

RECOMMENDATION ITU-R F.1330-2*

Performance limits for bringing into service the parts of international plesiochronous digital hierarchy and synchronous digital hierarchy paths and sections implemented by digital fixed wireless systems

(Question ITU-R 161/9)

(1997-1999-2006)

Scope

This Recommendation provides BIS performance limits for international PDH and SDH paths and sections implemented using FWS. The approach is aligned to the ITU-T BIS approach, but some media-specific (FWS) aspects are incorporated. The Annex details the application of the performance limits for BIS.

The ITU Radiocommunication Assembly,

considering

- a) that digital fixed wireless systems for use in constant bit-rate digital paths at or above the primary rate in the international portion of a 27 500 km hypothetical reference path (HRP) are being designed;
- b) that there is a need to specify “bringing into service” (BIS) performance limits for digital fixed wireless systems;
- c) that the performance limits and procedures for maintenance activities for digital fixed wireless systems have been defined in Recommendation ITU-R F.1668;
- d) that ITU-T has prepared performance limits for bringing-into-service and maintenance of international multi-operator plesiochronous digital hierarchy (PDH) path, connections in ITU-T Recommendation M.2100 and for international multi-operator synchronous digital hierarchy (SDH) paths and international SDH multiplex sections in ITU-T Recommendation M.2101, being based on ITU-T Recommendation G.826 and G.828 respectively;
- e) that ITU-T Recommendation M.2110 provides procedures for the BIS of international multi-operator digital paths, sections and transmission systems with and without in-service monitoring (ISM);
- f) that ITU-R has approved Recommendation ITU-R F.1660 for-error performance objectives for real digital fixed wireless links used in 27 500 km hypothetical reference paths and connections;
- g) that propagation conditions may adversely affect the BIS procedures for digital fixed wireless systems;
- h) that the influence of propagation conditions on the BIS procedures for digital fixed-wireless systems currently under study in Radiocommunication Study Group 3;

* This Recommendation should be brought to the attention of Radiocommunication Study Groups 3 and 4, and Telecommunication Standardization Study Groups 4 and 13.

- j) that performance limits and procedures for the BIS of PDH and SDH constant bit rate paths and sections based on digital fixed-wireless systems should be defined;
- k) that BIS performance objectives (BISPOs) should take into account a suitable margin, to minimize subsequent maintenance interventions;
- l) that due consideration of propagation conditions should be taken when undertaking BIS measurements;

noting

- a) that for the purpose of allocating the performance objectives for the international portion of a constant bit rate path at or above the primary rate using digital fixed-wireless systems, an international digital path has been partitioned in geographical terms; these portions have been titled path core elements (PCE). Two types of international PCE are used:
- an international PCE (IPCE) between an international gateway and a frontier station in a terminating country, or between frontier stations in a transit country (see Note 1);
 - an inter-country PCE (ICPCE) 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;

recommends

- 1 that the limits for BIS should be based on end-to-end reference performance objectives (RPOs) shown in Tables 1a and 1b as well as allocations shown in Table 2;

TABLE 1a (See Note 2)

RPO

PDH	Primary (Note 4)	Secondary	Tertiary	Quaternary	
SDH (Mbit/s)	1.5 to 5	> 5 to 15	> 15 to 55	> 55 to 160	> 160 to 3 500
Parameter	End-to-end RPO				
Errored seconds ratio (ESR) for paths designed according to G.826	0.02	0.025	0.0375	0.08	Not applicable (NA)
Errored second ratio (ESR) for paths designed according to G.828	0.005	0.005	0.01	0.02	(NA)
Background block error ratio (BBER) for SDH paths designed according to G.828	2.5×10^{-5}	2.5×10^{-5}	2.5×10^{-5}	5×10^{-5}	5×10^{-5}
Severely errored seconds ratio (SESr)	0.001	0.001	0.001	0.001	0.001

TABLE 1b

RPO for end-to-end international SDH multiplex sections

Rate	STM-0	STM-1	STM-4
Blocks/second	64 000	192 000	768 000
ESR (according to G.826)	0.0375	0.08	NA
ESR (according to G.828)	0.01	0.02	NA
SESR	0.001	0.001	0.001
BBER (according to G.826)	NA	NA	NA
BBER (according to G.828)	2.5×10^{-5}	5×10^{-5}	5×10^{-5}

TABLE 2

Allocation, a_n

PCE classification (see Note 3)	Allocation (% of end-to-end RPOs)
<i>IPCE</i> Terminating/transit national networks:	
$d \leq 100$ km	1.2
$100 \text{ km} < d \leq 200$ km	1.4
$200 \text{ km} < d \leq 300$ km	1.6
$300 \text{ km} < d \leq 400$ km	1.8
$400 \text{ km} < d \leq 500$ km	2.0
$500 \text{ km} < d \leq 1\,000$ km	3.0
$1\,000 \text{ km} < d \leq 2\,500$ km	4.0
$2\,500 \text{ km} < d \leq 5\,000$ km	6.0
$5\,000 \text{ km} < d \leq 7\,500$ km	8.0
$d > 7\,500$ km	10.0
<i>ICPCE</i> $d \leq 300$ km	0.3
International multiplex section	0.2

2 that the allocated performance objective (APO) and the BISPO for the BIS of a path and a multiplex section should be calculated as follows:

for a path

$$APO_{es} = A\% \times RPO_{es} \times TP \div 100 \text{ (convert } A\% \text{ to ratio)}$$

$$APO_{ses} = A\% \times RPO_{ses} \times TP \div 100 \text{ (convert } A\% \text{ to ratio)}$$

$$APO_{bbe} = A\% \times RPO_{bbe} \times TP \times 2\,000 \div 100 \text{ (convert } A\% \text{ to ratio – VC-1 and 2)}$$

$$APO_{bbe} = A\% \times RPO_{bbe} \times TP \times 8\,000 \div 100 \text{ (convert } A\% \text{ to ratio – VC-3 and 4 and VC-4-Xc)}$$