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Title: **Noise model wish list for SDSL performance tests**

Project: **SDSL**

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ABSTRACT

This contribution provides a wish list of information required to generate a comprehensive noise model for the SDSL tests. The contribution uses the existing VDSL noise specification and points out areas that need to be investigated.

Introduction

At the Antwerp meeting, it was agreed to reformulate the SDSL noise requirements in an attempt to obtain a more realistic model. Much work had gone into the VDSL noise model and it was proposed to keep as many elements in common as possible between both projects.

This contribution is modeled after the VDSL Part I specification document. For the various sections and subsections of the VDSL noise specification, it lists the information required to characterize the noise environment. A companion contribution (TD 43) addresses VDSL more specifically. For the sake of clarity, the elements that can be applied to both models are labeled GEN-*item number*, those specific to VDSL or SDSL will be labeled VDSL-*item number* or SDSL-*item number*.

1. Test loops

- [SDSL-L1] - For SDSL, a set of test loops (topology) must be defined.

  See TD27 for a proposal. Is there, for example, any need to include for SDSL a test loop with bridged taps ? It is not a Dutch issue, but we are not sure if it is a problem in other European countries.

- [SDSL-L2] - For SDSL, the electrical length of the test loops must be defined, for each bit rate combination of interest.

  See TD27 for the definition of "electrical length". It must be based on performance simulations.

- [SDSL-L2] - The tolerance limits of the test loops must be defined.

  See TD27 for a proposal. How closely shall a cable simulator meet the target specification for insertion loss, characteristic impedance, etc. In what frequency band. How simple is it to build a cable simulator that approximate the specified insertion loss within 3% on a dB scale, and impedance within 7% on a linear scale? How critical is the group delay (mean and ripple)?. Is 3% accuracy adequate and feasible?

2. Impairment generator

The lower bandwidth of SDSL does not warrant the inclusion of the RF components of the VDSL impairment generator. A subset of the VDSL impairment generator could be used as illustrated in Fig. 1. It is still for further study whether the VDSL impairment generator can be reduced to the functional diagram and how the various parts should be specified. See TD 27 for a proposal.

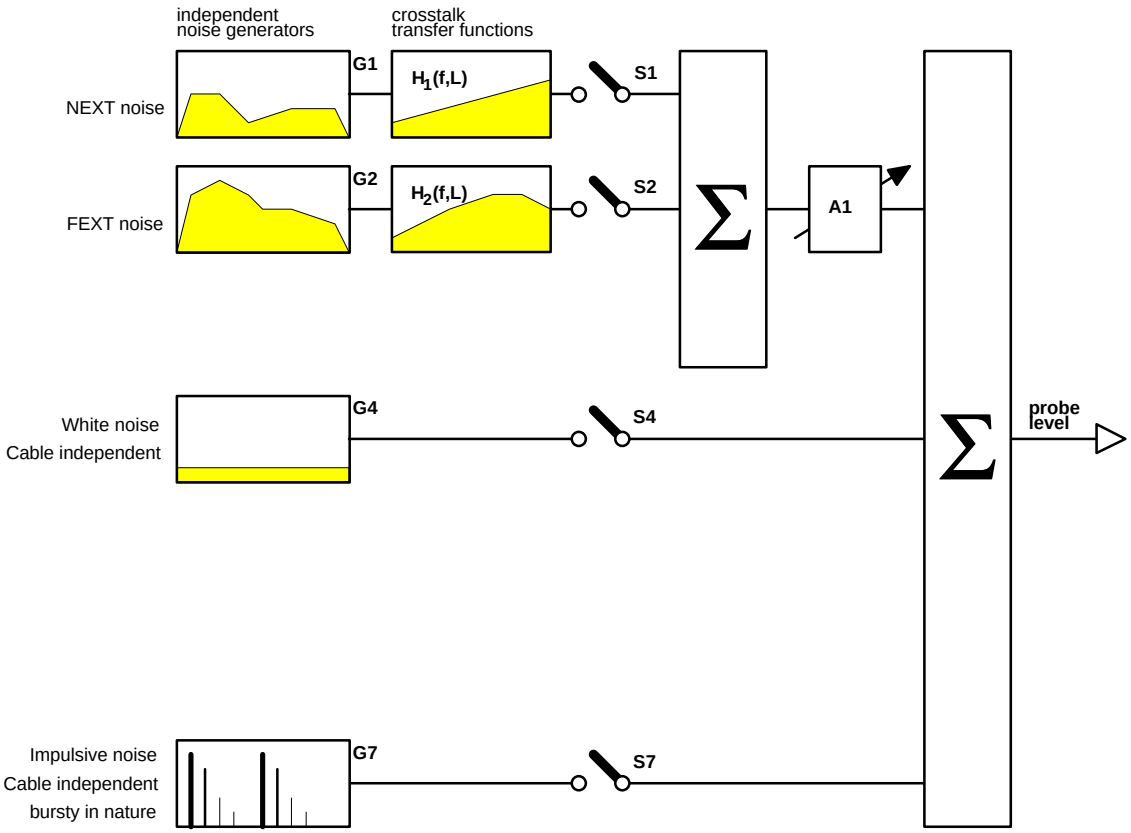

Figure 1. Block Diagram of the impairment generator for SDSL

2.1 Cross Talk Noise Models

- [SDSL-G1] - The length independent Near End Composite Interferer PSD that is fed to the NEXT Crosstalk coupling function in generator G1 should be specified. The PSD represents the power sum of a realistic worst case mix of services likely to be present in the cable with SDSL.

  See TD27 for a proposal. As a starting point for generator G1, one could consider the weighted power sum of the uncorrelated spectra:

  [1] an ISDN.2B1Q spectrum

  [2] a two pair 2B1Q HDSL spectrum

  [3] an ADSL DMT (over ISDN) spectrum

  [4] an SDSL spectrum of the system under test

  To account for a higher number of interferers, a scalar could multiply each individual interferer.

- [SDSL-G2] - The length independent Far End Composite Interferer PSD that is fed to the FEXT Crosstalk coupling function in generator G2 should be specified. The PSD represents the power sum of a realistic worst case mix of services likely to be present in the cable with SDSL.

  See TD27 for a proposal. As a starting point, the NEXT proposal above could be used with the difference that the relevant upstream and downstream spectra are used.

- **[**GEN - G3] - The parameters of the NEXT and FEXT transfer functions should be specified in terms of worst case statistics for European cables.

  Currently, the model uses constants from the ANSI standard. Their applicability to the European case should be established.

- [GEN-G4] - Adequate specification for the time domain distribution function of noise.
  The current specification of "Gaussian distributed" and "Crest factor between 5 and 8" has been shown to be inadequate (see for example TD16 contributed by KPN to the Lulea meeting: "PSD + Crest factor is not sufficient to specify performance")

- [GEN-G5] - Specification of the maximum repetition rate of test noise.
  This becomes relevant when the noise is generated as pseudo random noise. It is expected that pseudo random noise (e.g. with an arbitrary wave generator) is the preferred practical implementation of the impairment generators. What shall be the minimum number of random samples?

- [SDSL-G6] It is not a requirement, but always useful to improve the power sum models for multiple interferers.

  See for example 983t04a0. FSAN. A new analytical method for NEXT and FEXT noise calculation. Luleå, Sweden, June '98. Adding a scalar factor to each individual factor could be representative as well.

2.2 Impulse noise model [G7]

- [GEN-IN1] Definition of an adequate impulse noise test and minimum impulse noise margin.

3. Micro interruptions

- [SDSL-M1] Determine the origin of micro-interruptions in an SDSL system
- [SDSL-M2] Determine the period and duration of a micro-interruption and generate a test procedure