



INTERNATIONAL TELECOMMUNICATION UNION

# ITU-T

TELECOMMUNICATION  
STANDARDIZATION SECTOR  
OF ITU

# G.774.03

**Corrigendum 1**  
(11/96)

SERIES G: TRANSMISSION SYSTEMS AND MEDIA,  
DIGITAL SYSTEMS AND NETWORKS

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

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Synchronous Digital Hierarchy (SDH) management  
of multiplex-section protection for the network  
element view

**Corrigendum 1**

ITU-T Recommendation G.774.03 – Corrigendum 1

(Previously CCITT Recommendation)

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**ITU-T RECOMMENDATION G.774.03**

**SYNCHRONOUS DIGITAL HIERARCHY (SDH) MANAGEMENT  
OF MULTIPLEX-SECTION PROTECTION FOR THE  
NETWORK ELEMENT VIEW**

**CORRIGENDUM 1**

**Source**

Corrigendum 1 to ITU-T Recommendation G.774.03 was prepared by ITU-T Study Group 15 (1993-1996) and was approved under the WTSC Resolution No. 1 procedure on the 8th of November 1996.

## FOREWORD

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The World Telecommunication Standardization Conference (WTSC), which meets every four years, establishes the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

The approval of Recommendations by the Members of the ITU-T is covered by the procedure laid down in WTSC Resolution No. 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

## NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

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## **Recommendation G.774.03**

# **SYNCHRONOUS DIGITAL HIERARCHY (SDH) MANAGEMENT OF MULTIPLEX-SECTION PROTECTION FOR THE NETWORK ELEMENT VIEW**

## **CORRIGENDUM 1**

*(Geneva, 1996)*

### **1 Scope**

#### **Revisions that do not require re-registration**

The following text replaces the entire text within clause 1/G.774.03 (1994). All additions are marked in **bold** for clarity.

This Recommendation provides an information model, as related to the protection function for the Synchronous Digital Hierarchy (SDH). It identifies the Telecommunications Management Network (TMN) object classes required for the management of the protection function for SDH network elements. These objects are relevant to information exchanged across standardized interfaces defined in Recommendation M.3010 (TMN architecture).

This Recommendation applies to SDH network elements which perform the Multiplex-Section protection function and those systems in the TMN that manage SDH network elements. Functional capabilities of SDH multiplex equipment, particularly the Multiplex-Section protection switching function, are given in Recommendation G.783. Performance monitoring requirements for Multiplex-Section protection (for the management of SDH equipment with this capability) are provided in Recommendation G.784; however, the information model which supports these can be found in Recommendation G.774.01.

**The new objects defined in this Recommendation supersede those defined in Recommendation G.774.03 (1994). For each object class, attribute, action, notification, parameter defined in this Recommendation it shall be indicated what the impacts upon the existing Recommendation G.774.03 (1994) are.**

#### **1.1 Structure of this Recommendation**

No revisions are required.

### **2 References**

No revisions are required.

### **3 Definitions**

No revisions are required.

### **4 Abbreviations**

No revisions are required.

## 5 Multiplex-Section Protection Management Model

### 5.1 Overview

No revisions are required.

### 5.2 SDH Multiplex-Section Protection Requirements

No revisions are required.

#### 5.2.1 Generic SDH Transmission Protection Functional Requirements

No revisions are required.

#### 5.2.2 SDH Multiplex-Section Specific Functional Requirements

No revisions are required.

## 6 Managed Object Class Definitions

### Revisions that require re-registration

This clause provides replacement managed object class definitions for the existing Recommendation G.774.03 (1994). Any managed object class replaced by one in this clause is considered to be deprecated. The reasons for the replacement of a managed object class are as follows:

- 1) The replaced managed object class is faulty and must be fixed.
- 2) The replaced managed object class includes an attribute, package, notification or action which has been re-registered in this or another Recommendation.
- 3) The replaced managed object class inherits from a managed object class which has been re-registered in this or another Recommendation.

In each case where a class is replaced, the new class will be registered within this Recommendation. The textual label for the class will be revised to include the text "R1". For example, in the revision of the G.774.03 (1994) managed object class "protectionGroup", the revised label will become "protectionGroupR1".

Below is a table of classes deprecated from Recommendation G.774.03 (1994) and the G.774.03 classes which replace them:

Deprecated G.774.03 (1994) Classes	Replacement G.774.03 Classes
protectionGroup	protectionGroupR1
sdhMSProtectionGroup	sdhMSProtectionGroupR1

### Protection Group

protectionGroupR1 MANAGED OBJECT CLASS

DERIVED FROM "Recommendation X.721 | ISO/IEC 10165-2:1992":top;

CHARACTERIZED BY

protectionGroupPkgR1 PACKAGE

BEHAVIOUR protectionGroupR1Beh;

ATTRIBUTES

"Recommendation X.721 | ISO/IEC 10165-2:1992":operationalState

GET,

"Recommendation X.721 | ISO/IEC 10165-2:1992":availabilityStatus

GET,

"Recommendation G.774.03":protectionGroupId

GET,

"Recommendation G.774.03":protectionGroupType

GET-REPLACE,

"Recommendation G.774.03":revertive REPLACE-WITH-DEFAULT



```

        DEFAULT VALUE SDHProtASN1.booleanTrueDefault
        "Recommendation M.3100:1992":supportedByObjectList
        "Recommendation G.774.03":waitToRestoreTime
    GET-REPLACE,
    GET,
    GET-REPLACE;

ACTIONS
    "Recommendation G.774.03":invokeProtection,
    "Recommendation G.774.03":releaseProtection;

NOTIFICATIONS
    protectionSwitchReportingR1,
    "Recommendation X.721 | ISO/IEC 10165-2:1992":stateChange;;;

CONDITIONAL PACKAGES
    "Recommendation M.3100:1992":createDeleteNotificationsPackage
        PRESENT IF "an instance supports it",
    "Recommendation M.3100:1992":attributeValueChangeNotificationPackage
        PRESENT IF "an instance supports it";

REGISTERED AS { g774-03ObjectClass 12 };

```

protectionGroupR1Beh BEHAVIOUR  
DEFINED AS

"A protectionGroup object instance contains zero or more protectionUnit objects for defining a protection switching relationship where one or more standby (i.e. backup) entities provide protection for one or more working (i.e. regular or preferred) entities.

The invokeProtection action can be used to request a lockout, a forced switch, or a manual switch (i.e. normal switch) on one or more protectionUnit instances contained in the protectionGroup object. The releaseProtection action can be used to release a lockout, a forced switch, or a manual switch (i.e. normal switch) on one or more protectionUnit instances contained in the protectionGroup object.

The protectionSwitchReporting notification is emitted from the protectionGroup object to report any protection switch events, such as protection switching (forced switch, manual switch, or automatic switch), protection release (release of forced switch, manual switch, or automatic switch), lockout or release of lockout.

If the attributeValueChangeNotification package is present, then changes to the protectionGroupType attribute, the revertive attribute or the waitToRestoreTime attribute shall cause an attributeValueChange notification to be emitted.

The protectionGroupType attribute shall have the value 'colon' when more than one protectionUnit is protected. Changing the value of this attribute between 'plus' and 'colon' is allowed when only one protected protectionUnit and one protecting protectionUnit are contained by the protectionGroup. The change from 'plus' to 'colon' is only allowed if the underlying resources support M:N protection.";

### **SDH Multiplex-Section Protection Group**

```

sdhMSProtectionGroupR1 MANAGED OBJECT CLASS
    DERIVED FROM      protectionGroupR1;
    CHARACTERIZED BY
        sdhMSProtectionGroupR1Pkg PACKAGE
    BEHAVIOUR sdhMSProtectionGroupR1Beh;
    ATTRIBUTES
        "Recommendation G.774.03":protectionSwitchMode
    GET-REPLACE;

NOTIFICATIONS
    protectionSwitchReportingR1,
    "Recommendation G.774.03":protectionStatusParameter;;;

CONDITIONAL PACKAGES
    "Recommendation G.774.03":protectionMismatchStatusPkg
        PRESENT IF "the APS protocol is used",
    "Recommendation G.774.03":protectionSwitchExercisePkg
        PRESENT IF "an instance supports it";

REGISTERED AS { g774-03ObjectClass 13 };

```

sdhMSProtectionGroupR1Beh BEHAVIOUR

DEFINED AS

"This object class is used specifically for representing a SDH multiplex-section protection group in a protection system. Only one protecting protection unit is allowed.

The protectionMismatchStatus indicates a mismatch between the provisioned protectionGroupType of this protection group 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.";

## 7 Packages

No revisions are required.

## 8 Attributes

No revisions are required.

## 9 Actions

No revisions are required.

## 10 Notifications

### Revisions that require re-registration

This clause provides replacement notification definitions for the existing Recommendation G.774.03 (1994). Any notification replaced by one in this clause is considered to be deprecated. The reasons for the replacement of a notification are as follows:

- 1) The replaced action is faulty and must be fixed.

In each case where a notification is replaced, the new notification will be registered within this Recommendation. The textual label for the notification will be revised to include the text "R1". For example in the revision of the G.774.03 (1994) notification "protectionSwitchReporting", the revised label will become "protectionSwitchReportingR1".

Below is a table of notifications deprecated from Recommendation G.774.03 (1994) and the G.774.03 notifications which replace them:

#### Deprecated G.774.03 (1994) Notifications

protectionSwitchReporting

#### Replacement G.774.03 Notifications

protectionSwitchReportingR1

### Protection Switch Reporting

protectionSwitchReportingR1 NOTIFICATION

BEHAVIOUR protectionSwitchReportingR1Beh;

WITH INFORMATION SYNTAX SDHProtASN1.ProtectionSwitchReportingInfo

AND ATTRIBUTE IDS

protectingUnit relativeDistinguishedName,

additionalInformation additionalInformation;

REGISTERED AS { g774-03Notification 2 };

protectionSwitchReportingBeh BEHAVIOUR

DEFINED AS

"The protectionSwitchReporting notification is emitted from the protectionGroup object to report any protection switch events.";

## 11 Parameters

No revisions are required.

## 12 Namebindings

### Revisions that require re-registration

This clause provides replacement namebinding definitions for the existing Recommendation G.774.03 (1994). Any namebinding replaced by one in this clause is considered to be deprecated. The reasons for the replacement of a namebinding are as follows:

- 1) The replaced namebinding is faulty and must be fixed.
- 2) The replaced namebinding refers to a superior managed object class which has been re-registered in this or another Recommendation.
- 3) The replaced namebinding refers to a subordinate managed object class which has been re-registered in this or another Recommendation.
- 4) The replaced namebinding refers to a naming attribute which has been re-registered in this or another Recommendation.

In each case where a namebinding is replaced, the new namebinding will be registered within this Recommendation. The textual label for the namebinding will be revised to include the text "R1". For example, in the revision of the G.774.03 (1994) namebinding "protectionGroup-managedElement", the revised label will become namebinding "protectionGroupR1-managedElement". Note the "R1" is placed immediately following the revised class which impacts the namebinding.

Below is a table of namebindings deprecated from Recommendation G.774.03 (1994) and the G.774.03 namebindings which replace them:

Deprecated G.774.03 (1994) Namebindings	Replacement G.774.03 Namebindings
protectionGroup-managedElement	protectionGroupR1-managedElement
protectionUnit-protectionGroup	protectionUnit-protectionGroupR1

  

protectionGroupR1-managedElement NAME BINDING	
SUBORDINATE OBJECT CLASS	protectionGroupR1 AND SUBCLASSES;
NAMED BY SUPERIOR OBJECT CLASS	
"Recommendation M.3100:1992":managedElement AND SUBCLASSES;	
WITH ATTRIBUTE "Recommendation G.774.03":protectionGroupId;	
REGISTERED AS { g774-03NameBinding 12 };	

  

protectionUnit-protectionGroupR1 NAME BINDING	
SUBORDINATE OBJECT CLASS	
"Recommendation G.774.03": protectionUnit AND SUBCLASSES;	
NAMED BY SUPERIOR OBJECT CLASS	protectionGroupR1 AND SUBCLASSES;
WITH ATTRIBUTE "Recommendation G.774.03":protectionUnitId;	
REGISTERED AS { g774-03NameBinding 13 };	

## 13 Subordination Rules

No revisions are required.

## 14 Pointer Constraints

No revisions are required.

## 15 Supporting ASN.1 Productions

### Revisions that do not require re-registration

The following text replaces the entire text within clause 15/G.774.03 (1994). No textual changes have been made; the ASN.1 definitions have simply been alphabetically ordered for convenience.

```
SDHProtASN1 {itu(0) recommendation(0) g(7) g774(774) hyphen(127) prot(03)
informationModel(0) asn1Module(2) sdhmsp(0)}
```

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

```
-- EXPORTS everything
```

```
IMPORTS
```

```
NameType
```

```
FROM
```

```
ASN1DefinedTypesModule {itu(0) recommendation m gnm(3100) informationModel(0)
asn1Modules(2) asn1DefinedTypesModule(0)}
```

```
RelativeDistinguishedName
```

```
FROM
```

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

```
ObjectInstance
```

```
FROM
```

```
CMIP-1 {joint-iso-ccitt ms(9) cmip(1) modules(0) protocol(3)}
```

```
AdditionalInformation, ManagementExtension
```

```
FROM
```

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

```
sdhProt OBJECT IDENTIFIER ::= {itu(0) recommendation(0) g(7) g774(774) hyphen(127)
prot(03) informationModel(0)}
```

```
g774-03ObjectClass OBJECT IDENTIFIER ::= {sdhProt managedObjectClass(3)}
```

```
g774-03Attribute OBJECT IDENTIFIER ::= {sdhProt attribute(7)}
```

```
g774-03NameBinding OBJECT IDENTIFIER ::= {sdhProt nameBinding(6)}
```

```
g774-03Action OBJECT IDENTIFIER ::= {sdhProt action(9)}
```

```
g774-03Notification OBJECT IDENTIFIER ::= {sdhProt notification(10)}
```

```
g774-03Parameter OBJECT IDENTIFIER ::= {sdhProt parameter(5)}
```

```
g774-03Package OBJECT IDENTIFIER ::= {sdhProt package(4)}
```

```
-- default value definitions
```

```
booleanTrueDefault Boolean ::= TRUE
```

```
-- supporting productions
```

```
AutoSwitchReason ::= CHOICE {
```

```
waitToRestore [0] NULL,
```

```
signalDegrade [1] NULL,
```

```
signalFail [2] NULL}
```

```
Boolean ::= BOOLEAN
```

FromAndToProtectionUnit ::= CHOICE {  
     fromProtectionUnitNumber      [0] RelativeDistinguishedName ,  
     toProtectionUnitNumber        [1] RelativeDistinguishedName }

*--The fromProtectionUnitNumber is used for protecting protection unit in order to hold the  
 --name of the protected protection unit which has been protected by that protecting  
 --protection unit. The toProtectionUnitNumber is used for protected protection unit in  
 --order to hold the number of the protecting protection unit to which it has been  
 --switched to. In case of a MSP 1+1 system these parameters are not mandatory.--*

Integer ::= INTEGER

InvokeExerciseArg ::= SEQUENCE {  
     protectionEntity      ProtectionEntity OPTIONAL, -- if absent, all PUs  
     otherInfo             SET OF ManagementExtension OPTIONAL}

InvokeExerciseReply ::= SET OF SEQUENCE {  
     protectionUnit       RelativeDistinguishedName,  
     result               LastAttemptResult}

InvokeProtectionArg ::= SEQUENCE {  
     switchType           SwitchType,  
     protectionEntity     ProtectionEntity OPTIONAL, -- if absent, all PUs  
     otherInfo            SET OF ManagementExtension OPTIONAL}

InvokeProtectionError ::= ENUMERATED {  
     preempted           (0),  
     failure             (1),  
     timeout             (2)}

LastAttemptResult ::= CHOICE {  
     success             [0]     NULL, -- default value  
     denied              [1]     NULL,  
     fail                [2]     RxTxAPS}

ProtectionDirection ::= ENUMERATED {  
     transmit            (0),  
     receive             (1),  
     bidirectional       (2) }

ProtectionEntity ::= SEQUENCE {  
     protectedUnits      [0] SEQUENCE OF RelativeDistinguishedName OPTIONAL,  
     protectingUnits     [1] SEQUENCE OF RelativeDistinguishedName OPTIONAL  
     }

*--In case of a 1+1 non-revertive MSP system for a manual switch from the protecting  
 --protection unit to the protected one, the protectingUnits field shall be used and shall  
 --indicate the protection unit which has the channel number 0. If both fields are present  
 --they should be compatible sequences--*

ProtectionGroupType ::= ENUMERATED {  
     plus                (0), -- 1+1 (1 plus 1) or hot-standby  
     colon               (1) -- M:N (M for N)  
     }

ProtectionMismatchStatus ::= SEQUENCE {  
     uniBi               [0] BOOLEAN,  
     plusColon           [1] BOOLEAN}

```

ProtectionStatus ::= SET OF CHOICE {
    noRequest          [0] NULL,
    doNotRevert        [1] NULL,
    manualSwitch[2] SEQUENCE {
        requestSource   [0] RequestSource OPTIONAL,
        switchStatus     [1] SwitchStatus,
        relatedChannel   [2] FromAndToProtectionUnit},
    autoSwitch         [3] SEQUENCE {
        requestSource   [0] RequestSource OPTIONAL,
        switchStatus     [1] SwitchStatus,
        relatedChannel   [2] FromAndToProtectionUnit,
        autoSwitchReason [3] AutoSwitchReason},
    forcedSwitch        [4] SEQUENCE {
        requestSource   [0] RequestSource OPTIONAL,
        switchStatus     [1] SwitchStatus ,
        relatedChannel   [2] FromAndToProtectionUnit},
    lockout             [5] SEQUENCE {
        requestSource   [0] RequestSource OPTIONAL,
        switchStatus     [1] SwitchStatus},
    releaseFailed        [6] NULL,
    protectionFailCond   [7] CHOICE {
        aPSInvalid       [0] BOOLEAN,
        channelMismatch   [1] BOOLEAN}-- invalid or toggling APS byte value received or channel mismatch
    }

```

```

ProtectionStatusParameter ::= SEQUENCE {
    oldProtectionStatus   ProtectionStatus,
    newProtectionStatus   ProtectionStatus,
    psDirection           ProtectionDirection DEFAULT bidirectional}

```

```

ProtectionSwitchMode ::= ENUMERATED {
    bidirectional    (0),
    unidirectional   (1)}

```

```

ProtectionSwitchReportingInfo ::= SEQUENCE {
    protectingUnit      RelativeDistinguishedName,
    additionalInfoAdditionalInformation}

```

```

ReleaseProtectionArg ::= SEQUENCE {
    switchType          SwitchType,
    protectionEntity     ProtectionEntity,
    otherInfo            SET OF ManagementExtension OPTIONAL}

```

```

ReleaseProtectionError ::= ENUMERATED {
    failure            (0),
    timeout            (1)}

```

```

RequestSource ::= ENUMERATED {
    local              (0),
    remote              (1) }

```

```

ResourcePointer ::= CHOICE {
    NULL,
    SEQUENCE OF ObjectInstance }

```

```

RxTxAPS ::= SEQUENCE {
    rxAPSvalue          [0] INTEGER,
    txAPSvalue           [1] INTEGER} -- APS byte 1 in low order byte , byte 2 in high order byte

```

```

SDHMSPriority ::= Integer(1 .. 2)
-- 1 = high priority, 2 = low priority

```

SDHMSResourcePointer ::= ResourcePointer(SIZE (1))

SwitchStatus ::= ENUMERATED {  
    pending            (0),  
    completed          (1),  
    operateFailed      (2)}

SwitchType ::= ENUMERATED {  
    manual          (0),  
    forced          (1),  
    lockout         (2)}

END





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