

– Telecommunication Standardization Sector

**Geneva – 7.12.2002**

QUESTIONS: 4/15  
SOURCE: ITU-T Question 4/15  
TITLE: Communication to IEEE P802.3ah concerning xDSL Recommendations

**COMMUNICATION STATEMENT**

TO: IEEE 802.3ah Ethernet in the First Mile Task Force  
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APPROVAL: Agreed to at ITU-T Q.4/15 Rapporteur Group meeting, Clearwater, Florida, USA, 10-14 December 2001

FOR: Information/Action

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Mr. Frazier, Mr. Barrass,

Thank you for the communications statement from your Los Angeles EFM Task Force meeting. Please also extend our thanks to Mr. Thompson and Mr. Carlo for the communications sent to SG15 from the November 2001 Austin meeting of the 802.3 Working Group, on which we were copied. We appreciate your communication and cooperation and look forward to continuing in kind. In this communication, we discuss: 1) Existing ITU-T Recommendations and architectures that are likely to be relevant to your Objectives, 2) On-going ITU-T Recommendation work that may be relevant to your Objectives, and 3) and possibilities for future collaboration.

## Existing ITU-T Recommendations and architectures

We appreciate the invitation in the November communication to review materials on the EFM Task Force website. Noting that Objectives passed by 802.3ah now include multiple distances and data rates, we provide further information beyond the list of Recommendations provided in our August communication. Although we briefly review some points about these Recommendations with respect to your Objectives, ITU-T Recommendation G.995.1, *Overview of Digital Subscriber Line (DSL) Recommendations*, provides a detailed summary and comparison of all the ITU-T Q.4/15 xDSL Recommendations (attached). Please note that additional G-series ITU-T Recommendations may be found at: <http://www.itu.int/itudoc/itu-t/rec/g/g800up/>. Alternately, we can provide them to you upon request in order to further the work within your group.

Objective: 10Mbit/s 800m single-pair

Objective: 4Mbit/s 3700m single-pair

ITU-T Recommendation G.993.1, *Very-high-speed Digital Subscriber Line — Foundation*, previously provided to you, has completed final formal approval on 28-Nov-2001 and is now an in-force ITU-T Recommendation. G.993.1 provides frequency planning and a Packet Transfer Mode (PTM) Transmission Convergence (TC) and interface.

Objective: 256kbit/s 4600m single-pair

Q.4/15 has developed several Recommendations for xDSL transceivers that would satisfy this objective. In particular, ITU-T G.991.2, *Single-pair High-speed Digital Subscriber Line (SHDSL) Transceivers*, provides symmetric 256 kbit/s service at approximately 5000 meters under worst-case noise conditions. It does not, however, allow simultaneous POTS/ISDN service on the same loop. ITU-T G.992.1, *Asymmetric Digital Subscriber Line (ADSL) Transceivers*, and G.992.2, *Splitterless Asymmetric Digital Subscriber Line (ADSL) Transceivers*, do allow simultaneous POTS/ISDN service and also meet the Objective, even though originally designed to have a larger (asymmetric) throughput downstream.

Regarding copper access technologies, we wish to share some key architectural considerations that we believe should be kept in mind by the EFM Task Force:

- Uniform initialization. All of the Q.4/15 xDSL Recommendations use a common handshaking mechanism, ITU-T G.994.1, *Handshake procedures for Digital Subscriber Line (DSL) Transceivers*, that includes initial carriers and information exchanges for selecting the desired xDSL Recommendation or Standard and related startup parameters. The G.994.1 information exchange even allows non-ITU communication standards to have their own defined code points. ETSI and T1E1 have already taken advantage of this facility. IEEE 802.3ah is encouraged to make use of G.994.1 and could define IEEE 802.3ah-specific code points and information exchange.
- The Q.4/15 Recommendations use a functional decomposition of TPS-TC, PMS-TC, and PMD. In our ongoing joint work, we recognize the value of continue using the upper layers of networking (e.g. MAC and above), within your scope with the functional decomposition

of DSL access with PMS-TC and PMD, within our scope. The key areas requiring further work are the middle layers in between. We need to cooperate on studying the block(s) in this area noting that bonding multiple loops presents issues. For reference, Figure 1 from our August 2001 communication statement to you is reproduced below. Note that while this figure shows an example application of the packet-mode PTM-TC with G.993.1 VDSL, forthcoming revisions of other xDSL Recommendations (as discussed in the following section) are also defined to use the PTM-TC.

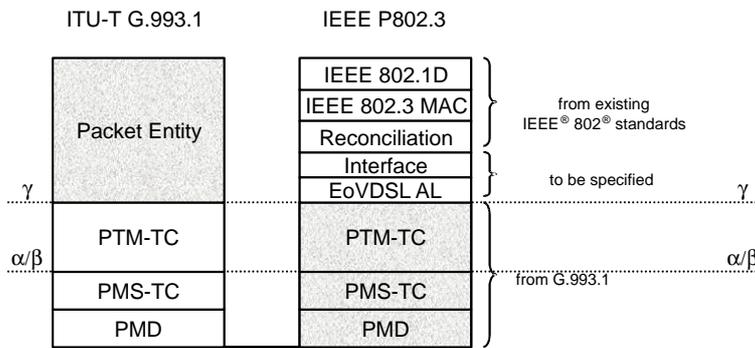


Figure 1: Possible IEEE 802.3 frame transport layer decomposition (example for VDSL)

### In-process ITU-T Recommendations

Both Recommendations G.992.1 and G.992.2 are undergoing review and revision likely to lead to new ADSL Recommendations in 2002.

We note that you are considering proposals for multiple pairs that may be bonded 1) above the PTM-TC, 2) above PMS-TC, or 3) at the PMS-TC (loop) layers. G.991.2 (SHDSL) already bonds 2-pairs and we are currently generalizing this to more pairs. We are also generalizing this work to other xDSL recommendations. Various approaches may be considered. While bonding at the higher layers of the stack, even above our  $\tilde{a}$ -interface, may be the most straightforward approach, performance improvements may be possible by bonding at lower layers. For example, in light of the fact that the copper loop plant is primarily a crosstalk-limited environment, operating multiple PMDs operating in the same binder in a coordinated manner (e.g., using the fact that the crosstalk induced from other pairs in the bond is caused by data content that is also known to the receiver(s)) may result in increased bit rate and/or reach.

### Collaboration

Q.4/15 would like you to know that we are highly interested in your work and committed to assisting you appropriately to the fullest extent possible, and we have the full support of ITU-T SG15 management in this regard. We would like to hear your thoughts on the value of our exploring the bonding issue, and which Recommendations would be of most interest to you. In particular, we would like to know in what timeframe any bonding enhancements would be needed in order to be relevant to your work. Also, we are particularly interested in understanding what modifications to our currently defined protocol layers you would find most useful; e.g., newly-defined TPS-TC or PMS-TC, deletions or simplifications, etc. Finally, we would like to understand

if you believe any new or modified management objects might be needed to Recommendation G.997.1, *Physical layer management for Digital Subscriber Line (DSL) Transceivers*

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