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STANDARDIZATION SECTOR
OF ITU

G.783

Amendment 1

(05/2008)

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

Digital terminal equipments – Principal characteristics of multiplexing equipment for the synchronous digital hierarchy

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Characteristics of synchronous digital hierarchy (SDH) equipment functional blocks

Amendment 1

Recommendation ITU-T G.783 (2006) – Amendment 1

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Recommendation ITU-T G.783

Characteristics of synchronous digital hierarchy (SDH) equipment functional blocks

Amendment 1

Summary

Amendment 1 to Recommendation ITU-T G.783 contains the STM-256 rate jitter parameters and specifications as well as the detection and processing of the generic alarm indication signal (AIS) as inserted by the optical transport network (OTN).

Source

Amendment 1 to Recommendation ITU-T G.783 (2006) was approved on 22 May 2008 by ITU-T Study Group 15 (2005-2008) under Recommendation ITU-T A.8 procedure.

FOREWORD

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The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

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Characteristics of synchronous digital hierarchy (SDH) equipment functional blocks

Amendment 1

1 Scope

This amendment contains material to be added to Recommendation ITU-T G.783 in respect to new STM-256, jitter parameters and generic AIS detection.

2 Changes to G.783

The following clauses contain changes to be made to G.783.

2.1 References

Add the following reference to clause 2:

[27] Recommendation ITU-T G.8251 (2001), *The control of jitter and wander within the optical transport network (OTN).*

2.2 Modifications to clause 6.2.6.1, AIS defect (dAIS)

In clause 6.2.6.1, add the STM-AIS defect as follows:

6.2.6.1 AIS defect (dAIS)

MS-n dAIS: See 6.2.6.2/G.806.

AU-n dAIS: See Annex A.

TU-m dAIS: See Annex A.

STM-AIS: See 6.2.6.2.1/G.806.

2.3 Modifications to clause 9.3.1.1, STM-N optical section to regenerator section adaptation source OSn/RSn_A_So

In clause 9.3.1.1, add the following note after the text:

"This function limits the output jitter on the clock information in the OSn_AI_Data signal as given in Tables 9-6 and 9-7 measured over a 60-second interval":

NOTE – For STM-256 interfaces operating with unregenerated links between SDH nodes synchronized by synchronization sources of G.813 quality or better, higher limits may apply for jitter generation. In such cases, the values, as specified in Table A.3/G.8251, are required for wideband jitter, measured from 80 kHz to 320 MHz.

Modify tables:

Table 9-6 – Jitter generation for STM-N type A regenerators in 2048 kbit/s based networks

Interface	Measurement band (–3 dB frequencies) (Notes 1 and 2)		Peak-peak amplitude (UI) (Notes 2 and 3)
	high-pass (kHz)	low-pass (MHz) –60 dB/dec	
STM-1 optical	0.5	1.3	0.30
	65	1.3	0.10
STM-4 optical	1	5	0.30
	250	5	0.10
STM-16 optical	5	20	0.30
	1000	20	0.10
STM-64 optical	20	80	0.30
	4000	80	0.10
STM-256 optical ~~Note 4~~	~~FFS~~80	~~FFS~~320	~~FFS~~0.3
	16 000	320	0.1~~0~~

NOTE 1 – The high-pass and low-pass measurement filter transfer functions are defined in clause 5/G.825.

NOTE 2 – For STM-1: 1 UI = 6.43 ns
For STM-4: 1 UI = 1.61 ns
For STM-16: 1 UI = 0.40 ns
For STM-64: 1 UI = 0.10 ns
For STM-256: 1 UI = 0.025 ns

NOTE 3 – The measurement time and pass/fail criteria are defined in clause 5/G.825.

~~NOTE 4 – Values for STM-256 are provisional and are not present in ITU-T Rec. G.825 at the time of publication of this version of this Recommendation.~~

Table 9-7 – Jitter generation for STM-N regenerators in 1544 kbit/s based networks

Interface	Measurement band (–3 dB frequencies)		Limit (Notes 1, 2, and 3)
	high-pass (kHz)	low-pass (MHz) –60 dB/dec	
STM-1 optical	12	1.3	0.1 UIpp/0.01 UIrms
STM-4 optical	12	5	0.1 UIpp/0.01 UIrms
STM-16 optical	12	20	0.1 UIpp/0.01 UIrms
STM-64 optical	20	80	0.30 UIpp
	4000	80	0.10 UIpp
STM-256 optical	80	320	0.3 UIpp
	16000~~FFS~~	320~~FFS~~	0.14 UIpp~~FFS~~

NOTE 1 – Both peak-to-peak and rms jitter limits are to be met simultaneously for the rates STM-1, STM-4, and STM-16 (not applicable for STM-64).

NOTE 2 – For STM-1: 1 UI = 6.43 ns
For STM-4: 1 UI = 1.61 ns
For STM-16: 1 UI = 0.40 ns
For STM-64: 1 UI = 0.10 ns
For STM-256: 1 UI = 0.025 ns

NOTE 3 – The measurement time and pass/fail criteria are defined in clause 5/G.825.

2.4 Modifications to clause 9.3.1.2, STM-N optical section to regenerator section adaptation sink OSn/RSn_A_Sk

Change the title of clause 9.3.1.2 and add a new note as follows:

9.3.1.2 STM-N optical section to regenerator section adaptation sink OSn/RSn_A_Sk **Version 1**

NOTE 1 – Equipment designed prior to this amendment may not support the detection of generic AIS. Instead, such equipment will detect and report LOF.

2.5 Add a new clause 9.3.1.3, STM-N optical section to regenerator section adaptation sink OSn/RSn_A_Sk Type 2

Add a new clause describing equipment capable of detecting generic (STM) AIS as follows:

9.3.1.3 STM-N optical section to regenerator section adaptation sink OSn/RSn_A_Sk version 2

This equipment supports the detection of generic (STM) AIS. This difference concerns only the generic AIS as a potential output signal from OTN as specified in ITU-T Rec. G.798. There will not be any interworking issues between equipment version 1 not supporting this and version 2 supporting the detection of this AIS signal.

Symbol

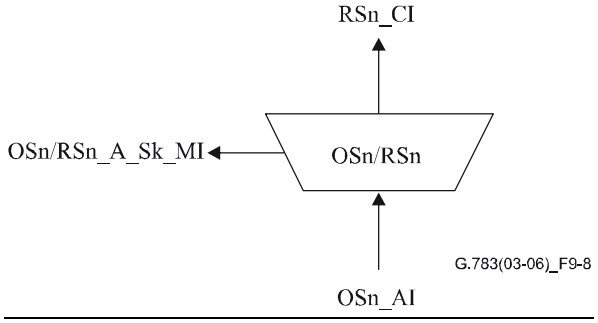

Figure 9a – OSn/RSn_A_Sk symbol

Interfaces

Table 9a – OSn/RSn_A_Sk input and output signals

Inputs	Outputs
OSn_AI_Data OSn_AI_TSF	RSn_CI_Data RSn_CI_Clock RSn_CI_FS RSn_CI_SSF OSn/RSn_A_Sk_MI_cLOF OSn/RSn_A_Sk_MI_pOFS

Processes

The OSn_AI_Data signal, with its contained timing, is received by the OSn_AP from the OSn_TT_Sk function. The OSn/RSn function processes this signal to form data and associated timing at the RSn_CP. The function also recovers frame alignment and identifies the frame start positions in the data of the RSn_CP. The framed STM-N data and timing are presented at the RSn_CP.

Regeneration: The function shall operate with a maximum BER of TBD when any combination of the following signal conditions exist at the input:

– any input optical power level within the range specified in ITU-T Recs G.957 or G.691;

– jitter modulation applied to the input signal as specified in ITU-T Rec. G.825;

– the input signal bit rate has any value in the range $N \times 155\,520$ kbit/s ± 20 ppm.

NOTE 1 – The frequency and jitter/wander tolerance might be further constrained by the requirements of the client layers.

To ensure adequate immunity against the presence of consecutive identical digits (CIDs) in the STM-N signal, the function shall comply with the specification in 15.1.4.

The function shall process the signal such that in the absence of input jitter, the intrinsic jitter at the STM-N output interface (in a regenerative repeater) shall not exceed the values specified in 15.1.2.

The function shall process the signal such that the jitter transfer (measured between an STM-N input and STM-N output in a regenerative repeater) shall be as specified in 15.1.3.

The frame alignment process is described in 8.2.1.

Defects

dLOF: see 6.2.5.1.

dAIS: see 6.2.6.2.1/G.806.

NOTE 2 – Equipment designed prior to this amendment will not support the detection of AIS. Instead, such equipment will detect and report LOF.

Defect correlations

cPLM ← dPLM and (not AI_TSF)

cLOF ← dLOF and (not dAIS) and (not dPLM) and (not AI_TSF)

Consequent actions

The function shall perform the following consequent actions:

aAIS ← dLOF or AI_TSF or dAIS

aSSF ← dLOF or AI_TSF or dAIS

On declaration of an aAIS, the function shall output an all-ONEs (AIS) signal – complying to the frequency limits for this interface – within 250 µs; on clearing of aAIS, the function shall output normal data within 250 µs.

Defect correlations

The function shall perform the following defect correlations to determine the most probable fault cause. This fault cause shall be reported to the SEMF.

cLOF ← dLOF and (not AI_TSF) and (not dAIS)

NOTE 3 – dAIS is not reported as a fault cause as it is a secondary alarm and will result in aSSF, which is reported as cSSF fault cause in the RSn_TT_Sk that directly follows this function.

Performance monitoring

The function shall perform the following performance monitoring primitives processing:

Any second with at least one OOF event shall be reported as a pOFS (optional in ITU-T Rec. G.784 [10]).

2.6 Changes to clause 15.1.3, Jitter and wander transfer

Add the required values for STM-256 jitter tolerance and transfer to Tables 15-1 and 15-2 as follows:

Table 15-1 – Parameter values for Figure 15-2

STM level	A_3 (UI)	A_4 (UI)	f_2 (kHz)	f_3 (kHz)	Reference
STM-1 Optical	1.5	0.15	6.5	65	Table 3/G.825 Figure 1/G.825
STM-1 Electrical (Note 1)	1.5	0.075	3.3	65	Table 4/G.825 Figure 2/G.825
STM-1 Electrical (Note 2)	1.5	0.15	6.5	65	Table 4/G.825 Figure 1/G.825
STM-4	1.5	0.15	25	250	Table 5/G.825 Figure 3/G.825
STM-16	1.5	0.15	100	1000	Table 6/G.825 Figure 4/G.825
STM-64	1.5	0.15	400	4000	Table 7/G.825 Figure 5/G.825
STM-256	~~Tbd~~1.5	0.18 ~~tbd~~	~~Tbd~~1920	~~Tbd~~16000	Table 8/G.825 Figure 6/G.825~~tbd~~
NOTE 1 – These values apply to SDH networks optimized for the 2048 kbit/s hierarchy. NOTE 2 – These values apply to SDH networks optimized for the 1544 kbit/s hierarchy.					

Table 15-2 – Jitter transfer parameters

STM-N level (type)	f_L (kHz)	f_C (kHz)	f_H (kHz)	P (dB)
STM-1 (A)	1.3	130	1 300	0.1
STM-1 (B)	0.3	30	1 300	0.1
STM-4 (A)	5	500	5 000	0.1
STM-4 (B)	0.3	30	3 000	0.1
STM-16 (A)	20	2 000	20 000	0.1
STM-16 (B)	0.3	30	3 000	0.1
STM-64 (A)	10	1 000	80 000	0.1
STM-64 (B)	tbd	tbd	tbd	tbd
STM-256 (A)	~~tbd~~40	~~tbd~~4 000	~~tbd~~320 000	~~tbd~~0.1
STM-256 (B)	tbd	tbd	tbd	tbd

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