
Data Center Background Noise Measurements

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Overview

- Purpose:
 - Measure Noise in Enterprise Data Centers to Establish More Accurate Upper Bound for 10GBASE-T Wideband Background Noise.
- Background Noise Review
- Noise Measurement Results
- Summary

10GBT Background Noise

- Background Noise Level of -140dBm/Hz generally accepted for DSL.
- 10GBASE-T Background Noise is Accounted for Separately from FEXT, Alien NEXT, and EMI.
- Accurate Simulation of 10GBT Capacity Requires Accurate Background Noise Models.

DSL Background Noise

- DSL Pilot Noise Measurement Program:
 - Measured wideband background noise on loop pairs and inside wire pairs.
 - Found background noise can be conservatively modeled by a Gaussian density at levels of -150 dBm/Hz.
 - Source:
 - Valenti, et. al., “Analysis of Loop and Inside Wire Background Noise Measured at Two New Jersey Residential Locations”, T1E1.4 Technical Subcommittee Contribution, T1E1.4/92-227

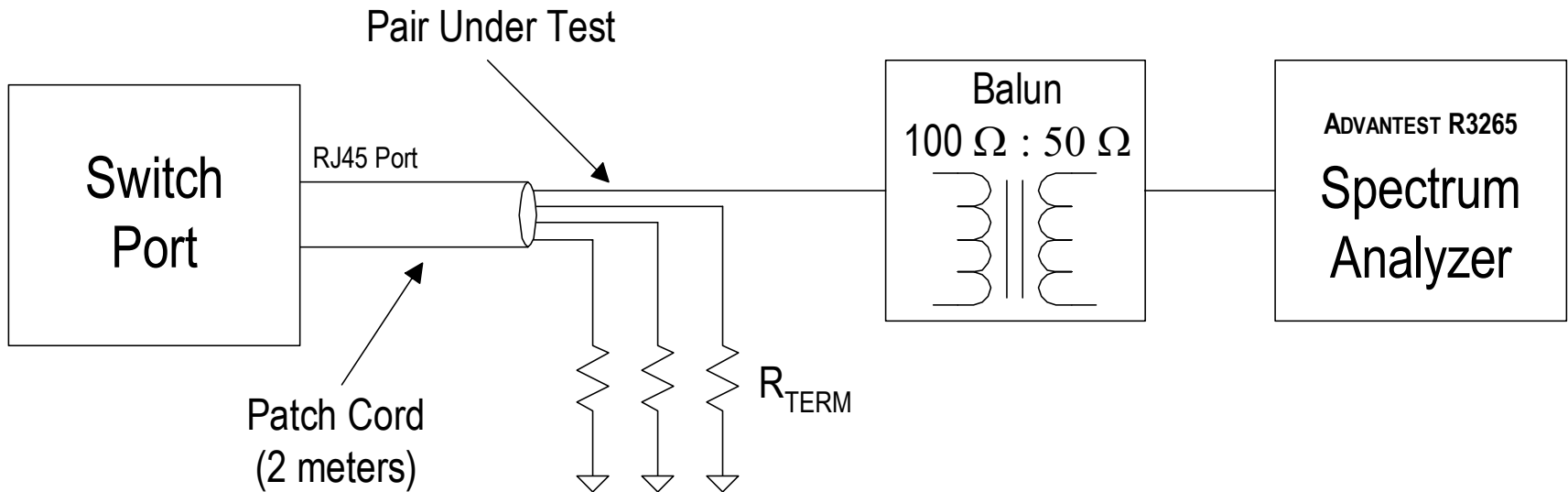
DSL Background Noise

- Very Early DSL Transmission Scheme Studies Assumed Background Noise Levels of -140 dBm/Hz.
 - This noise level is same order of magnitude as DSL Alien FEXT.
 - This noise level is higher than measurements indicating background noise of -150 dBm/Hz.
 - Sources:
 - P.S. Chow, et. al., “A Multichannel Transceiver System for Asymmetric Digital Subscriber Line Service,” Proceeding of IEEE Global Telecommunications Conference (Dec. 1991)
 - M. Barton, “On the Performance of an ADSL QAM Transceiver,” Proceeding of IEEE Global Telecommunications Conference (Dec. 1991)

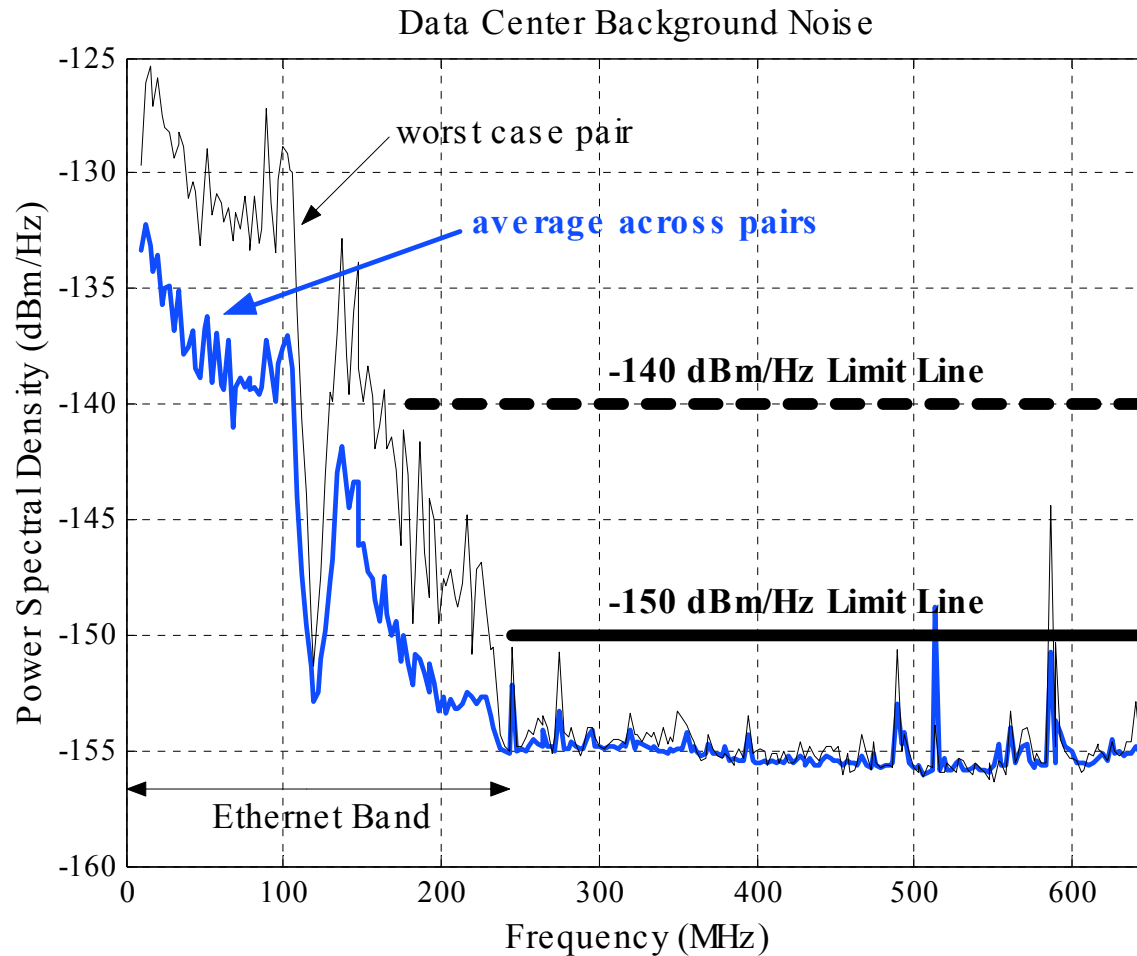
10GBT Background Noise

- The 10GBASE-T Background Noise Model Should be Supported by Measurements of Actual Noise in Business Data Centers.
- A measurement of Wideband Background Noise was made in the Data Centers of Two Local Enterprises with Active Data Networks.
 - Measurements were made on 24 pairs

Measurement Arrangement



Measurement Results



Summary

- Based on Initial Measurements, a Background Noise Level of -140dBm/Hz is Pessimistic.
- Typical Wideband Background Noise Levels are as Low as -155 dBm/Hz .
- A Background Noise Model of -150 dBm/Hz May Represent a More Reasonable Upper Bound Than -140 dBm/Hz .