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INTERNATIONAL TRANSPORT NETWORK

PERFORMANCE LIMITS FOR BRINGING-INTO-SERVICE AND MAINTENANCE OF INTERNATIONAL PDH PATHS, SECTIONS AND TRANSMISSION SYSTEMS

ITU-T Recommendation M.2100

(Previously "CCITT Recommendation")

FOREWORD

The ITU-T (Telecommunication Standardization Sector) is a permanent organ of the International Telecommunication Union (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 (Helsinki, March 1-12, 1993).

ITU-T Recommendation M.2100 was revised by ITU-T Study Group 4 (1993-1996) and was approved under the WTSC Resolution No. 1 procedure on the 27th of July 1995.

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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PERFORMANCE LIMITS FOR BRINGING-INTO-SERVICE AND MAINTENANCE OF INTERNATIONAL PDH PATHS, SECTIONS AND TRANSMISSION SYSTEMS

(First published in 1988; revised in 1992 and 1995)

Abstract: This Recommendation provides limits for bringing-into-service and maintenance of international sections, paths and transmission systems at every level of the plesiochronous digital hierarchy from 64 kbit/s. Error timing and availability performance are considered. A method for deriving ES and SES from in-service measurement is given for all hierarchical levels.

Keywords: Availability; bringing-into-service limit; digital path; digital section; digital transmission system; errored performance parameter; errored second; maintenance limit; performance allocation; performance objective; severely errored second; unavailability.

Abbreviations

For the purposes of this Recommendation, the following abbreviations are used:

AIS	Alarm Indication Signal
BER	Bit Error Ratio
BIS	Bringing-Into-Service
CRC	Cyclic Redundancy Check
ES	Errored Second
FAS	Frame Alignment Signal
FS	Frontier Station
ICPCE	Inter-Country Path Core Element
IDTC	International Digital Transmission centre
IG	International Gateway
IPCE	International Path Core Element
ISC	International Switching Centre
ISDN	Integrated Services Digital Network
LOF	Loss Of Frame
LOS	Loss Of Signal
PCE	Path Core Element
PDH	Plesiochronous Digital Hierarchy
PEP	Path End Point
PRBS	Pseudo-Random Bit Sequence
RDI	Remote Defect Indication
RPO	Reference Performance Objective
SES	Severely Errored Second
TMN	Telecommunications Management Network

1 General

The purpose of this Recommendation is to provide limits for bringing-into-service and limits for maintenance of digital paths, sections and transmission systems in order to achieve the performance objectives given for a multiservice environment. These objectives include error performance (Recommendations G.821 [1] and G.826 [41]), timing performance (Recommendation G.822 [2]) and availability. This Recommendation defines the parameters and their associated objectives in order to respect the principles given in Recommendations M.20 [34], M.32 [35] and M.34 [36].

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

This Recommendation uses certain principles which are the basis of the maintenance of a digital network:

- it is desirable to do in-service, continuous measurements. In some cases (e.g. for bringing-into-service), out-of-service measurements may be necessary;
- a single set of parameters must be used for maintenance of every level of the hierarchy (this principle does not apply to limits);
- error performance limits of transmission systems are dependent on the medium used; however, due to the many possible network structures, error performance limits on paths are independent of the medium.

Since the performance limits are intended to satisfy the needs of the evolving digital network, it must be recognized that such limits might not be achieved by all today's digital equipment and systems.

In the future, this or companion Recommendations will cover all digital paths, sections and transmission systems which operate at 64 kbit/s and at every higher level of the PDH hierarchy, including the ISDN subscriber access described in Recommendation I.412 [3].

Currently, this Recommendation covers the error performance limits for paths at every level of the PDH hierarchy and in-service parameter evaluation criteria up to quarternary layer.

1.1 Convention

Throughout this Recommendation the terms "path", "section" and "transmission system" should be understood as digital. Also RPO is used for reference performance objective for both ES and SES unless only one is specifically indicated.

1.2 Definition of the international portion

An international digital path can be subdivided in two national and international portions. The boundary between these portions is defined to be at an International Gateway (IG), which corresponds to:

- an ISC, on the international side, for 64 kbit/s paths between switches (IG = ISC = PEP);
- an IDTC for paths at 2 Mbit/s and above (IG = IDTC = PEP), carrying lower order paths providing paths between ISCs or leased lines.

When the 2 Mbit/s paths are terminated inside an ISC (ISC = PEP), IG is located at the IDTC associated with the ISC. No national portion has to be considered since IDTC and ISC are situated in the same geographical area.

2 Reference models

2.1 Path Core Elements

An international digital path has been partitioned in geographical terms for the purpose of allocating the RPO. These partitions have been titled Path Core Elements.

Two types of international PCEs are used:

– an IPCE is between an IG and a frontier station in a terminating country, or between frontier stations in a transit country (see definition of IG in 1.2);

– an ICPCE is between the adjacent frontier stations of the two countries involved. The ICPCE corresponds to the highest order digital path carried on a digital transmission system linking the two countries. An ICPCE may be transported on a terrestrial, satellite or undersea cable transmission system.

2.2 Hypothetical reference performance model for international 64 kbit/s paths

The physical relationship between international paths of the primary rate network layer and paths in the 64 kbit/s network layer is illustrated in Figure 1.

Key points to note in Figure 1 are:

i) Paths of the primary rate network layer can serve either:

   – peer-layer clients, e.g. an H12 channel in the case of 2048 kbit/s paths; or

   – lower order clients, e.g. 64 kbits/s section of a path in the 64 kbit/s network layer.

ii) The international portion of the 64 kbit/s path is given 40% of the end-to-end error RPO (see Figure 1).

iii) Some examples of international primary rate paths are given in Annex A. These examples also illustrate the breakdown of the international primary rate path into PCEs; the PCE RPOs are given in Table 2.

iv) Simple addition of the PCE RPOs is assumed when determining the end-to-end RPO (i.e. between primary rate – PEPs). Moreover, simple addition of tandemed international primary rate path RPOs is assumed when considering the RPO offered to the section of the 64 kbit/s network layer.

v) Sensible engineering planning is required to ensure that tandemed international primary rate paths respect the 40% allocation.

2.3 Hypothetical reference performance model for international primary and higher order paths

The physical relationship between international primary and higher order paths is illustrated in Figure 2a.

Key points to note in Figure 2a are:

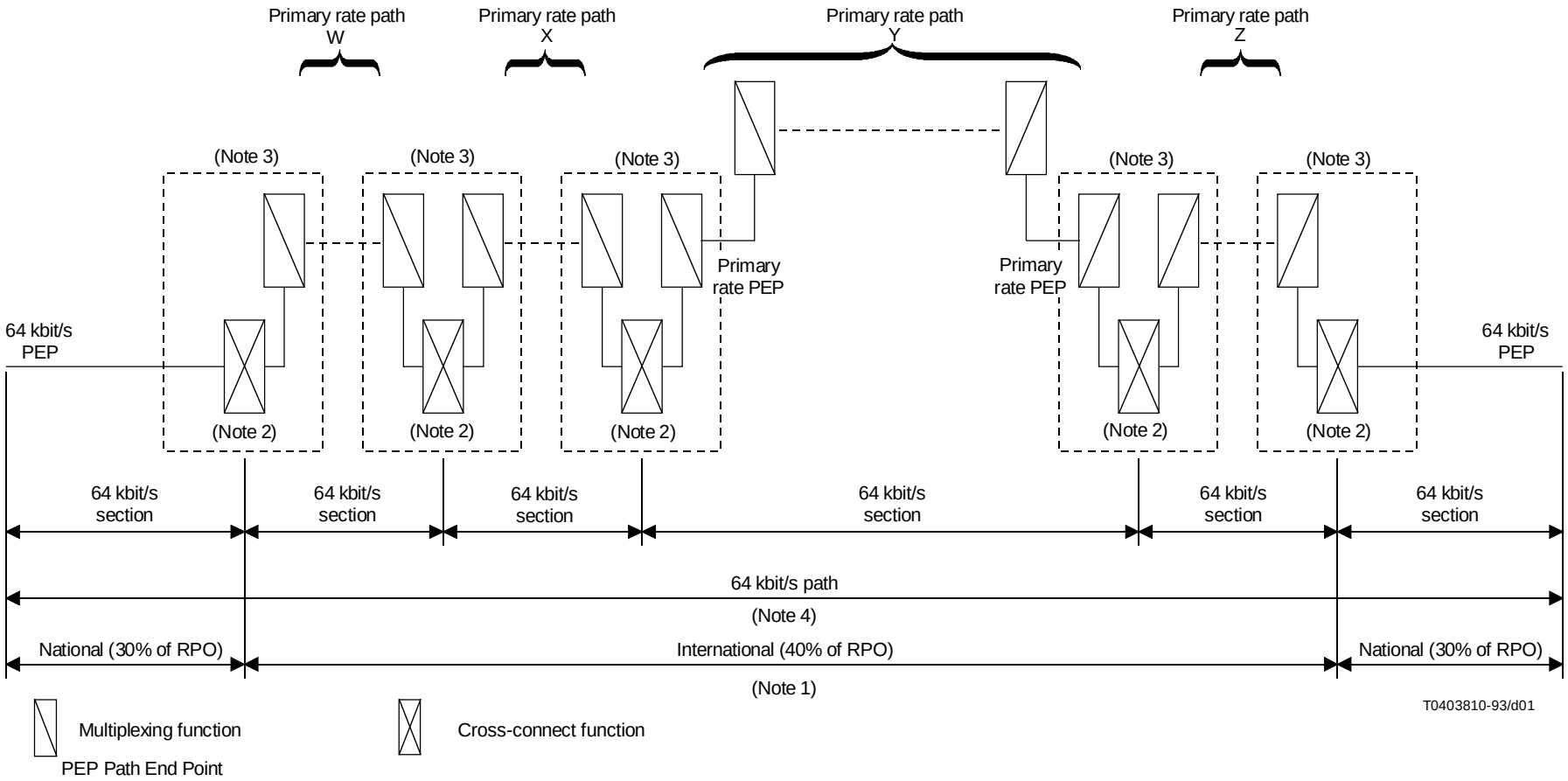
i) Allocation of the end-to-end path is specified in Recommendation G.826 [41].

ii) According to Recommendation G.826, the international portion of primary and higher order paths are given a maximum 63% of the end-to-end error RPO.

iii) Sensible engineering planning is required to ensure that international n Mbit/s paths in tandem, above or equal the primary rate respect the 63% allocation.

iv) Some examples of primary and higher order international paths are provided in Annex A.

v) An example of an apportionment for a primary rate path, showing the relationship with the higher bit rates which support it, is provided in Figure 2b.



NOTES

1 The international portion of 64 kbit/s path may be made up of up to 4 tandem primary rate paths W, X,Y and Z, where $W + X + Y + Z \leq 40\%$ of the total RPO.

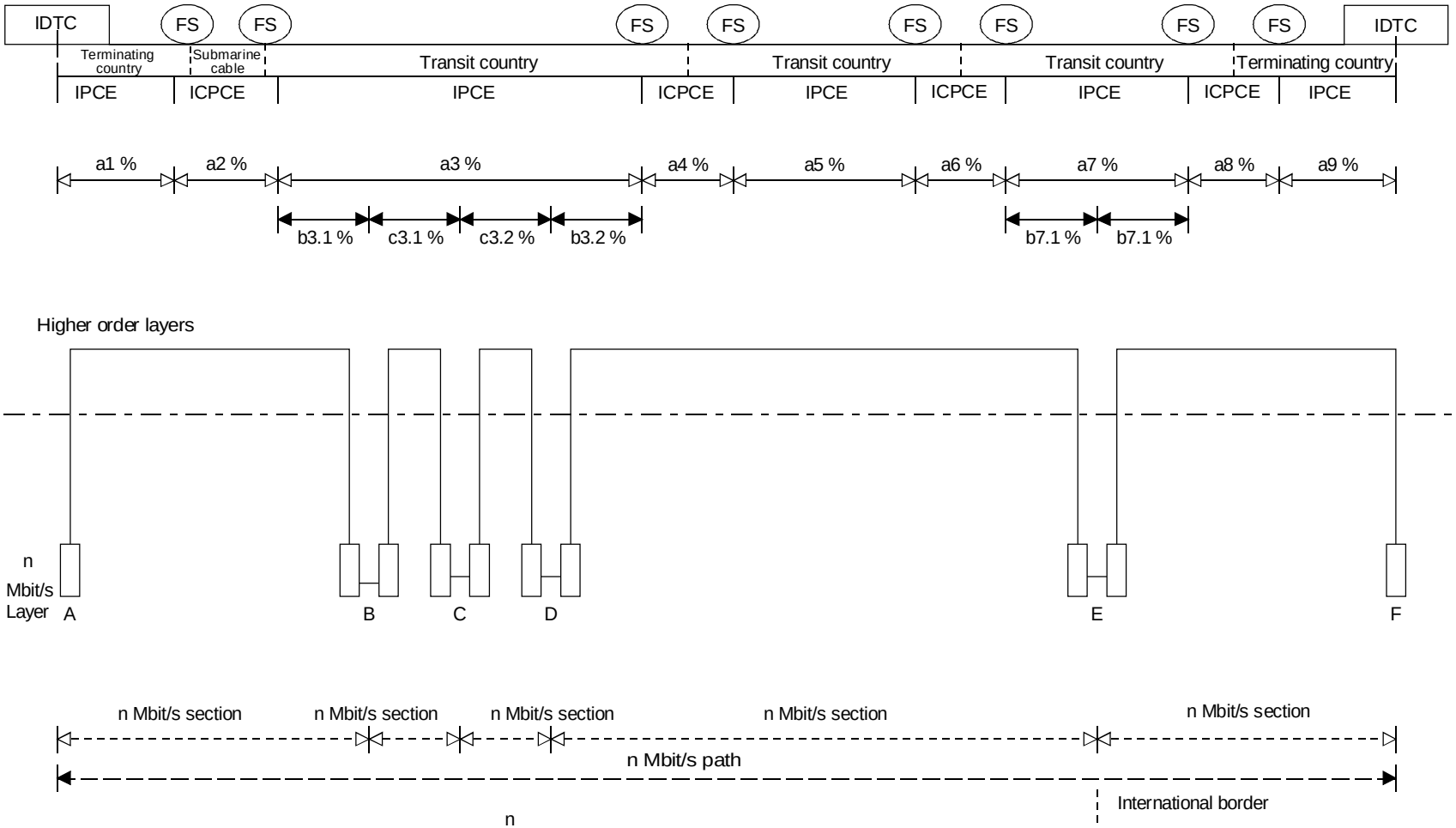
2 For a 64 kbit/s switched connection, this point has historically been referred to as an (International Switching Centre). For other network layers, the node of the network (e.g. digital distribution frames) is defined to exist at the IDTC (International Digital Transmission Center).

3 The primary rate PEPs logically terminate the primary rate transmission network layer. Physically, however, it might reside in a 64 kbit/s node, e.g. an International Switching Centre for International 64 kbit/s switched ISDN path.

4 In the case of a 64 kbit/s ISDN path, further information on the partitioning of quality classes (e.g. high grade, medium grade and low grade) is given in Figure 1/G.821 [1].

FIGURE 1/M.2100

HRP model for international primary rate path and 64 kbit/s path



a_i are given in Table 2b. Parh allocation = a1 + a2 + ... + a9 = $\sum_{i=1}^{n} a_i$ (%)

b_i and c_i values are the responsibility of the national network operators for country i

with the following constraints: $b_i \cdot n + c_i \cdot m \leq a_i$ for each PCE; where n = 1, 2, ..., and m = 1, 2, ..., etc.

c_i values must be communicated to each control station.

FIGURE 2a/M.2100

Example of apportionment for an international n Mbit/s path, where n = 1.5, 2, 6, 8, ..., 140

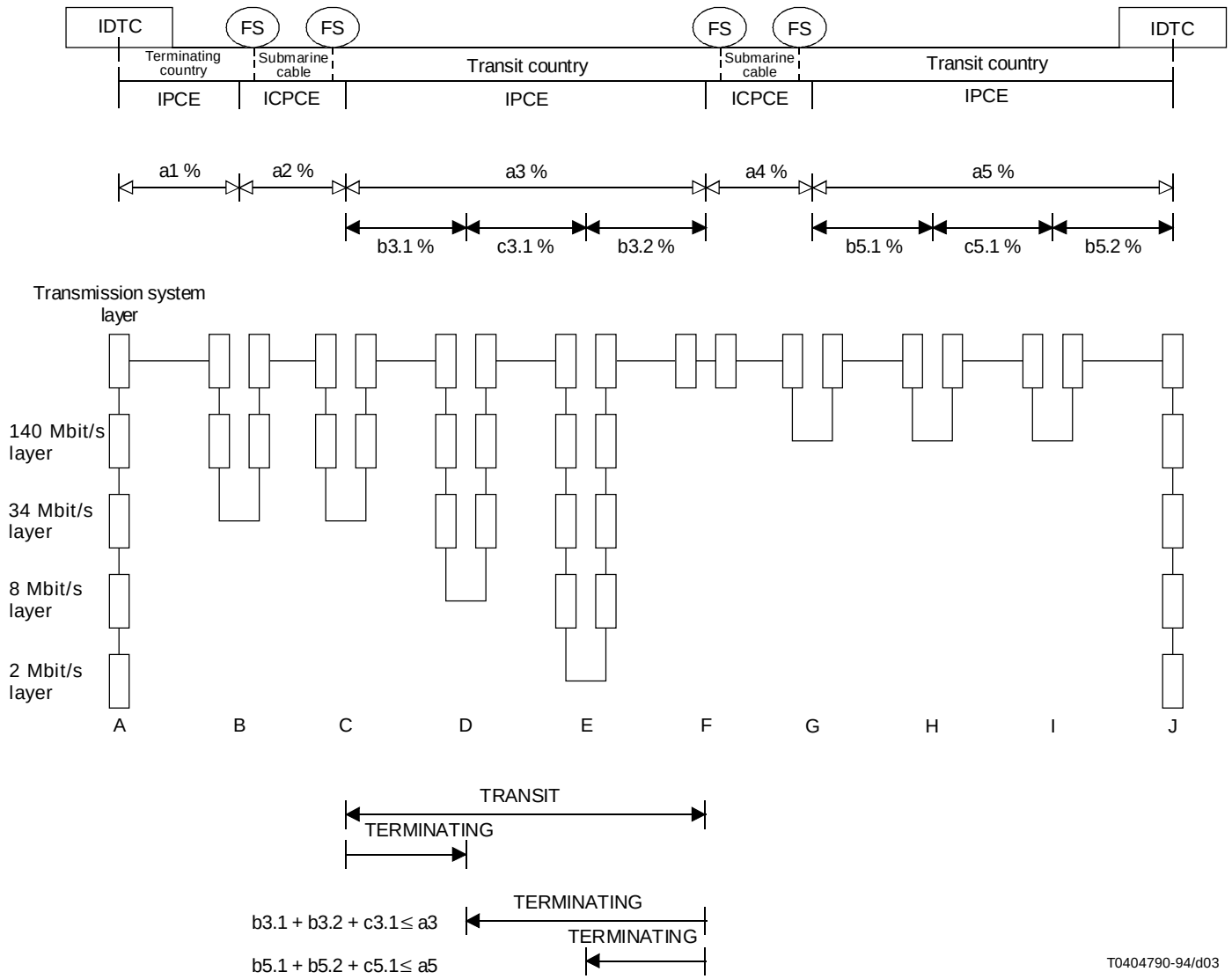


FIGURE 2b/M.2100

Example of apportionment for a primary rate path showing the relationship with the higher bit rate paths which support it

3 Performance objectives

3.1 64 kbit/s rate

The RPO for ES used in this Recommendation is based on 40% of a 4% end-to-end RPO proposed in Recommendation M.1340 [37]. The RPO will also support the 8% end-to-end objective for services based on Recommendation G.821 [1]. The RPO is based on empirical evidence of readily achievable primary rate path performance.

The RPO for SES is based on 40% of a 0.1% end-to-end RPO taken directly from Recommendation G.821. However, since the periods used for BIS/maintenance are short compared to the one month evaluation period suggested in Recommendation G.821, the additional allowance for radio/satellite systems (per Recommendation G.821) has not been included. See Table 1a.

TABLE 1a/M.2100

End-to-end error reference performance objectives at 64 kbit/s

Parameter (Note)	End-to-end RPO (maximum % of time)
Errored Seconds (ES)	4.0
Severely Errored Seconds (SES)	0.1
NOTE – The ES and SES parameters are defined in clause 5.	

3.2 Primary rate and higher bit rates

The values given in Table 1b for layers at or above the primary rate are selected to maintain alignment with Recommendation G.826 [41], and are 50% of G.826 values. The RPO for ES used in this Recommendation is based on a maximum of 63% of a 2% (primary level), 2.5% (secondary level), 3.75% (tertiary level) and 8% (quaternary level) end-to-end RPO as derived from Recommendation G.826 [41].

The RPO for SES is based on a maximum of 63% of a 0.1% (for every level) end-to-end RPO as derived from Recommendation G.826 [41]. However, the bases for calculating ES and SES in Recommendation G.826 [41] and in this Recommendation are different and numbers cannot be compared directly.

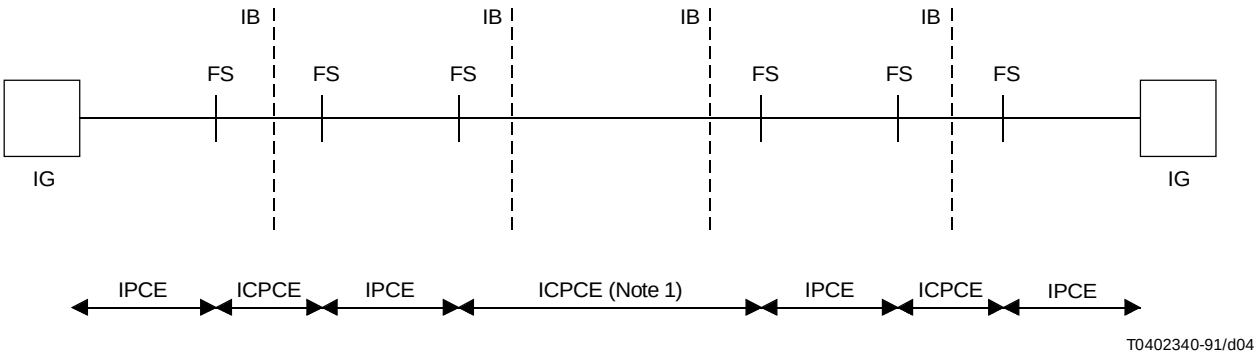
TABLE 1b/M.2100

End-to-end error reference performance objectives at or above the primary rate

Network level	Maximum Errored Seconds (ES) % of time	Maximum Severely Errored Seconds (SES) % of time
Primary	2	0.1
Secondary	2.5	0.1
Tertiary	3.75	0.1
Quaternary	8	0.1
NOTE – The ES and SES parameters are defined in clause 5.		

4 Allocation principles

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 3.



FS Frontier Station (See clause 2/M.2110.)

IB International Border
IG International Gateway

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

FIGURE 3/M.2100

Example of the components of a primary rat pathe (such as W, X, Y or Z in Figure 1)

It is the responsibility of each country to design its network in a way that is consistent with its country allocation for the international path. The allocation of each portion of the international path can be determined from the values given in Table 2b. Except for undersea cables, the lengths referred to in this table are actual route lengths or air-route distances multiplied by an appropriate routing factor (rf), whichever is less. Values of rf are given in Table 2a.

TABLE 2a/M.2100

PCE air-route distances	Routing factor (rf)
Terrestrial:	
d < 1000 km	1.5
d > 1000 km	1.25

For undersea cable, the actual route length should be used.

As shown in Figures 2a and 2b, 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 sub-allocation for maintenance purposes, e.g. fault localization as described in Recommendation M.2120 [38]. Such sub-allocations will be the responsibility of the national network operator(s) of the country involved, with the following constraints:

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

TABLE 2b/M.2100

Allocation of RPOs to international and inter-country path core elements

PCE classification (Note 2)	Allocation (% of end-to-end RPOs) (Note 5)
IPCE	
Terminating/transit national networks:	
d ≤ 500 km	2.0
500 km < d ≤ 1000 km	3.0
1000 km < d ≤ 2500 km	4.0
2500 km < d ≤ 5000 km	6.0
5000 km < d ≤ 7500 km	8.0
d > 7500 km	10.0
ICPCE	
Non-optical undersea cable:	
d ≤ 500 km	2.0
500 km < d ≤ 1000 km	3.0
1000 km < d ≤ 2500 km	4.0
2500 km < d ≤ 5000 km	6.0
d > 5000 km	8.0
Optical undersea cable:	
d ≤ 500 km	1.0
d > 500 km	2.5
Satellite:	
Normal operation	20.0
Wideband cable restoration mode	(Note 1)
Terrestrial:	
d < 300 km (Notes 3, 4)	0.5

NOTES

1 The allocated percentage of the RPOs for the satellite ICPCE will be the same as that for the particular cable restored, with a minimum value of 2.5%. This level of error performance, which is better than that provided by usual satellite portions of ISDN connections, can be achieved through the careful design of specialized wideband, high capacity, C-band carriers which use dedicated facilities.

2 Examples of PCE allocations using Table 2b are given in Annex A.

3 The terrestrial ICPCE is only intended for use in the calculation of end-to-end path BIS/maintenance thresholding applications. It is not intended to be used as the basis for setting maintenance thresholds for the terrestrial ICPCE itself.

4 It is assumed that this length will be less than 300 km. In the case of an unusually long terrestrial ICPCE, the country could transfer a portion of the allocation of its adjacent IPCE to supplement the 0.5% allocation.

5 The allocations of this table are maximum values and may be decreased by bilateral or multilateral agreement. For some very short paths, the M.2100 methodology sometimes gives a larger allocation than Recommendation G.826. In this case, the administrations can by bilateral or multilateral agreement choose to lower the allocation given by this Recommendation to reflect the G.826 value, or to take M.2100 values, assuming that the end-to-end G.826 objectives are respected over the long term.

6 Note that in the case of higher order terminating path supporting lower order transit path, the transit path may have a lower allocation than the sum of the terminating paths. Sensible engineering planning should result in all requirements being met.

7 The 20% allocation is for primary rate links. Applicability to higher bit rates has yet to be validated.

5 Evaluation of error performance parameters

5.1 Scope

This subclause addresses the evaluation of the error performance parameters ES and SES from standardized signals using anomalies and defects. The concepts of anomaly and defect are defined in Recommendation M.20 [34].

In-service evaluation is considered in 5.2, and out-of-service evaluation is considered in 5.3.

NOTE – Only standardized path signals are considered under in-service evaluation; transmission systems with proprietary overhead are not covered. However, both paths and systems can be considered under out-of-service evaluation.

The treatment of the ES and SES counts during the unavailable state is explained in clause 8.

5.2 Evaluation of ES/SES parameters from in-service measurements

5.2.1 General

Both the ES and SES parameters are evaluated from in-service anomalies (see 5.2.2) and in-service defects (see 5.2.3) relevant to the path terminating equipment at the network level of interest over a one-second integration period.

5.2.2 In-service anomaly information

An "in-service anomaly" occurs on a path when there is an elemental change of the path overhead from its normal value without a change of state of the total path signal from its normal state, i.e. there is no in-service defect present.

Examples of in-service anomalies are:

- an FAS violation – It should be noted that for a bunched FAS, an FAS violation occurs if one or more binary errors are present in a single occurrence of the FAS pattern;
- a CRC codeword violation (or its return equivalent, e.g. the "E" bits at 2.048 Mbit/s);
- a parity bit violation;
- an interface code violation (as in Recommendation G.703 [5]) – It should be noted that this in-service anomaly is extra redundancy which is not part of the overhead of the binary path signal structure; however, it is required to adapt the binary path signal structure to a form more suited to the transmission media;
- a controlled slip – Recommendation G.822 [2] gives the performance requirements for controlled slips on primary rate paths which terminate international clock boundaries (see also clause 7).

5.2.3 In-service defect information

An "in-service defect" occurs on a path when there is a change of state of the total path signal from its normal state. A particular in-service defect is evaluated from the persistence (i.e. integration period) of the relevant in-service anomalies; exact details (including any associated consequent actions) are given in the Recommendations dealing with the path termination function for the particular in-service defect considered.

Examples of in-service defects are:

- LOF – Recommendation G.706 [6] gives the LOF criteria for the basic frame structures (including the primary rate) defined in Recommendation G.704 [7];
- LOS – Recommendation G.775 [8] gives the integration criterion for the HDB3 interface code (per Recommendation G.703 [5]). The integration criterion for other interface codes is under study;

– AIS – Recommendation G.775 [8] gives the integration criterion for 2048 kbit/s path signals structured as per Recommendations G.704 [7] and G.706 [6]. The integration criteria for other path signals are under study.

NOTE – An AIS can be considered to cause an effective BER of 0.5 for its duration. If the AIS is of sufficient duration to cause a LOF event at the path level, then for the purposes of ES/SES parameter evaluation (see 5.2.4) it should be considered as a LOF defect. However, a signal with all bits, except the frame alignment in the 1 state, should not be mistaken for an AIS.

5.2.4 Return in-service defect information

The majority of path signals have a facility whereby the detection of the in-service defect LOF at a path terminating equipment results in a remote alarm indication bit being set in the return path overhead. In order to give a degree of protection against transmission errors causing an incorrect decision regarding the status of the remote alarm indication bit, it should be evaluated over an integration period commensurate with its minimum set-state period in the path terminating equipment which originally detected the in-service defect LOF.

5.2.5 ES and SES evaluation from in-service anomaly and defect information at path terminating equipment

This subclause shows how anomaly and defect event indicators may be processed into ES and SES parameters. Tables have been prepared for each network level, from 64 kbit/s sub-primary rate to the 97 728/139 264 kbit/s quarternary rate. The tables are all of the same format, each table referring to one level as follows:

– Table B.1: sub-primary level (64 kbit/s)

– Table B.2: primary level frame (1544, 2048 kbit/s)

– Table B.3: primary level equipment (1544, 2048 kbit/s)

– Table B.4: secondary level equipment (6312, 8448 kbit/s)

– Table B.5: tertiary level equipment (32 064, 34 368, 44 736 kbit/s)

– Table B.6: quaternary level equipment (97 728, 139 264 kbit/s)

Each table provides guidance for mapping the wide variety of path overhead and the line signal anomaly and defect indicators into the standard ES and SES parameters.

Where applicable, return in-service anomaly or defect information from a remote path terminating equipment is included in the tables. This allows, when required, a single-ended both-direction monitoring capability.

5.3 Evaluation of ES/SES parameters from out-of-service measurements

5.3.1 General

The ES and SES parameters are evaluated from out-of-service anomalies and defects relevant to the test equipment at the network level of interest over the relevant integration period.

5.3.2 Out-of-service anomaly information

An out-of-service anomaly occurs when there is an elemental change of the test signal from its normal value without a change of state of the total test signal from its normal state, i.e. there is no defect.

Out-of-service measurements usually employ a PRBS and therefore permit resolution to the bit level. Hence, the bit error is the most basic out-of-service anomaly which can be measured. However, since some test equipment uses PRBSs which are embedded in standardized path signals, it might also be possible to evaluate in-service anomalies (see 5.2.2).

5.3.3 Out-of-service defect information

An out-of-service defect occurs when there is a change of state of the test signal from its normal state. Since some out-of-service test equipment uses PRBSs which are embedded in standardized path signals, it might also be possible to evaluate in-service defects (see 5.2.3).

NOTE – Some test equipment which uses a PRBS that is not embedded in a standardized path signal can experience a condition which is referred to as "Loss of Sequence Synchronization".

Loss of sequence synchronization can occur as a consequence of:

- long duration intense error burst;
- long duration AIS;
- uncontrolled bit slip;
- loss of signal.

The criterion to declare "loss of sequence synchronization" is manufacturer-specific and can be highly variable between different manufacturers. The standardized criterion for loss of sequence synchronization in test equipment is given in the O-Series Recommendations.

5.3.4 ES and SES evaluation from out-of-service anomaly and defect information in test equipment

Since there will generally be resolution to the bit, the predominant evaluation criteria for ES and SES parameters will be:

- ES – A 1-second period with ≥ 1 bit errors.
- SES – A 1-second period with an integrated BER of ≥ 10^{-3}.

If, in addition, the test equipment uses a PRBS that is embedded in a standardized path signal, then the further ES/SES evaluation criteria referred to in 5.2.5 for in-service anomaly and defect information can also be utilized.

However, if the test equipment uses a PRBS that is not embedded in a standardized path signal, then the only additional anomaly or defect conditions which can be taken into account are:

- Anomalies – Interface code violations (per Recommendation G.703 [5]).
- Defects – AIS, LOS.

In particular, a 1-second period with ≥ 1 LOS should be considered to give rise to a SES (and an ES).

NOTE – An AIS can be considered to cause an effective BER of 0.5 for its duration. If the AIS is of sufficient duration to cause a BER ≥ 10^{-3} in any 1-second period, then it should be considered as a SES (+ES) parameter event. However, a signal with all bits, except the frame alignment in the one state, should not be mistaken for an AIS.

6 Performance limits

See Table 3.

6.1 General

Relationship between performance limits and objectives

The limits in this Recommendation are to be used to indicate the need for actions during maintenance and bringing-into-service. A network maintained to these limits should meet the performance objectives specified in the Recommendations G.821 [1] and G.826 [41].

The particular parameters measured, the measurement duration, and the limits used for the procedure need not be identical to those used for specifying the performance objectives as long as they result in network performance which meets these objectives. For example, the error performance objectives refer to long periods, such as one month. However, practical considerations demand that maintenance and BIS limits be based on shorter measurement intervals.

Statistical fluctuations in the occurrence of anomalies mean that one cannot be certain that the long-term objectives are met. The limits on the numbers of events and the duration of measurements attempt to ensure that systems or paths exhibiting unacceptable or degraded performance can be detected. The only way to ensure that a system or path meets network performance objectives is to do continuous measurement over a long period (months).

Type of limits

Limits are needed for several maintenance functions as defined in Recommendation M.20 [34]. This Recommendation provides limits for three of these functions:

- bringing-into-service;
- keeping the network operational (maintenance);
- system restoration.

Limits for commissioning (installation and acceptance testing of transmission systems) are not provided in ITU-T Recommendations.

BIS tests are done by measurements using a PRBS between digital terminating points. These should be long-term measurements for routes with new equipment. However, for practical reasons (a new path on a route with many paths already in-service, rearrangements of the network, etc.) the measurements between PEPs may be reduced to a quick measurement and the assessment completed with performance monitoring equipment.

Once entities have been placed into service, supervision of the network requires additional limits, as described in Recommendation M.20 [34]. This supervision is done on an in-service basis using performance monitoring equipment. The supervision process involves analyzing anomalies and defects detected by maintenance entities to determine if the performance level is normal, degraded, or unacceptable. Thus, degraded and unacceptable performance limits are required. In addition, a limit on performance after intervention (repair) is also required. It may be different from the BIS limit.

6.2 Performance limits for bringing-into-service

The BIS testing procedure, including how to deal with any period of unavailability during the test, is defined in 4.2/M.2110 [39]. This subclause defines the methodology of calculation of BIS performance limits for international paths of every rate of PDH hierarchy. The derivation of the limits is a function of a given allocation and the measurement duration, and is based on a pragmatic rule. These limits depend on parameters and objectives from Recommendations G.821 [1] and G.826 [41], and are shown in Tables 1a and 1b.

The difference between the RPO and the BIS limit is called the ageing margin. This margin should be as large as possible to minimize maintenance interventions.

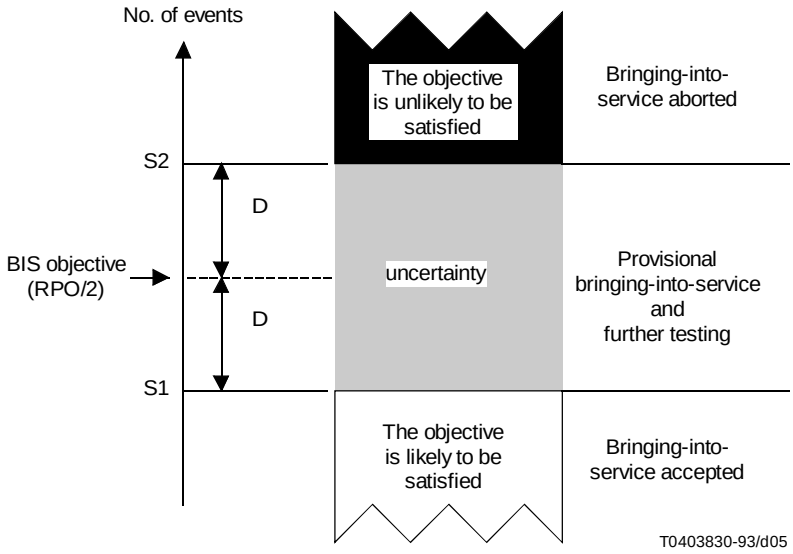
Two limits S1 and S2 are provided for use in BIS testing, as shown in Figure 4.

If performance is better than the first limit S1, the entity can be brought into service with some confidence. If performance is between the two limits, further testing is necessary and the entity can only be provisionally accepted. Corrective action is required if performance is worse than the second limit S2.

The ageing margin for transmission systems will depend on the procedures of individual Administrations. A stringent limit which is 0.1 times the RPO should be used when previous commissioning tests have not been conducted. When commissioning tests have been made, the out-of-service test for BIS can be conducted for a shorter period and does not require the same stringent limits.

The ageing margin for paths and sections is 0.5 times the RPO. The testing duration will obviously be limited to no more than a few days.

Continuous in-service monitoring is required to provide sufficient confidence in the long-term performance.



NOTE – For derivation of D, see 6.2.1.

FIGURE 4/M.2100

Bringing-into-service limits and conditions

6.2.1 Calculation of the BIS limits

The BIS limits S1 and S2 for each parameter (ES and SES) are calculated on the basis of the BIS objective, which is fixed at two times better than the RPO.

The RPO is determined by summing the allocation in per cent for all path sections in the path (see Annex A). When modifications are made to one or more individual sections, the new allocation must be summed as a per cent to obtain the overall path RPO.

The BIS objective, S1 and S2 are then derived from the overall RPO. Values for the BIS objective, S1 and S2 should not be summed for the individual sections to determine end-to-end limits. This is in order to avoid the introduction of errors due to:

- the inherent non-linearity of S1 and S2 values; and
- cumulative rounding errors in BIS objective, S1 and S2.

BIS objective, S1 and S2 are calculated as follows:

$$\text{BIS objective} = \text{RPO}/2$$

$$S1 = \text{RPO}/2 - D \qquad S2 = \text{RPO}/2 + D$$

where

$$\text{RPO} = A \times TP \times PO$$

and D is derived from a pragmatic rule and described by the formula:

$$2 \times \sqrt{\text{BIS objective}}$$

- A: Path Allocation (see clause 4);
- TP: Test Period duration in seconds;
- PO: Performance Objective (see Tables 1a and 1b).

The limits S1 and S2 are rounded to the nearest integer value. The applicable range for TP goes from a minimum of two hours to several days.

6.2.2 BIS limits values

By application of the methodology described above, the performance limits for BIS are given in Tables of Annex C (C.11 up to C.52), where values of S1 and S2 are calculated according to the path allocation and the testing duration. Note that S1 and S2 are not used over seven days.

24 hours BIS limits

Tables C.i1 (i = 1, 2, 3, 4, 5 for each hierarchy level) in Annex C give the values of S1 and S2 limits for a testing period of 24 hours.

Seven-day BIS limits

Under some cases, described in Recommendation M.2110, a supplementary test over seven days is necessary and performance must satisfy the BIS objective on seven days, for each parameter (ES and SES). It is obtained by multiplying the BIS objective for one day with the value 7.

Tables C.i1 (i = 1, 2, 3, 4, 5 for each hierarchy level) in Annex C give the values relative to BIS objective for seven days for various path allocations.

2 hours BIS limits

Recommendation M.2110 [39] describes procedures for Bringing-Into-Service more than one path at the same time on the same higher order digital path.

In this case, there is a test over 2 hours. The values of 2 hours BIS limits are given in Tables C.i2 (i = 1, 2, 3, 4, 5 for each hierarchy level).

6.3 Performance limits for maintenance

Once entities have been placed into service, the supervision of the network requires additional limits, as described in Recommendation M.20 [34]. The supervision process involves analyzing anomalies and defects detected by maintenance entities to determine the performance level. The maintenance procedures are defined in Recommendation M.2120 [38].

6.3.1 Levels of performance limits

Unacceptable performance level

An unacceptable performance level is defined in Recommendation M.20 [34]. The unacceptable performance limit for a given entity is derived from an objective of at least 10 times the RPO.

Degraded performance level

A degraded performance level is defined in Recommendation M.20 [34]. The degraded performance limit for a given entity is derived from an objective on the order of 0.5 times the RPO for transmission systems and 0.75 times the RPO for paths and sections. The monitoring duration may be a fixed duration that depends on the level in the digital hierarchy.

Performance limit after intervention (repair)

This performance limit is derived from an objective in the order of 0.125 times the RPO for transmission systems and the same as the BIS limit for paths and sections (see Recommendations M.35 [40] and M.2110 [39]).

6.3.2 Performance limit thresholds

Performance limits are defined for ES and SES. Each performance limit will have its own threshold and will require its own measurement duration. Examples of the above principles and objectives to derive limits are shown in Table 3.

TABLE 3/M.2100

Performance limits (ES & SES) relative to RPO from a long-term perspective (> 1 month)

(See 6.1)

<table>
<tr><th colspan="2">Transmission systems</th><th colspan="2">Paths and sections</th></tr>
<tr><th>Limit
(relative number
of impairments)</th><th>Performance for staff</th><th>Limit
(Relative number
of impairments)</th><th>Performance for staff</th></tr>
<tr><td>Bringing-into-service 0.1

Performance after repair 0.125

Degraded 0.5</td><td rowspan="2">Acceptable</td><td>

Bringing-into-service 0.5

Performance after repair

Degraded 0.75</td><td rowspan="2">Acceptable</td></tr>
<tr><td>Reference performance objective 1

Unacceptable > 10</td><td>Degraded</td><td>Reference performance objective 1

Unacceptable > 10</td><td>Degraded</td></tr>
<tr><td></td><td>Unacceptable</td><td></td><td>Unacceptable</td></tr>
</table>

6.3.2.1 Use of thresholds

The general strategy for the use of performance monitoring information and thresholds is described in Recommendations M.20 [34] and M.34 [36]. These thresholds and information will be reported to operations systems via the TMN for both real time and longer term analysis. When thresholds of unacceptable or degraded performance levels are reached, maintenance action should be initiated independently of the performance measurement. Other thresholds may be used for maintenance and longer term quality analysis. The operations systems will use real time processing to assign maintenance priorities to these thresholds and information, using the performance supervision process described in Recommendation M.20 [34].

6.3.2.2 Types of thresholds

There are two types of thresholds according to the monitoring duration T1 or T2.

Thresholds based on a T1 evaluation period

The monitoring duration T1 is fixed to a 15-minute value and ES and SES are counted over this period. The T1 period is to assist in detection of unacceptable performance.

A threshold report occurs when an ES or SES threshold is exceeded. The reset threshold report, which is an optional feature, occurs when the number of ES and SES is lower than or equal to the reset threshold. Those principles are explained in 2.3/M.2120 [38].

Thresholds based on a T2 evaluation period

The monitoring duration T2 is fixed to a 24-hour value. The T2 period is to assist in detection of degraded performance.

A threshold report occurs when an ES or SES threshold is exceeded over the period of time T2 as explained in Recommendation M.2120 [38].

6.3.2.3 Threshold values

Thresholds should be programmable (for both ES and SES) to suit specific operating requirements. In particular, the need for iterative adjustment (with operational experience) of threshold is seen as a likely requirement.

The default thresholds for the 15-minute window of an international path are given in Table D.1 for various allocations.

Thresholds for the 24-hour window are the responsibility of each network operator; 0.75 × RPO values are suggested.

6.4 Long-term quality monitoring/measurement

Performance monitoring history should be kept for at least one year (suggested value).

7 Effects of timing impairments on error performance

The following two types of timing impairments may affect the network performance:

– The first one, called controlled slip, is caused by the long-term phase departure between two timing signals at the primary rate path terminating equipment. The number of controlled slips – which produces the loss or the duplication of an octet at the 64 kbit/s level – must fulfil the requirements of Recommendation G.822 [2].

– The second one, called jitter and wander, is related to the fluctuations in the timing signal. Limits for jitter and wander are defined in Recommendations G.823 [32] and G.824 [33]. Those limits are fixed in such a way that a given level of jitter could be applied to the input of a network equipment without producing errors or excessive jitter at its output.

Therefore, for maintenance purposes, the error performance requirements are sufficient to deal with those timing impairments.

8 Availability at 64 kbit/s layer and higher bit rate

8.1 Definitions of available and unavailable states

A period of unavailable time begins at the onset of ten consecutive SES events. These ten seconds are considered to be part of unavailable time. A new period of available time begins at the onset of ten consecutive non-SES events. These ten seconds are considered to be part of available time.

Criterion for a path

A path is in the unavailable state if either one or both directions are in the unavailable state.

NOTE – This definition is intended to align with Annex A/G.826.

8.2 Consequences for error maintenance measurements

To determine the entry into and exit from unavailability, it is necessary to collect SES and to determine unavailability for each direction of a two-way path independently. It should be noted that when only one direction is in the unavailable state, measurements made on the opposite direction should not be included in the performance assessment of the bidirectional path.

8.3 Inhibiting performance monitoring during unavailable time

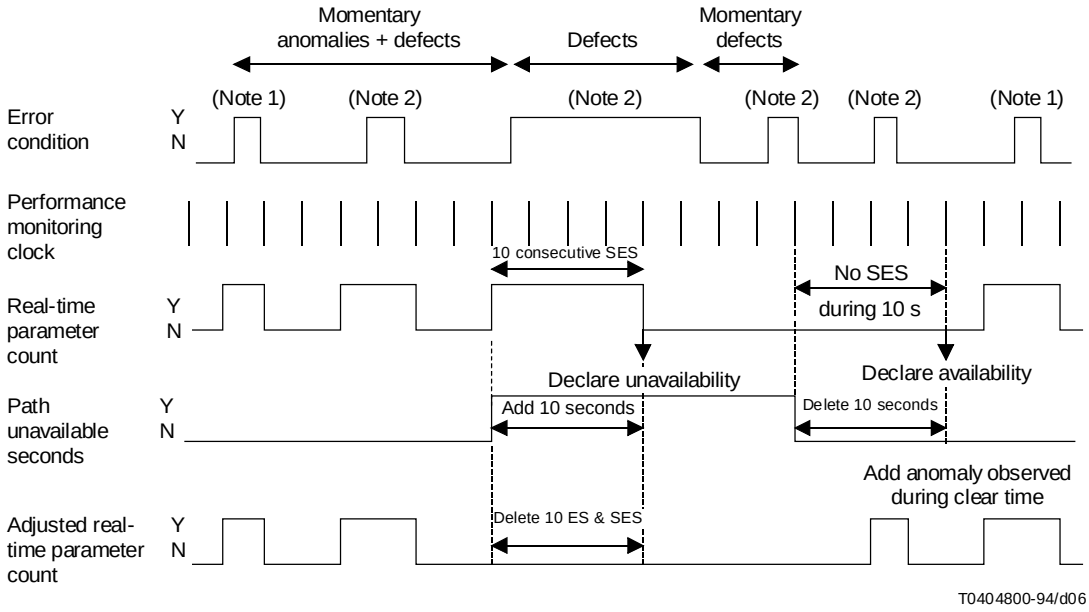
Figure 5 illustrates the rules for determining the unavailable second parameter and for inhibiting other parameter counts. Reading down and left to right, the first row represents the error condition and shows momentary and persistent conditions. It indicates if an error condition exists (Y) or not (N). Error conditions include anomalies and defects as shown. Proceeding in a similar manner, the latter three rows show the procedures for calculating path unavailable seconds, real-time and adjusted real-time parameter counts.

This figure shows the correction to the unavailable counter, and the rules for deleting and adding increments in time in the unavailable second counter. It also shows the count of anomalies during the clearing time interval.

Note that the signal condition transition, or declaration instant of a defect or anomaly condition is independent of the performance monitoring clock one-second boundaries.

8.4 Unavailability limits

For the time being, unavailability limits are left for negotiation. This subject is under consideration.



NOTES

1 Anomaly (or anomalies).

2 Defect (or defects).

FIGURE 5/M.2100

Illustration of performance monitoring inhibiting during unavailable time

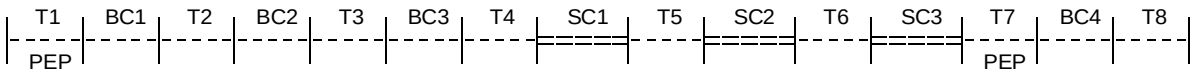
Annex A

Example applications of RPO allocation from Tables 2a and 2b

(This annex forms an integral part of this Recommendation)

This annex provides two examples showing the application of RPO Allocation Table described in clause 4. The first example is of a primary rate path which is extremely long and as such does not allow for additional tandem paths to further extend the 64 kbit/s path. The second example is of a complex network where a 64 kbit/s path is routed over three tandem primary rate paths. The purpose of these examples is to clearly show that the design of individual primary rate paths may result in a wide variation of performance limits. As a result, attention must be paid to this when designing a 64 kbit/s path so that the high grade international allocation of 40% is not exceeded.

Example 1



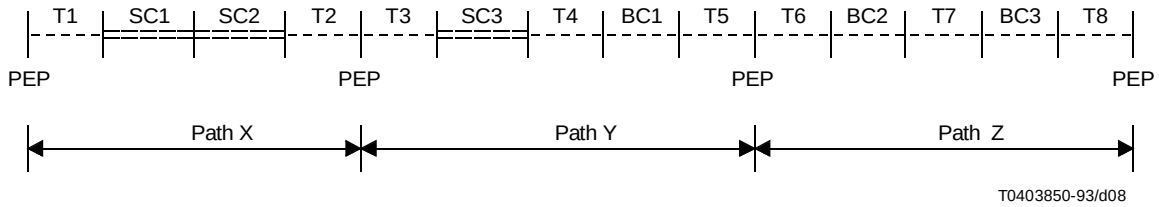
T0402380-91/d07

T	Terminating or transit IPCE		
BC	Border Crossing ICPCE		
SC	Submarine Cable ICPCE		
T1,-T8	IPCE (Terminating)	1000 km-2500 km	2 × 4.0% = 8.0%
T2 - T5	IPCE (Transit)	500 km-1000 km	4 × 3.0% = 12.0%
T6	IPCE (Transit)	< 500 km	1 × 2.0% = 2.0%
T7	IPCE (Transit)	> 5000 km	1 × 8.0% = 8.0%
SC1 - SC3	ICPCE (Optical Submarine Cable)	< 500 km	3 × 2.5% = 7.5%
BC1 - BC4	ICPCE (Terrestrial)		4 × 0.5% = 2.0%

Total primary rate path allocation = 39.5%

This path is suitable for 64 kbit/s paths that do not require an additional international primary rate connection such as allowing message traffic to be switched through to another international destination.

Example 2



T	Terminating or transit IPCE
BC	Border Crossing ICPCE
SC	Submarine Cable ICPCE

Path X			
T1	IPCE (Terminating)	500 km-1000 km	1 × 3.0% = 3.0%
T2	IPCE (Terminating)	>5000 km	1 × 8.0% = 8.0%
SC1-SC2	ICPCE (Optical Submarine Cable)	>500 km	2 × 2.5% = 5.0%
		Total primary rate path allocation = 16.0%	
Path Y			
T3, T5	IPCE (Terminating)	<500 km	2 × 2.0% = 4.0%
T4	IPCE (Transit)	500 - 1000 km	1 × 3.0% = 3.0%
SC3	ICPCE (Optical Submarine Cable)	>500 km	1 × 2.5% = 2.5%
BC1	ICPCE (Terrestral)		1 × 0.5% = 0.5%
		Total primary rate path allocation = 10.0%	
Path Z			
T6	IPCE (Terminating)	500 - 1000 km	1 × 3.0% = 3.0%
T7	IPCE (Transit)	1000 - 2500 km	1 × 4.0% = 4.0%
T8	IPCE (Terminating)	<500 km	1 × 2.0% = 2.0%
BC2, BC3	ICPCE (Terrestrial)		2 × 0.5% = 1.0%
		Total primary rate path allocation = 10.0%	

International 64 kbit/s path allocation: 16.0% + 10.0% + 10.0% = 36.0%

The total international high grade allocation for a 64 kbits/s path between terminating countries T1 and T8 is 36.0% which is within the objective of 40%. Since the lowest allocation possible for a primary rate path is 4.5% (two terminating IPCEs < 500 km and one terrestrial ICPCE) adding a fourth primary rate path would exceed the 40% objective.

Annex B

In-service ES and SES parameter evaluation criteria

(This annex forms an integral part of this Recommendation)

This annex is presented as explanatory text followed by tables. The explanatory text is split into six sections which refer to their respective columns.

Each table contains six columns.

Column 1: Equipment Recommendation and path level (kbit/s)

The left hand column indicates the path bit rate in kbit/s, as well as any relevant qualifying information for the equipment in question and a reference to any relevant equipment Recommendation.

Column 2: Path overhead available to derive anomaly and defect information

The second column indicates the path overhead available in the given frame structure suitable for the derivation of anomaly and defect events. The following path overhead functions may be available:

- CRC-4/6 errored block indication;
- E-bits events – Bit 1 of frame 13 and 15 in multiframe – CRC-4 error indication;
- FAS events (binary errors in alignment word);
- Remote defect indication events;
- A-bits – Remote defect indication – Bit 3 in Recommendation G.704 [7];
- Parity bits;
- S-bits – (multi)frame alignment signal for 1544 kbit/s signals.

Column 3: Anomalies and defects in 1 second

The third column lists the anomaly and defect criteria for 1 second duration. The following techniques may be used:

- LOF alignment;
- LOS – Equipment dependent;
- Errored FAS – Binary errors in any FAS bits/words during the 1 second duration;
- Frame bit-errors – If the equipment can detect binary errors in the FAS word, then an SES can be detected using the suggested value. If the equipment can only detect FAS word violations, then the same number of violated FAS words will lead to an SES;
- A-bits – Remote defect indication – Bit 3 in Recommendation G.704 [7];
- Remote defect indication bits;
- Parity errors;
- E-bits – Return CRC-4 errored block indicator bits.

In a number of rows, values are suggested when recommended values are not available.

Controlled slips may be introduced at primary rate path end points which are also international clock boundaries (see Recommendation G.822 [2]). A controlled slip is a deterministic impairment which effectively removes or duplicates a single frame of payload at the primary rate path end point. It is classified as an anomaly (see 5.2.2) and should be interpreted as causing an ES (but not an SES).

Column 4: Interpretation for receive direction

Column 4 demonstrates how to interpret anomalies and defects detected using the criteria specified in Column 3 for the path overhead in Column 2. Anomalies lead to ESs, defects lead to SESs and ESs.

Column 5: Interpretation for send direction

Column 5 demonstrates how to interpret anomalies and defects detected by the techniques specified in Column 3. Anomalies lead to ESs; defects lead to SESs and ESs.

Column 6: Remarks

This column provides further explanatory text.

See Tables B.1 to B.6.

TABLE B.1/M.2100

In-service ES and SES parameter evaluation criteria for sub-primary level

Path level (kbit/s)	Path overhead available to derive anomaly/defect information	ES/SES parameter measurement criteria (anomalies and defects in 1 second)			Remarks
		Anomalies/ and defects in 1 second	Interpretation for receive direction	Interpretation for send direction	
64 (clear)	None	–	–	–	Rec. G.821 [1] gives reference performance
64 Rec. H.221 [9]	CRC-4 E-bits FAS RDI bit	Under study	Under study	Under study	See Rec. H.221 [9] for details. Parameter evaluation criteria is under study

TABLE B.2/M.2100

In-service ES and SES parameter evaluation criteria for synchronous frame structures used at the primary level

Path level (kbit/s)	Path overhead available to derive anomaly/defect information	ES/SES parameter measurement criteria (anomalies and defects in 1 second)			Remarks
		Anomalies and defects in 1 second	Interpretation for receive direction	Interpretation for send direction	
1544 (non CRC-6)	FAS S-bit	≥ 1 LOF ≥ 1 LOS ≥ 1 AIS ≥ 1 errored FAS ≥ 8 frame bit errors	ES + SES ES + SES ES + SES ES ES + SES	– – – – –	Send ES resolution limited to part of SES population
1544 (CRC-6)	CRC-6 FAS LOF	≥ 1 LOF ≥ 1 LOS ≥ 1 AIS ≥ 1 CRC-6 block errors ≥ 320 CRC-6 block errors ≥ 1 LOF sequence	ES + SES ES + SES ES + SES ES ES + SES –	– – – – – ES + SES	Send ES resolution limited to part of SES population (real-time). Total send ES data could be obtained from remote end store via 4 kbit/s data link (method not detailed)
2048 (non CRC-4)	FAS A-bit	≥ 1 LOF ≥ 1 LOS ≥ 1 AIS ≥ 1 errored FAS ≥ 28 frame bit errors ≥ 1 RDI	ES + SES ES + SES ES + SES ES ES + SES –	– – – – – ES + SES	Send ES resolution limited to part of SES population.
2048 (CRC-4)	CRC-4 E-bits FAS A-bit	≥ 1 LOF ≥ 1 LOS ≥ 1 AIS ≥ 1 CRC-4 block errors ≥ 805 CRC-4 block errors ≥ 1 E-bit ≥ 805 E-bits ≥ 1 RDI	ES + SES ES + SES ES + SES ES ES + SES – – –	– – – – – ES ES + SES ES + SES	Both send and receive ES and SES resolution possible in real-time from single end

TABLE B.3/M.2100

In-service ES and SES parameter evaluation criteria for equipment which operates at the primary level

Equipment and path level (kbit/s)	Path overhead available to derive anomaly/defect information	ES/SES parameter measurement criteria (anomalies and defects in 1 second)			Remarks
		Anomalies and defects in 1 second	Interpretation for receive direction	Interpretation for send direction	
Rec. G.724 [10] Rec. G.733 [11] Rec. G.762 [12] Rec. G.794 [13] 1544					Uses Rec. G.704 [7] and Rec. G.706 [6]. See appropriate entry in Table B2
Rec. G.734 [14] 1544	FAS RDI bit	≥ 1 LOF ≥ 1 LOS ≥ 1 AIS ≥ 1 errored FAS ≥ 8 frame bit errors ≥ 1 RDI	ES + SES ES + SES ES + SES ES ES + SES –	– – – – – ES + SES	
Rec. G.732 [15] Rec. G.735 [16] Rec. G.736 [17] Rec. G.737 [18] Rec. G.738 [19] Rec. G.739 [20] Rec. G.761 [21] Rec. G.793 [22] 2048					Uses Rec. G.704 [7] and Rec. G.706 [6]. See appropriate entry in Table B2

TABLE B.4/M.2100

In-service ES and SES parameter evaluation criteria for equipment which operates at the secondary level

Equipment and path level (kbit/s)	Path overhead available to derive anomaly/defect information	ES/SES parameter measurement criteria (anomalies and defects in 1 second)			Remarks
		Anomalies and defects in 1 second	Interpretation for receive direction	Interpretation for send direction	
Rec. G.743 [23] 6312	FAS RDI bit (if equipped)	≥ 1 LOF ≥ 1 LOS ≥ 1 AIS ≥ 1 errored FAS ≥ 21 frame bit errors ≥ 1 RDI	ES + SES ES + SES ES + SES ES ES + SES –	– – – – – ES + SES	Send ES resolution limited to part of SES population (if RDI equipped)
Rec. G.747 [24] 6312	Parity bit FAS RDI bit	≥ 1 LOF ≥ 1 LOS ≥ 1 AIS ≥ 1 Parity error, or ≥ 1 errored FAS ≥ 2000 Parity errors or ≥ 28 frame bit errors ≥ 1 RDI	ES + SES ES + SES ES + SES ES ES ES + SES ES + SES –	– – – – – – – ES + SES	The method of using Parity and/or errored FAS for receive ES and SES evaluation is under study. Send ES resolution limited to part of SES population
Rec. G.742 [25] 8448	FAS RDI bit	≥ LOF ≥ LOS ≥ AIS ≥ 1 errored FAS ≥ 41 frame bit errors ≥ 1 RDI	ES + SES ES + SES ES + SES ES ES + SES –	– – – – – ES + SES	Send ES resolution limited to part of SES population
Rec. G.745 [26] 8448	FAS RDI bit	≥ 1 LOF ≥ 1 LOS ≥ 1 AIS ≥ 1 errored FAS ≥ 22 frame bit errors ≥ 1 RDI	ES + SES ES + SES ES + SES ES ES + SES –	– – – – – ES + SES	Send ES resolution limited to part of SES population

TABLE B.5/M.2100

In-service ES and SES parameter evaluation criteria for equipment which operates at the tertiary level

Equipment and path level (kbit/s)	Path overhead available to derive anomaly/defect information	ES/SES parameter measurement criteria (anomalies and defects in 1 second)			Remarks
		Anomalies and defects in 1 second	Interpretation for receive direction	Interpretation for send direction	
Rec. G.752 [27] 32 064	FAS RDI bit	≥ 1 LOF ≥ 1 LOS ≥ 1 AIS ≥ 1 errored FAS ≥ 31 frame bit errors ≥ 1 RDI	ES + SES ES + SES ES + SES ES ES + SES –	– – – – – ES + SES	Send ES resolution limited to part of SES population
Rec. G.751 [28] 34 368	FAS RDI bit	≥ 1 LOF ≥ 1 LOS ≥ 1 AIS ≥ 1 errored FAS ≥ 52 frame bit errors ≥ 1 RDI	ES + SES ES + SES ES + SES ES ES + SES –	– – – – – ES + SES	Send ES resolution limited to part of SES population
Rec. G.753 [29] 34 368	FAS RDI bit	≥ 1 LOF ≥ 1 LOS ≥ 1 AIS ≥ 1 errored FAS ≥ 32 frame bit errors ≥ 1 RDI	ES + SES ES + SES ES + SES ES ES + SES –	– – – – – ES + SES	Send ES resolution limited to part of SES population
Rec. G.752 [27] 44 736	Parity bits FAS RDI bit (if equiped)	≥ 1 LOF ≥ 1 LOS ≥ 1 AIS ≥ 1 Parity error, or ≥ 1 errored FAS ≥ 2444 Parity errors, or ≥ 5 frame bit errors ≥ 1 RDI	ES + SES ES + SES ES + SES ES ES ES + SES ES + SES –	– – – – – – – ES + SES	The method of using Parity and/or errored FAS for receive ES and SES evaluation is under study. Send ES resolution limited to part of SES population (if RDI equipped)

TABLE B.6/M.2100

In-service ES and SES parameter evaluation criteria for equipment which operates at the quaternary level

Equipment and path level (kbit/s)	Path overhead available to derive anomaly/defect information	ES/SES parameter measurement criteria (anomalies and defects in 1 second)			Remarks
		Anomalies and defects in 1 second	Interpretation for receive direction	Interpretation for send direction	
Rec. G.752 [27] 97 728	Parity bit FAS RDI bit	≥ 1 LOF ≥ 1 LOS ≥ 1 AIS ≥ 1 Parity error, or ≥ 1 errored FAS ≥ 21 000 Parity errors, or ≥ 152 frame bit errors ≥ 1 RDI	ES + SES ES + SES ES + SES ES ES ES + SES ES + SES –	– – – – – – – ES + SES	The method of using Parity and/or errored FAS for receive ES and SES evaluation is under study. Send ES resolution limited to part of SES population
Rec. G.751 [28] 139 264	FAS RDI bit	≥ 1 LOF ≥ 1 LOS ≥ 1 AIS ≥ 1 errored FAS ≥ 69 frame bit errors ≥ 1 RDI	ES + SES ES + SES ES + SES ES ES + SES –	– – – – – ES + SES	Send ES resolution limited to part of SES population
Rec. G.754 [30] 139 264	FAS RDI bit	≥ 1 LOF ≥ 1 LOS ≥ 1 AIS ≥ 1 errored FAS ≥ 104 frame bit errors ≥ 1 RDI	ES + SES ES + SES ES + SES ES ES + SES –	– – – – – ES + SES	Send ES resolution limited to part of SES population
Rec. G.755 [31] 139 264	Parity bit FAS RDI bit	≥ 1 LOF ≥ 1 LOS ≥ 1 AIS ≥ 1 Parity error, or ≥ 1 errored FAS ≥ 43 800 Parity errors or ≥ 655 frame bit errors ≥ 1 RDI	ES + SES ES + SES ES + SES ES ES ES + SES ES + SES –	– – – – – – – ES + SES	The method of using Parity and/or errored FAS for receive ES and SES evaluation is under study. Send ES resolution limited to part of SES population

Annex C

Values for bringing-into-service limits for international digital paths

(This annex forms an integral part of this Recommendation)

Two tables have been prepared for each network level from 64 kbit/s to 139 264 kbit/s.

- Tables C.11 and C.12: Sub-primary level.
- Tables C.21 and C.22: Primary level.
- Tables C.31 and C.32: Secondary level.
- Tables C.41 and C.42: Tertiary level.
- Tables C.51 and C.52: Quaternary level.

Tables C.i1 provide BIS limits for 24 hours and 7 days.

Tables C.i2 provide BIS limits for 2 hours.

TABLE C.11/M.2100

BIS limits for sub-primary level

	ES (4%) 1 day				ES 7 days	SES (0.1%) 1 day				SES 7 days
Path allocation	RPO	BISO	S1	S2	BISO	RPO	BISO	S1	S2	BISO
0.50%	17	9	3	15	60	0	0	0	1	2
1.00%	35	17	9	26	121	1	0	0	2	3
1.50%	52	26	16	36	181	1	1	0	2	5
2.00%	69	35	23	46	242	2	1	0	3	6
2.50%	86	43	30	56	302	2	1	0	3	8
3.00%	104	52	37	66	363	3	1	0	4	9
3.50%	121	60	45	76	423	3	2	0	4	11
4.00%	138	69	52	86	484	3	2	0	4	12
4.50%	156	78	60	95	544	4	2	0	5	14
5.00%	173	86	68	105	605	4	2	0	5	15
5.50%	190	95	76	115	665	5	2	0	5	17
6.00%	207	104	83	124	726	5	3	0	6	18
6.50%	225	112	91	134	786	6	3	0	6	20
7.00%	242	121	99	143	847	6	3	0	7	21
7.50%	259	130	107	152	907	6	3	0	7	23
8.00%	276	138	115	162	968	7	3	0	7	24
8.50%	294	147	123	171	1028	7	4	0	8	26
9.00%	311	156	131	180	1089	8	4	0	8	27
9.50%	328	164	139	190	1149	8	4	0	8	29
10.00%	346	173	147	199	1210	9	4	0	8	30
10.50%	363	181	155	208	1270	9	5	0	9	32
11.00%	380	190	163	218	1331	10	5	0	9	33
11.50%	397	199	171	227	1391	10	5	1	9	35
12.00%	415	207	179	236	1452	10	5	1	10	36
12.50%	432	216	187	245	1512	11	5	1	10	38
13.00%	449	225	195	255	1572	11	6	1	10	39
13.50%	467	233	203	264	1633	12	6	1	11	41
14.00%	484	242	211	273	1693	12	6	1	11	42
14.50%	501	251	219	282	1754	13	6	1	11	44
15.00%	518	259	227	291	1814	13	6	1	12	45
15.50%	536	268	235	301	1875	13	7	2	12	47
16.00%	553	276	243	310	1935	14	7	2	12	48
16.50%	570	285	251	319	1996	14	7	2	12	50
17.00%	588	294	259	328	2056	15	7	2	13	51
17.50%	605	302	268	337	2117	15	8	2	13	53
18.00%	622	311	276	346	2177	16	8	2	13	54
18.50%	639	320	284	355	2238	16	8	2	14	56
19.00%	657	328	292	365	2298	16	8	2	14	57
19.50%	674	337	300	374	2359	17	8	3	14	59
20.00%	691	346	308	383	2419	17	9	3	15	60
20.50%	708	354	317	392	2480	18	9	3	15	62
21.00%	726	363	325	401	2540	18	9	3	15	64
21.50%	743	372	333	410	2601	19	9	3	15	65
22.00%	760	380	341	419	2661	19	10	3	16	67
22.50%	778	389	349	428	2722	19	10	3	16	68
23.00%	795	397	358	437	2782	20	10	4	16	70
23.50%	812	406	366	446	2843	20	10	4	17	71
24.00%	829	415	374	455	2903	21	10	4	17	73
24.50%	847	423	382	465	2964	21	11	4	17	74
25.00%	864	432	390	474	3024	22	11	4	17	76
25.50%	881	441	399	483	3084	22	11	4	18	77

TABLE C.11/M.2100 *(end)*

BIS limits for sub-primary level

	ES (4%) 1 day				ES 7 days	SES (0.1%) 1 day				SES 7 days
Path allocation	RPO	BISO	S1	S2	BISO	RPO	BISO	S1	S2	BISO
26.00%	899	449	407	492	3145	22	11	5	18	79
26.50%	916	458	415	501	3205	23	11	5	18	80
27.00%	933	467	423	510	3266	23	12	5	18	82
27.50%	950	475	432	519	3326	24	12	5	19	83
28.00%	968	484	440	528	3387	24	12	5	19	85
28.50%	985	492	448	537	3447	25	12	5	19	86
29.00%	1002	501	456	546	3508	25	13	5	20	88
29.50%	1020	510	465	555	3568	25	13	6	20	89
30.00%	1037	518	473	564	3629	26	13	6	20	91
30.50%	1054	527	481	573	3689	26	13	6	20	92
31.00%	1071	536	489	582	3750	27	13	6	21	94
31.50%	1089	544	498	591	3810	27	14	6	21	95
32.00%	1106	553	506	600	3871	28	14	6	21	97
32.50%	1123	562	514	609	3931	28	14	7	22	98
33.00%	1140	570	522	618	3992	29	14	7	22	100
33.50%	1158	579	531	627	4052	29	14	7	22	101
34.00%	1175	588	539	636	4113	29	15	7	22	103
34.50%	1192	596	547	645	4173	30	15	7	23	104
35.00%	1210	605	556	654	4234	30	15	7	23	106
35.50%	1227	613	564	663	4294	31	15	8	23	107
36.00%	1244	622	572	672	4355	31	16	8	23	109
36.50%	1261	631	580	681	4415	32	16	8	24	110
37.00%	1279	639	589	690	4476	32	16	8	24	112
37.50%	1296	648	597	699	4536	32	16	8	24	113
38.00%	1313	657	605	708	4596	33	16	8	25	115
38.50%	1331	665	614	717	4657	33	17	8	25	116
39.00%	1348	674	622	726	4717	34	17	9	25	118
39.50%	1365	683	630	735	4778	34	17	9	25	119
40.00%	1382	691	639	744	4838	35	17	9	26	121

TABLE C.12/M.2100

BIS limits for sub-primary level

	ES (4%) 2 hours				SES (0.1%) 2 hours			
Path allocation	RPO	BISO	S1	S2	RPO	BISO	S1	S2
0.50%	1	1	0	2	0	0	0	0
1.00%	3	1	0	4	0	0	0	0
1.50%	4	2	0	5	0	0	0	1
2.00%	6	3	0	6	0	0	0	1
2.50%	7	4	0	7	0	0	0	1
3.00%	9	4	0	8	0	0	0	1
3.50%	10	5	1	10	0	0	0	1
4.00%	12	6	1	11	0	0	0	1
4.50%	13	6	1	12	0	0	0	1
5.00%	14	7	2	13	0	0	0	1
5.50%	16	8	2	14	0	0	0	1
6.00%	17	9	3	15	0	0	0	1
6.50%	19	9	3	15	0	0	0	1
7.00%	20	10	4	16	1	0	0	1
7.50%	22	11	4	17	1	0	0	1
8.00%	23	12	5	18	1	0	0	1
8.50%	24	12	5	19	1	0	0	1
9.00%	26	13	6	20	1	0	0	1
9.50%	27	14	6	21	1	0	0	2
10.00%	29	14	7	22	1	0	0	2
10.50%	30	15	7	23	1	0	0	2
11.00%	32	16	8	24	1	0	0	2
11.50%	33	17	8	25	1	0	0	2
12.00%	35	17	9	26	1	0	0	2
12.50%	36	18	10	26	1	0	0	2
13.00%	37	19	10	27	1	0	0	2
13.50%	39	19	11	28	1	0	0	2
14.00%	40	20	11	29	1	1	0	2
14.50%	42	21	12	30	1	1	0	2
15.00%	43	22	12	31	1	1	0	2
15.50%	45	22	13	32	1	1	0	2
16.00%	46	23	13	33	1	1	0	2
16.50%	48	24	14	34	1	1	0	2
17.00%	49	24	15	34	1	1	0	2
17.50%	50	25	15	35	1	1	0	2
18.00%	52	26	16	36	1	1	0	2
18.50%	53	27	16	37	1	1	0	2
19.00%	55	27	17	38	1	1	0	2
19.50%	56	28	17	39	1	1	0	2
20.00%	58	29	18	40	1	1	0	2
20.50%	59	30	19	40	1	1	0	2
21.00%	60	30	19	41	2	1	0	2
21.50%	62	31	20	42	2	1	0	3
22.00%	63	32	20	43	2	1	0	3
22.50%	65	32	21	44	2	1	0	3
23.00%	66	33	22	45	2	1	0	3
23.50%	68	34	22	45	2	1	0	3
24.00%	69	35	23	46	2	1	0	3
24.50%	71	35	23	47	2	1	0	3
25.00%	72	36	24	48	2	1	0	3
25.50%	73	37	25	49	2	1	0	3

TABLE C.12/M.2100 *(end)*

BIS limits for sub-primary level

	ES (4%) 2 hours				SES (0.1%) 2 hours			
Path allocation	RPO	BISO	S1	S2	RPO	BISO	S1	S2
26.00%	75	37	25	50	2	1	0	3
26.50%	76	38	26	51	2	1	0	3
27.00%	78	39	26	51	2	1	0	3
27.50%	79	40	27	52	2	1	0	3
28.00%	81	40	28	53	2	1	0	3
28.50%	82	41	28	54	2	1	0	3
29.00%	84	42	29	55	2	1	0	3
29.50%	85	42	29	56	2	1	0	3
30.00%	86	43	30	56	2	1	0	3
30.50%	88	44	31	57	2	1	0	3
31.00%	89	45	31	58	2	1	0	3
31.50%	91	45	32	59	2	1	0	3
32.00%	92	46	33	60	2	1	0	3
32.50%	94	47	33	60	2	1	0	3
33.00%	95	48	34	61	2	1	0	3
33.50%	96	48	34	62	2	1	0	3
34.00%	98	49	35	63	2	1	0	3
34.50%	99	50	36	64	2	1	0	3
35.00%	101	50	36	65	3	1	0	4
35.50%	102	51	37	65	3	1	0	4
36.00%	104	52	37	66	3	1	0	4
36.50%	105	53	38	67	3	1	0	4
37.00%	107	53	39	68	3	1	0	4
37.50%	108	54	39	69	3	1	0	4
38.00%	109	55	40	70	3	1	0	4
38.50%	111	55	41	70	3	1	0	4
39.00%	112	56	41	71	3	1	0	4
39.50%	114	57	42	72	3	1	0	4
40.00%	115	58	42	73	3	1	0	4

TABLE C.21/M.2100

BIS limits for primary level

	ES (2%) 1 day				ES 7 days	SES (0.1%) 1 day				SES 7 days
Path allocation	RPO	BISO	S1	S2	BISO	RPO	BISO	S1	S2	BISO
0.50%	9	4	0	8	30	0	0	0	1	2
1.00%	17	9	3	15	60	1	0	0	2	3
1.50%	26	13	6	20	91	1	1	0	2	5
2.00%	35	17	9	26	121	2	1	0	3	6
2.50%	43	22	12	31	151	2	1	0	3	8
3.00%	52	26	16	36	181	3	1	0	4	9
3.50%	60	30	19	41	212	3	2	0	4	11
4.00%	69	35	23	46	242	3	2	0	4	12
4.50%	78	39	26	51	272	4	2	0	5	14
5.00%	86	43	30	56	302	4	2	0	5	15
5.50%	95	48	34	61	333	5	2	0	5	17
6.00%	104	52	37	66	363	5	3	0	6	18
6.50%	112	56	41	71	393	6	3	0	6	20
7.00%	121	60	45	76	423	6	3	0	7	21
7.50%	130	65	49	81	454	6	3	0	7	23
8.00%	138	69	52	86	484	7	3	0	7	24
8.50%	147	73	56	91	514	7	4	0	8	26
9.00%	156	78	60	95	544	8	4	0	8	27
9.50%	164	82	64	100	575	8	4	0	8	29
10.00%	173	86	68	105	605	9	4	0	8	30
10.50%	181	91	72	110	635	9	5	0	9	32
11.00%	190	95	76	115	665	10	5	0	9	33
11.50%	199	99	79	119	696	10	5	1	9	35
12.00%	207	104	83	124	726	10	5	1	10	36
12.50%	216	108	87	129	756	11	5	1	10	38
13.00%	225	112	91	134	786	11	6	1	10	39
13.50%	233	117	95	138	816	12	6	1	11	41
14.00%	242	121	99	143	847	12	6	1	11	42
14.50%	251	125	103	148	877	13	6	1	11	44
15.00%	259	130	107	152	907	13	6	1	12	45
15.50%	268	134	111	157	937	13	7	2	12	47
16.00%	276	138	115	162	968	14	7	2	12	48
16.50%	285	143	119	166	998	14	7	2	12	50
17.00%	294	147	123	171	1028	15	7	2	13	51
17.50%	302	151	127	176	1058	15	8	2	13	53
18.00%	311	156	131	180	1089	16	8	2	13	54
18.50%	320	160	135	185	1119	16	8	2	14	56
19.00%	328	164	139	190	1149	16	8	2	14	57
19.50%	337	168	143	194	1179	17	8	3	14	59
20.00%	346	173	147	199	1210	17	9	3	15	60
20.50%	354	177	151	204	1240	18	9	3	15	62
21.00%	363	181	155	208	1270	18	9	3	15	64
21.50%	372	186	159	213	1300	19	9	3	15	65
22.00%	380	190	163	218	1331	19	10	3	16	67
22.50%	389	194	167	222	1361	19	10	3	16	68
23.00%	397	199	171	227	1391	20	10	4	16	70
23.50%	406	203	175	232	1421	20	10	4	17	71
24.00%	415	207	179	236	1452	21	10	4	17	73
24.50%	423	212	183	241	1482	21	11	4	17	74
25.00%	432	216	187	245	1512	22	11	4	17	76
25.50%	441	220	191	250	1542	22	11	4	18	77

TABLE C.21/M.2100 *(continued)*

BIS limits for primary level

	ES (2%) 1 day				ES 7 days	SES (0.1%) 1 day				SES 7 days
Path allocation	RPO	BISO	S1	S2	BISO	RPO	BISO	S1	S2	BISO
26.00%	449	225	195	255	1572	22	11	5	18	79
26.50%	458	229	199	259	1603	23	11	5	18	80
27.00%	467	233	203	264	1633	23	12	5	18	82
27.50%	475	238	207	268	1663	24	12	5	19	83
28.00%	484	242	211	273	1693	24	12	5	19	85
28.50%	492	246	215	278	1724	25	12	5	19	86
29.00%	501	251	219	282	1754	25	13	5	20	88
29.50%	510	255	223	287	1784	25	13	6	20	89
30.00%	518	259	227	291	1814	26	13	6	20	91
30.50%	527	264	231	296	1845	26	13	6	20	92
31.00%	536	268	235	301	1875	27	13	6	21	94
31.50%	544	272	239	305	1905	27	14	6	21	95
32.00%	553	276	243	310	1935	28	14	6	21	97
32.50%	562	281	247	314	1966	28	14	7	22	98
33.00%	570	285	251	319	1996	29	14	7	22	100
33.50%	579	289	255	323	2026	29	14	7	22	101
34.00%	588	294	259	328	2056	29	15	7	22	103
34.50%	596	298	264	333	2087	30	15	7	23	104
35.00%	605	302	268	337	2117	30	15	7	23	106
35.50%	613	307	272	342	2147	31	15	8	23	107
36.00%	622	311	276	346	2177	31	16	8	23	109
36.50%	631	315	280	351	2208	32	16	8	24	110
37.00%	639	320	284	355	2238	32	16	8	24	112
37.50%	648	324	288	360	2268	32	16	8	24	113
38.00%	657	328	292	365	2298	33	16	8	25	115
38.50%	665	333	296	369	2328	33	17	8	25	116
39.00%	674	337	300	374	2359	34	17	9	25	118
39.50%	683	341	304	378	2389	34	17	9	25	119
40.00%	691	346	308	383	2419	35	17	9	26	121
40.50%	700	350	313	387	2449	35	17	9	26	122
41.00%	708	354	317	392	2480	35	18	9	26	124
41.50%	717	359	321	396	2510	36	18	9	26	125
42.00%	726	363	325	401	2540	36	18	10	27	127
42.50%	734	367	329	406	2570	37	18	10	27	129
43.00%	743	372	333	410	2601	37	19	10	27	130
43.50%	752	376	337	415	2631	38	19	10	27	132
44.00%	760	380	341	419	2661	38	19	10	28	133
44.50%	769	384	345	424	2691	38	19	10	28	135
45.00%	778	389	349	428	2722	39	19	11	28	136
45.50%	786	393	353	433	2752	39	20	11	29	138
46.00%	795	397	358	437	2782	40	20	11	29	139
46.50%	804	402	362	442	2812	40	20	11	29	141
47.00%	812	406	366	446	2843	41	20	11	29	142
47.50%	821	410	370	451	2873	41	21	11	30	144
48.00%	829	415	374	455	2903	41	21	12	30	145
48.50%	838	419	378	460	2933	42	21	12	30	147
49.00%	847	423	382	465	2964	42	21	12	30	148
49.50%	855	428	386	469	2994	43	21	12	31	150
50.00%	864	432	390	474	3024	43	22	12	31	151
50.50%	873	436	395	478	3054	44	22	12	31	153
51.00%	881	441	399	483	3084	44	22	13	31	154
51.50%	890	445	403	487	3115	44	22	13	32	156

TABLE C.21/M.2100 *(end)*

BIS limits for primary level

	ES (2%) 1 day				ES 7 days	SES (0.1%) 1 day				SES 7 days
Path allocation	RPO	BISO	S1	S2	BISO	RPO	BISO	S1	S2	BISO
52.00%	899	449	407	492	3145	45	22	13	32	157
52.50%	907	454	411	496	3175	45	23	13	32	159
53.00%	916	458	415	501	3205	46	23	13	32	160
53.50%	924	462	419	505	3236	46	23	13	33	162
54.00%	933	467	423	510	3266	47	23	14	33	163
54.50%	942	471	427	514	3296	47	24	14	33	165
55.00%	950	475	432	519	3326	48	24	14	34	166
55.50%	959	480	436	523	3357	48	24	14	34	168
56.00%	968	484	440	528	3387	48	24	14	34	169
56.50%	976	488	444	532	3417	49	24	15	34	171
57.00%	985	492	448	537	3447	49	25	15	35	172
57.50%	994	497	452	541	3478	50	25	15	35	174
58.00%	1002	501	456	546	3508	50	25	15	35	175
58.50%	1011	505	460	550	3538	51	25	15	35	177
59.00%	1020	510	465	555	3568	51	25	15	36	178
59.50%	1028	514	469	559	3599	51	26	16	36	180
60.00%	1037	518	473	564	3629	52	26	16	36	181
60.50%	1045	523	477	568	3659	52	26	16	36	183
61.00%	1054	527	481	573	3689	53	26	16	37	184
61.50%	1063	531	485	577	3720	53	27	16	37	186
62.00%	1071	536	489	582	3750	54	27	16	37	187
62.50%	1080	540	494	586	3780	54	27	17	37	189
63.00%	1089	544	498	591	3810	54	27	17	38	191

TABLE C.22/M.2100

BIS limits for primary level

	ES (2%) 2 hours				SES (0.1%) 2 hours			
Path allocation	RPO	BISO	S1	S2	RPO	BISO	S1	S2
0.50%	1	0	0	2	0	0	0	0
1.00%	1	1	0	2	0	0	0	0
1.50%	2	1	0	3	0	0	0	1
2.00%	3	1	0	4	0	0	0	1
2.50%	4	2	0	4	0	0	0	1
3.00%	4	2	0	5	0	0	0	1
3.50%	5	3	0	6	0	0	0	1
4.00%	6	3	0	6	0	0	0	1
4.50%	6	3	0	7	0	0	0	1
5.00%	7	4	0	7	0	0	0	1
5.50%	8	4	0	8	0	0	0	1
6.00%	9	4	0	8	0	0	0	1
6.50%	9	5	0	9	0	0	0	1
7.00%	10	5	1	10	1	0	0	1
7.50%	11	5	1	10	1	0	0	1
8.00%	12	6	1	11	1	0	0	1
8.50%	12	6	1	11	1	0	0	1
9.00%	13	6	1	12	1	0	0	1
9.50%	14	7	2	12	1	0	0	2
10.00%	14	7	2	13	1	0	0	2
10.50%	15	8	2	13	1	0	0	2
11.00%	16	8	2	14	1	0	0	2
11.50%	17	8	3	14	1	0	0	2
12.00%	17	9	3	15	1	0	0	2
12.50%	18	9	3	15	1	0	0	2
13.00%	19	9	3	15	1	0	0	2
13.50%	19	10	3	16	1	0	0	2
14.00%	20	10	4	16	1	1	0	2
14.50%	21	10	4	17	1	1	0	2
15.00%	22	11	4	17	1	1	0	2
15.50%	22	11	4	18	1	1	0	2
16.00%	23	12	5	18	1	1	0	2
16.50%	24	12	5	19	1	1	0	2
17.00%	24	12	5	19	1	1	0	2
17.50%	25	13	6	20	1	1	0	2
18.00%	26	13	6	20	1	1	0	2
18.50%	27	13	6	21	1	1	0	2
19.00%	27	14	6	21	1	1	0	2
19.50%	28	14	7	22	1	1	0	2
20.00%	29	14	7	22	1	1	0	2
20.50%	30	15	7	22	1	1	0	2
21.00%	30	15	7	23	2	1	0	2
21.50%	31	15	8	23	2	1	0	3
22.00%	32	16	8	24	2	1	0	3
22.50%	32	16	8	24	2	1	0	3
23.00%	33	17	8	25	2	1	0	3
23.50%	34	17	9	25	2	1	0	3
24.00%	35	17	9	26	2	1	0	3
24.50%	35	18	9	26	2	1	0	3
25.00%	36	18	10	26	2	1	0	3
25.50%	37	18	10	27	2	1	0	3
26.00%	37	19	10	27	2	1	0	3
26.50%	38	19	10	28	2	1	0	3

TABLE C.22/M.2100 *(continued)*

BIS limits for primary level

	ES (2%) 2 hours				SES (0.1%) 2 hours			
Path allocation	RPO	BISO	S1	S2	RPO	BISO	S1	S2
27.00%	39	19	11	28	2	1	0	3
27.50%	40	20	11	29	2	1	0	3
28.00%	40	20	11	29	2	1	0	3
28.50%	41	21	11	30	2	1	0	3
29.00%	42	21	12	30	2	1	0	3
29.50%	42	21	12	30	2	1	0	3
30.00%	43	22	12	31	2	1	0	3
30.50%	44	22	13	31	2	1	0	3
31.00%	45	22	13	32	2	1	0	3
31.50%	45	23	13	32	2	1	0	3
32.00%	46	23	13	33	2	1	0	3
32.50%	47	23	14	33	2	1	0	3
33.00%	48	24	14	34	2	1	0	3
33.50%	48	24	14	34	2	1	0	3
34.00%	49	24	15	34	2	1	0	3
34.50%	50	25	15	35	2	1	0	3
35.00%	50	25	15	35	3	1	0	4
35.50%	51	26	15	36	3	1	0	4
36.00%	52	26	16	36	3	1	0	4
36.50%	53	26	16	37	3	1	0	4
37.00%	53	27	16	37	3	1	0	4
37.50%	54	27	17	37	3	1	0	4
38.00%	55	27	17	38	3	1	0	4
38.50%	55	28	17	38	3	1	0	4
39.00%	56	28	17	39	3	1	0	4
39.50%	57	28	18	39	3	1	0	4
40.00%	58	29	18	40	3	1	0	4
40.50%	58	29	18	40	3	1	0	4
41.00%	59	30	19	40	3	1	0	4
41.50%	60	30	19	41	3	1	0	4
42.00%	60	30	19	41	3	2	0	4
42.50%	61	31	20	42	3	2	0	4
43.00%	62	31	20	42	3	2	0	4
43.50%	63	31	20	43	3	2	0	4
44.00%	63	32	20	43	3	2	0	4
44.50%	64	32	21	43	3	2	0	4
45.00%	65	32	21	44	3	2	0	4
45.50%	66	33	21	44	3	2	0	4
46.00%	66	33	22	45	3	2	0	4
46.50%	67	33	22	45	3	2	0	4
47.00%	68	34	22	45	3	2	0	4
47.50%	68	34	23	46	3	2	0	4
48.00%	69	35	23	46	3	2	0	4
48.50%	70	35	23	47	3	2	0	4
49.00%	71	35	23	47	4	2	0	4
49.50%	71	36	24	48	4	2	0	4
50.00%	72	36	24	48	4	2	0	4
50.50%	73	36	24	48	4	2	0	5
51.00%	73	37	25	49	4	2	0	5
51.50%	74	37	25	49	4	2	0	5
52.00%	75	37	25	50	4	2	0	5
52.50%	76	38	26	50	4	2	0	5
53.00%	76	38	26	51	4	2	0	5
53.50%	77	39	26	51	4	2	0	5

TABLE C.22/M.2100 *(end)*

BIS limits for primary level

	ES (2%) 2 hours				SES (0.1%) 2 hours			
Path allocation	RPO	BISO	S1	S2	RPO	BISO	S1	S2
54.00%	78	39	26	51	4	2	0	5
54.50%	78	39	27	52	4	2	0	5
55.00%	79	40	27	52	4	2	0	5
55.50%	80	40	27	53	4	2	0	5
56.00%	81	40	28	53	4	2	0	5
56.50%	81	41	28	53	4	2	0	5
57.00%	82	41	28	54	4	2	0	5
57.50%	83	41	29	54	4	2	0	5
58.00%	84	42	29	55	4	2	0	5
58.50%	84	42	29	55	4	2	0	5
59.00%	85	42	29	56	4	2	0	5
59.50%	86	43	30	56	4	2	0	5
60.00%	86	43	30	56	4	2	0	5
60.50%	87	44	30	57	4	2	0	5
61.00%	88	44	31	57	4	2	0	5
61.50%	89	44	31	58	4	2	0	5
62.00%	89	45	31	58	4	2	0	5
62.50%	90	45	32	58	5	2	0	5
63.00%	91	45	32	59	5	2	0	5

TABLE C.31/M.2100

BIS limits for secondary level

	ES (2.5%) 1 day				ES 7 days	SES (0.1%) 1 day				SES 7 days
Path allocation	RPO	BISO	S1	S2	BISO	RPO	BISO	S1	S2	BISO
0.50%	11	5	1	10	38	0	0	0	1	2
1.00%	22	11	4	17	76	1	0	0	2	3
1.50%	32	16	8	24	113	1	1	0	2	5
2.00%	43	22	12	31	151	2	1	0	3	6
2.50%	54	27	17	37	189	2	1	0	3	8
3.00%	65	32	21	44	227	3	1	0	4	9
3.50%	76	38	26	50	265	3	2	0	4	11
4.00%	86	43	30	56	302	3	2	0	4	12
4.50%	97	49	35	63	340	4	2	0	5	14
5.00%	108	54	39	69	378	4	2	0	5	15
5.50%	119	59	44	75	416	5	2	0	5	17
6.00%	130	65	49	81	454	5	3	0	6	18
6.50%	140	70	53	87	491	6	3	0	6	20
7.00%	151	76	58	93	529	6	3	0	7	21
7.50%	162	81	63	99	567	6	3	0	7	23
8.00%	173	86	68	105	605	7	3	0	7	24
8.50%	184	92	73	111	643	7	4	0	8	26
9.00%	194	97	77	117	680	8	4	0	8	27
9.50%	205	103	82	123	718	8	4	0	8	29
10.00%	216	108	87	129	756	9	4	0	8	30
10.50%	227	113	92	135	794	9	5	0	9	32
11.00%	238	119	97	141	832	10	5	0	9	33
11.50%	248	124	102	146	869	10	5	1	9	35
12.00%	259	130	107	152	907	10	5	1	10	36
12.50%	270	135	112	158	945	11	5	1	10	38
13.00%	281	140	117	164	983	11	6	1	10	39
13.50%	292	146	122	170	1021	12	6	1	11	41
14.00%	302	151	127	176	1058	12	6	1	11	42
14.50%	313	157	132	182	1096	13	6	1	11	44
15.00%	324	162	137	187	1134	13	6	1	12	45
15.50%	335	167	142	193	1172	13	7	2	12	47
16.00%	346	173	147	199	1210	14	7	2	12	48
16.50%	356	178	152	205	1247	14	7	2	12	50
17.00%	367	184	157	211	1285	15	7	2	13	51
17.50%	378	189	162	216	1323	15	8	2	13	53
18.00%	389	194	167	222	1361	16	8	2	13	54
18.50%	400	200	172	228	1399	16	8	2	14	56
19.00%	410	205	177	234	1436	16	8	2	14	57
19.50%	421	211	182	240	1474	17	8	3	14	59
20.00%	432	216	187	245	1512	17	9	3	15	60
20.50%	443	221	192	251	1550	18	9	3	15	62
21.00%	454	227	197	257	1588	18	9	3	15	64
21.50%	464	232	202	263	1625	19	9	3	15	65
22.00%	475	238	207	268	1663	19	10	3	16	67
22.50%	486	243	212	274	1701	19	10	3	16	68
23.00%	497	248	217	280	1739	20	10	4	16	70
23.50%	508	254	222	286	1777	20	10	4	17	71
24.00%	518	259	227	291	1814	21	10	4	17	73
24.50%	529	265	232	297	1852	21	11	4	17	74
25.00%	540	270	237	303	1890	22	11	4	17	76
25.50%	551	275	242	309	1928	22	11	4	18	77

TABLE C.31/M.2100 *(continued)*

BIS limits for secondary level

	ES (2.5%) 1 day				ES 7 days	SES (0.1%) 1 day				SES 7 days
Path allocation	RPO	BISO	S1	S2	BISO	RPO	BISO	S1	S2	BISO
26.00%	562	281	247	314	1966	22	11	5	18	79
26.50%	572	286	252	320	2003	23	11	5	18	80
27.00%	583	292	257	326	2041	23	12	5	18	82
27.50%	594	297	263	331	2079	24	12	5	19	83
28.00%	605	302	268	337	2117	24	12	5	19	85
28.50%	616	308	273	343	2155	25	12	5	19	86
29.00%	626	313	278	349	2192	25	13	5	20	88
29.50%	637	319	283	354	2230	25	13	6	20	89
30.00%	648	324	288	360	2268	26	13	6	20	91
30.50%	659	329	293	366	2306	26	13	6	20	92
31.00%	670	335	298	371	2344	27	13	6	21	94
31.50%	680	340	303	377	2381	27	14	6	21	95
32.00%	691	346	308	383	2419	28	14	6	21	97
32.50%	702	351	314	388	2457	28	14	7	22	98
33.00%	713	356	319	394	2495	29	14	7	22	100
33.50%	724	362	324	400	2533	29	14	7	22	101
34.00%	734	367	329	406	2570	29	15	7	22	103
34.50%	745	373	334	411	2608	30	15	7	23	104
35.00%	756	378	339	417	2646	30	15	7	23	106
35.50%	767	383	344	423	2684	31	15	8	23	107
36.00%	778	389	349	428	2722	31	16	8	23	109
36.50%	788	394	354	434	2759	32	16	8	24	110
37.00%	799	400	360	440	2797	32	16	8	24	112
37.50%	810	405	365	445	2835	32	16	8	24	113
38.00%	821	410	370	451	2873	33	16	8	25	115
38.50%	832	416	375	457	2911	33	17	8	25	116
39.00%	842	421	380	462	2948	34	17	9	25	118
39.50%	853	427	385	468	2986	34	17	9	25	119
40.00%	864	432	390	474	3024	35	17	9	26	121
40.50%	875	437	396	479	3062	35	17	9	26	122
41.00%	886	443	401	485	3100	35	18	9	26	124
41.50%	896	448	406	491	3137	36	18	9	26	125
42.00%	907	454	411	496	3175	36	18	10	27	127
42.50%	918	459	416	502	3213	37	18	10	27	129
43.00%	929	464	421	507	3251	37	19	10	27	130
43.50%	940	470	426	513	3289	38	19	10	27	132
44.00%	950	475	432	519	3326	38	19	10	28	133
44.50%	961	481	437	524	3364	38	19	10	28	135
45.00%	972	486	442	530	3402	39	19	11	28	136
45.50%	983	491	447	536	3440	39	20	11	29	138
46.00%	994	497	452	541	3478	40	20	11	29	139
46.50%	1004	502	457	547	3515	40	20	11	29	141
47.00%	1015	508	463	553	3553	41	20	11	29	142
47.50%	1026	513	468	558	3591	41	21	11	30	144
48.00%	1037	518	473	564	3629	41	21	12	30	145
48.50%	1048	524	478	570	3667	42	21	12	30	147
49.00%	1058	529	483	575	3704	42	21	12	30	148
49.50%	1069	535	488	581	3742	43	21	12	31	150
50.00%	1080	540	494	586	3780	43	22	12	31	151
50.50%	1091	545	499	592	3818	44	22	12	31	153
51.00%	1102	551	504	598	3856	44	22	13	31	154
51.50%	1112	556	509	603	3893	44	22	13	32	156

TABLE C.31/M.2100 *(end)*

BIS limits for secondary level

	ES (2.5%) 1 day				ES 7 days	SES (0.1%) 1 day				SES 7 days
Path allocation	RPO	BISO	S1	S2	BISO	RPO	BISO	S1	S2	BISO
52.00%	1123	562	514	609	3931	45	22	13	32	157
52.50%	1134	567	519	615	3969	45	23	13	32	159
53.00%	1145	572	525	620	4007	46	23	13	32	160
53.50%	1156	578	530	626	4045	46	23	13	33	162
54.00%	1166	583	535	631	4082	47	23	14	33	163
54.50%	1177	589	540	637	4120	47	24	14	33	165
55.00%	1188	594	545	643	4158	48	24	14	34	166
55.50%	1199	599	550	648	4196	48	24	14	34	168
56.00%	1210	605	556	654	4234	48	24	14	34	169
56.50%	1220	610	561	660	4271	49	24	15	34	171
57.00%	1231	616	566	665	4309	49	25	15	35	172
57.50%	1242	621	571	671	4347	50	25	15	35	174
58.00%	1253	626	576	676	4385	50	25	15	35	175
58.50%	1264	632	582	682	4423	51	25	15	35	177
59.00%	1274	637	587	688	4460	51	25	15	36	178
59.50%	1285	643	592	693	4498	51	26	16	36	180
60.00%	1296	648	597	699	4536	52	26	16	36	181
60.50%	1307	653	602	705	4574	52	26	16	36	183
61.00%	1318	659	607	710	4612	53	26	16	37	184
61.50%	1328	664	613	716	4649	53	27	16	37	186
62.00%	1339	670	618	721	4687	54	27	16	37	187
62.50%	1350	675	623	727	4725	54	27	17	37	189
63.00%	1361	680	628	733	4763	54	27	17	38	191

TABLE C.32/M.2100

BIS limits for secondary level

	ES (2.5%) 2 hours				SES (0.1%) 2 hours			
Path allocation	RPO	BISO	S1	S2	RPO	BISO	S1	S2
0.50%	1	0	0	2	0	0	0	0
1.00%	2	1	0	3	0	0	0	0
1.50%	3	1	0	4	0	0	0	1
2.00%	4	2	0	4	0	0	0	1
2.50%	5	2	0	5	0	0	0	1
3.00%	5	3	0	6	0	0	0	1
3.50%	6	3	0	7	0	0	0	1
4.00%	7	4	0	7	0	0	0	1
4.50%	8	4	0	8	0	0	0	1
5.00%	9	5	0	9	0	0	0	1
5.50%	10	5	1	9	0	0	0	1
6.00%	11	5	1	10	0	0	0	1
6.50%	12	6	1	11	0	0	0	1
7.00%	13	6	1	11	1	0	0	1
7.50%	14	7	2	12	1	0	0	1
8.00%	14	7	2	13	1	0	0	1
8.50%	15	8	2	13	1	0	0	1
9.00%	16	8	2	14	1	0	0	1
9.50%	17	9	3	14	1	0	0	2
10.00%	18	9	3	15	1	0	0	2
10.50%	19	9	3	16	1	0	0	2
11.00%	20	10	4	16	1	0	0	2
11.50%	21	10	4	17	1	0	0	2
12.00%	22	11	4	17	1	0	0	2
12.50%	23	11	5	18	1	0	0	2
13.00%	23	12	5	19	1	0	0	2
13.50%	24	12	5	19	1	0	0	2
14.00%	25	13	6	20	1	1	0	2
14.50%	26	13	6	20	1	1	0	2
15.00%	27	14	6	21	1	1	0	2
15.50%	28	14	6	21	1	1	0	2
16.00%	29	14	7	22	1	1	0	2
16.50%	30	15	7	23	1	1	0	2
17.00%	31	15	7	23	1	1	0	2
17.50%	32	16	8	24	1	1	0	2
18.00%	32	16	8	24	1	1	0	2
18.50%	33	17	8	25	1	1	0	2
19.00%	34	17	9	25	1	1	0	2
19.50%	35	18	9	26	1	1	0	2
20.00%	36	18	10	26	1	1	0	2
20.50%	37	18	10	27	1	1	0	2
21.00%	38	19	10	28	2	1	0	2
21.50%	39	19	11	28	2	1	0	3
22.00%	40	20	11	29	2	1	0	3
22.50%	41	20	11	29	2	1	0	3
23.00%	41	21	12	30	2	1	0	3
23.50%	42	21	12	30	2	1	0	3
24.00%	43	22	12	31	2	1	0	3
24.50%	44	22	13	31	2	1	0	3
25.00%	45	23	13	32	2	1	0	3
25.50%	46	23	13	33	2	1	0	3
26.00%	47	23	14	33	2	1	0	3
26.50%	48	24	14	34	2	1	0	3

TABLE C.32/M.2100 *(continued)*

BIS limits for secondary level

	ES (2.5%) 2 hours				SES (0.1%) 2 hours			
Path allocation	RPO	BISO	S1	S2	RPO	BISO	S1	S2
27.00%	49	24	14	34	2	1	0	3
27.50%	50	25	15	35	2	1	0	3
28.00%	50	25	15	35	2	1	0	3
28.50%	51	26	16	36	2	1	0	3
29.00%	52	26	16	36	2	1	0	3
29.50%	53	27	16	37	2	1	0	3
30.00%	54	27	17	37	2	1	0	3
30.50%	55	27	17	38	2	1	0	3
31.00%	56	28	17	38	2	1	0	3
31.50%	57	28	18	39	2	1	0	3
32.00%	58	29	18	40	2	1	0	3
32.50%	59	29	18	40	2	1	0	3
33.00%	59	30	19	41	2	1	0	3
33.50%	60	30	19	41	2	1	0	3
34.00%	61	31	20	42	2	1	0	3
34.50%	62	31	20	42	2	1	0	3
35.00%	63	32	20	43	3	1	0	4
35.50%	64	32	21	43	3	1	0	4
36.00%	65	32	21	44	3	1	0	4
36.50%	66	33	21	44	3	1	0	4
37.00%	67	33	22	45	3	1	0	4
37.50%	68	34	22	45	3	1	0	4
38.00%	68	34	23	46	3	1	0	4
38.50%	69	35	23	46	3	1	0	4
39.00%	70	35	23	47	3	1	0	4
39.50%	71	36	24	47	3	1	0	4
40.00%	72	36	24	48	3	1	0	4
40.50%	73	36	24	49	3	1	0	4
41.00%	74	37	25	49	3	1	0	4
41.50%	75	37	25	50	3	1	0	4
42.00%	76	38	26	50	3	2	0	4
42.50%	77	38	26	51	3	2	0	4
43.00%	77	39	26	51	3	2	0	4
43.50%	78	39	27	52	3	2	0	4
44.00%	79	40	27	52	3	2	0	4
44.50%	80	40	27	53	3	2	0	4
45.00%	81	41	28	53	3	2	0	4
45.50%	82	41	28	54	3	2	0	4
46.00%	83	41	29	54	3	2	0	4
46.50%	84	42	29	55	3	2	0	4
47.00%	85	42	29	55	3	2	0	4
47.50%	86	43	30	56	3	2	0	4
48.00%	86	43	30	56	3	2	0	4
48.50%	87	44	30	57	3	2	0	4
49.00%	88	44	31	57	4	2	0	4
49.50%	89	45	31	58	4	2	0	4
50.00%	90	45	32	58	4	2	0	4
50.50%	91	45	32	59	4	2	0	5
51.00%	92	46	32	59	4	2	0	5
51.50%	93	46	33	60	4	2	0	5
52.00%	94	47	33	60	4	2	0	5
52.50%	95	47	34	61	4	2	0	5
53.00%	95	48	34	62	4	2	0	5
53.50%	96	48	34	62	4	2	0	5

TABLE C.32/M.2100 *(end)*

BIS limits for secondary level

	ES (2.5%) 2 hours				SES (0.1%) 2 hours			
Path allocation	RPO	BISO	S1	S2	RPO	BISO	S1	S2
54.00%	97	49	35	63	4	2	0	5
54.50%	98	49	35	63	4	2	0	5
55.00%	99	50	35	64	4	2	0	5
55.50%	100	50	36	64	4	2	0	5
56.00%	101	50	36	65	4	2	0	5
56.50%	102	51	37	65	4	2	0	5
57.00%	103	51	37	66	4	2	0	5
57.50%	104	52	37	66	4	2	0	5
58.00%	104	52	38	67	4	2	0	5
58.50%	105	53	38	67	4	2	0	5
59.00%	106	53	39	68	4	2	0	5
59.50%	107	54	39	68	4	2	0	5
60.00%	108	54	39	69	4	2	0	5
60.50%	109	54	40	69	4	2	0	5
61.00%	110	55	40	70	4	2	0	5
61.50%	111	55	40	70	4	2	0	5
62.00%	112	56	41	71	4	2	0	5
62.50%	113	56	41	71	5	2	0	5
63.00%	113	57	42	72	5	2	0	5

TABLE C.41/M.2100

BIS limits for tertiary level

	ES (3.75%) 1 day				ES 7 days	SES (0.1%) 1 day				SES 7 days
Path allocation	RPO	BISO	S1	S2	BISO	RPO	BISO	S1	S2	BISO
0.50%	16	8	2	14	57	0	0	0	1	2
1.00%	32	16	8	24	113	1	0	0	2	3
1.50%	49	24	11	34	170	1	1	0	2	5
2.00%	65	32	21	44	227	2	1	0	3	6
2.50%	81	41	28	53	284	2	1	0	3	8
3.00%	97	49	35	63	340	3	1	0	4	9
3.50%	113	57	42	72	397	3	2	0	4	11
4.00%	130	65	49	81	454	3	2	0	4	12
4.50%	146	73	56	90	510	4	2	0	5	14
5.00%	162	81	63	99	567	4	2	0	5	15
5.50%	178	89	70	108	624	5	2	0	5	17
6.00%	194	97	77	117	680	5	3	0	6	18
6.50%	211	105	85	126	737	6	3	0	6	20
7.00%	227	113	92	135	794	6	3	0	7	21
7.50%	243	122	99	144	851	6	3	0	7	23
8.00%	259	130	107	152	907	7	3	0	7	24
8.50%	275	138	114	161	964	7	4	0	8	26
9.00%	292	146	122	170	1021	8	4	0	8	27
9.50%	308	154	129	179	1077	8	4	0	8	29
10.00%	324	162	137	187	1134	9	4	0	8	30
10.50%	340	170	144	196	1191	9	5	0	9	32
11.00%	356	178	152	205	1247	10	5	0	9	33
11.50%	373	186	159	214	1304	10	5	0	9	35
12.00%	389	194	167	222	1361	10	5	0	10	36
12.50%	405	203	174	231	1418	11	5	0	10	38
13.00%	421	211	182	240	1474	11	6	0	10	39
13.50%	437	219	189	248	1531	12	6	0	11	41
14.00%	454	227	197	257	1588	12	6	0	11	42
14.50%	470	235	204	266	1644	13	6	0	11	44
15.00%	486	243	212	274	1701	13	6	0	12	45
15.50%	502	251	219	283	1758	13	7	0	12	47
16.00%	518	259	227	291	1814	14	7	0	12	48
16.50%	535	267	235	300	1871	14	7	0	12	50
17.00%	551	275	242	309	1928	15	7	0	13	51
17.50%	567	284	250	317	1985	15	8	0	13	53
18.00%	583	292	257	326	2041	16	8	0	13	54
18.50%	599	300	265	334	2098	16	8	0	14	56
19.00%	616	308	273	343	2155	16	8	0	14	57
19.50%	632	316	280	351	2211	17	8	0	14	59
20.00%	648	324	288	360	2268	17	9	0	15	60
20.50%	664	332	296	369	2325	18	9	0	15	62
21.00%	680	340	303	377	2381	18	9	0	15	64
21.50%	697	348	311	386	2438	19	9	0	15	65
22.00%	713	356	319	394	2495	19	10	0	16	67
22.50%	729	365	326	403	2552	19	10	0	16	68
23.00%	745	373	334	411	2608	20	10	0	16	70
23.50%	761	381	342	420	2665	20	10	0	17	71
24.00%	778	389	349	428	2722	21	10	0	17	73
24.50%	794	397	357	437	2778	21	11	0	17	74
25.00%	810	405	365	445	2835	22	11	0	17	76
25.50%	826	413	372	454	2892	22	11	0	18	77

TABLE C.41/M.2100 *(continued)*

BIS limits for tertiary level

	ES (3.75%) 1 day				ES 7 days	SES (0.1%) 1 day				SES 7 days
Path allocation	RPO	BISO	S1	S2	BISO	RPO	BISO	S1	S2	BISO
26.00%	842	421	380	462	2948	22	11	0	18	79
26.50%	859	429	388	471	3005	23	11	0	18	80
27.00%	875	437	396	479	3062	23	12	0	18	82
27.50%	891	446	403	488	3119	24	12	0	19	83
28.00%	907	454	411	496	3175	24	12	0	19	85
28.50%	923	462	419	505	3232	25	12	0	19	86
29.00%	940	470	426	513	3289	25	13	0	20	88
29.50%	956	478	434	522	3345	25	13	0	20	89
30.00%	972	486	442	530	3402	26	13	0	20	91
30.50%	988	494	450	539	3459	26	13	0	20	92
31.00%	1004	502	457	547	3515	27	13	0	21	94
31.50%	1021	510	465	555	3572	27	14	0	21	95
32.00%	1037	518	473	564	3629	28	14	0	21	97
32.50%	1053	527	481	572	3686	28	14	0	22	98
33.00%	1069	535	488	581	3742	29	14	0	22	100
33.50%	1085	543	496	589	3799	29	14	0	22	101
34.00%	1102	551	504	598	3856	29	15	0	22	103
34.50%	1118	559	512	606	3912	30	15	0	23	104
35.00%	1134	567	519	615	3969	30	15	0	23	106
35.50%	1150	575	527	623	4026	31	15	0	23	107
36.00%	1166	583	535	631	4082	31	16	0	23	109
36.50%	1183	591	543	640	4139	32	16	0	24	110
37.00%	1199	599	550	648	4196	32	16	0	24	112
37.50%	1215	608	558	657	4253	32	16	0	24	113
38.00%	1231	616	566	665	4309	33	16	0	25	115
38.50%	1247	624	574	674	4366	33	17	0	25	116
39.00%	1264	632	582	682	4423	34	17	0	25	118
39.50%	1280	640	589	690	4479	34	17	0	25	119
40.00%	1296	648	597	699	4536	35	17	0	26	121
40.50%	1312	656	605	707	4593	35	17	9	26	122
41.00%	1328	664	613	716	4649	35	18	9	26	124
41.50%	1345	672	620	724	4706	36	18	9	26	125
42.00%	1361	680	628	733	4763	36	18	10	27	127
42.50%	1377	689	636	741	4820	37	18	10	27	129
43.00%	1393	697	644	749	4876	37	19	10	27	130
43.50%	1409	705	652	758	4933	38	19	10	27	132
44.00%	1426	713	659	766	4990	38	19	10	28	133
44.50%	1442	721	667	775	5046	38	19	10	28	135
45.00%	1458	729	675	783	5103	39	19	11	28	136
45.50%	1474	737	683	791	5160	39	20	11	29	138
46.00%	1490	745	691	800	5216	40	20	11	29	139
46.50%	1507	753	698	808	5273	40	20	11	29	141
47.00%	1523	761	706	817	5330	41	20	11	29	142
47.50%	1539	770	714	825	5387	41	21	11	30	144
48.00%	1555	778	722	833	5443	41	21	12	30	145
48.50%	1571	786	730	842	5500	42	21	12	30	147
49.00%	1588	794	737	850	5557	42	21	12	30	148
49.50%	1604	802	745	859	5613	43	21	12	31	150
50.00%	1620	810	753	867	5670	43	22	12	31	151
50.50%	1636	818	761	875	5727	44	22	12	31	153
51.00%	1652	826	769	884	5783	44	22	13	31	154
51.50%	1669	834	777	892	5840	44	22	13	32	156

TABLE C.41/M.2100 *(end)*

BIS limits for tertiary level

	ES (3.75%) 1 day				ES 7 days	SES (0.1%) 1 day				SES 7 days
Path allocation	RPO	BISO	S1	S2	BISO	RPO	BISO	S1	S2	BISO
52.00%	1685	842	784	900	5897	45	22	13	32	157
52.50%	1701	851	792	909	5954	45	23	13	32	159
53.00%	1717	859	800	917	6010	46	23	13	32	160
53.50%	1733	867	808	926	6067	46	23	13	33	162
54.00%	1750	875	816	934	6124	47	23	14	33	163
54.50%	1766	883	823	942	6180	47	24	14	33	165
55.00%	1782	891	831	951	6237	48	24	14	34	166
55.50%	1798	899	839	959	6294	48	24	14	34	168
56.00%	1814	907	847	967	6350	48	24	14	34	169
56.50%	1831	915	855	976	6407	49	24	15	34	171
57.00%	1847	923	863	984	6464	49	25	15	35	172
57.50%	1863	932	870	993	6521	50	25	15	35	174
58.00%	1879	940	878	1001	6577	50	25	15	35	175
58.50%	1895	948	886	1009	6634	51	25	15	35	177
59.00%	1912	956	894	1018	6691	51	25	15	36	178
59.50%	1928	964	902	1026	6747	51	26	16	36	180
60.00%	1944	972	910	1034	6804	52	26	16	36	181
60.50%	1960	980	917	1043	6861	52	26	16	36	183
61.00%	1976	988	925	1051	6917	53	26	16	37	184
61.50%	1993	996	933	1059	6974	53	27	16	37	186
62.00%	2009	1004	941	1068	7031	54	27	16	37	187
62.50%	2025	1013	949	1076	7088	54	27	17	37	189
63.00%	2041	1021	957	1084	7144	54	27	17	38	191

TABLE C.42/M.2100

BIS limits for tertiary level

	ES (3.75%) 2 hours				SES (0.1%) 2 hours			
Path allocation	RPO	BISO	S1	S2	RPO	BISO	S1	S2
0.50%	1	1	0	2	0	0	0	0
1.00%	3	1	0	4	0	0	0	0
1.50%	4	2	0	5	0	0	0	1
2.00%	5	3	0	6	0	0	0	1
2.50%	7	3	0	7	0	0	0	1
3.00%	8	4	0	8	0	0	0	1
3.50%	9	5	0	9	0	0	0	1
4.00%	11	5	1	10	0	0	0	1
4.50%	12	6	1	11	0	0	0	1
5.00%	14	7	2	12	0	0	0	1
5.50%	15	7	2	13	0	0	0	1
6.00%	16	8	2	14	0	0	0	1
6.50%	18	9	3	15	0	0	0	1
7.00%	19	9	3	16	1	0	0	1
7.50%	20	10	4	16	1	0	0	1
8.00%	22	11	4	17	1	0	0	1
8.50%	23	11	5	18	1	0	0	1
9.00%	24	12	5	19	1	0	0	1
9.50%	26	13	6	20	1	0	0	2
10.00%	27	14	6	21	1	0	0	2
10.50%	28	14	7	22	1	0	0	2
11.00%	30	15	7	23	1	0	0	2
11.50%	31	16	8	23	1	0	0	2
12.00%	32	16	8	24	1	0	0	2
12.50%	34	17	9	25	1	0	0	2
13.00%	35	18	9	26	1	0	0	2
13.50%	36	18	10	27	1	0	0	2
14.00%	38	19	10	28	1	1	0	2
14.50%	39	20	11	28	1	1	0	2
15.00%	41	20	11	29	1	1	0	2
15.50%	42	21	12	30	1	1	0	2
16.00%	43	22	12	31	1	1	0	2
16.50%	45	22	13	32	1	1	0	2
17.00%	46	23	13	33	1	1	0	2
17.50%	47	24	14	33	1	1	0	2
18.00%	49	24	14	34	1	1	0	2
18.50%	50	25	15	35	1	1	0	2
19.00%	51	26	16	36	1	1	0	2
19.50%	53	26	16	37	1	1	0	2
20.00%	54	27	17	37	1	1	0	2
20.50%	55	28	17	38	1	1	0	2
21.00%	57	28	18	39	2	1	0	2
21.50%	58	29	18	40	2	1	0	3
22.00%	59	30	19	41	2	1	0	3
22.50%	61	30	19	41	2	1	0	3
23.00%	62	31	20	42	2	1	0	3
23.50%	63	32	20	43	2	1	0	3
24.00%	65	32	21	44	2	1	0	3
24.50%	66	33	22	45	2	1	0	3
25.00%	68	34	22	45	2	1	0	3
25.50%	69	34	23	46	2	1	0	3
26.00%	70	35	23	47	2	1	0	3
26.50%	72	36	24	48	2	1	0	3

TABLE C.42/M.2100 *(continued)*

BIS limits for tertiary level

	ES (3.75%) 2 hours				SES (0.1%) 2 hours			
Path allocation	RPO	BISO	S1	S2	RPO	BISO	S1	S2
27.00%	73	36	24	49	2	1	0	3
27.50%	74	37	25	49	2	1	0	3
28.00%	76	38	26	50	2	1	0	3
28.50%	77	38	26	51	2	1	0	3
29.00%	78	39	27	52	2	1	0	3
29.50%	80	40	27	52	2	1	0	3
30.00%	81	41	28	53	2	1	0	3
30.50%	82	41	28	54	2	1	0	3
31.00%	84	42	29	55	2	1	0	3
31.50%	85	43	29	56	2	1	0	3
32.00%	86	43	30	56	2	1	0	3
32.50%	88	44	31	57	2	1	0	3
33.00%	89	45	31	58	2	1	0	3
33.50%	90	45	32	59	2	1	0	3
34.00%	92	46	32	59	2	1	0	3
34.50%	93	47	33	60	2	1	0	3
35.00%	95	47	34	61	3	1	0	4
35.50%	96	48	34	62	3	1	0	4
36.00%	97	49	35	63	3	1	0	4
36.50%	99	49	35	63	3	1	0	4
37.00%	100	50	36	64	3	1	0	4
37.50%	101	51	36	65	3	1	0	4
38.00%	103	51	37	66	3	1	0	4
38.50%	104	52	38	66	3	1	0	4
39.00%	105	53	38	67	3	1	0	4
39.50%	107	53	39	68	3	1	0	4
40.00%	108	54	39	69	3	1	0	4
40.50%	109	55	40	69	3	1	0	4
41.00%	111	55	40	70	3	1	0	4
41.50%	112	56	41	71	3	1	0	4
42.00%	113	57	42	72	3	2	0	4
42.50%	115	57	42	73	3	2	0	4
43.00%	116	58	43	73	3	2	0	4
43.50%	117	59	43	74	3	2	0	4
44.00%	119	59	44	75	3	2	0	4
44.50%	120	60	45	76	3	2	0	4
45.00%	122	61	45	76	3	2	0	4
45.50%	123	61	46	77	3	2	0	4
46.00%	124	62	46	78	3	2	0	4
46.50%	126	63	47	79	3	2	0	4
47.00%	127	63	48	79	3	2	0	4
47.50%	128	64	48	80	3	2	0	4
48.00%	130	65	49	81	3	2	0	4
48.50%	131	65	49	82	3	2	0	4
49.00%	132	66	50	82	4	2	0	4
49.50%	134	67	50	83	4	2	0	4
50.00%	135	68	51	84	4	2	0	4
50.50%	136	68	52	85	4	2	0	5
51.00%	138	69	52	85	4	2	0	5
51.50%	139	70	53	86	4	2	0	5
52.00%	140	70	53	87	4	2	0	5
52.50%	142	71	54	88	4	2	0	5
53.00%	143	72	55	88	4	2	0	5
53.50%	144	72	55	89	4	2	0	5

TABLE C.42/M.2100 *(end)*

BIS limits for tertiary level

	ES (3.75%) 2 hours				SES (0.1%) 2 hours			
Path allocation	RPO	BISO	S1	S2	RPO	BISO	S1	S2
54.00%	146	73	56	90	4	2	0	5
54.50%	147	74	56	91	4	2	0	5
55.00%	149	74	57	91	4	2	0	5
55.50%	150	75	58	92	4	2	0	5
56.00%	151	76	58	93	4	2	0	5
56.50%	153	76	59	94	4	2	0	5
57.00%	154	77	59	94	4	2	0	5
57.50%	155	78	60	95	4	2	0	5
58.00%	157	78	61	96	4	2	0	5
58.50%	158	79	61	97	4	2	0	5
59.00%	159	80	62	97	4	2	0	5
59.50%	161	80	62	98	4	2	0	5
60.00%	162	81	63	99	4	2	0	5
60.50%	163	82	64	100	4	2	0	5
61.00%	165	82	64	100	4	2	0	5
61.50%	166	83	65	101	4	2	0	5
62.00%	167	84	65	102	4	2	0	5
62.50%	169	84	66	103	5	2	0	5
63.00%	170	85	67	103	5	2	0	5

TABLE C.51/M.2100

BIS limits for quaternary level

	ES (8%) 1 day				ES 7 days	SES (0.1%) 1 day				SES 7 days
Path allocation	RPO	BISO	S1	S2	BISO	RPO	BISO	S1	S2	BISO
0.50%	35	17	9	26	121	0	0	0	1	2
1.00%	69	35	23	46	242	1	0	0	2	3
1.50%	104	52	37	66	363	1	1	0	2	5
2.00%	138	69	52	86	484	2	1	0	3	6
2.50%	173	86	68	105	605	2	1	0	3	8
3.00%	207	104	83	124	726	3	1	0	4	9
3.50%	242	121	99	143	847	3	2	0	4	11
4.00%	276	138	115	162	968	3	2	0	4	12
4.50%	311	156	131	180	1089	4	2	0	5	14
5.00%	346	173	147	199	1210	4	2	0	5	15
5.50%	380	190	163	218	1331	5	2	0	5	17
6.00%	415	207	179	236	1452	5	3	0	6	18
6.50%	449	225	195	255	1572	6	3	0	6	20
7.00%	484	242	211	273	1693	6	3	0	7	21
7.50%	518	259	227	291	1814	6	3	0	7	23
8.00%	553	276	243	310	1935	7	3	0	7	24
8.50%	588	294	259	328	2056	7	4	0	8	26
9.00%	622	311	276	346	2177	8	4	0	8	27
9.50%	657	328	292	365	2298	8	4	0	8	29
10.00%	691	346	308	383	2419	9	4	0	8	30
10.50%	726	363	325	401	2540	9	5	0	9	32
11.00%	760	380	341	419	2661	10	5	0	9	33
11.50%	795	397	358	437	2782	10	5	1	9	35
12.00%	829	415	374	455	2903	10	5	1	10	36
12.50%	864	432	390	474	3024	11	5	1	10	38
13.00%	899	449	407	492	3145	11	6	1	10	39
13.50%	933	467	423	510	3266	12	6	1	11	41
14.00%	968	484	440	528	3387	12	6	1	11	42
14.50%	1002	501	456	546	3508	13	6	1	11	44
15.00%	1037	518	473	564	3629	13	6	1	12	45
15.50%	1071	536	489	582	3750	13	7	2	12	47
16.00%	1106	553	506	600	3871	14	7	2	12	48
16.50%	1140	570	522	618	3992	14	7	2	12	50
17.00%	1175	588	539	636	4113	15	7	2	13	51
17.50%	1210	605	556	654	4234	15	8	2	13	53
18.00%	1244	622	572	672	4355	16	8	2	13	54
18.50%	1279	639	589	690	4476	16	8	2	14	56
19.00%	1313	657	605	708	4596	16	8	2	14	57
19.50%	1348	674	622	726	4717	17	8	3	14	59
20.00%	1382	691	639	744	4838	17	9	3	15	60
20.50%	1417	708	655	762	4959	18	9	3	15	62
21.00%	1452	726	672	780	5080	18	9	3	15	64
21.50%	1486	743	689	798	5201	19	9	3	15	65
22.00%	1521	760	705	815	5322	19	10	3	16	67
22.50%	1555	778	722	833	5443	19	10	3	16	68
23.00%	1590	795	738	851	5564	20	10	4	16	70
23.50%	1624	812	755	869	5685	20	10	4	17	71
24.00%	1659	829	772	887	5806	21	10	4	17	73
24.50%	1693	847	789	905	5927	21	11	4	17	74
25.00%	1728	864	805	923	6048	22	11	4	17	76
25.50%	1763	881	822	941	6169	22	11	4	18	77

TABLE C.51/M.2100 *(continued)*

BIS limits for quaternary level

	ES (8%) 1 day				ES 7 days	SES (0.1%) 1 day				SES 7 days
Path allocation	RPO	BISO	S1	S2	BISO	RPO	BISO	S1	S2	BISO
26.00%	1797	899	839	959	6290	22	11	5	18	79
26.50%	1832	916	855	976	6411	23	11	5	18	80
27.00%	1866	933	872	994	6532	23	12	5	18	82
27.50%	1901	950	889	1012	6653	24	12	5	19	83
28.00%	1935	968	905	1030	6774	24	12	5	19	85
28.50%	1970	985	922	1048	6895	25	12	5	19	86
29.00%	2004	1002	939	1066	7016	25	13	5	20	88
29.50%	2039	1020	956	1083	7137	25	13	6	20	89
30.00%	2074	1037	972	1101	7258	26	13	6	20	91
30.50%	2108	1054	989	1119	7379	26	13	6	20	92
31.00%	2143	1071	1006	1137	7500	27	13	6	21	94
31.50%	2177	1089	1023	1155	7620	27	14	6	21	95
32.00%	2212	1106	1039	1172	7741	28	14	6	21	97
32.50%	2246	1123	1056	1190	7862	28	14	7	22	98
33.00%	2281	1140	1073	1208	7983	29	14	7	22	100
33.50%	2316	1158	1090	1226	8104	29	14	7	22	101
34.00%	2350	1175	1106	1244	8225	29	15	7	22	103
34.50%	2385	1192	1123	1261	8346	30	15	7	23	104
35.00%	2419	1210	1140	1279	8467	30	15	7	23	106
35.50%	2454	1227	1157	1297	8588	31	15	8	23	107
36.00%	2488	1244	1174	1315	8709	31	16	8	23	109
36.50%	2523	1261	1190	1332	8830	32	16	8	24	110
37.00%	2557	1279	1207	1350	8951	32	16	8	24	112
37.50%	2592	1296	1224	1368	9072	32	16	8	24	113
38.00%	2627	1313	1241	1386	9193	33	16	8	25	115
38.50%	2661	1331	1258	1404	9314	33	17	8	25	116
39.00%	2696	1348	1274	1421	9435	34	17	9	25	118
39.50%	2730	1365	1291	1439	9556	34	17	9	25	119
40.00%	2765	1382	1308	1457	9677	35	17	9	26	121
40.50%	2799	1400	1325	1475	9798	35	17	9	26	122
41.00%	2834	1417	1342	1492	9919	35	18	9	26	124
41.50%	2868	1434	1358	1510	10040	36	18	9	26	125
42.00%	2903	1452	1375	1528	10161	36	18	10	27	127
42.50%	2938	1469	1392	1545	10282	37	18	10	27	129
43.00%	2972	1486	1409	1563	10403	37	19	10	27	130
43.50%	3007	1503	1426	1581	10524	38	19	10	27	132
44.00%	3041	1521	1443	1599	10644	38	19	10	28	133
44.50%	3076	1538	1459	1616	10765	38	19	10	28	135
45.00%	3110	1555	1476	1634	10886	39	19	11	28	136
45.50%	3145	1572	1493	1652	11007	39	20	11	29	138
46.00%	3180	1590	1510	1670	11128	40	20	11	29	139
46.50%	3214	1607	1527	1687	11249	40	20	11	29	141
47.00%	3249	1624	1544	1705	11370	41	20	11	29	142
47.50%	3283	1642	1561	1723	11491	41	21	11	30	144
48.00%	3318	1659	1577	1740	11612	41	21	12	30	145
48.50%	3352	1676	1594	1758	11733	42	21	12	30	147
49.00%	3387	1693	1611	1776	11854	42	21	12	30	148
49.50%	3421	1711	1628	1793	11975	43	21	12	31	150
50.00%	3456	1728	1645	1811	12096	43	22	12	31	151
50.50%	3491	1745	1662	1829	12217	44	22	12	31	153
51.00%	3525	1763	1679	1847	12338	44	22	13	31	154
51.50%	3560	1780	1695	1864	12459	44	22	13	32	156

TABLE C.51/M.2100 *(end)*

BIS limits for quaternary level

	ES (8%) 1 day				ES 7 days	SES (0.1%) 1 day				SES 7 days
Path allocation	RPO	BISO	S1	S2	BISO	RPO	BISO	S1	S2	BISO
52.00%	3594	1797	1712	1882	12580	45	22	13	32	157
52.50%	3629	1814	1729	1900	12701	45	23	13	32	159
53.00%	3663	1832	1746	1917	12822	46	23	13	32	160
53.50%	3698	1849	1763	1935	12943	46	23	13	33	162
54.00%	3732	1866	1780	1953	13064	47	23	14	33	163
54.50%	3767	1884	1797	1970	13185	47	24	14	33	165
55.00%	3802	1901	1814	1988	13306	48	24	14	34	166
55.50%	3836	1918	1830	2006	13427	48	24	14	34	168
56.00%	3871	1935	1847	2023	13548	48	24	14	34	169
56.50%	3905	1953	1864	2041	13668	49	24	15	34	171
57.00%	3940	1970	1881	2059	13789	49	25	15	35	172
57.50%	3974	1987	1898	2076	13910	50	25	15	35	174
58.00%	4009	2004	1915	2094	14031	50	25	15	35	175
58.50%	4044	2022	1932	2112	14152	51	25	15	35	177
59.00%	4078	2039	1949	2129	14273	51	25	15	36	178
59.50%	4113	2056	1966	2147	14394	51	26	16	36	180
60.00%	4147	2074	1983	2165	14515	52	26	16	36	181
60.50%	4182	2091	1999	2182	14636	52	26	16	36	183
61.00%	4216	2108	2016	2200	14757	53	26	16	37	184
61.50%	4251	2125	2033	2218	14878	53	27	16	37	186
62.00%	4285	2143	2050	2235	14999	54	27	16	37	187
62.50%	4320	2160	2067	2253	15120	54	27	17	37	189
63.00%	4355	2177	2084	2271	15241	54	27	17	38	191

TABLE C.52/M.2100

BIS limits for quaternary level

	ES (8%) 2 hours				SES (0.1%) 2 hours			
Path allocation	RPO	BISO	S1	S2	RPO	BISO	S1	S2
0.50%	3	1	0	4	0	0	0	0
1.00%	6	3	0	6	0	0	0	0
1.50%	9	4	0	8	0	0	0	1
2.00%	12	6	1	11	0	0	0	1
2.50%	14	7	2	13	0	0	0	1
3.00%	17	9	3	15	0	0	0	1
3.50%	20	10	4	16	0	0	0	1
4.00%	23	12	5	18	0	0	0	1
4.50%	26	13	6	20	0	0	0	1
5.00%	29	14	7	22	0	0	0	1
5.50%	32	16	8	24	0	0	0	1
6.00%	35	17	9	26	0	0	0	1
6.50%	37	19	10	27	0	0	0	1
7.00%	40	20	11	29	1	0	0	1
7.50%	43	22	12	31	1	0	0	1
8.00%	46	23	13	33	1	0	0	1
8.50%	49	24	15	34	1	0	0	1
9.00%	52	26	16	36	1	0	0	1
9.50%	55	27	17	38	1	0	0	2
10.00%	58	29	18	40	1	0	0	2
10.50%	60	30	19	41	1	0	0	2
11.00%	63	32	20	43	1	0	0	2
11.50%	66	33	22	45	1	0	0	2
12.00%	69	35	23	46	1	0	0	2
12.50%	72	36	24	48	1	0	0	2
13.00%	75	37	25	50	1	0	0	2
13.50%	78	39	26	51	1	0	0	2
14.00%	81	40	28	53	1	1	0	2
14.50%	84	42	29	55	1	1	0	2
15.00%	86	43	30	56	1	1	0	2
15.50%	89	45	31	58	1	1	0	2
16.00%	92	46	33	60	1	1	0	2
16.50%	95	48	34	61	1	1	0	2
17.00%	98	49	35	63	1	1	0	2
17.50%	101	50	36	65	1	1	0	2
18.00%	104	52	37	66	1	1	0	2
18.50%	107	53	39	68	1	1	0	2
19.00%	109	55	40	70	1	1	0	2
19.50%	112	56	41	71	1	1	0	2
20.00%	115	58	42	73	1	1	0	2
20.50%	118	59	44	74	1	1	0	2
21.00%	121	60	45	76	2	1	0	2
21.50%	124	62	46	78	2	1	0	3
22.00%	127	63	47	79	2	1	0	3
22.50%	130	65	49	81	2	1	0	3
23.00%	132	66	50	83	2	1	0	3
23.50%	135	68	51	84	2	1	0	3
24.00%	138	69	52	86	2	1	0	3
24.50%	141	71	54	87	2	1	0	3
25.00%	144	72	55	89	2	1	0	3
25.50%	147	73	56	91	2	1	0	3
26.00%	150	75	58	92	2	1	0	3
26.50%	153	76	59	94	2	1	0	3

TABLE C.52/M.2100 *(continued)*

BIS limits for quaternary level

	ES (8%) 2 hours				SES (0.1%) 2 hours			
Path allocation	RPO	BISO	S1	S2	RPO	BISO	S1	S2
27.00%	156	78	60	95	2	1	0	3
27.50%	158	79	61	97	2	1	0	3
28.00%	161	81	63	99	2	1	0	3
28.50%	164	82	64	100	2	1	0	3
29.00%	167	84	65	102	2	1	0	3
29.50%	170	85	67	103	2	1	0	3
30.00%	173	86	68	105	2	1	0	3
30.50%	176	88	69	107	2	1	0	3
31.00%	179	89	70	108	2	1	0	3
31.50%	181	91	72	110	2	1	0	3
32.00%	184	92	73	111	2	1	0	3
32.50%	187	94	74	113	2	1	0	3
33.00%	190	95	76	115	2	1	0	3
33.50%	193	96	77	116	2	1	0	3
34.00%	196	98	78	118	2	1	0	3
34.50%	199	99	79	119	2	1	0	3
35.00%	202	101	81	121	3	1	0	4
35.50%	204	102	82	122	3	1	0	4
36.00%	207	104	83	124	3	1	0	4
36.50%	210	105	85	126	3	1	0	4
37.00%	213	107	86	127	3	1	0	4
37.50%	216	108	87	129	3	1	0	4
38.00%	219	109	89	130	3	1	0	4
38.50%	222	111	90	132	3	1	0	4
39.00%	225	112	91	134	3	1	0	4
39.50%	228	114	92	135	3	1	0	4
40.00%	230	115	94	137	3	1	0	4
40.50%	233	117	95	138	3	1	0	4
41.00%	236	118	96	140	3	1	0	4
41.50%	239	120	98	141	3	1	0	4
42.00%	242	121	99	143	3	2	0	4
42.50%	245	122	100	145	3	2	0	4
43.00%	248	124	102	146	3	2	0	4
43.50%	251	125	103	148	3	2	0	4
44.00%	253	127	104	149	3	2	0	4
44.50%	256	128	106	151	3	2	0	4
45.00%	259	130	107	152	3	2	0	4
45.50%	262	131	108	154	3	2	0	4
46.00%	265	132	109	155	3	2	0	4
46.50%	268	134	111	157	3	2	0	4
47.00%	271	135	112	159	3	2	0	4
47.50%	274	137	113	160	3	2	0	4
48.00%	276	138	115	162	3	2	0	4
48.50%	279	140	116	163	3	2	0	4
49.00%	282	141	117	165	4	2	0	4
49.50%	285	143	119	166	4	2	0	4
50.00%	288	144	120	168	4	2	0	4
50.50%	291	145	121	170	4	2	0	5
51.00%	294	147	123	171	4	2	0	5
51.50%	297	148	124	173	4	2	0	5
52.00%	300	150	125	174	4	2	0	5
52.50%	302	151	127	176	4	2	0	5
53.00%	305	153	128	177	4	2	0	5
53.50%	308	154	129	179	4	2	0	5

TABLE C.52/M.2100 *(end)*

BIS limits for quaternary level

	ES (8%) 2 hours				SES (0.1%) 2 hours			
Path allocation	RPO	BISO	S1	S2	RPO	BISO	S1	S2
54.00%	311	156	131	180	4	2	0	5
54.50%	314	157	132	182	4	2	0	5
55.00%	317	158	133	184	4	2	0	5
55.50%	320	160	135	185	4	2	0	5
56.00%	323	161	136	187	4	2	0	5
56.50%	325	163	137	188	4	2	0	5
57.00%	328	164	139	190	4	2	0	5
57.50%	331	166	140	191	4	2	0	5
58.00%	334	167	141	193	4	2	0	5
58.50%	337	168	143	194	4	2	0	5
59.00%	340	170	144	196	4	2	0	5
59.50%	343	171	145	198	4	2	0	5
60.00%	346	173	147	199	4	2	0	5
60.50%	348	174	148	201	4	2	0	5
61.00%	351	176	149	202	4	2	0	5
61.50%	354	177	151	204	4	2	0	5
62.00%	357	179	152	205	4	2	0	5
62.50%	360	180	153	207	5	2	0	5
63.00%	363	181	155	208	5	2	0	5

Annex D

(This annex forms an integral part of this Recommendation)

TABLE D.1/M.2100

Values for maintenance limits for international digital paths at all levels

Path Allocation (%)	15-minute Threshold		15-minute Reset Threshold (optional)	
	ES	SES	ES	SES
0.5 → 2.5	120	15	0	0
3 → 4	120	15	1	0
4.5 → 7	120	15	2	0
7.5 → 10	120	15	3	0
10.5 → 11	120	15	4	0
11.5 → 13	150	15	4	0
13.5 → 15.5	150	15	5	0
16 → 18.5	150	15	6	0
19 → 20	150	15	7	0
20.5 → 21.5	180	15	7	0
22 → 24.5	180	15	8	0
25 → 27	180	15	9	0
27.5 → 30	180	15	10	0
30.5 → 33	180	15	11	0
33.5 → 36	180	15	12	0
36.5 → 40	180	15	13	0

NOTE – Threshold values for path allocations between 40.5% and 63% are under study.

References

The following 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: all users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published.

[1] CCITT Recommendation G.821 (1988), *Error performance of an international digital connection forming part of an integrated services digital network*.

[2] CCITT Recommendation G.822 (1988), *Controlled slip rate objectives on an international digital connection*.

[3] CCITT Recommendation I.412 (1988), *ISDN user-network interfaces, interface structures and access capabilities*.

[4] CCITT Recommendation G.702 (1988), *Digital hierarchy bit rates*.

[5] CCITT Recommendation G.703 (1991), *Physical/electrical characteristics of hierarchical digital interfaces*.

[6] CCITT Recommendation G.706 (1991), *Frame alignment and cyclic redundancy check (CRC) procedures relating to basic frame structures defined in Recommendation G.704*.

[7] CCITT Recommendation G.704 (1991), *Synchronous frame structures used at primary and secondary hierarchical levels*.

[8] ITU-T Recommendation G.775 (1994), *Loss of Signal (LOS) and Alarm Indication Signal (AIS) defect detection and clearance criteria*.

[9] ITU-T Recommendation H.221 (1993), *Frame structure for a 64 kbit/s to 1920 channel in audiovisual teleservices*.

[10] CCITT Recommendation G.724 (1988), *Characteristics of a 48-channel low bit rate encoding primary multiplex operating at 1544 kbit/s*.

[11] CCITT Recommendation G.733 (1988), *Characteristics of primary PCM multiplex equipment operating at 1544 kbit/s*.

[12] CCITT Recommendation G.762 (1988), *General characteristics of a 48-channel transcoder equipment*.

[13] CCITT Recommendation G.794 (1988), *Characteristics of a 24-channel transmultiplexing equipment*.

[14] CCITT Recommendation G.734 (1988), *Characteristics of synchronous digital multiplex equipment operating at 1544 kbit/s*.

[15] CCITT Recommendation G.732 (1988), *Characteristics of primary PCM multiplex equipment operating at 2048 kbit/s*.

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[23] CCITT Recommendation G.743 (1988), *Second order digital multiplex equipment operating at 6312 kbit/s and using positive justification*.

[24] CCITT Recommendation G.747 (1988), *Second order digital multiplex equipment operating at 6312 kbit/s and multiplexing three tributaries at 2048 kbit/s*.

[25] CCITT Recommendation G.742 (1988), *Second order digital multiplex equipment operating at 8448 kbit/s and using positive justification*.

[26] CCITT Recommendation G.745 (1988), *Second order digital multiplex equipment operating at 8448 kbit/s and using positive/zero/negative justification*.

[27] CCITT Recommendation G.752 (1988), *Characteristics of digital multiplex equipments based on a second order bit rate of 6312 kbit/s and using positive justification*.

[28] CCITT Recommendation G.751 (1988), *Digital multiplex equipments operating at the third order bit rate of 34 368 kbit/s and the fourth order bit rate of 139 264 kbit/s and using positive justification*.

[29] CCITT Recommendation G.753 (1988), *Third order digital multiplex equipment operating at 34 368 kbit/s and using positive/zero/negative justification*.

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[41] ITU-T Recommendation G.826 (1993), *Error performance parameters and objectives for international, constant bit rate digital paths at or above the primary rate*.