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| TITLE | Operators' need for nominal and peak PSD masks, as normative requirements | | |
| PROJECT | VDSL | | |
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| STATUS | For Decision | | |
| ABSTRACT | This contribution asks for a clarification with regard to peak and nominal PSD requirements in the VDSL standard. It proposes to define explicitly a normative nominal PSD mask in order to use these nominal PSD values as a reliable PSD template for use in performance evaluations and noise calculations. This document contains the common viewpoint of a number of FSAN operators cooperating within FS-VDSL. | | |

1. The issue

The current draft text for the VDSL part 1 specification [1] contains both 'PSD limits' and 'nominal PSD values'. The precise meaning of these terms is unclear (needs an unambiguous definition), as well as their status (normative/informative). To avoid confusion, the following terminology is proposed:

- A *peak PSD mask* is a normative requirement, specifying maximum PSD levels in 10 kHz resolution bandwidth
- A *nominal PSD mask* is a normative requirement, specifying maximum PSD levels in well defined resolution bandwidths, significantly wider than 10 kHz. (*suggested values are 100 kHz for in-band frequencies and 1 MHz for out-of-band frequencies*).
- A *PSD template* is intended to be used for
 - performance simulation (informative use of template)
 - simplifying the definition self noise (this may be a normative use of the template in the standard)

The PSD template is expected to be close to the appropriate¹ combination of the nominal and peak PSD mask requirements.

¹ Typically, the template will coincide with the nominal mask for in-band frequencies, and should never violate any of the specified masks. It is expected that at steep edges of the masks, the template will be steeper than the masks, because there is no resolution bandwidth involved with the template.

The need for a *PSD template* is obvious: evaluating VDSL performance. Such a PSD template should describe the nominal PSD values of the VDSL signal.

The need for a *nominal PSD mask* originates from the requirement of many operators to ensure that a PSD template should be realistic and in line with other requirements that are mandatory and verifiable. In other words, to guarantee that the PSD template is a realistic description of the "average" PSD values, these "average" PSD values of a modem must be constrained by appropriate normative requirements. This is true in particular when the "average" PSD values differ significantly from the peak PSD masks. This is the case for VDSL where a difference of 2 dB between the *peak PSD mask* and the *nominal PSD mask* has been proposed[1].

Figure 1 illustrates that when the PSD shape of a signal varies rapidly with the frequency, some "average" value can be recognized. This is a good candidate for that template but it should be backed up by an adequate requirement. The purpose of a *nominal PSD mask* is to define this verifiable requirement. If the resolution bandwidth is wide enough, it will approximate that intuitive "average" level.

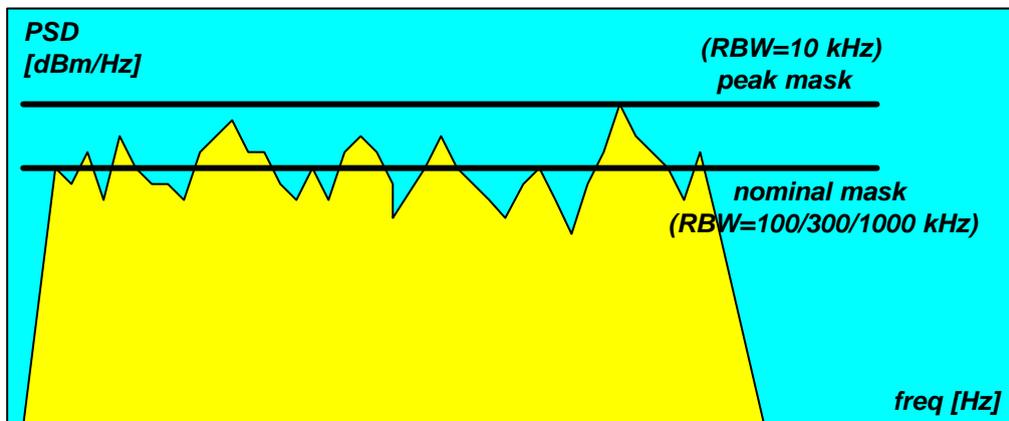


Figure 1. The nominal mask is indicative for some "average" level of the PSD. This is even true in case the PSD shape of a VDSL spectrum varies rapidly with the frequency.

2. Proposal

For the VDSL part 1 specification [1] we propose to include the following in that specification:

1. Specify the normative values of a *peak PSD mask* in a resolution band width of 10 kHz
2. Define values of a *nominal PSD mask*, and make them normative as well
3. Make the requirements of a *nominal PSD mask* well-defined by explicitly defining a measurement resolution bandwidth. The appropriate bandwidth is TBD and may differ for in-band and out-of-band frequencies.
4. Construct PSD templates (for performance evaluation) based on the appropriate combination of *peak and nominal PSD mask* requirements.

A suggested resolution bandwidth for the nominal PSD masks is 100 kHz for in-band frequencies. It is recognized that the existing 1 MHz constraints on the PSD for out-of-band frequencies can also be made part of the nominal requirements.

3. References

- [1] draft ETSI-TS 101 270-1 V2.0.2, "Transmission and Multiplexing (TM); Access transmission systems on metallic access cables; Very high speed Digital Subscriber Line (VDSL); Part 1: Functional requirements", July 2002, Permanent document m01p06a2.