ETSI STC TM6 Torino, Italy 4-8 February, 2002

| Project: | VDSL |
|---------------|--|
| Title: | Second Proposal for VDSL Simulation Parameters |
| Source: | FTW |
| Authors: | Tomas Nordström |
| Contact: | Tomas Nordström Forschungszentrum Telekommunikation Wien (FTW), Donau-City-Strasse 1/3 AT-1220 Wien, Austria Telephone: +43 1 5052830-22 Fax: +43 1 5052830-99 Email: Tomas.Nordstrom@ftw.at |
| Abstract: | This paper suggests that a common set of simulation parameters should be used when simulating VDSL performance requirements. It also suggests a first set of such simulation parameters. |
| Distribution: | ETSI STC TM6 working group members |
| Status: | For information |

This contribution has been prepared to assist ETSI Standards Committee STC TM6. This document is offered as a basis for discussions and is not a binding proposal of FTW. FTW specifically reserves the right to add to, amend or withdraw the statements contained herein.

1. Introduction

To be able to compare performance simulations, and in the end agree on the result, a common set of simulation parameters should be established and used when simulating. We therefore suggest that such a set of simulation parameters is established for ETSI VDSL performance simulations.

This contribution tries to state all the important simulation parameters that are needed to be able to accurate simulate VDSL performance simulations. The parameters below are based on parameters found in [1-3] and during work on the FTW xDSL simulator [4].

Note that this is a second proposal and is not meant to be final!

This paper, furthermore, tries to identify places where decisions are needed to be able to progress the simulation work.

Generic simulation parameters

Frequency plans

| According to Part 1: | |
|---|---|
| Loops, Cables, and Services (bit-rates) | |
| FEXT coupling | -45dB@1MHz growing as f^2 |
| NEXT coupling | -50dB@1MHz growing as f^1.5 |
| | Crosstalk combination use the FSAN rule |
| Noise model | FSAN A, B, C, D, E, F |
| Self FEXT and NEXT from | 20 VDSL (of the same kind, i.e. same line |
| | code, same PSD) |
| AWGN | -140dBm/Hz |
| Shannon gap | 9.8dB |
| SNR cross-talk margin | 6.0dB |
| Coding gain | 3.8dB |
| Maximum useful SNR | 57dB (15bits) |
| Power back-off | Reference PSD method (parameters as agreed) |
| Maximum transmit power | 11.5 dBm |
| We shall <i>not</i> assume that the HAM-bands are | used (at –80dBm/Hz). |
| Nominal PSD masks specified | Pcab.D.M1, Pcab.P.M1, Pcab.M2, Pex.D1.M1, |
| - | Pex.D2.M1, Pex.D3.M1, Pex.M2, Pex.P1.M1, |
| | Pex.P2.M1 |
| TODO: Define the nominal level for each mas | sk (M1 is currently at -59dBm/Hz?) |
| Use M1 with notching | Subject to change request |
| Use M2 without notching | Subject to change request |
| | |

997, 998

Specific simulation parameters

| Excess bandwidth (Alpha) SNR implementation loss | 20% 2dB |
|---|-------------------|
| Guard bands | 175kHz |
| Loss for implementing notching | 2*BW of the notch |
| Data overhead (EOC, VOC channel etc.) | (405-362)/405 |

Power distribution:

In the case of loose masks, distribute first above 1MHz (fill up to the nominal mask). In parts with a loose mask distribute in an optimal way. Should DMT use standard water-filling

DMT

| Carrier spacing | 4.3125e3 Hz |
|--|---|
| Cyclic extension length | 640 |
| No carriers | 4096 |
| Cyclic extension loss | 7.25% |
| Additional SNR loss | 2dB |
| Maximum constellation size to use | 15 |
| Power distribution: | In the case of loose masks, distribute power using a water-filling algorithm. |
| Define guard bands as tones (how many?) | 40 (175kHz) |
| Frequency plan as used tones: | |
| $[715.1162 - 1654.2782] \cdot \%$ Unstream | m active tones |
| [32:675 1202:1614]; % Downst | ream active tones |
| % 998 | |
| [889:1185 1991:2782]; % Upstrea | m active tones |
| [32:849 1225:1951]; % Downst | ream active tones |
| 2. References | |

- [1] Mielants, Nordström, "Proposal of new insertion loss requirements for VDSL", ETSI TM6, TD49 Edinburgh (993t49a0), 1999
- [2] Nordström, Mielants, "Problems in the reach/insertion loss specifications in the VDSL Part 1 document", WD02 Edinburg (993wd02a0), 1999
- [3] Rapporteur, "Output from ad-hoc group to discuss VDSL simulation work program", WD02 Edinburg (993wd02a0), 1999
- [4] Nordström T., D. Bengtsson, *FTW xDSL simulation tool*, Version 2.3beta3, 2001. Version 2.2 is available at http://www.xdsl.ftw.at/xdslsimu/>.