



INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

M.2101

(06/2003)

SERIES M: TMN AND NETWORK MAINTENANCE:
INTERNATIONAL TRANSMISSION SYSTEMS,
TELEPHONE CIRCUITS, TELEGRAPHY, FACSIMILE
AND LEASED CIRCUITS

International transport network

**Performance limits for bringing-into-service and
maintenance of international multi-operator SDH
paths and multiplex sections**

ITU-T Recommendation M.2101

ITU-T M-SERIES RECOMMENDATIONS

TMN AND NETWORK MAINTENANCE: INTERNATIONAL TRANSMISSION SYSTEMS, TELEPHONE CIRCUITS, TELEGRAPHY, FACSIMILE AND LEASED CIRCUITS

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Document ID: ITU-T M.2101 2003

ITU-T Recommendation M.2101

Performance limits for bringing-into-service and maintenance of international multi-operator SDH paths and multiplex sections

Summary

This Recommendation provides limits for Bringing-Into-Service (BIS) and maintenance for international multi-operator SDH paths, including tandem connections, and international multi-operator SDH multiplex sections using equipment designed according to ITU-T Recs G.826, G.828 and G.829. Error, timing and availability performance are considered. This Recommendation also deals with all levels of PDH signals transported within SDH containers. Regenerator sections are not covered by this Recommendation. BIS limits and maintenance procedures for radio regenerator sections are described in the relevant ITU-R Recommendations.

Maintenance of systems designed to ITU-T Recs G.826, G.828 and G.829 should use the limits given in this Recommendation.

This revised Recommendation includes all applicable material from ITU-T Rec. M.2101.1 and is therefore the only Recommendation to be used for SDH technology.

Source

ITU-T Recommendation M.2101 was approved by ITU-T Study Group 4 (2001-2004) under the ITU-T Recommendation A.8 procedure on 13 June 2003.

Keywords

Allocated Performance Objective (APO), Background Block Error (BBE), Bringing-Into-Service (BIS), Bringing-Into-Service Performance Objective (BISPO), Degraded Performance Level (DPL), Errored Second (ES), Limits, Maintenance, Performance Objectives, Severely Errored Second (SES), Severely Errored Period (SEP), Tandem Connection Monitoring (TCM), Unacceptable Performance Level (UPL).

FOREWORD

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Introduction

This Recommendation provides limits for bringing-into-service and maintenance of international multi-operator SDH paths and multiplex sections in order to achieve the performance objectives given for a multi-service environment. These objectives include error performance (ITU-T Recs G.826 and G.828), timing performance (ITU-T Rec. G.822) and availability (ITU-T Rec. G.827). This Recommendation defines the parameters and their associated objectives in order to respect the principles given in ITU-T Recs M.20, M.32 and M.34.

"International multi-operator" in this Recommendation refers to SDH paths and multiplex sections which cross international boundaries with a change in jurisdictional responsibility.

The SDH signal format and structure are described in ITU-T Rec. G.707. The long-term error performance objectives for SDH paths are given in ITU-T Recs G.826 and G.828. For availability performance, ITU-T Rec. G.827 provides the long-term requirements. Availability performance requirements from a short-term maintenance perspective are under study.

ITU-T Rec. G.803 provides a modelling method for describing the functions which exist or are required to make up a telecommunications network. This modelling method has been used where appropriate within this Recommendation.

The methods and procedures for applying these limits are described in ITU-T Rec. M.2110 for bringing-into-service tests and procedures and in ITU-T Rec. M.2120 for the maintenance procedures.

This Recommendation uses certain principles that form the basis of the maintenance of a digital network:

- It is desirable to do in-service, continuous measurements. In some cases, out-of-service measurements may be necessary.
- A single set of parameters must be used for maintenance of the SDH hierarchy (see ITU-T Rec. G.702), however, the actual limits are bit rate dependent.
- Error performance limits of international SDH paths and multiplex sections are dependent on the medium used.

The reasons for revising this Recommendation include the addition of Tandem Connection Monitoring (TCM), Background Block Error (BBE)¹ measurements and the Severely Errored Period (SEP) event in accordance with ITU-T Rec. G.828.

This revised Recommendation includes all applicable material from ITU-T Rec. M.2101.1 and is therefore the only Recommendation to be used for SDH technology.

The use of the SEP event and limits for maintenance are under study.

¹ BBE measures will not be required for installed equipment designed according to ITU-T Rec. G.826.

ITU-T Recommendation M.2101

Performance limits for bringing-into-service and maintenance of international multi-operator SDH paths and multiplex sections

1 Scope

This Recommendation defines the performance objectives and limits for bringing-into-service and maintenance of international multi-operator SDH paths and multiplex sections and also SDH signals transported over PDH networks. For the case of PDH signals transported over SDH networks, ITU-T Rec. M.2100 applies to the PDH path. For the case of mixed PDH/SDH terminated paths, ITU-T Rec. M.2100 applies (at the PDH bit rate). Further guidance is given in the main body of this Recommendation on how ITU-T Recs M.2100 and M.2101 relate. "International" in this Recommendation refers to SDH paths and multiplex sections which cross international boundaries with a change in jurisdictional responsibility. SDH regenerator sections are not covered by this Recommendation. By bilateral agreement, ITU-R Rec. F.1330-1 may be used in conjunction with this Recommendation for radio-relay systems where applicable. Maintenance of SDH systems designed to ITU-T Recs G.826, G.828 and G.829 should use the limits given in the relevant parts of this Recommendation.

The use of the SEP event and limits for maintenance are under study².

This Recommendation does not consider commissioning of SDH equipment into the network. The SDH VC-11 bit rate is the lowest considered by this Recommendation. It does not, therefore, consider 64 kbit/s circuits or sub-64 kbit/s, which are dealt with by ITU-T Recs M.2100 and M.1340.

Limits for BIS and maintenance are given for Virtual Containers (VC) and Synchronous Transport Module-N (STM-N). Limits are also given for triggering maintenance activity (e.g., repair, fault localization, etc.).

Methods of deriving performance information from Bit Interleaved Parity-Ns (BIP-N) and other path overhead information are given. Tandem connection monitoring is considered in this Recommendation. The guidance given in this Recommendation in terms of performance limits for maintenance purposes, and that given in the companion ITU-T Recs M.2110 and M.2120 provide a consistent platform from which the requirements for a maintenance management system can be derived.

This revised Recommendation includes all applicable material from ITU-T Rec. M.2101.1 and is therefore the only Recommendation to be used for SDH technology.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the

² As provided in section 8.5.4 of Resolution 1 of the 1996 WTSC, the United States of America registers a degree of reservation against the use of the objectives in Tables 3a/M.2101 and D.1 to D.4/M.2101, and intends to treat the values of these tables as though their entries were designated "FFS", i.e., for further study. As the text of ITU-T Rec. G.828, approved in Kyoto in March 2000, places no numeric end-to-end performance objectives on the SEPI parameter, the use of numeric maintenance objectives in ITU-T Rec. M.2101 is unjustified.

most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

- ITU-R Recommendation F.1330-1 (1999), *Performance limits for bringing-into-service of the parts of international plesiochronous digital hierarchy and synchronous digital hierarchy paths and sections implemented by digital radio-relay systems.*
- ITU-T Recommendation G.702 (1988), *Digital hierarchy bit rates.*
- ITU-T Recommendation G.707/Y.1322 (2000), *Network node interface for the synchronous digital hierarchy (SDH).*
- ITU-T Recommendation G.784 (1999), *Synchronous digital hierarchy (SDH) management.*
- ITU-T Recommendation G.803 (2000), *Architectures of transport networks based on the synchronous digital hierarchy (SDH).*
- ITU-T Recommendation G.822 (1988), *Controlled slip rate objectives on an international digital connection.*
- ITU-T Recommendation G.825 (2000), *The control of jitter and wander within digital networks which are based on the synchronous digital hierarchy (SDH).*
- ITU-T Recommendation G.826 (2002), *End-to-end error performance parameters and objectives for international, constant bit-rate digital paths and connections.*
- ITU-T Recommendation G.827 (2000), *Availability parameters and objectives for path elements of international constant bit-rate digital paths at or above the primary rate.*
- ITU-T Recommendation G.828 (2000), *Error performance parameters and objectives for international, constant bit-rate synchronous digital paths.*
- ITU-T Recommendation G.829 (2002), *Error performance events for SDH multiplex and regenerator sections.*
- ITU-T Recommendation M.20 (1992), *Maintenance philosophy for telecommunications networks.*
- ITU-T Recommendation M.32 (1988), *Principles for using alarm information for maintenance of international transmission systems and equipment.*
- ITU-T Recommendation M.34 (1988), *Performance monitoring on international transmission systems and equipment.*
- ITU-T Recommendation M.60 (1993), *Maintenance terminology and definitions.*
- ITU-T Recommendation M.1340 (2000), *Performance objectives, allocations and limits for international PDH leased circuits and supporting data transmission links and systems.*
- ITU-T Recommendation M.2100 (2003), *Performance limits for bringing-into-service and maintenance of international multi-operator PDH paths and connections.*
- ITU-T Recommendation M.2110 (2002), *Bringing-into-service of international multi-operator paths, sections and transmission systems.*
- ITU-T Recommendation M.2120 (2002), *International multi-operator paths, sections and transmission systems fault detection and localization procedures.*
- ITU-T Recommendation O.181 (2002), *Equipment to assess error performance on STM-N interfaces.*

3 Terms and definitions

General terms and definitions related to this Recommendation are provided in ITU-T Rec. M.60. This Recommendation defines the following terms:

3.1 usage of the terms "path" and "multiplex section" in this Recommendation: The terms "path" and "multiplex section" describe unidirectional transport entities. For a bidirectional path or multiplex section, all objectives, limits, etc. should be applied to each direction of the trail independently from the other direction. This means that for maintenance purposes, performance shall be evaluated per direction, i.e., events occurring on the A-Z direction shall not have any impact on the evaluation of performance events occurring on the Z-A direction, and vice versa.

3.2 performance objective (PO): Performance objective for the international portion of the hypothetical reference path (see Figures 3/G.826 and 3/G.828) or multiplex section.

3.3 allocated performance objective (APO): Performance objective for a real path calculated according to the allocation rules.

3.4 bringing-into-service performance objective (BISPO): Bringing-into-service performance objective for a real path or multiplex section calculated from its APO.

3.5 international portion: An international digital path can be subdivided into two national portions and one international portion. The boundary between these portions is defined to be an International Gateway.

The national portion is outside the scope of this Recommendation.

3.6 international gateway (IG): International VC-*n* Sink/Source equipment.

3.7 path core elements (PCE): An international digital path has been partitioned in geographical terms for the purpose of allocating the Performance Objectives (POs). These portions have been titled Path Core Elements (PCEs).

Two types of international PCE are used:

- an International Path Core Element (IPCE) is between an IG and a Frontier Station (FS) in a terminating country, or between FSs in a transit country (see definition of IG in 3.6);
- an Inter-Country Path Core Element (ICPCE) is between the agreed frontier stations of the two countries involved. The ICPCE corresponds to the highest-order digital trail carried on a digital transmission system linking the two countries. An ICPCE may be transported on a terrestrial, satellite or undersea cable transmission system.

There are two cases where a country may not contain an IPCE:

- depending on the geographical situation and network topology, the IG may coincide with the FS in a terminating country;
- the path uses only one FS in a transit country.

3.8 the international boundary and border crossing points: The International Boundary, the point at which control transfers from one international operator to the next international operator, normally exists within the ICPCE. Generally, this would be half-way along a submarine cable or terrestrial border crossing ICPCE. The Border Crossing Point may coincide with the International Boundary (for example, for a terrestrial border crossing ICPCE) or, in the case of a submarine cable (for example), there would be two border crossings, corresponding to the coastline of the operator's country, which would not coincide with the International Boundary.

3.9 international paths operating in tandem: International paths may operate in tandem where network topology requires links between certain terminating countries to be established. The restriction is that the allocation must not exceed 63%.

NOTE – ITU-T Recs G.826 and G.828 allocate a block allowance of 17.5% of the overall performance objectives to one national portion of a path. In addition, a length-dependent allowance of 0.2% per 100 km is allocated to this portion. Considering that a path comprises two national portions, and assuming a minimum length of 2×500 km, the total allocation assigned to the national portion is:

$$2 \times 17.5\% + 2 \times 1.0\% = 37.0\%$$

Because this Recommendation only deals with the **international portion**, only:

$$100\% - 37\% = 63\%$$

can be assigned to the **international** portion.

3.10 in-service measurement points: The full definitions of sections and paths are given in ITU-T Rec. G.803. The following definitions are for use with this Recommendation, and are for guidance only. See also ITU-T Rec. G.803 for an illustration of these objects.

3.11 STM-N section network connection: The link between STM-N Section Network Connection termination points. Examples include point-to-point submarine cables and border crossings. This is the highest bit-rate part of the SDH transmission network. It would not normally be possible to make any measurements of this.

3.12 STM-N section trail: The STM-N Section Network Connection and its termination points. Since this includes termination points, measurements can be made.

This Recommendation gives performance limits for international STM-N multiplex section trails, which will be the case for some submarine cables, satellite links or terrestrial border crossings. Where STM-N section trails are operating in tandem across a given operator's territory to make up its Path Core Element, it is the responsibility of the operator to ensure that the performance of the Section Trails operating in tandem meets the requirements for its Path Core Element, as given in this Recommendation.

3.13 STM-N termination point: Terminates the STM-N Section Network Connection, and interfaces with the adaptation function. At this point, the STM-N Section Overhead is removed.

3.14 STM-N adaptation function: Multiplexes between the Higher-Order Path Layer and the STM-N Section layer. It interfaces the STM-N Termination point with either the Higher-Order Path Trail termination point or a Higher-Order Path Subnetwork Connection.

3.15 higher-order path subnetwork connection: Provides connectivity between STM-N/HOPL adaptation functions, permitting higher-order VCs (VC-3³, VC-4) to be connected between STM-N Section Trails. Add-drop multiplexers or cross-connects would normally provide this type of connection.

3.16 higher-order path trail: Exists between and includes the Higher-Order Path Termination Points. Since it is terminated, measurements can be made over this trail. It is made up of one or more STM-N Section Trails operating in tandem, and therefore also includes one or more Higher-Order Path Subnetwork Connections.

Performance limits for Higher-Order path trails (VC-3s and VC-4s) will only be given by this Recommendation when the VC-3 or VC-4 is the end-to-end path solely under consideration, or when the Higher-Order Path Trail corresponds directly to a Path Core Element. In the case where one operator's Path Core Element is made up of a number of Higher-Order path trails operating in tandem, it is the responsibility of that operator to ensure that the performance of those trails operating in tandem meets the performance limit for its PCE.

³ Note that the Virtual Container 3 (VC-3) can be considered to be either a lower-order or a higher-order VC.

3.17 higher-order adaptation function: Multiplexes between the higher-order path layer (a given higher-order path trail) and the lower-order path layer, interfacing to the higher-order trail termination points, and either the lower-order trail termination point or to a Lower-Order Path Subnetwork Connection.

3.18 lower-order path subnetwork connection: Provides a link between higher-order to lower-order path layer adaptation functions. This link would normally exist inside equipment such as an add-drop multiplexer or cross-connect. It allows higher-order path trails to operate in tandem in order to make up a Lower-Order path trail.

3.19 lower-order path trail: Exists between and includes the Lower-Order Path Trail Termination Points, where the VC-1, -2 or -3 overhead is removed. Measurements can therefore be made of this object. Performance limits are given in this Recommendation for Lower-Order Path Trails.

4 Abbreviations

This Recommendation uses the following abbreviations:

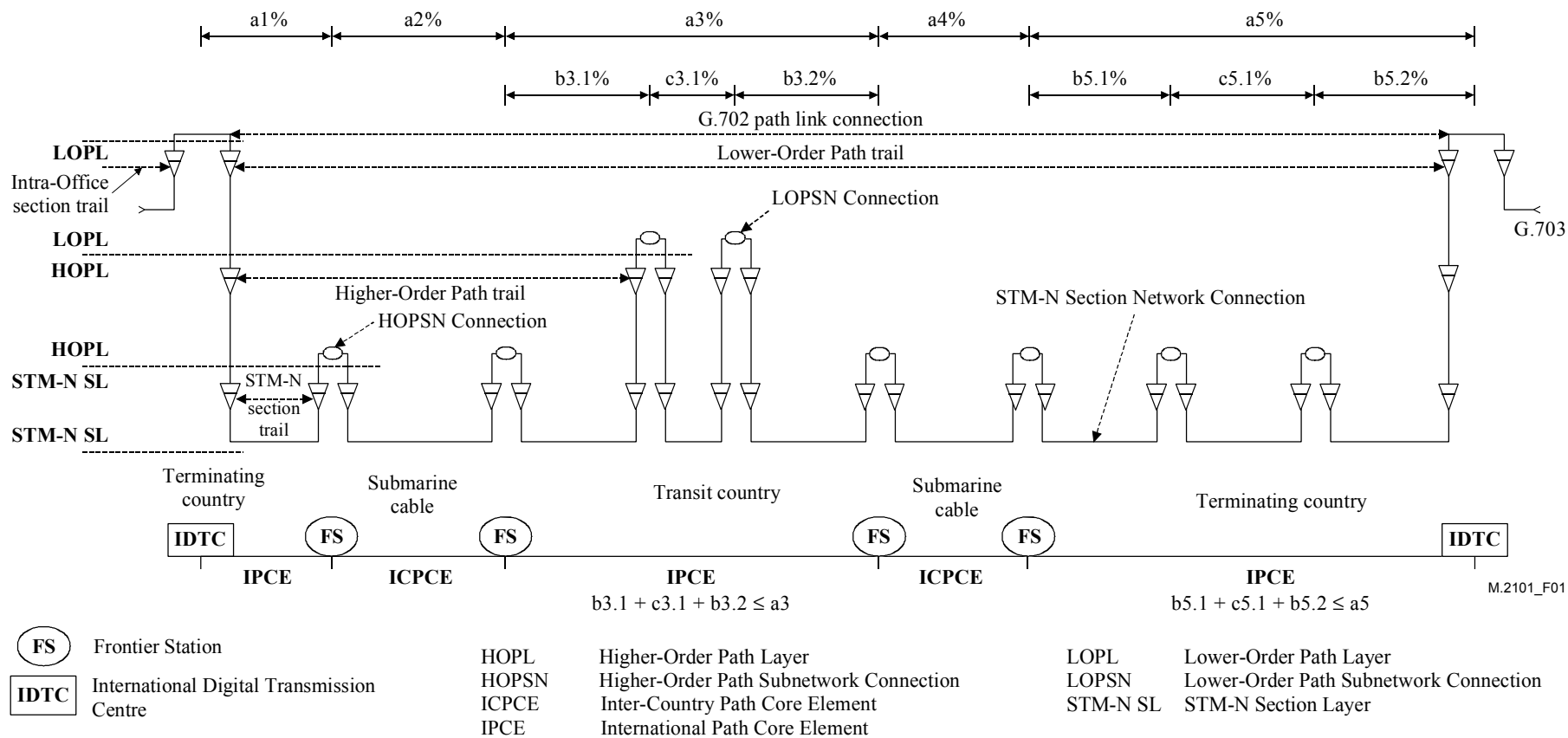
AIS	Alarm Indication Signal
APO	Allocated Performance Objective
AU	Administrative Unit
BBE	Background Block Error
BBER	Background Block Error Ratio
BER	Bit Error Ratio
BIP	Bit Interleaved Parity
BIS	Bringing-Into-Service
BISPO	BIS Performance Objective
DPL	Degraded Performance Level
EDC	Error Detection Code
ES	Errored Second
ESR	Errored Second Ratio
FAS	Frame Alignment Signal
FS	Frontier Station
HO	Higher Order
HOPL	Higher-Order Path Layer
HP	Higher order Path
HPTC	Higher-Order Path Tandem Connection
IB	International Border
ICPCE	Inter-Country Path Core Element
IDTC	International Digital Transmission Centre
IG	International Gateway
IPCE	International Path Core Element
IS	In-Service

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ISM	In Service Monitoring
LO	Lower Order
LOM	Loss Of Multiframe
LOP	Loss of Pointer
LOPL	Lower-Order Path Layer
LP	Lower order Path
LPTC	Lower-Order Path Tandem Connection
LTC	Loss of Tandem Connection
MS	Multiplex Section
NNI	Network Node Interface
OOS	Out-of-Service
PCE	Path Core Element
PDH	Plesiochronous Digital Hierarchy
PEP	Path End Point
PO	Performance Objective
PRBS	Pseudo-Random Binary Sequence
RDI	Remote Defect Indication
REI	Remote Error Indication
rf	routing factor
SDH	Synchronous Digital Hierarchy
SEP	Severely Errored Period
SEPI	Severely Errored Period Intensity
SES	Severely Errored Second
SESR	Severely Errored Second Ratio
STM	Synchronous Transport Module
TC	Tandem Connection
TCM	Tandem Connection Monitoring
TIM	Trail Identifier Mismatch
TMN	Telecommunication Management Network
TP	Test Period
TU	Tributary Unit
UPL	Unacceptable Performance Level
VC	Virtual Container

5 Hypothetical reference model

For performance of international path and multiplex section layers, the physical relationship between the international LOPL, HOPL and STM-N Section Layers is illustrated in Figure 1.



NOTE 1 – According to ITU-T Recs G.826 and G.828, the Allocated Performance Objective of the international portion must not exceed 63% of the Performance Objective.

NOTE 2 – A common international portion consists of two terminating countries (IPCEs), and one submarine cable, satellite system or terrestrial border crossing (ICPCE). The physical endpoints of the international portion exist within IDTCs; the IDTC corresponds to one of the IGs (International Gateways) as given in ITU-T Recs G.826 and G.828.

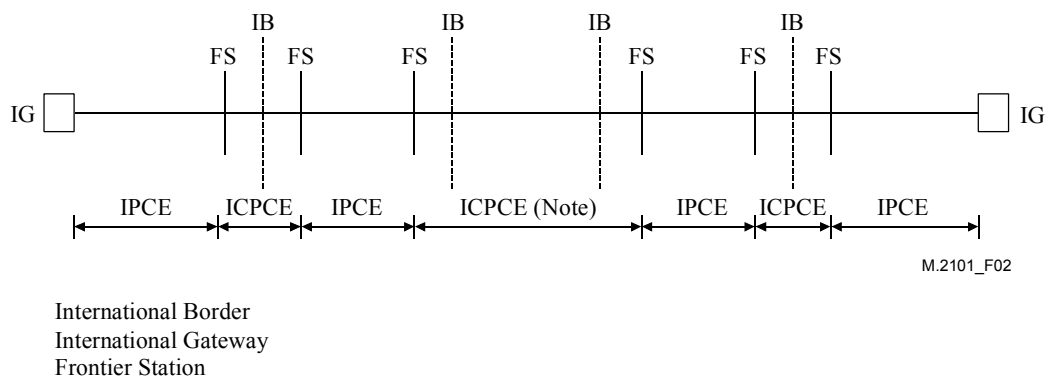
NOTE 3 – More complex path structures may include transit countries, which would exist between the two terminating countries linked by IPCE (terrestrial border crossings, submarine cables or satellite links). ICPCEs operating in tandem are acceptable (e.g. submarine cables operating in tandem).

NOTE 4 – This international path allocation shows the relationship between Path Core Elements and ITU-T Rec G.803 network modelling. Please see Figure 4-1/G.803 for a precise network model.

Figure 1/M.2101 – Example of apportionment for an international path

6 Allocation principles for end-to-end VC connections

This clause specifies the allocation of error performance objectives for the international portion of international digital paths, in terms of PCEs as shown in Figure 2.



NOTE – This ICPCE crosses two international borders and is typically on a satellite or undersea cable transmission system.

Figure 2/M.2101 – Example of the components of a path to show PCEs

It is the responsibility of each operator to design its network in a way that is consistent with the PCE country allocation for the international path. The allocation of each portion of the international path can be determined from the values given in Table 2a; the allocation for multiplex sections is given in Table 2b. These allocations are a percentage of the end-to-end PO. Distances referred to in Tables 2a and 2b are actual distances, or great circle (also called air-route or air-mile) distances multiplied by the routing factor (rf), whichever is less. See Table 1.

Table 1/M.2101 – PCE great circle length vs. routing factor

PCE great circle length	Routing Factor (rf)	Calculated PCE length
$d < 1000 \text{ km}$	1.5	$1.5 \times d \text{ km}$
$1000 \text{ km} \leq d < 1200 \text{ km}$	$1500/d$	1500 km
$d \geq 1200 \text{ km}$	1.25	$1.25 \times d \text{ km}$

As shown in Figure 1, it is possible that access to the bit stream for a given path may not coincide with the end of a PCE. In this case, or if a transit country has other access points within its network, it may be necessary to make a suballocation for maintenance purposes, e.g., fault localization as described in ITU-T Rec. M.2120. Such suballocations will be the responsibility of the network operator(s) of the country involved, with the following constraints:

- the sum of suballocations may not exceed the allocation of Table 2a for the PCE in question;
- the values of the suballocations must be communicated to all maintenance centres involved before bringing the path into service and after any rearrangement which changes the values.

Table 2a/M.2101 – Maximum allocation of PO to path core elements

PCE classification	Allocation (% of end-to-end PO)
IPCE	
Terminating/Transit national network:	
$d \leq 100$ km	1.2
$100 \text{ km} < d \leq 200$ km	1.4
$200 \text{ km} < d \leq 300$ km	1.6
$300 \text{ km} < d \leq 400$ km	1.8
$400 \text{ km} < d \leq 500$ km	2
$500 \text{ km} < d \leq 1000$ km	3
$1000 \text{ km} < d \leq 2500$ km	4
$2500 \text{ km} < d \leq 5000$ km	6
$5000 \text{ km} < d \leq 7500$ km	8
$d > 7500$ km	10
ICPCE (Note)	
Optical undersea cable:	
$d \leq 500$ km	1
$d > 500$ km	2.5
Satellite:	
Normal operation	35
Wideband cable restoration mode	35
Terrestrial:	
$d < 300$ km	0.3
NOTE – ICPCE allocations must be met regardless of how many MS make up the ICPCE.	

Table 2b/M.2101 – Maximum allocation of PO to international multiplex sections

Facility type	Allocation (% of end-to-end PO)
Terrestrial	0.2
Satellite	35
Optical undersea cable	
$d < 500$ km	0.2
$d > 500$ km	0.5

VC connections using rings: For the purpose of calculating error performance limits for paths transported by SDH rings, the Path End Points should first be identified, and then the performance allocated in the normal way, using the air-route distance multiplied by the routing factor. This will result in only one set of error performance limits independently of the direction around the ring (the clockwise direction, or the anti-clockwise direction).

7 Performance objectives

In this Recommendation, ES, SES, BBE and SEP events are dealt with. Of these, ES, SES and BBE are considered essential for BIS and maintenance purposes. The ESR, SESR and BBER values given in Table 3a are 50% of the G.826 and G.828 values for paths in order to provide some margin for maintenance purposes.

Table 3a/M.2101 – Performance objectives for end-to-end international paths

Rate (kbit/s) Parameter	1664 (VC-11)	2240 (VC-12)	6848 (VC-2)	48 960 (VC-3)	150 336 (VC-4)	601 344 (VC-4-4c)	2 405 376 (VC-4-16c)	9 621 504 (VC-4-64c)
Blocks/second	2000	2000	2000	8000	8000	8000	8000	8000
ESR (according to ITU-T Rec. G.826, see Note 1)	0.02	0.02	0.025	0.0375	0.08	NA	NA	NA
ESR (according to ITU-T Rec. G.828, see Note 2)	0.005	0.005	0.005	0.01	0.02	NA	NA	NA
SESR % of time	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
SEPI events/s (Note 3)	1×10^{-4}	1×10^{-4}	1×10^{-4}	1×10^{-4}	1×10^{-4}	1×10^{-4}	1×10^{-4}	1×10^{-4}
BBER (according to ITU-T Rec. G.826, see Note 1)	NA	NA	NA	NA	NA	NA	NA	NA
BBER (according to ITU-T Rec. G.828, see Note 2)	2.5×10^{-5}	2.5×10^{-5}	2.5×10^{-5}	2.5×10^{-5}	5×10^{-5}	5×10^{-5}	5×10^{-5}	5×10^{-5}
NA Not applicable for this Recommendation NOTE 1 – These ESR and BBER values are applicable to paths designed according to ITU-T Rec. G.826. NOTE 2 – These ESR and BBER values are applicable to paths designed according to ITU-T Rec. G.828. NOTE 3 – The use of SEPI and limits for maintenance are under study. NOTE 4 – For VC-4-4/16c, each VC-4 is transmitted 8000 times per second. Because each VC-4 is not evaluated separately, the total number of monitored blocks is still 8000.								

Table 3b/M.2101 – Performance objectives for end-to-end international multiplex sections

Rate (kbit/s)	STM-0	STM-1	STM-4	STM-16	STM-64
Blocks/second	64 000	192 000	768 000	3 072 000	12 288 000
ESR (according to ITU-T Rec. G.826, see Note 1)	0.0375	0.08	NA	NA	NA
ESR (according to ITU-T Rec. G.828, see Note 2)	0.01	0.02	NA	NA	NA
SESR	0.001	0.001	0.001	0.001	0.001
BBER (according to ITU-T Rec. G.826, see Note 1)	NA	NA	NA	NA	NA
BBER (according to ITU-T Rec. G.828, see Note 2)	2.5×10^{-5}	5×10^{-5}	5×10^{-5}	5×10^{-5}	5×10^{-5}