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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)

ITU-T G-SERIES RECOMMENDATIONS

TRANSMISSION SYSTEMS AND MEDIA, DIGITAL SYSTEMS AND NETWORKS

INTERNATIONAL TELEPHONE CONNECTIONS AND CIRCUITS	G.100–G.199
INTERNATIONAL ANALOGUE CARRIER SYSTEM	
GENERAL CHARACTERISTICS COMMON TO ALL ANALOGUE CARRIER-TRANSMISSION SYSTEMS	G.200–G.299
INDIVIDUAL CHARACTERISTICS OF INTERNATIONAL CARRIER TELEPHONE SYSTEMS ON METALLIC LINES	G.300–G.399
GENERAL CHARACTERISTICS OF INTERNATIONAL CARRIER TELEPHONE SYSTEMS ON RADIO-RELAY OR SATELLITE LINKS AND INTERCONNECTION WITH METALLIC LINES	G.400–G.449
TRANSMISSION MEDIA CHARACTERISTICS	
DIGITAL TRANSMISSION SYSTEMS	
TERMINAL EQUIPMENTS	G.700–G.799
General	G.700–G.709
Coding of analogue signals by pulse code modulation	G.710–G.719
Coding of analogue signals by methods other than PCM	G.720–G.729
Principal characteristics of primary multiplex equipment	G.730–G.739
Principal characteristics of second order multiplex equipment	G.740–G.749
Principal characteristics of higher order multiplex equipment	G.750–G.759
Principal characteristics of transcoder and digital multiplication equipment	G.760–G.769
Operations, administration and maintenance features of transmission equipment	**G.770–G.779**
Principal characteristics of multiplexing equipment for the synchronous digital hierarchy	G.780–G.789
Other terminal equipment	G.790–G.799
DIGITAL NETWORKS	G.800–G.899
General aspects	G.800–G.809
Design objectives for digital networks	G.810–G.819
Quality and availability targets	G.820–G.829
Network capabilities and functions	G.830–G.839
SDH network characteristics	G.840–G.899
DIGITAL SECTIONS AND DIGITAL LINE SYSTEM	G.900–G.999
General	G.900–G.909
Parameters for optical fibre cable systems	G.910–G.919
Digital sections at hierarchical bit rates based on a bit rate of 2048 kbit/s	G.920–G.929
Digital line transmission systems on cable at non-hierarchical bit rates	G.930–G.939
Digital line systems provided by FDM transmission bearers	G.940–G.949
Digital line systems	G.950–G.959
Digital section and digital transmission systems for customer access to ISDN	G.960–G.969
Optical fibre submarine cable systems	G.970–G.979
Optical line systems for local and access networks	G.980–G.999

For further details, please refer to ITU-T List of Recommendations.

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

ITU (International Telecommunication Union) is the United Nations Specialized Agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of the ITU. The ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

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.

INTELLECTUAL PROPERTY RIGHTS

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As of the date of approval of this Recommendation, the ITU had/had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementors are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database.

CONTENTS

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                GET-REPLACE,
            "Recommendation M.3100:1992":supportedByObjectList          GET,
            "Recommendation G.774.03":waitToRestoreTime                 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	**Replacement G.774.03 Notifications**
protectionSwitchReporting	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 IDENIFIER ::= {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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Series A	Organization of the work of the ITU-T
Series B	Means of expression: definitions, symbols, classification
Series C	General telecommunication statistics
Series D	General tariff principles
Series E	Overall network operation, telephone service, service operation and human factors
Series F	Non-telephone telecommunication services
Series G	**Transmission systems and media, digital systems and networks**
Series H	Audiovisual and multimedia systems
Series I	Integrated services digital network
Series J	Transmission of television, sound programme and other multimedia signals
Series K	Protection against interference
Series L	Construction, installation and protection of cables and other elements of outside plant
Series M	Maintenance: international transmission systems, telephone circuits, telegraphy, facsimile and leased circuits
Series N	Maintenance: international sound programme and television transmission circuits
Series O	Specifications of measuring equipment
Series P	Telephone transmission quality, telephone installations, local line networks
Series Q	Switching and signalling
Series R	Telegraph transmission
Series S	Telegraph services terminal equipment
Series T	Terminals for telematic services
Series U	Telegraph switching
Series V	Data communication over the telephone network
Series X	Data networks and open system communication
Series Z	Programming languages