ITU - Telecommunication Standardization Sector Temporary Document CF-068

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Question: 4/15

SOURCE1: Broadcom

TITLE: G.vdsl: G.hs.bis: G.vdsl and Implications to G.hs

ABSTRACT

Three house keeping items for G.994.1 relating to VDSL are discussed with proposals:

1. SPar(1) bits for regional VDSL standards (See BI-112R1)
2. Mandatory Carrier Frequencies for VDSL (HC-U16 Issues 2.1 and 2.3)
3. 25-138kHz Optional Band Usage (BI-U11 Issue: 2.10.19)

1 Introduction

During the last ITU-T SG15/Q4 meeting in Goa, India, it was identified that the ETSI VDSL draft (TS 101270-2) was incompatible with ITU Recommendation G.994.1 (G.hs). A communication was sent to ETSI (BI-112R1) suggesting various ways to align the two documents. In the ETSI Monterey meeting during November, modifications were made to the ETSI VDSL draft (TS 101270-2) that are communicated in CF-022 to this meeting. The present contribution proposes specific text modifications to the revised G.hs white contribution to implement the requests of CF-022.

Further, this contribution makes additional editorial proposals to the G.hs text to resolve some other outstanding issues related to VDSL. Some of these issues were first raised in HC-074.

2 Spar(1) Code Points

Section 2.3 of CF-022 requests two code points for use by ETSI VDSL. CF-058 discusses usage of bits for Committee T1 VDSL. Although not specifically requested, allocation of both bits is suggested here to maintain consistency. Allocation of these code points by modifying Table 11.0.1/G.994.1 is shown below:

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Table 11.0.1/G.994.1 – Standard information field – SPar(1) coding – Octet 2

Bits 8	7	6	5	4	3	2	1	**SPar(1)s – Octet 2**
x	x	x	x	x	x	x	1	G.991.2 - Annex A
x	x	x	x	x	x	1	x	G.991.2 - Annex B
x	x	x	x	x	1	x	x	Committee T1 DMT VDSL - NOTE 1 ~~Reserved for allocation by the ITU-T~~
x	x	x	x	1	x	x	x	Committee T1 SCM VDSL - NOTE 2 ~~Reserved for allocation by the ITU-T~~
x	x	x	1	x	x	x	x	ETSI MCM VDSL - NOTE 3 ~~Reserved for allocation by the ITU-T~~
x	x	1	x	x	x	x	x	ETSI SCM VDSL - NOTE 3 ~~Reserved for allocation by the ITU-T~~
x	1	x	x	x	x	x	x	Reserved for allocation by the ITU-T
x	0	0	0	0	0	0	0	No parameters in this octet

NOTE 1 - Use of this bit is defined in T1 ??????
NOTE 2 - Use of this bit is defined in T1 ??????
NOTE 3 - Use of this bit is defined in ETSI TS 101270-2

3 D43 Carrier Set Frequency Indices

Based on the discussion in section 4.1 of HC-074, the proposed G.hs mandatory carrier frequencies for use with VDSL are based on tones from set B43. The proposed Carrier Set is designated D43 and shown in the Tables below. Two frequency indices in the upstream and two frequency indices in the downstream are proposed as a compromise between systems that may use two transmission carriers and systems that may use clocks based on multiples of 4.3125 kHz. These four carrier frequencies all occur in the downstream band of various VDSL spectral plans.

The proposed power levels may be considered higher than typical VDSL signals, however the probability of occurrence at those levels is already reasonably likely due to existing use of handshaking into various xDSL.

Note that all xDSL systems including VDSL systems may make concurrent use of Carrier Sets A4, A43, B43, and C43 as described section 6.1 of G.994.1.

Table 1/CF-XXX D43 Carrier Frequencies

G.hs Upstream	37	159.5625 kHz
G.hs Upstream	53	228.5625 kHz
G.hs Downstream	72	310.5000 kHz
G.hs Downstream	96	414.0000 kHz

Proposed Table 1/G.994.1 – Carrier sets for the 4.3125 kHz signalling family

Carrier set designation	Upstream carrier sets		Downstream carrier sets		Transmission mode
	Frequency indices (N)	Maximum power level/carrier (dBm)	Frequency indices (N)	Maximum power level/carrier (dBm)	
A43	9 17 25	–1.65	40 56 64	–3.65	duplex only
B43	37 45 53	–1.65	72 88 96	–3.65	duplex only
C43	7 9	–1.65	12 14 64	–3.65	duplex only
D43	37 53	–1.65	72 96	–3.65	duplex only

4 25-138kHz Optional Band Usage

Use and directionality of the G.vdsl optional 25 -138 kHz band is to be negotiated by G.hs. In keeping with the current practice of using bits in the G.hs Identification Field to indicate usage of generic parameters that affect more than one xDSL and selection between the various xDSL, it is proposed the usage of the band from 25-138 kHz for VDSL also be considered generically. Knowledge of how the band can be used may influence the selection of the type of VDSL instead of another xDSL. For example, if local regulations dictate the specific directional usage of the band and the desired data rate characteristics have been identified with Table 9.1/G.994.1, use of one type of xDSL may be more favorable than another.

Proposed Table 9/G.994.1 – Identification field – SPar(1) coding

Bits 8	7	6	5	4	3	2	1	SPar(1)s
x	x	x	x	x	x	x	1	Net data rate upstream (Note 1)
x	x	x	x	x	x	1	x	Net data rate downstream (Note 1)
x	x	x	x	x	1	x	x	Data flow characteristics upstream (Note 2)
x	x	x	x	1	x	x	x	Data flow characteristics downstream (Note 2)
x	x	x	1	x	x	x	x	xTU-R splitter information (Note 3)
x	x	1	x	x	x	x	x	xTU-C splitter information (Note 3)
x	1	x	x	x	x	x	x	25-138 kHz Band ~~Reserved for allocation by the ITU-T~~
x	0	0	0	0	0	0	0	No parameters set in this octet

Proposed Table 9.7/G.994.1 – Identification field – 25-138 kHz Band NPar(2) coding

Bits 8	7	6	5	4	3	2	1	25-138 kHz Band NPar(2)s
x	x	x	x	x	x	x	1	25-138 kHz Band Use
x	x	x	x	x	x	1	x	25-138 kHz Band Upstream
x	x	x	x	x	1	x	x	25-138 kHz Band Downstream
x	x	x	x	1	x	x	x	Reserved for allocation by the ITU-T
x	x	x	1	x	x	x	x	Reserved for allocation by the ITU-T
x	x	1	x	x	x	x	x	Reserved for allocation by the ITU-T
x	x	0	0	0	0	0	0	No parameters in this octet

NOTE 1 – In a CLR, CL, or MP message, bit1 indicates the equipment is capable of using the band from 25-138 kHz. Bit 2 indicates the equipment is capable of supporting transmission from the HSTU-R or reception at the HSTU-C. Bit 3 indicates the equipment is capable of transmission from the HSTU-C or reception at the HSTU-R.

In an MS message only one of bit 2 or bit 3 may be set to 1.

4.1 25-138 kHz Band Bit Usage

The capability indications and selection states for usage and directionality of the band between 25 to 138 kHz may be used for data communication by the xTU-R and xTU-C. is shown in the Tables above. Due to the nature of the optionally, the HSTU-R must indicate it's capabilities, but the HSTU-C must make the final selection for usage and direction. Before the HSTU-R may use the G.vdsl optional band for upstream data transmission, the HSTU-C must indicate usability and upstream directionality.

Table 2 VDSL optional band usage

HSTU-C						HSTU-R			Operation	Case #
Capability (CL)			Select (MS)			Capability (CLR)				
Use	Up	Down	Use	Up	Down	Use	Up	Down		
0	X	X	X	X	X	X	X	X	None	1
0	X	X	X	X	X	1	X	X	None	2
1	X	X	X	X	X	0	X	X	None	3
1	1	X	1	1	0	1	1	X	Up	4
1	X	1	1	0	1	1	X	1	Down	5

5 Relevant Issues:

This contribution addresses the following Issues for G.hs (BA-U16R1):

1.1	Agreed (04/99)	that future enhancements to existing ITU-T DSL Recommendations and future ITU-T xDSL Recommendations (e.g., G.shdsl and G.vdsl) shall be negotiated through G.994.1 (or a revision of G.994.1).	PO-070, MA-067
2.2	Open	Considering robustness and complexity, what symbol rate should be specified to support G.vdsl?	PO-070, MA-067
2.3	Open	Which signalling family in G.994.1 should be used for G.vdsl?	MA-067, MA-077

This contribution addresses the following Issues for G.vdsl (BA-U11R4):

2.10.19	Agreed (21-Jun-00)	The band between 25kHz and 138 kHz may be used for either upstream or downstream direction in the VDSL application. The G.hs handshake mechanism signals one of: 1. If the capability exists 2. If the band is to be used for upstream 3. If the band is to be used for downstream Other uses of this band are for further study.	BA-021, BA-041, BA-047, BA-081, BA-093

6 Summary:

1. This paper will be presented in G.hs but will also be discussed in G.vdsl

2. Expectations:
   - Agree to the three text proposals.