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ITU-T

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G.992.3

Amendment 4

(10/2011)

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 4

Recommendation ITU-T G.992.3 (2009) – Amendment 4

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Recommendation ITU-T G.992.3

Asymmetric digital subscriber line transceivers 2 (ADSL2)

Amendment 4

Summary

Functionalities covered in Amendment 4 to Recommendation ITU-T G.992.3 (2009) (also apply to Recommendation ITU-T G.992.5 by reference):

- Correction to CIpolicy=1 (corrigendum).
- Extended valid values for L_p in L2 low power mode (amendment).
- Extended valid values for the g_i gain scaling in L2 low power mode (amendment).

History

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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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NOTE

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

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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, implementers are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database at http://www.itu.int/ITU-T/ipr/.

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Asymmetric digital subscriber line transceivers 2 (ADSL2)

Amendment 4

1) Clause 7.10.3 (corrigendum)

Make the following correction to the channel initialization policy:

7.10.3 Exchange phase

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• Policy ONE: if $CIpolicy_n$ = 1, then:

a) If the minimum net data rate (see clause 7.3.2.1.1 of [ITU-T G.997.1]) is set equal to the maximum net data rate (see clause 7.3.2.1.3 of [ITU-T G.997.1]), then:

   1) Maximize INP_act_n for the bearer channel #*n*.

b) If the minimum net data rate (see clause 7.3.2.1.1 of [ITU-T G.997.1]) is not set equal to the maximum net data rate (see clause 7.3.2.1.3 of [ITU-T G.997.1]), then:

   1) Maximize net data rate for all the bearer channels, per the allocation of the net data rate, in excess of the sum of the minimum net data rates over all bearer channels (see clause 7.10.2).

   2) If such maximized net data rate is equal to the maximum net data rate (see clause 7.3.2.1.3 of [ITU-T G.997.1]), maximize INP_act_n for the bearer channel #*n*.

   3) Minimize excess margin with respect to the maximum noise margin MAXSNRM through gain scalings (see clause 8.6.4). Other control parameters may be used to achieve this (e.g., PCB, see clause 8.13.3).

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

• • •

2) Extended valid values for L_p in L2 low power mode (amendment)

Change clause 7.12.1.1 as follows:

7.12.1.1 Transition to L2 link state operation

The L0 to L2 transition procedures of the PMS-TC function supports changing some of the control parameters to reduce the number of bits transferred per PMD primitive in the downstream direction. This change is accomplished by changing the downstream control parameter displayed in Table 7-8. The transition is intended to allow changes in the downstream control parameters without errors (i.e., seamless).

Table 7-23 – Power management control parameters of the PMS-TC function

Parameter	Definition
L_p	The number of bits from latency path #p shall be decreased from L_p in the L0 link state in the range of $1 \le L_p \le$ ~~1024~~ and $\sum L_p$ shall be such that $8 \le \sum L_p \le$ ~~1024~~.

Entry into the L2 link state occurs with the coordinated change in the downstream L_p parameters in order to decrease the number of bits per PMD primitive. The change shall be preceded by the protocol described in clause 9.5.3.3. Following the successful completion of the protocol, the coordinated change of the L_p parameters shall occur as specified in clause 7.11.1.2.

The ATUs shall store the L0 link state PMS-TC control parameter L_p when transitioning from link state L0 to state L2.

Add NOTE to clause 9.4.1.7.3 as follows:

9.4.1.7.3 L2 request by ATU-C

When sending the L2 request command, the ATU-C shall specify parameters describing the minimum and maximum average power cutback, defined in terms of the PMD control parameter *PCBds*. The ATU-C shall also specify the minimum and maximum L_p value for each configured PMS-TC latency path function. Values larger than the current L_p values shall not be encoded.

Upon receipt of the L2 request command, the ATU-R shall evaluate the parameters found in the L2 request message and the current operating conditions of the downstream receiver. If the parameters are invalid (i.e., not within the allowed encoding ranges), the ATU-R shall send an L2 reject command using reason code 02_{16}.

NOTE – An ATU-R implemented according to previous versions of this Recommendation may have a valid range for L_p limited to 1024. Therefore, it may send a L2 Reject command using reason code 02_{16}, in response to an L2 Request command with a minimum L_p value exceeding 1024.

If the parameters are valid but describe an operating condition that cannot be currently satisfied (e.g., because the current line and noise conditions cannot support the configuration), the ATU-R shall send an L2 reject command using reason code 04_{16}. If the parameters can be met, the ATU-R shall send an L2 grant command and follow procedures defined in clause 9.5.3.3. The L2 grant command shall contain the actual value of *PCBds* necessary modifications to the bits and gain tables to be used by the ATUs in the downstream direction. Additionally, the grant command shall describe the *PCBds* and the b_i/g_i flag value that the ATU-C shall use to transmit an L2 exit sequence as described in clause 8.7. These should be selected by the receiver to best assure reliable detection of the L2 exit sequence. A b_i/g_i flag value of zero corresponds to the L0 link state; the value of 1 corresponds to the L2 link state. The ATU-R may instead send an L2 reject command indicating it is temporarily busy using reason code 01_{16}.

The ATU-R shall send a response command to an L2 request by the ATU-C within the time period defined in Table 7-17. An ATU-R shall not send an L2 grant command if it has already sent an OLR request command and is awaiting a response.

3) Extended valid values for the g_i gain scaling in L2 low power mode (amendment)

Change clause 8.6.4 as follows:

8.6.4 Gain scaling

. . .

These requirements on the bits and gains table apply in the L0 state. ~~and~~

~~a~~At entry into the L2 state, the requirements for the bits table are unchanged, but the following requirements on the gains table apply:

- If ($b_i > 0$) or ($b_i = 0$), then g_i shall be in the [–14.5 to +2.5 + *EXTGI*] (dB) range;
- If ($b_i > 0$) or ($b_i = 0$), then [*PCB*(L2)+g_i(L2)] ≤ [PCB(L0)+ *RMSGI*(L0)+2.5];
- The overall gains and PCB in L2 shall be such that ATP(L2) < ATP(L0);
- If (g_i(L0) ≠ 0) then (g_i(L2) ≠ 0).

The L2 entry grant response message indicates the gains table to be used in the L2 state (see clause 9.4.1.7).

NOTE 1 – An ATU-R implemented according to previous versions of this Recommendation may send L2 entry grant response messages having a gains table according to L0 state constraints.

However, at entry into the L2 state, the excess margin may not be minimized. Power trimming during the L2 state may be used to minimize the excess margin. The L2 entry and trim grant response messages indicate the PCB value to be used in the L2 state (see clause 9.4.1.7). Power trimming is defined as changing the downstream power cutback (*PCBds*) level, resulting in a change of the downstream reference transmit PSD (*REFPSDds*) level. Power trimming changes the *PCBds* value used during the L2 state and does not change the g_i values determined at the time of entry into the L2 state.

The g_i values in dB shall be defined as the 20 log g_i (g_i in linear scale). A g_i value of –14.5 dB corresponds to a g_i of 0.1888 in linear scale. A g_i value of +2.5 dB corresponds to a g_i value of 1.333 in linear scale. Same relationship shall be used for the tss_i values in dB and in linear scale.

NOTE 2 – The g_i values define a scaling of the root mean square (rms) subcarrier power levels relative to the *REFPSD* level (see clause 8.13.5). They are independent of any methods that manufacturers may use to simplify implementation (e.g., constellation nesting).

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