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STANDARDIZATION SECTOR
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G.992.5

Corrigendum 1

(04/2004)

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

Digital sections and digital line system – Access networks

Asymmetric Digital Subscriber Line (ADSL) transceivers – Extended bandwidth ADSL2 (ADSL2+)

Corrigendum 1

ITU-T Recommendation G.992.5 (2003) – Corrigendum 1

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
TESTING EQUIPMENTS	G.500–G.599
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
DIGITAL TERMINAL EQUIPMENTS	G.7000–G.7999
DIGITAL NETWORKS	G.8000–G.8999

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

ITU-T Recommendation G.992.5

Asymmetric Digital Subscriber Line (ADSL) transceivers – Extended bandwidth ADSL2 (ADSL2+)

Corrigendum 1

Summary

This corrigendum to ITU-T Rec. G.992.5 deals with the Control Plane Procedures, PSD Mask Control parameters, the Loop Diagnostic Timing Diagram and Test Parameter Messages.

Source

Corrigendum 1 to ITU-T Recommendation G.992.5 (2003) was approved on 30 April 2004 by ITU-T Study Group 15 (2001-2004) under the ITU-T Recommendation A.8 procedure.

FOREWORD

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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.

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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.

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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.

CONTENTS

Page

1) Clause 7.8 – Control plane procedures 1

2) Clause 8.5.1 – Definition of control parameters 4

3) Clause 8.15.6 – Timing diagram of the loop diagnostics procedures 5

4) Clause 9.4.1.10 – Test parameter messages 5

ITU-T Recommendation G.992.5

Asymmetric Digital Subscriber Line (ADSL) transceivers – Extended bandwidth ADSL2 (ADSL2+)

Corrigendum 1

1) Clause 7.8 – Control plane procedures

Add new subclause with following title and text:

7.8.2.4.3 Overhead message segmentation (supplements 7.8.2.4/G.992.3)

An overhead message shall be segmented if the message length P is higher than the maximum of 1024 octets. Otherwise, an overhead message may still be segmented at the transmitter's discretion. To avoid starvation of the protocol, it may be desirable to reduce the transmit duration of a segment to a value significantly shorter than the timeout of the highest priority message, e.g., 200 ms.

If an overhead message of length P is segmented into N segments, the n-th segment ($1 \le n \le N$) contains P_n message octets. To allow for the message indicator and message type to be included in each message segment, the following relationship shall be satisfied:

$$\sum_{n=1}^{N}(P_n - 2) = P - 2, \mathit{with}\, \forall n : 2 < P_n < P$$

The last (P – 2) message octets of the non-segmented message shall be mapped to the N message segments in the same order as they are contained in the non-segmented message. The third message octet of the non-segmented message shall map to the third message octet of the first message segment. The last octet of the non-segmented message shall map to the P_N-th message octet of the N-th message segment. Each message segment shall be transmitted using the HDLC frame structure encapsulation defined in 7.8.2.3, with P_n message octets contained in the HDLC frame encapsulating the n-th message segment. Each message segment may contain a different number of message octets. The maximum number of message segments is 8 (i.e., $2 \le N \le 8$). Figure 7-1 shows the bit assignments for the control field.

7 6	5 4 3	2	1	0
Flag Field (set to 10 or 00)	Segment ID Field (numbered 000 to 111)	Set to 0	Command (0) Response (1)	Alternate (0/1)

Figure 7-1/G.992.5 – Bit assignment for control field

The following shall apply to all encapsulated message segments:

- The message segment length is variable length with a maximal length of 1024 message octets per message segment;
- The address field shall be the same for all message segments (identical to the non-segmented case);
- Each of the three least significant bits of the control field shall be the same for all message segments (identical to the non-segmented case);
- The segment ID field of the control field shall contain the message segment ID n, with n in the range 0 to 7 (MSB of message segment ID mapping to MSB of the segment ID field);

- The segment ID shall count down from N – 1 to 0 where N is the total number of segments in the message;
- The flag field shall be set to 10_2 for the first and last segment and shall be set to 00_2 for all other segments;
- A segmented message shall have at least two segments (i.e., N ≥ 2);
- The first octet of the message segment shall be the message designator (same for all segments, identical to the non-segmented case);
- The second octet of the message segment shall be the message type (same for all segments, identical to the non-segmented case).

An example sequence of control fields in subsequent message segments is shown in Figure 7-2.

1	0		N – 1		0	0	1
0	0		N – 2		0	0	1
			. . .				
0	0	0	0	1	0	0	1
1	0	0	0	0	0	0	1

Figure 7-2/G.992.5 – Example showing the control field in a segmented message of length N

Each transmitted message segment shall be acknowledged by the far-end with a segment acknowledge message, except the last one. The last command message segment shall be acknowledged by the far-end with the appropriate response message (identical to the non-segmented case). The last response message segment shall not be acknowledged. Table 7-17a defines the segment acknowledge message. The following shall apply to all encapsulated segment acknowledge messages:

- HDLC frame shall contain five message octets (P = 5);
- The two least significant bits of the address field shall be identical to the corresponding bits in the address field of the acknowledged message segment. All other bits of the address field shall be set to 0_2;
- The second least significant bit of the control field shall either indicate a command message (request to continue the response, e.g., L2 grant) or a response message (request to continue the command, e.g., OLR);
- The least significant bit of the control field shall toggle for each acknowledgement message as it normally toggles for each command/response message (see 7.8.2.4.2);
- All other bits of the control field shall be set to 0_2.

Table 7-17a/G.992.5 – Segment Acknowledge Message

Message octet number	Message octet definition
Octet 1	Message designator 1111 0000_b for acknowledgement of high priority message segment 1111 0001_b for acknowledgement of normal priority message segment 1111 0010_b for acknowledgement of low priority message segment
Octet 2	Message type of segment acknowledge message 01_{16}
Octet 3	Acknowledged message segment ID (in range 1 to 7)
Octet 4	Message Designator (first message octet of acknowledged message segment)
Octet 5	Message Type (second message octet of acknowledged message segment)

Every message segment must be acknowledged by the far-end before the next message segment is transmitted. The segment acknowledge message shall not be segmented.

Timeouts shall be defined as follows:

- For a non-segmented message, timeout shall apply between the last octet of the command message transmitted and the first octet of the response message received.
- For a segmented response message, the timeout shall apply between the last octet of the command message transmitted and the first octet of the first message segment received.
- A timeout corresponding to the command priority shall apply between the last octet of the message segment transmitted and the first octet of the segment acknowledge message received.
- Another timeout corresponding to the command priority shall apply between the last octet of the segment acknowledge message transmitted and the first octet of the next message segment received.

If a timeout expires, the transmitter may repeat the last transmitted message. This repeated message can be an unsegmented command message, a command/response message segment (except the last segment of a response message), or a segment acknowledge message. Alternately, the ATU may abandon the message after an implementation-specific number of retransmissions.

If a segment of a segmented message is aborted by a higher priority message, the transmitter shall retransmit only the aborted segment and continue to transmit the remaining segments, if any. A segment acknowledge message shall not be aborted by a higher priority message.

Examples of overhead message segmentation and applicable timeouts are shown in Figures 7-10 and 7-11.

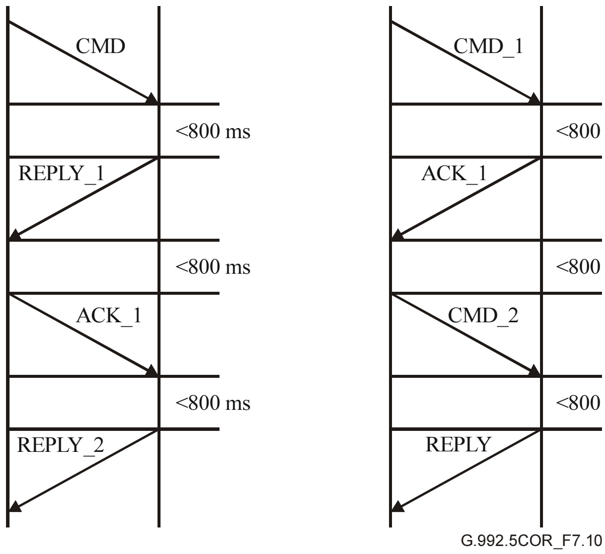

Figure 7-10/G.992.5 – Example of segmentation of a command and response of priority 2 in two segments

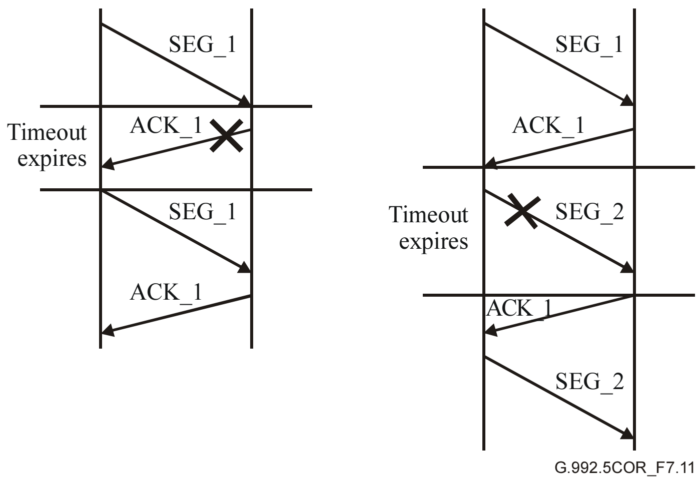

Figure 7-11/G.992.5 – Example of retransmission of segment and acknowledgment

2) Clause 8.5.1 – Definition of control parameters

Change the text of bullet items 2, 3 and 4 as follows leaving the rest of the text unchanged:

2) *Low-frequency end and high-frequency end of MIB PSD mask (f)*

– $t_1 = roundup(f\_pb\_start/\Delta f)$ or ~~$(75 \le t_1 \le 273)$~~ $(73 \le t_1 \le 271)$

….

3) *MIB PSD stopband in lower frequency part*

if ~~$(75 \le t_1 \le 273)$~~ $(73 \le t_1 \le 271)$ then:

...

4) *MIB PSD inband shaping*

if $t_1 = roundup(f\_pb\_start/\Delta f)$ then for $n = 1$ to $N - 1$:

if ~~$(75 \le t_1 \le 273)$~~ $(73 \le t_1 \le 271)$ then for $n = 2$ to $N - 1$:

…

NOTE – If the first breakpoint has subcarrier index ~~75 ≤ t_1 ≤ 273~~ 73 ≤ t_1 ≤ 271, then a stopband is created in the lower frequency …

Change Figure 8-2 as follows:

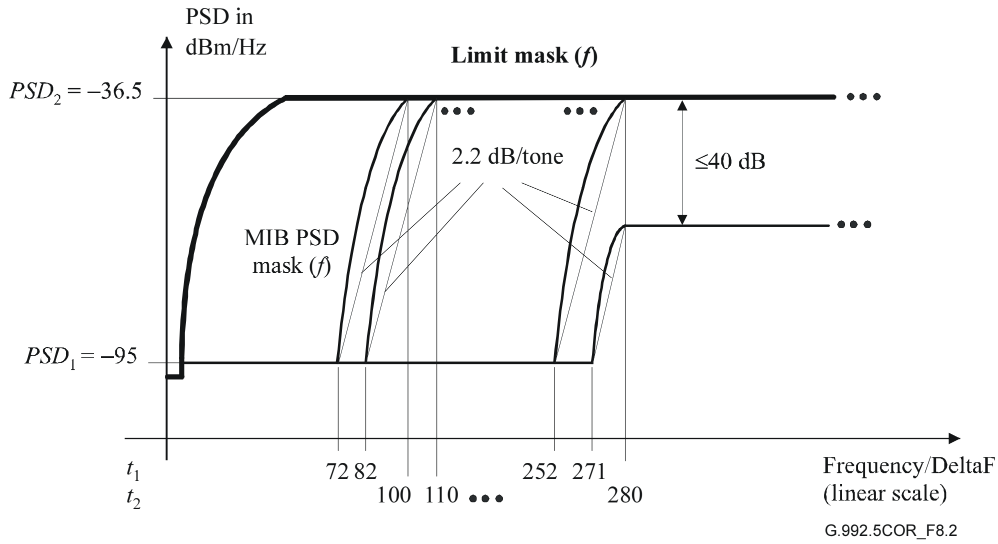

Figure 8-2/G.992.5 – Illustration of a stopband in the first part of the frequency band

3) Clause 8.15.6 – Timing diagram of the loop diagnostics procedures

Loop diagnostics timing diagram (Part 1)

The R-MSG-PCB length is defined as 2560, which corresponds to 8 × (NSCds + 48 + 16) where NSCds = 256. For NSCds = 512, it should be 4608.

The C-QUIET4 length is defined as 2954, which corresponds to 64 + 64 + 10 + 256 + LEN_R-MSG-PCB where LEN_R-MSG-PCB = 2560. For NSCds = 512, it should be 5002, corresponding to LEN_R-MSG-PCB = 4608.

In Figure 8-14 Loop diagnostics timing diagram (part 1), change the following:

For R-MSG-PCB, replace "2560" *by* "8 × (NSCds + 64)".

For C-QUIET4, replace "2954" *by* "394 + 8 × (NSCds + 64)".

4) Clause 9.4.1.10 – Test parameter messages

Correct the text as follows:

The PMD test parameters read commands shall be used to access the value of certain PMD test parameters maintained by the far ATU in accordance with the description of the PMD function. The local parameter values shall be retrieved as described in this clause. The PMD test parameter read command may be initiated by either ATU as shown in Table 9-28. The responses shall be using the command shown in Table 9-29. The PMD test parameter read command shall consist of ~~a~~ two to six octets. The first octet shall be PMD test parameter command designator shown in Table 9-4. The ~~second~~remaining octets shall be ~~one of the values~~as shown in Table 9-28. The PMD test parameter read response command shall be multiple octets. The first octet shall be PMD test parameter read command designator shown in Table 9-4. The second shall correspond to received ~~management counter read command~~PMD test parameter read command second octet, XOR 80_{16}, except for the Next Multiple Read Command (see Tables 9-28 and 9-29).~~.~~ The remaining octets shall be as shown in Table 9-29. The octets shall be sent using the format described in 7.8.2.3 and using the protocol described in 7.8.2.4.

Table 9-28/G.992.5 – PMD test parameter read commands transmitted by the initiator

Message length (octets)	Element name (Command)
3	01_{16} Single Read followed by: 1 octet describing the test parameter ID
2	03_{16} Next Multiple Read
4	04_{16} Multiple Read Block followed by: 2 octets describing the sub-carrier index
6	05_{16} Block Read followed by: 2 octets describing the start subcarrier index 2 octets describing the stop subcarrier index
	All other octet values are reserved by the ITU-T

Table 9-29/G.992.5 – PMD test parameter read command transmitted by the responder

Message length (octets)	Element name (Command)
Variable (see Note)	81_{16} followed by octets for the test parameter arranged for the single read format
12	82_{16} followed by octets for the test parameters arranged for the multiple read format
2	80_{16} NACK
Variable (see Note)	84_{16} followed by octets for the test parameters arranged for the block read format
	All other octet values are reserved by the ITU-T
NOTE – Variable length equals 2 plus length shown in Table 9-30.	

Upon receipt of one of the PMD test parameter read commands, the receiving ATU shall transmit the corresponding response message. If an unrecognized test parameter is requested, the response shall be a PMD test parameter command for NACK. The function of the receiving or transmitting ATUs is not otherwise affected.

The PMD test parameters are all derived according to the procedures in the PMD function clause of this Recommendation. Following initialization, the PMD shall maintain training test parameters until the overhead command for update test parameters is received.

The parameters are transferred in the order and format defined in Table 9-30. During a test parameter read command for single read, all information for the test parameter is transferred. If the test parameter is an aggregate parameter, only one value is transferred. If the test parameter has a value per subcarrier, then all values are transferred from subcarrier index #0 to carrier index #NSC – 1 in a single message. The format of the octets is as described in PMD clause. Values that are formatted as multiple octets shall be inserted in the response message in most significant to least significant octet order.

During a test parameter read command for multiple read or next, information for all test parameters associated with the specified block of~~a particular~~ subcarrier ~~a~~is ~~are~~ transferred. Aggregate test parameters are not transferred with the PMD test parameter read command for multiple read or next. The subcarrier used for a PMD test parameter read command for multiple read shall be the subcarrier contained within the command. This subcarrier index shall be saved. Each subsequent PMD test parameter command for next shall increment and use the saved subcarrier index. If the subcarrier index reaches *NSC*, the response shall be a PMD test parameter command for NACK. The per subcarrier values are inserted into the message according to the numeric order of the octets designators shown in Table 9-30. The format of the octets is as described in PMD clause of this Recommendation. Values that are formatted as multiple octets shall be inserted in the response message in most significant to least significant octet order.

During a test parameter read command for a block read, information for the test parameter is transferred within the specified block of subcarriers. Aggregate test parameters are not transferred with the PMD test parameter block read command. If the test parameter has a value per subcarrier, then all values are transferred from subcarrier index #start subcarrier to subcarrier index #stop subcarrier in a single message. The format of the octets is as described in the PMD clause. Values that are formatted as multiple octets shall be inserted in the response message in most significant to least significant octet order.

Table 9-30/G.992.5 – PMD test parameter ID values

Test parameter ID	Test parameter name	Length for single read	Length for multiple read	Length for block read
01_{16}	Channel Transfer Function *Hlog(f)* per subcarrier	2 + *NSC* × 2 octets	4 octets	2 + (stop sub-carrier – start subcarrier + 1) × 2 octets
02_{16}	Reserved by ITU-T			
03_{16}	Quiet Line Noise PSD *QLN(f)* per subcarrier	2 + *NSC* octets	3 octets	2 + (stop sub-carrier – start subcarrier + 1) octets
04_{16}	Signal-to-noise ratio *SNR(f)* per subcarrier	2 + *NSC* octets	3 octets	2 + (stop subcarrier – start subcarrier + 1) octets
05_{16}	Reserved by ITU-T			
21_{16}	Line Attenuation *LATN*	2 octets	N/a	N/a
22_{16}	Signal Attenuation *SATN*	2 octets	N/a	N/a
23_{16}	Signal-to-Noise Margin *SNRM*	2 octets	N/a	N/a
24_{16}	Attainable Net Data Rate *ATTNDR*	4 octets	N/a	N/a
25_{16}	Near-end Actual Aggregate Transmit Power *ACTATP*	2 octets	N/a	N/a
26_{16}	Far-end Actual Aggregate Transmit Power *ACTATP*	2 octets	N/a	N/a

In transferring the value of the channel transfer function *Hlog*(f), the measurement time shall be inserted into the message, followed by the value *m* (see 8.12.3.1). The measurement time is included only once in a PMD test parameter response for single read or block read. The measurement time is included in each response for multiple read or next multiple read.

In transferring the value of the quiet line noise *QLN(f),* the measurement time shall be inserted into the message, followed by the *n* value (see 8.12.3.2). The measurement time is included only once in a PMD test parameter response for single read or block read. The measurement time is included in each response for multiple read or next multiple read.

In transferring the value of the signal-to-noise ratio *SNR(f)*, the measurement time shall be inserted into the message, followed by the SNR value (see 8.12.3.3). The measurement time is included only once in a PMD test parameter response for single read or block read. The measurement time is included in each response for multiple read or next multiple read.

The values for test parameters defined with fewer bits than shown in Table 9-30 shall be inserted into the message using the least significant bits of the two octets. Unused more significant bits shall be set to 0 for unsigned quantities and to the value of the sign bit for signed quantities.

9.4.1.10.1 Single read command

See 9.4.1.10.1/G.992.3.

9.4.1.10.2 Multiple read protocol with next

See 9.4.1.10.2/G.992.3.

9.4.1.10.3 Block read command

See 9.4.1.10.3/G.992.3.

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