



Channel analysis at ~12.5 GHz

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Problem statement

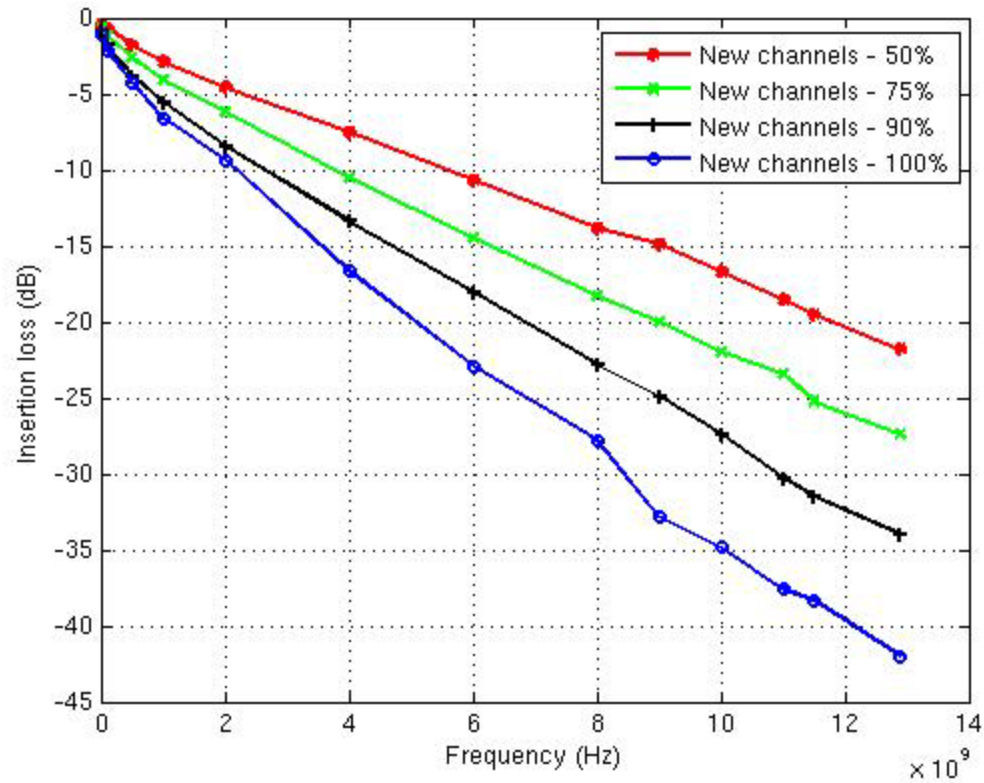
- Previous presentations have examined the characteristics of installed backplane channels over a frequency range from 0 to 7 GHz¹
- Determine insertion loss, insertion loss to crosstalk ratio, insertion loss deviation, and return loss characteristics of “newer” backplane channels constructed from low Df/Dk materials, over a frequency range of 0 to 12.5 GHz
 - To establish performance targets at a Nyquist frequency of ~12.5 GHz for new backplane channels
- The results may be helpful in creating limit lines for these characteristics in the style of Annex 69-B

1. Frazier, et al., *Characteristics of Installed Backplane Channels*, IEEE 802.3 100 Gb/s backplane and copper cable Task Force, September, 2011

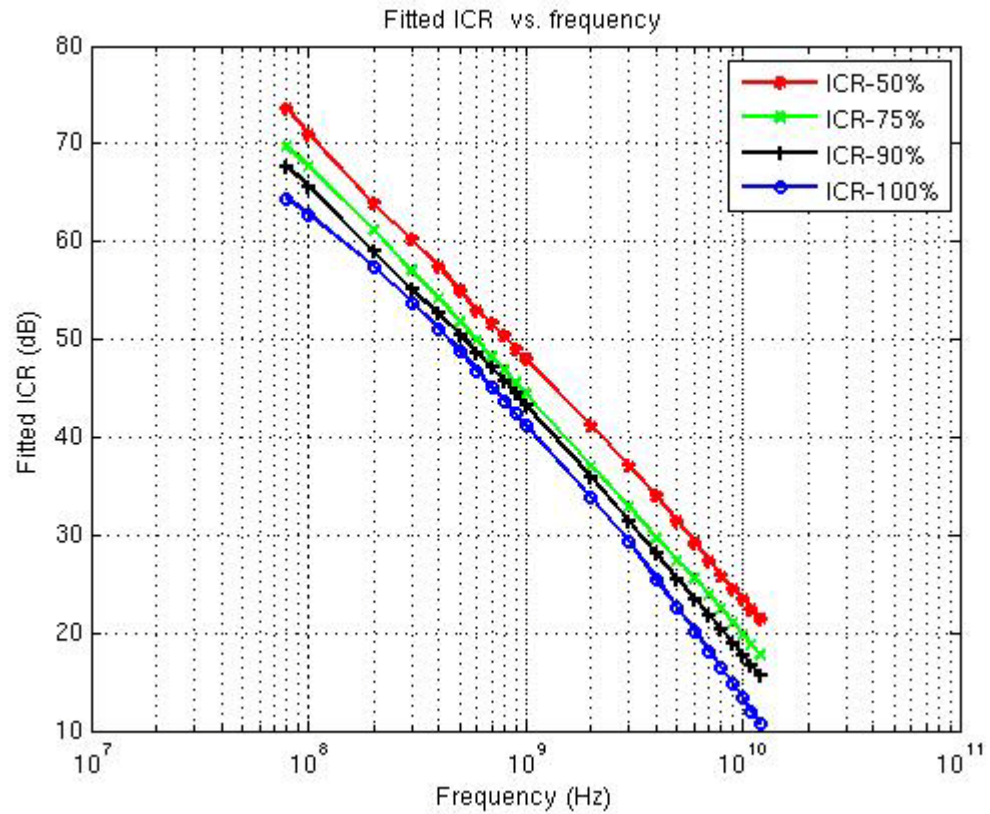
Methodology

- Broadcom has collected a significant amount of backplane data over many years
- Backplane traces are from various customers all over the industry
- S-parameters of traces provided by customers or in other cases measured at BRCM
- For this study, backplane traces must meet three criteria:
 - Recent vintage – S-parameters obtained after 1-January-2010
 - Known to be constructed of Nelco-13si, Megtron 4, or Megtron 6
 - At least meet the limit lines in Annex 69-B
- Roughly 180 channels in the database meet these criteria
- Plot envelopes for 50th, 75th, 90th and 100th percentiles

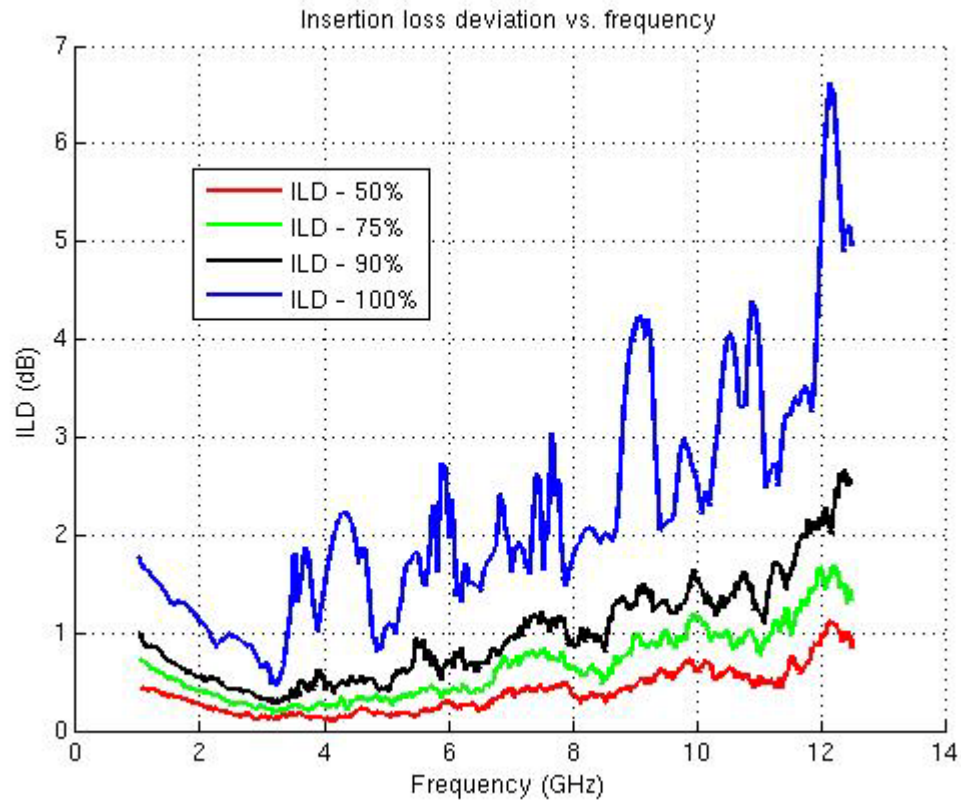
Results - Insertion loss



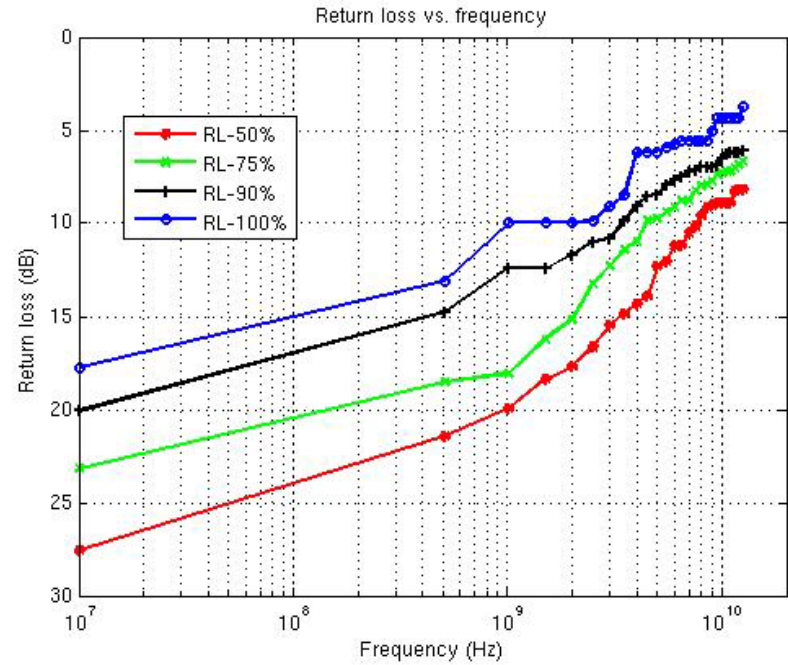
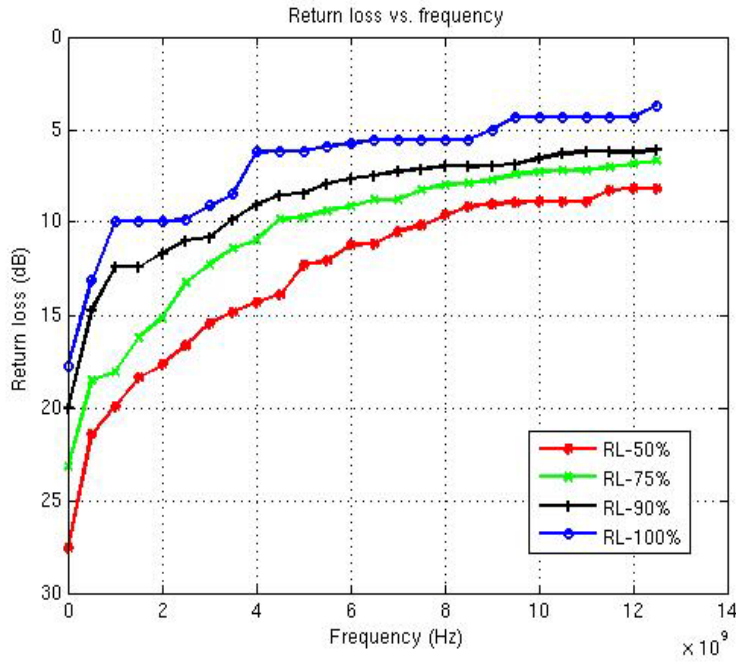
Results - Fitted ICR



Results - ILD



Results - Return loss



Summary

- The data mining exercise demonstrates that there are a significant number of backplane implementations of recent vintage, constructed with low Df/Dk laminates, that provide reasonable channel characteristics out to ~12.5 Ghz
- These characteristics will enable technically and economically feasible PHY implementations