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G.992.3

Amendment 3

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

Digital sections and digital line system – Access networks

Asymmetric digital subscriber line transceivers 2 (ADSL2)

Amendment 3

ITU-T Recommendation G.992.3 (2005) – Amendment 3

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ITU-T Recommendation G.992.3

Asymmetric digital subscriber line transceivers 2 (ADSL2)

Amendment 3

Summary

Amendment 3 to ITU-T Recommendation G.992.3 (2005) addresses the following corrections and added functionality:

1) Clause 7.10.3: Channel initialization policies;
2) Clause 8.12: Accuracy of test parameters;
3) Clause A.4: Longitudinal conversion loss;
4) Clause C.K.3: Packet transmission convergence function (PTM-TC);
5) Clause J.4: Upstream PSD shaping and handshake;
6) Clause K.3: Handshake of PTM-TC encapsulation mode;
7) Clause M.4: Upstream PSD shaping and handshake;
8) New Appendix VII on automode.

Source

Amendment 3 to ITU-T Recommendation G.992.3 (2005) was approved on 14 December 2006 by ITU-T Study Group 15 (2005-2008) 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.

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Asymmetric digital subscriber line transceivers 2 (ADSL2)

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1) Changes related to "Channel initialization policies"

a) Change clause 7.10.3 paragraph as follows:

• • •

The method used by the receiver to select these values is implementation dependent. However, within the limit of the raw data rate and coding gain provided by the local PMD, the selected values shall meet all of the constraints communicated by the transmitter prior to the Exchange Phase, including:

- (Message-based) Overhead data rate ≥ Minimum overhead data rate;
- Net data rate ≥ Minimum net data rate for all bearer channels;
- Impulse noise protection ≥ Minimum impulse noise protection for all bearer channels;
- Delay ≤ Maximum delay for all bearer channels.

Within these constraints, the receiver shall select the values as to optimize in the priority ~~listed~~ configured through the CO-MIB channel initialization policy parameter (CIPOLICY, see clause 7.3.2.10 of [ITU-T G.997.1]). The channel initialization policy applies only for the selection of the values exchanged in the PARAMS message during initialization, and does not apply during SHOWTIME.

The following channel initialization policies are defined:

- Policy ZERO: if $CIpolicy_n = 0$, then:
  1) Maximize net data rate for ~~all~~ the bearer channel~~s~~ #*n*, per the allocation of the net data rate, in excess of the sum of the minimum net data rates over all bearer channels (see 7.10.2).
  2) Minimize excess margin with respect to the maximum noise margin MAXSNRM through gain scalings (see 8.6.4). Other control parameters may be used to achieve this (e.g., PCB see 8.13.3).
- Policy ONE: if $CIpolicy_n = 1$, then:
  1) Maximize INP_act_n for the bearer channel #*n*.

If the CO-MIB sets CIPOLICY (see clause 7.3.2.10 of [ITU-T G.997.1]) to ONE for a bearer channel, it shall have the minimum net data rate (see clause 7.3.2.1.1 of [ITU-T G.997.1]) set equal to the maximum net data rate (see clause 7.3.2.1.3 of [ITU-T G.997.1]) and shall have the MAXSNRM set to infinity (see clause 7.3.1.3.3 of [ITU-T G.997.1]).

If only a single bearer channel is configured through the CO-MIB, then the CIPOLICY shall be set to ZERO or ONE for the bearer channel. If multiple bearer channels are configured through the CO-MIB, then the CIPOLICY shall be set to ZERO for each of the bearer channels. The use of channel initialization policy ONE with multiple bearer channels is for further study.

Support of channel initialization policy ZERO is mandatory. Support of channel initialization policy ONE is optional. Additional channel initialization policies are for further study. The *CIpolicy$_n$* parameter values other than 0 and 1 are reserved for use by the ITU-T.

• • •

b) Add row at the end of Table K.2 as follows (with the same change in Tables K.9 and K.18):

Table K.2 – STM-TC parameters

Parameter	Definition
Channel initialization policy *CIpolicy$_n$*	This parameter controls the policy to be applied to bearer channel #*n* in setting the transceiver configuration parameters during initialization (see clause 7.10.3).

c) Add row at the end of Table K.3 as follows (with the same change in Tables K.10 and K.19):

Table K.3 – Valid configuration for STM-TC function

Parameter	Capability
CIpolicy$_n$	0, 1

d) Add row at the end of Table K.4 as follows (with the same change in Tables C.K.2-3, K.11 and K.20):

Table K.4 – Mandatory downstream configuration for STM-TC function

Parameter	Capability
CIpolicy$_n$	0

e) Add row at the end of Table K.5 as follows (with the same change in Tables K.12 and K.21):

Table K.5 – Mandatory upstream configuration for STM-TC function

Parameter	Capability
CIpolicy$_n$	0

f) *Change Tables K.6, K.7, K.15, K.16, K.22 and K.23 as follows*:

Table K.6 – Format for an STM-TC CL and CLR message

	Definition of the parameter block of Npar(3) octets
	A parameter block of ~~9~~10 octets containing: – the maximum supported value of *net_max*; – the maximum supported value of *net_min*; – the maximum supported value of *net_reserve*; – the maximum supported value of *delay_max*; – the maximum supported value of *error_max*; ~~and~~ – the minimum Impulse Noise Protection *INP_min*; and – the *CIpolicy* bitmap. The unsigned 12-bit *net_max, net_min* and *net_reserve* values represent the data rate divided by 4000 bit/s. The *delay_max* is a 6-bit unsigned value expressed in ms. A value of 000000 indicates no delay bound is being imposed. The *error_max* is a 2-bit indication, defined as 00 for an error ratio of 1E-3, 01 for an error ratio of 1E-5, and 10 for an error ratio of 1E-7. The value 11 is reserved. The *INP_min* value is an 8-bit indication, with values coded as defined in Table K.6a. The *CIpolicy* (see clause 7.10.3) is a 2-bit bitmap, representing the channel initialization policies ZERO and ONE (see Note).
NOTE – The CLR message shall indicate one or more policies supported by the ATU-R. The CL message shall indicate the single policy enabled by the CO-MIB. Support or enabling of only policy ZERO may be explicitly indicated by setting the related G.994.1 codepoint, or implicitly by not including the policy codepoints in the CLR or CL message.	

Table K.7 – Format for an STM-TC MS message

	Definition of the parameter block of Npar(3) octets
	A parameter block of ~~9~~10 octets containing: – the value of *net_max*; – the value of *net_min*; – the value of *net_reserve*; – the value of *delay_max*; – the value of *error_max*; ~~and~~ – the minimum Impulse Noise Protection *INP_min*; and – the *CIpolicy* bitmap (see Note). The format of the octets is as described in Table K.6.
NOTE – The MS message shall indicate the policy enabled for use with the bearer channel. Enabling of policy ZERO may be explicitly indicated by setting the related G.994.1 codepoint, or implicitly by not including the policy codepoints in the MS message.	

Table K.15 – Format for an ATM-TC CL and CLR message

	Definition of the parameter block of Npar(3) octets
	A parameter block of ~~9~~10 octets containing: – the maximum supported value of *net_max*; – the maximum supported value of *net_min*; – the maximum supported value of *net_reserve*; – the maximum supported value of *delay_max*; – the maximum supported value of *error_max*; – the minimum Impulse Noise Protection *INP_min*; ~~and~~ – the support of *IMA_flag*; and – the *CIpolicy* bitmap (see Note in Table K.6). The format of the octets is as described in Table K.6. The *IMA_flag* is a single bit indication, set to 1 if IMA is supported and set to 0 if IMA is not supported or disabled.

Table K.16 – Format for an ATM-TC MS message

	Definition of the parameter block of Npar(3) octets
	A parameter block of ~~9~~10 octets containing: – the value of *net_max*; – the value of *net_min*; – the value of *net_reserve*; – the value of *delay_max*; – the value of *error_max*; – the minimum Impulse Noise Protection *INP_min*; ~~and~~ – the value of the *IMA_flag*; and – the *CIpolicy* bitmap (see Note in Table K.7). The format of the octets is as described in Table K.15.

Table K.22 – Format for a PTM-TC CL and CLR message

	Definition of the parameter block of Npar(3) octets
	A parameter block of ~~10~~11 octets containing: – the maximum supported value of *net_max*; – the maximum supported value of *net_min*; – the maximum supported value of *net_reserve*; – the maximum supported value of *delay_max*; – the maximum supported value of *error_max*; ~~and~~ – the minimum Impulse Noise Protection *INP_min*; – the encapsulation type (see clause K.3.8); and – the *CIpolicy* bitmap (see Note in Table K.6). The format of the octets is as described in Tables K.6 and K.22a. ~~An additional octet containing indication of which encapsulation types are supported (see K.3.8). The format of this octet is as described in Table K.22a.~~

Table K.23 – Format for an PTM-TC MS message

	Definition of the parameter block of Npar(3) octets
	A parameter block of ~~10~~11 octets containing: – the value of *net_max*; – the value of *net_min*; – the value of *net_reserve*; – the value of *delay_max*; – the value of *error_max*; ~~and~~ – the minimum Impulse Noise Protection *INP_min*; – the encapsulation type (see clause K.3.8); and – the *CIpolicy* bitmap (see Note in Table K.7). The format of the octets is as described in Tables K.6 and K.22a. ~~An additional octet containing indication of which encapsulation type is selected (see K.3.8). The format of this octet is as described in Table K.22a.~~

2) Clause 8.12 – Management plane procedures

a) Change the following two paragraphs in clause 8.12.3.1:

8.12.3.1 Channel characteristics function per subcarrier (CCF-ps)

• • •

An Hlin(i × Δf) value indicated as $\boldsymbol{a(i) = b(i) = -2^{15}}$ is a special value. It indicates that no measurement could be done for this subcarrier because it is out of the PSD mask passband (as relevant to the chosen application option – see annexes) or in the BLACKOUTset (see clauses 8.13.2.4, 8.13.4.1 and 8.13.4.2) or that the attenuation is out of range to be represented.

• • •

An Hlog(i × Δf) value indicated as $\boldsymbol{m(i)} = 2^{10} - 1$ is a special value. It indicates that no measurement could be done for this subcarrier because it is out of the PSD mask passband (as relevant to the chosen application option – see annexes) or in the BLACKOUTset (see clauses 8.13.2.4, 8.13.4.1 and 8.13.4.2) or that the attenuation is out of range to be represented.

b) Add new clause 8.12.5:

8.12.5 Accuracy of test parameters

This clause defines accuracy requirements for test parameters defined in clause 8.12.3. The accuracy requirement is expressed as a tolerance relative to a reference value. Both the reference value and the allowed tolerance are defined in this clause.

The accuracy requirements of test parameters is optional.

NOTE – The measurement of test parameter reference values involves the use of test equipment. The accuracy requirements defined in this clause do not take into account test equipment tolerance. Test equipment tolerance is out of the scope of this Recommendation and is to be added to the tolerance defined in this clause.

8.12.5.1 Channel characteristics function per subcarrier (CCF-ps)

8.12.5.1.1 Channel attenuation in logarithmic format (HLOGps)

For further study.

8.12.5.1.2 Channel attenuation in complex format (HLINps)

For further study.

8.12.5.2 Quiet line noise PSD per subcarrier (QLN-ps)

For further study.

8.12.5.3 Signal-to-noise ratio per subcarrier (SNR-ps)

For further study.

8.12.5.4 Loop attenuation (LATN)

For further study.

8.12.5.5 Signal attenuation (SATN)

For further study.

8.12.5.6 Signal-to-noise ratio margin (SNRM)

For further study.

8.12.5.7 Attainable net data rate (ATTNDR)

For further study.

8.12.5.8 Actual Aggregate transmit power (ACTATP)

For further study.

3) G.992.3 electrical characteristics – Longitudinal conversion loss (LCL)

Add or replace paragraph in the following clauses:

A.4.3.3.1 Longitudinal balance

~~Longitudinal balance at the U-R interface shall be greater than 40 dB over the 30 kHz (see Figure A.1) to 1104 kHz frequency range.~~

The ATU-C shall have a longitudinal conversion loss (LCL) of at least 50 dB in the frequency range from 30 kHz to 138 kHz and at least 40 dB in the frequency range from 138 kHz to 1104 kHz.

The ATU-R shall have a longitudinal conversion loss (LCL) of at least 50 dB in the frequency range from 30 kHz to 1104 kHz.

• • •

B.4.1.3.1 Longitudinal balance

~~Longitudinal balance at the U-R interface shall be greater than 40 dB over the 120 kHz (see Figure B.1) to 1104 kHz frequency range.~~

The ATU-C shall have a longitudinal conversion loss (LCL) of at least 50 dB in the frequency range from 120 kHz to 276 kHz and at least 40 dB in the frequency range from 276 kHz to 1104 kHz.

The ATU-R shall have a longitudinal conversion loss (LCL) of at least 50 dB in the frequency range from 120 kHz to 1104 kHz.

• • •

I.4.3.1 Longitudinal balance

~~Longitudinal balance at the U-R interface shall be greater than 40 dB over the 5 kHz to 1104 kHz frequency range.~~

The ATU-C shall have a longitudinal conversion loss (LCL) of at least 50 dB in the frequency range from 4 kHz to 138 kHz and at least 40 dB in the frequency range from 138 kHz to 1104 kHz.

The ATU-R shall have a longitudinal conversion loss (LCL) of at least 50 dB in the frequency range from 4 kHz to 1104 kHz.

• • •

J.4 Electrical characteristics

The ATU shall meet the electrical characteristics defined in clause I.4.

The ATU-C longitudinal conversion loss (LCL) requirements shall apply over the frequency ranges from 4 kHz to 276 kHz and from 276 kHz to 1104 kHz respectively.

• • •

M.4 Electrical characteristics

The ATU shall meet the electrical characteristics defined in clause A.4.

The ATU-C longitudinal conversion loss (LCL) requirements shall apply over the frequency ranges from 30 kHz to 276 kHz and from 276 kHz to 1104 kHz respectively.

• • •

4) Annex C.K.3 – PTM-TC

Clarify that Annex C PTM mode is not defined, add "for further study" explicitly.

C.K.3 Packet transmission convergence function (PTM-TC)

For further study.

5) Annex J – Upstream PSD shaping and handshake

J.2.2 ATU-R upstream transmit spectral mask (supplements 8.10)

a) Add the following after Table J.3/G.992.3 and Table J.3/G.992.5:

The upstream spectrum bounds default settings in Table J.2 apply for all ADLU-x and shaped PSD Masks. Clause 8.13.2.4 defines how the ATU-R is to resolve inconsistencies between the upstream spectrum bounds, spectrum shaping and MIB PSD Mask parameters contained in the CLR and CL message.

In particular:

1) NOMPSDus shall be changed from its default value for the ADLU-masks 36 up to 64 during the pre-activation (G.994.1 phase, see clause 8.13.2) at least to the Template Nominal PSD values listed in Table J.3.
2) MAXNOMPSDus shall be a value within the Limit_PSD_Mask for PSD shaping (Table J.10) minus 3.5 dB.

b) Change the text of clause J.3 as follows (only modified sections are shown):

J.3.1 Handshake – ATU-C (supplements 8.13.2.1)

~~The G.994.1 codepoints required for the initialization of ATU-C and ATU-R shall be contained in an "Annex J Submode PSD Masks" SPAR(2) parameter block. This parameter block shall be added to the G.994.1 codetree defined for G.992.3 Annex J.~~

If, and only, if the ATU-C does not select to use Upstream PSD Shaping (see clause J.3.4 and Table J.9), the ATU-C shall include the "Annex J Submode PSD Masks" Spar(2) parameter block in CL (see clause J.3.1.1) messages.

If, and only if, the ATU-C does not select to use Upstream PSD Shaping (see clause J.3.4 and Table J.9), the ATU-C shall include the "Annex J Submode PSD Masks" Spar(2) parameter block in MS messages (see clause J.3.1.2).

J.3.2 Handshake – ATU-R (supplements 8.13.2.2)

~~The G.994.1 codepoints required for the initialization of ATU-C and ATU-R shall be contained in an "Annex J Submode PSD Masks" SPAR(2) parameter block. This parameter block shall be added to the G.994.1 codetree defined for G.992.3 Annex J.~~

Regardless whether the ATU-R supports Upstream PSD Shaping (see clause J.3.4 and Table J.10) or not, the ATU-R shall always include the "Annex J Submode PSD Masks" Spar(2) parameter block in CLR (see clause J.3.2.1) and MS messages.

If, and only if, the ATU-C does not select to use Upstream PSD Shaping (see clause J.3.4 and Table J.9), the ATU-R shall include the "Annex J Submode PSD Masks" Spar(2) parameter block in MS messages (see clause J.3.2.2).

J.3.4.2 Upstream PSD mask configuration parameter

a) Insert "/Δf" in the following sentence:

For $t_{N-1} < (f/\Delta f) <$ (686 kHz/Δ*f*), the MIB_PSD_mask shall be the highest of:

b) Change "PSDMAX" to "MAXPSD" in the following equation:

~~$$\forall n : (1 \le n \le N-1) AND \left(\begin{array}{c} (PSDMAX - PSD_n \le 6\,dB) \\ OR \\ (PSDMAX - PSD_{n-1} \le 6\,dB) \end{array} \right) : \left| \frac{PSD_n - PSD_{n-1}}{t_n - t_{n-1}} \right| \le 0.60 \text{ dB/tone}$$~~

$$\forall n : (1 \le n \le N-1) AND \left(\begin{array}{c} (MAXPSD - PSD_n \le 6\,dB) \\ OR \\ (MAXPSD - PSD_{n-1} \le 6\,dB) \end{array} \right) : \left| \frac{PSD_n - PSD_{n-1}}{t_n - t_{n-1}} \right| \le 0.60 \text{ dB/tone}$$

J.3.4.3 Transmission of upstream MIB_PSD_mask configuration parameter

The upstream MIB_PSD_Mask parameter is stored in the CO-MIB and shall be transmitted to the ATU-R to allow the ATU-R to derive the appropriate upstream tss_i values, and other ATU-R specific spectral shaping and time domain filtering settings, to comply with the requested upstream PSD mask (i.e., the lower of MIB_PSD_Mask and Limit_PSD_Mask). The upstream MIB_PSD_Mask parameter is transmitted from ATU-C to ATU-R through the CL message Submode_PSD_Shape parameter block during the G.994.1 handshake initialization phase (see Table J.11). This parameter block shall not be included in a CLR or MS message.

If the CL message includes an Spar(2) Submode_PSD_Mask parameter block (to indicate ATU-C selects one of the upstream PSD masks defined in clause J.2), the CL message shall not include an Spar(2) Submode_PSD_Shape parameter block. If the CL message does not include an Spar(2) Submode_PSD_Mask parameter block, then the CL message may include a Submode_PSD_Shape parameter block (to indicate the need of for upstream PSD shaping to the ATU-R). If the CL message does not include the Submode_PSD_Shape parameter block either, then by default the MIB_PSD_Mask equals the Limit_PSD_Mask.

If the CL message includes a Submode_PSD_Shape parameter block, this block shall contain the upstream PSD mask through a set of breakpoints defining the MIB_PSD_Mask. Upon receipt of this Submode_PSD_Shape parameter block, the ATU-R shall verify whether the upstream spectrum bounds and shaping (tss_i) parameter blocks communicated during the CLR message do comply with and are optimum under the requested upstream PSD mask. If not, the ATU-R shall initiate a new CLR/CL transaction with modified upstream spectrum bounds and shaping (tss_i) parameter blocks.

As the support of upstream spectrum shaping is optional, a PSD_shape_support NPAR(2) bit shall be added in the CL and CLR message to indicate support of upstream PSD shaping at the ATU-C receiver and ATU-R transmitter respectively (see Tables J.11 and J.12). This bit shall be set to 1 in the CLR if the ATU-R transmitter supports upstream PSD shaping.

- If this bit is set to 0 in the CLR message, the CL message may (in the current transaction or in a subsequent CL/CLR transaction in the current or subsequent G.994.1 session) include a Submode_PSD_Mask parameter block (resulting in a MS message selecting an upstream PSD mask defined in clause J.2) or the ATU-C may return the "configuration error" initialization failure code (see G.997.1).
- If this bit is set to 1 in the CLR message, the CL message may (in the current transaction or in a subsequent CL/CLR transaction in the current or subsequent G.994.1 session) include a Submode_PSD_Mask parameter block (resulting in a MS message selecting an upstream PSD mask defined in clause J.2) or the ATU-C may include a Submode_PSD_Shape parameter block (resulting in the MIB_PSD_Mask being equal to Submode_PSD_shape parameter) or the ATU-C may include no parameter block (resulting in the MIB_PSD_Mask being equal to the Limit_PSD_Mask).

If the CL message does include a Submode_PSD_Mask parameter block, it shall have the NPAR(2) bit set to 0 (indicating the ATU-C selects to use an upstream PSD mask defined in clause J.2). If the CL message does not include a Submode_PSD_Mask parameter block, it shall have the NPAR(2) bit set to 1 (indicating the ATU-C selects to use upstream PSD shaping).

If both the ATU-C and ATU-R indicate support of upstream spectrum shaping (i.e., the Npar(2) PSD_Shape_support bit is set to 1 in both the CL and CLR message), then the subsequent MS message (see Table J.13) shall have the Npar(2) PSD_Shape_support bit set to 1 and both the Spar(2) Submode_PSD_Mask and Spar(2) Submode_PSD_Shape bits set to 0. The ATU-R shall then comply to the upstream PSD mask as transmitted in the CL message (explicitly through the Submode_PSD_Shape parameter block or implicitly by absence of a Submode_PSD_Shape parameter block).

The indication of support for and selection of the upstream MIB PSD Mask is summarized in Table J.13a.

Table J.11 – ATU-C CL message additional Par(2) PMD bit definitions

Npar(2) bit	**Definition**
PSD_Shape Support	A ONE indicates that the ATU-C selects to use upstream PSD shaping.
Spar(2) bit	**Definition of related Npar(3) bits**
Submode PSD shape	In this parameter block, the ATU-C indicates to the ATU-R the upstream MIB_PSD_Mask through a set of maximum four breakpoints (see clause J.3.4.3). Breakpoints are in ascending order of tone index. Each breakpoint is represented in 2 octets: • The tone index *n* shall be coded as (*n* – 1) in an unsigned 6-bit value, ranging from tone index 1 (coded 0b000000) to tone index 64 (coded 0b111111). • The PSD at this tone index is coded as the attenuation relative to MAXNOMPSDus + 3.5 dB. The attenuation shall be coded as 6 bits in steps of 0.5 dB, ranging from 0 dB (coded 0b000000) to 24 dB (coded 0b110000). At least one breakpoint shall be coded with 0 dB.

Table J.12 – ATU-R CLR message additional Par(2) PMD bit definitions

Npar(2) bit	**Definition**
PSD_Shape Support	A ONE indicates that the ATU-R supports upstream PSD shaping.
Spar(2) bit	**Definition of related Npar(3) bits**
Submode PSD_Shape	This parameter block shall not be included. This Spar(2) shall be set 0.

Table J.13 – MS message additional Par(2) PMD bit definitions

Npar(2) bit	**Definition**
PSD_Shape Support	A ONE indicates that the ATU-R upstream PSD mask shall comply to the upstream MIB_PSD_Mask transmitted in the CL message.
Spar(2) bit	**Definition of related Npar(3) bits**
Submode PSD_Shape	This parameter block shall not be included. This Spar(2) shall be set 0.

Table J.13a – Indication of the upstream MIB PSD Mask during the G.994.1 phase

	CL = [1 0 0]	CL = [0 1 0]	CL = [0 1 1]
CLR = [1 0 0]	MS = [1 0 0] Flat MIB PSD Mask = EU-x as indicated in CL and MS and as defined in clause J.2	Annex J not selected in MS (configuration error)	Annex J not selected in MS (configuration error)
CLR = [1 1 0]	MS = [1 0 0] Flat MIB PSD Mask is EU-x as indicated in CL and MS and as defined in clause J.2.	MS = [0 1 0] Shaped MIB PSD Mask is Limit PSD Mask as defined in Table J.8.	MS = [0 1 0] Shaped MIB PSD Mask is as indicated in CL.

NOTE 1 – The notation for the [a b c] combination is defined as follows:
a = Annex J Submode PSD Masks Spar(2) bit;
b = Annex J PSD Shape Support Npar(2) bit;
c = Annex J Submode PSD Shape Spar(2) bit.

NOTE 2 – This table lists all valid [a b c] combinations for CL and CLR messages. Other combinations shall not be used.

NOTE 3 – For each of the a, b and c bits, the value in MS message shall be the logical AND of the values in the CL and CLR messages.

6) Annex K.3 – Handshake of PTM-TC encapsulation mode

G.992.3 Amendment 1: Replace table as follows (editorial alignment of table format and text with G.994.1):

~~**Table K.22a/G.992.3 – Indication of supported encapsulation types**~~

~~Bits~~								~~PMS-TC latency path #p NPar(3)s – Octet 10~~
~~8~~	~~7~~	~~6~~	~~5~~	~~4~~	~~3~~	~~2~~	~~1~~	
~~x~~	~~x~~						~~x~~	~~HDLC encapsulation~~
~~x~~	~~x~~					~~x~~		~~Reserved by ITU-T~~
~~x~~	~~x~~				~~x~~			~~Reserved by ITU-T~~
~~x~~	~~x~~			~~x~~				~~64/65-octet encapsulation with short packets (N.3.1.3)~~
~~x~~	~~x~~		~~x~~					~~64/65-octet encapsulation with Preemption (N.3.1.2)~~
~~x~~	~~x~~	~~x~~						~~64/65-octet encapsulation supported (N.3.1.1)~~

~~NOTE – Bit 4 and/or bit 5 may only be set if bit 6 is set.~~

Table K.22a – Indication of supported encapsulation types

Bits								**PTM TPS-TC #n NPar(3)s – Octet 10**
8	7	6	5	4	3	2	1	
x	x	x	x	x	x	x	1	HDLC encapsulation
x	x	x	x	x	x	1	x	Reserved by ITU-T
x	x	x	x	x	1	x	x	Reserved by ITU-T
x	x	x	x	1	x	x	x	64/65-octet encapsulation with short packets (N.3.1.3)
x	x	x	1	x	x	x	x	64/65-octet encapsulation with Preemption (N.3.1.2)
x	x	1	x	x	x	x	x	64/65-octet encapsulation supported (N.3.1.1)

NOTE – Bit 4 and/or bit 5 may only be set if bit 6 is set.

7) Annex M – Upstream PSD shaping and handshake

M.2.2 ATU-R upstream transmit spectral mask (supplements 8.10)

a) Add the following after Table M.3/G.992.3 and Table M.3/G.992.5:

The upstream spectrum bounds default settings in Table M.2 apply for all EU-x and shaped PSD Masks. Clause 8.13.2.4 defines how the ATU-R is to resolve inconsistencies between the upstream spectrum bounds, spectrum shaping and MIB PSD Mask parameters contained in the CLR and CL message.

In particular:

1) NOMPSDus shall be changed from its default value for the EU-masks 36 up to 64 during the pre-activation (G.994.1 phase, see clause 8.13.2) at least to the Template Nominal PSD values listed in Table M.3.

2) MAXNOMPSDus shall be a value within the Limit_PSD_Mask for PSD shaping (Table M.10) minus 3.5 dB.

b) Change the text of clause M.3 as follows (only modified sections are shown):

M.3.1 Handshake – ATU-C (supplements 8.13.2.1)

~~The G.994.1 codepoints required for the initialization of ATU-C and ATU-R shall be contained in an "Annex M Submode PSD Masks" SPAR(2) parameter block. This parameter block shall be added to the G.994.1 codetree defined for G.992.3 Annex M.~~

If, and only if, the ATU-C does not select to use Upstream PSD Shaping (see clause M.3.4), then the ATU-C shall include the "Annex M Submode PSD Masks" Spar(2) parameter block in CL (see clause M.3.1.1) and MS messages.

If, and only if, the ATU-C does not select to use Upstream PSD Shaping (see clause M.3.4), the ATU-C shall include the "Annex M Submode PSD Masks" Spar(2) parameter block in MS messages (see clause M.3.1.2).

M.3.2 Handshake – ATU-R (supplements 8.13.2.2)

~~The G.994.1 codepoints required for the initialization of ATU-C and ATU-R shall be contained in an "Annex M Submode PSD Masks" SPAR(2) parameter block. This parameter block shall be added to the G.994.1 codetree defined for G.992.3 Annex M.~~

Regardless whether the ATU-R supports Upstream PSD Shaping (see clause M.3.4) or not, the ATU-R shall always include the "Annex M Submode PSD Masks" Spar(2) parameter block in CLR (see clause M.3.2.1) messages.

If, and only if, the ATU-C does not select to use Upstream PSD Shaping (see clause M.3.4), the ATU-R shall include the "Annex M Submode PSD Masks" Spar(2) parameter block in MS messages (see clause M.3.2.2).

8) New Appendix VII – ADSL2 automoding

Add new Appendix VII as follows:

Appendix VII

ADSL2 automoding

(This appendix does not form an integral part of this Recommendation)

VII.1 Definition of automode

Automode shall be defined as the capability to automatically select (according to the automode policy) an operating mode among a selected set of enabled modes in a transceiver supporting multiple operating modes.

VII.2 Automode policies

A single automode policy is defined as the typical automode policy, for which performance requirements should be defined (to be met with a single typical set of operating modes enabled in the MIB). Alternative automode policies may be enabled through functionalities outside the transceiver or through vendor discretionary MIB extensions, without definition of related performance requirements.

The single typical set of enabled operating modes is:

- G.992.5 Annex A non-overlapped downstream;
- G.992.3 Annex A non-overlapped downstream;
- G.992.3 Annex L non-overlapped downstream, wide upstream.

The single typical automode policy shall choose the mode which achieves the highest total data rate, where the total data rate is defined as the sum of downstream and upstream net data rates, under the standard requirements of meeting minimum data rates, target noise margins, etc., for upstream and downstream.

VII.3 Automode performance requirements

Implementors are encouraged to shorten automode initialization time.

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