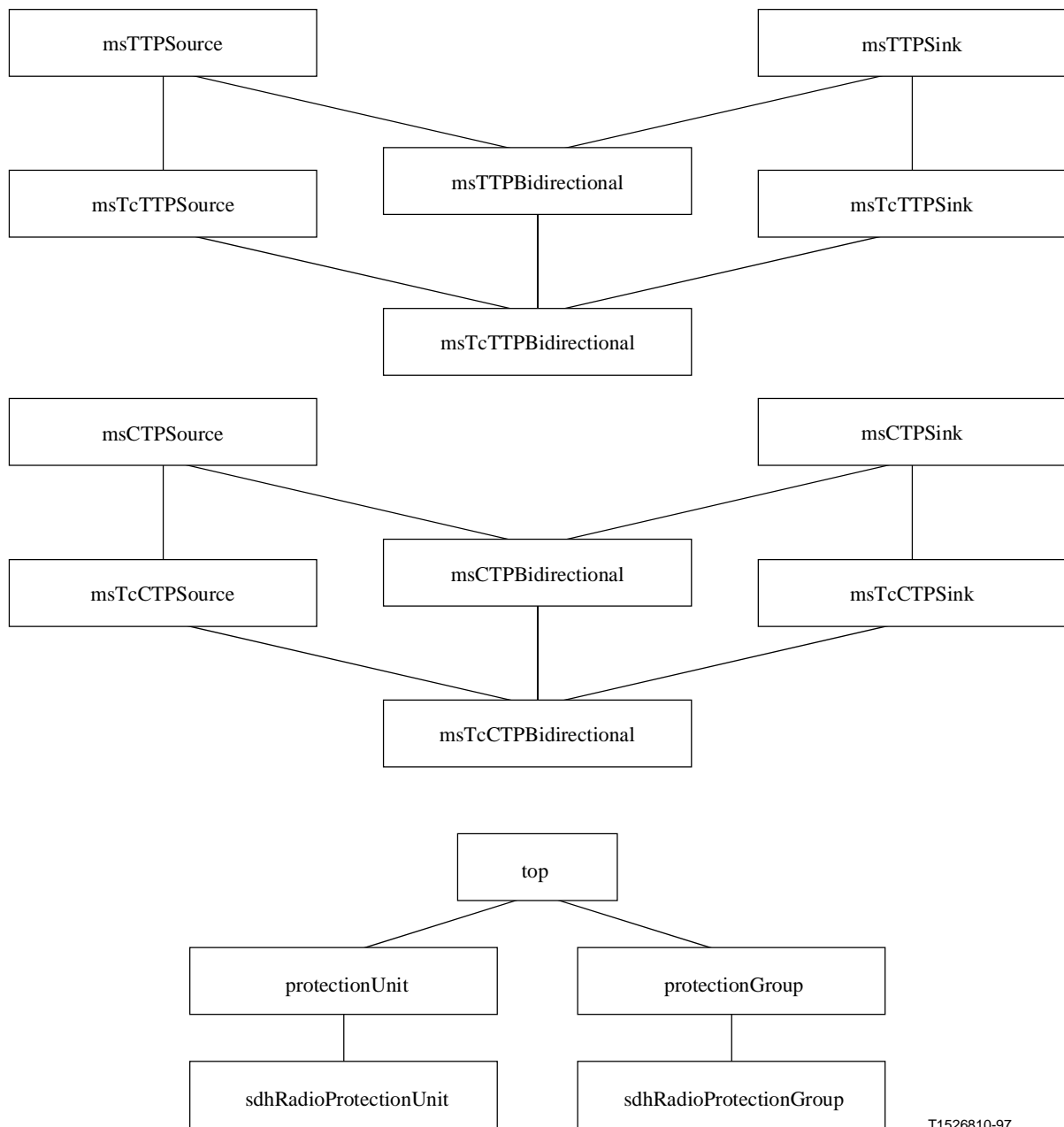**Figura I.1/G.774.8 – Herencia de objetos de fragmento radioeléctrico**



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

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

**Figura I.4/G.774.8 – Diagrama de herencia de protección radioeléctrica SDH**
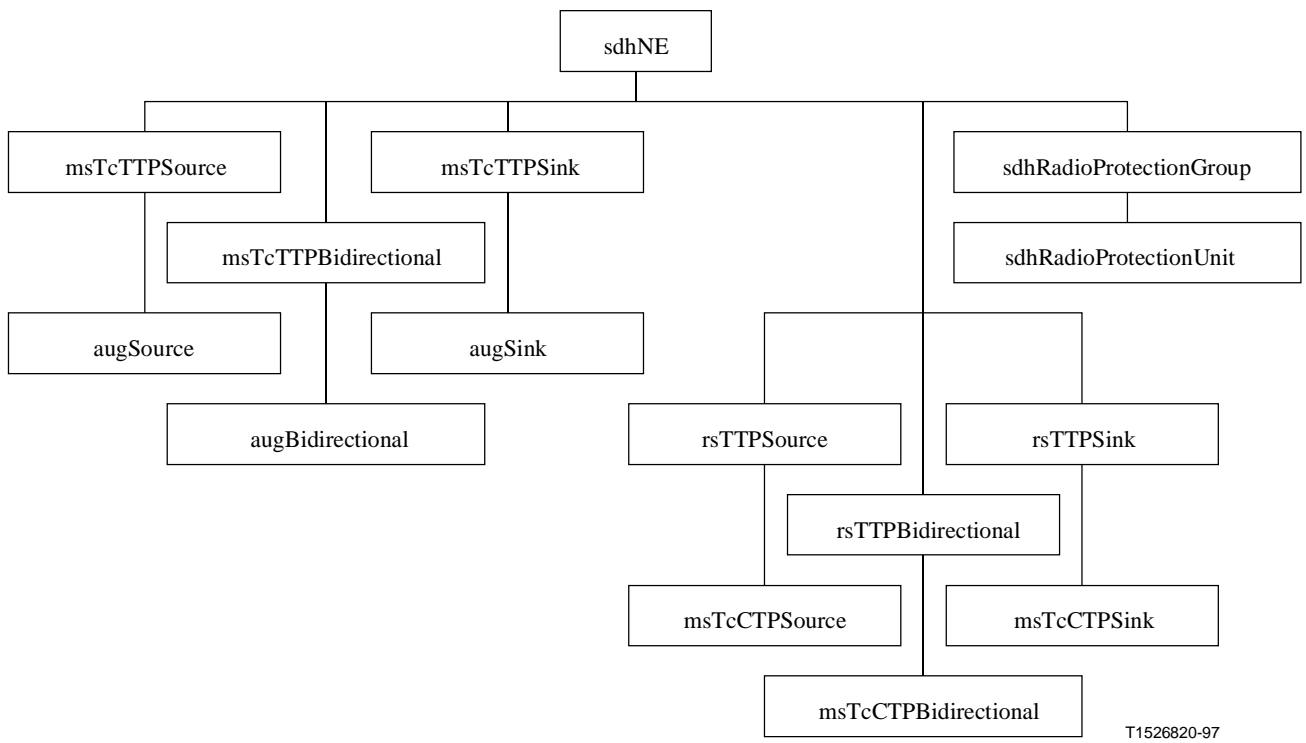
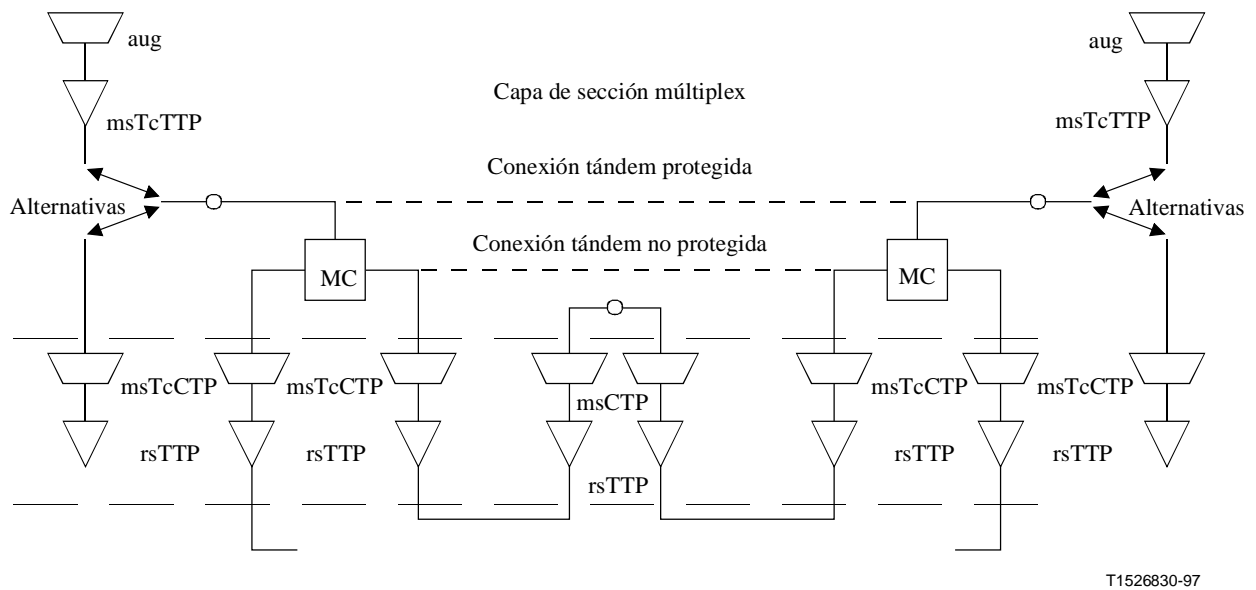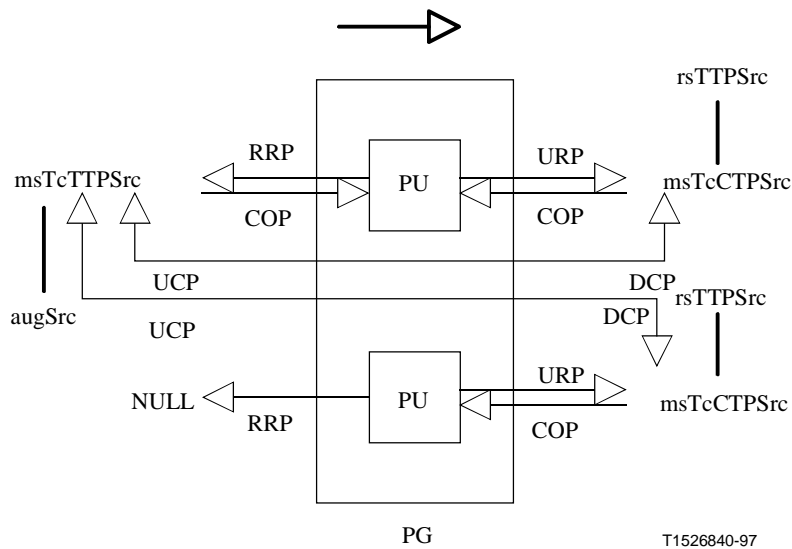**Figura I.5/G.774.8 – Diagrama de denominaciòn de protección radioeléctrica SDH**



**Figura I.6/G.774.8 – Aplicaciones RPS para protección de conexión tándem-MS**

rsTTPSrc

msTcTTPSrc          RRP          URP
                          PU
          COP                    COP          msTcCTPSrc

UCP                    DCP
augSrc          UCP                    DCP          rsTTPSrc

NULL          URP
                          PU          msTcCTPSrc
          RRP          COP

PG          T1526840-97

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

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

rsTTPSk                    rsTTPSrc

msTcCTPSk          RRP          URP
                          PU
          COP                    COP          msTcCTPSrc

UCP                    DCP
UCP                    DCP          rsTTPSrc

NULL          URP
                          PU          msTcCTPSrc
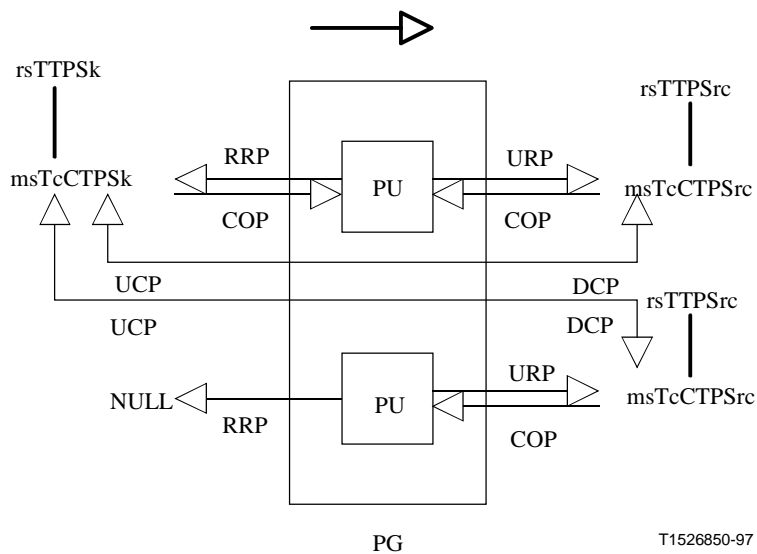          RRP          COP

PG          T1526850-97

**Figura I.8/G.774.8 – Ejemplo: Sección radioeléctrica = conexión tándem
de secciones de regenerador de protección 1 + 1 − extremo fuente**

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Serie C     Estadísticas generales de telecomunicaciones

Serie D     Principios generales de tarificación

Serie E     Explotación general de la red, servicio telefónico, explotación del servicio y factores humanos

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