

I n t e r n a t i o n a l T e l e c o m m u n i c a t i o n U n i o n

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

G.991.2
Amendment 3
(09/2005)

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

Digital sections and digital line system – Access networks

Single-pair high-speed digital subscriber line
(SHDSL) transceivers

Amendment 3

ITU-T Recommendation G.991.2 (2003) – Amendment 3



ITU-T G-SERIES RECOMMENDATIONS
TRANSMISSION SYSTEMS AND MEDIA, DIGITAL SYSTEMS AND NETWORKS

INTERNATIONAL TELEPHONE CONNECTIONS AND CIRCUITS	G.100–G.199
GENERAL CHARACTERISTICS COMMON TO ALL ANALOGUE CARRIER-TRANSMISSION SYSTEMS	G.200–G.299
INDIVIDUAL CHARACTERISTICS OF INTERNATIONAL CARRIER TELEPHONE SYSTEMS ON METALLIC LINES	G.300–G.399
GENERAL CHARACTERISTICS OF INTERNATIONAL CARRIER TELEPHONE SYSTEMS ON RADIO-RELAY OR SATELLITE LINKS AND INTERCONNECTION WITH METALLIC LINES	G.400–G.449
COORDINATION OF RADIOTELEPHONY AND LINE TELEPHONY	G.450–G.499
TRANSMISSION MEDIA CHARACTERISTICS	G.600–G.699
DIGITAL TERMINAL EQUIPMENTS	G.700–G.799
DIGITAL NETWORKS	G.800–G.899
DIGITAL SECTIONS AND DIGITAL LINE SYSTEM	G.900–G.999
General	G.900–G.909
Parameters for optical fibre cable systems	G.910–G.919
Digital sections at hierarchical bit rates based on a bit rate of 2048 kbit/s	G.920–G.929
Digital line transmission systems on cable at non-hierarchical bit rates	G.930–G.939
Digital line systems provided by FDM transmission bearers	G.940–G.949
Digital line systems	G.950–G.959
Digital section and digital transmission systems for customer access to ISDN	G.960–G.969
Optical fibre submarine cable systems	G.970–G.979
Optical line systems for local and access networks	G.980–G.989
Access networks	G.990–G.999
QUALITY OF SERVICE AND PERFORMANCE – GENERIC AND USER-RELATED ASPECTS	G.1000–G.1999
TRANSMISSION MEDIA CHARACTERISTICS	G.6000–G.6999
DATA OVER TRANSPORT – GENERIC ASPECTS	G.7000–G.7999
ETHERNET OVER TRANSPORT ASPECTS	G.8000–G.8999
ACCESS NETWORKS	G.9000–G.9999

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

ITU-T Recommendation G.991.2

Single-pair high-speed digital subscriber line (SHDSL) transceivers

Amendment 3

Summary

The following text reflects the agreed modification for a third amendment to ITU-T Rec. G.991.2 (2003). Amendment 3 contains an update to ITU-T Rec. G.991.2 defining a new TPS-TC for PTM Transport based on 64/65-octet packet encapsulation. The text modifications relative to ITU-T Rec. G.991.2 (2003) are shown with revision marks.

Source

Amendment 3 to ITU-T Recommendation G.991.2 (2003) was approved on 6 September 2005 by ITU-T Study Group 15 (2005-2008) under the ITU-T Recommendation A.8 procedure.

FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. 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 Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

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

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

Compliance with this Recommendation is voluntary. However, the Recommendation may contain certain mandatory provisions (to ensure e.g. interoperability or applicability) and compliance with the Recommendation is achieved when all of these mandatory provisions are met. The words "shall" or some other obligatory language such as "must" and the negative equivalents are used to express requirements. The use of such words does not suggest that compliance with the Recommendation is required of any party.

INTELLECTUAL PROPERTY RIGHTS

ITU draws attention to the possibility that the practice or implementation of this Recommendation may involve the use of a claimed Intellectual Property Right. ITU takes no position concerning the evidence, validity or applicability of claimed Intellectual Property Rights, whether asserted by ITU members or others outside of the Recommendation development process.

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

© ITU 2006

All rights reserved. No part of this publication may be reproduced, by any means whatsoever, without the prior written permission of ITU.

CONTENTS

	Page
1) Modification to Table E.22.....	1
2) Change of text in clause E.10	2
3) Modification to Table E.34a.....	2
4) Modification to title of clause E.11	2
5) Modifications to Annex E on 'Application-specific TPS-TC Framing'.....	3

ITU-T Recommendation G.991.2

Single-pair high-speed digital subscriber line (SHDSL) transceivers

Amendment 3

1) Modification to Table E.22

Modify Table E.22 as follows:

Table E.22/G.991.2 – Supported TPS-TCs in dual-bearer mode

Type	Description	TPS-TC _a	TPS-TC _b
1	STM + Broadband	Synchronous ISDN BRA (E.8) LAPV5 Enveloped POTS or ISDN (E.13) (Note 2) STM with DSC (E.12)	Clear Channel (E.1) Clear Channel Byte-Oriented (E.2) Unaligned DS1 (E.3) (Note 1) Aligned DS1/Fractional DS1 (E.4) (Note 1) Unaligned D2048U (E.5) (Note 2) Unaligned D2048S (E.6) (Note 2) Aligned D2048S/Fractional D2048S (E.7) (Note 2) ATM (E.9) PTM (<u>HDLC-based</u>) (E.11) <u>PTM (64/65-Octet-based) (E.15)</u>
2	STM + Cell/Packet	Unaligned DS1 (E.3) (Note 1) Aligned DS1/Fractional DS1 (E.4) (Note 1) Unaligned D2048U (E.5) (Note 2) Unaligned D2048S (E.6) (Note 2) Aligned D2048S/Fractional D2048S (E.7) (Note 2)	ATM (E.9) PTM (<u>HDLC-based</u>) (E.11) <u>PTM (64/65-Octet-based) (E.15)</u>
3	STM + Clear Channel	Unaligned DS1 (E.3) (Note 1) Aligned DS1/Fractional DS1 (E.4) (Note 1) Unaligned D2048U (E.5) (Note 2) Unaligned D2048S (E.6) (Note 2) Aligned D2048S/Fractional D2048S (E.7) (Note 2)	Clear Channel (E.1) Clear Channel Byte-Oriented (E.2)
NOTE 1 – Denotes TPS-TC modes that typically apply only in North American networks.			
NOTE 2 – Denotes TPS-TC modes that typically apply only in European networks.			

2) Change of text in clause E.10

Change two occurrences of "... E.1 through E.9 and E.11 through E.13" in the first sentence, and "... E.1 to E.9 and E.11 to E.13" in the last sentence, as follows:

... E.1 through E.9 and E.11 through E.13 and E.15... and

... E.1 to E.9 and E.11 to E.13 and E.15 ...

3) Modification to Table E.34a

Modify Table E.34a as follows:

**Table E.34a/G.991.2 – TPS-TCs from dual-bearer mode
Types 1 and 2 for which DRR is supported**

Type	Description	TPS-TC _a	TPS-TC _b
1	STM + Broadband	Synchronous ISDN BRA (E.8) LAPV5 Enveloped POTS or ISDN (E.13) STM with DSC (E.12)	Clear Channel Byte-Oriented (E.2) Aligned DS1/Fractional DS1 (E.4) Aligned D2048S/Fractional D2048S (E.7) ATM (E.9) PTM (HDLC-based) (E.11) PTM (64/65-Octet-based) (E.15)
2	STM + Cell/Packet	Aligned DS1/Fractional DS1 (E.4) Aligned D2048S/Fractional D2048S (E.7)	ATM (E.9) PTM (HDLC-based) (E.11) PTM (64/65-Octet-based) (E.15)
NOTE – See Table E.22 for the complete definitions of TPS-TC Types for dual-bearer mode.			

4) Modification to title of clause E.11

Change the title of clause E.11 to read as follows:

E.11 TPS-TC for PTM transport (HDLC based)

5) Modifications to Annex E on 'Application-specific TPS-TC Framing'

Add the following new clause E.15 to Annex E defining a new TPS-TC for PTM Transport based on 64/65-octet encapsulation.

E.15 TPS-TC for PTM transport (64/65-octet-based)

E.15.1 Packetized data transport

E.15.1.1 Functional model

The functional mode of packetized data transport is presented in Figure E.19. In the transmit direction, the PTM entity obtains data packets to be transported over SHDSL from the application layer interface. The PTM entity processes each packet and applies it to the γ -interface for packetized data transport. The PTM TPS-TC receives the packet from γ -interface, encapsulates it into a special frame (PTM-TC frame) and maps it into PMS-TC frame (transmission frame) for transmission over the SHDSL link.

In the receive direction, the PTM-TC frame extracted from the received PMS-TC frame is directed into the PTM-TC. The PTM-TC recovers the transported packet and delivers it to the PTM entity via the γ -interface.

The PTM path-related OAM data, including information on errored packets, shall be presented to the TPS-TC management entity providing all necessary OAM functions to support the PTM-TC.

The γ -interface is described in E.11.3.1. The α/β -interfaces are application-independent and thus have the same format as for other TPS-TCs (see E.11.3.2).

E.15.2 Transport of PTM data

The transport of PTM data shall be as specified in E.11.2.

E.15.3 Interface description

The interface description shall be as specified in E.11.3.

E.15.4 PTM TPS-TC functionality

The following PTM TPS-TC functionality should be applied to both Rx and Tx direction.

E.15.4.1 Packet encapsulation

For packet encapsulation a 64/65-octet-type mechanism shall be used with detailed characteristics as specified in Annex N/G.992.3.

Both a 16-bit and a 32-bit CRC are defined in Annex N/G.992.3. The STU-C shall support both of these CRC types. The STU-R shall support at least one of these CRC types. A bit in G.994.1, CRC Type, when received by an STU-C, shall indicate which CRC type will be used in both the upstream and downstream direction. When CRC Type is set to a 1 in an MS message, it indicates the 16-bit CRC; when CRC Type is set to a 0, it indicates the 32-bit CRC.

In a CL message the CRC Type bit shall always be set to a 1. In the MS message, if, and only if, both the CL and CLR indicate a 1, then the MS message indicates a 1 for the CRC Type bit.

E.15.4.2 Packet error monitoring

Packet error monitoring includes detection of invalid and errored frames at receive side as specified in Annex N/G.992.3.

E.15.4.3 Data rate decoupling

Data rate decoupling is accomplished as specified in Annex N/G.992.3.

E.15.4.4 Frame delineation

The PTM-TC frames should be delineated as specified in Annex N/G.992.3.

E.15.4.5 Mapping to the SHDSL framing

Packets are mapped into the SHDSL payload on a byte by byte basis as specified in E.11.4.5.

SERIES OF ITU-T RECOMMENDATIONS

Series A	Organization of the work of ITU-T
Series D	General tariff principles
Series E	Overall network operation, telephone service, service operation and human factors
Series F	Non-telephone telecommunication services
Series G	Transmission systems and media, digital systems and networks
Series H	Audiovisual and multimedia systems
Series I	Integrated services digital network
Series J	Cable networks and transmission of television, sound programme and other multimedia signals
Series K	Protection against interference
Series L	Construction, installation and protection of cables and other elements of outside plant
Series M	Telecommunication management, including TMN and network maintenance
Series N	Maintenance: international sound programme and television transmission circuits
Series O	Specifications of measuring equipment
Series P	Telephone transmission quality, telephone installations, local line networks
Series Q	Switching and signalling
Series R	Telegraph transmission
Series S	Telegraph services terminal equipment
Series T	Terminals for telematic services
Series U	Telegraph switching
Series V	Data communication over the telephone network
Series X	Data networks, open system communications and security
Series Y	Global information infrastructure, Internet protocol aspects and next-generation networks
Series Z	Languages and general software aspects for telecommunication systems