Ad Hoc Report

IEEE P802.3ch Multigig Automotive Ethernet PHY Task Force

George Zimmerman (Ad Hoc Chair)

CME Consulting, Inc

Summary

- 2 full Ad Hoc calls held since Sept. Interim
  - 4 October: 49 attendees, 3 contributions
  - 18 October: 40 attendees, 3 contributions
- 1 Telecon on cable measurements (10/9)
  - 9 October, 21 attendees, 1 contribution

Title	Presenters(s)	Affiliation(s)
18 October 2017 Teleconference		
IEEE P802.3ch Multigig Automotive Ethernet PHY TF October 9, 2017 Harness AdHoc meeting Summary	Natalie Wienckowski	General Motors
STP Cable in Automotive Environment (r1 – as presented)	Taketo Kumada	YAZAKI
802.3 Primer for Baselines	Natalie Wienckowski, TF Chief Editor	General Motors
9 October 2017 Teleconference on Cabling Harness Measurements		
802.3ch screening- and coupling attenuation measurements	Thomas Mueller	Rosenberger (October 9 update)
4 October 2017 Teleconference		
Measurement of Coupling Attenuation for NGAUTO	Eric DiBiaso & Bert Bergner	TE Connectivity
802.3ch channel measurement results (update)	Thomas Mueller	Rosenberger
Header Connectors: How to Consider in NGAUTO	Natalie Wienckowski	GM North America

Status and Ongoing Work

- Most discussion has been about getting cabling measurements
- Some measurements have come in, but vary in frequency range
  - Focus seems to be bringing progress....

GATHERING THE RIGHT CABLING DATA

G. Zimmerman
CME Consulting, Inc.
11/1/17

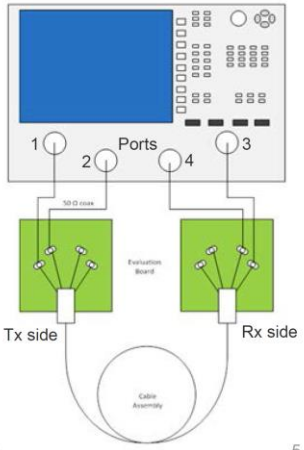
WHAT FREQUENCY TO GET CABLING DATA TO?

- Much discussion and work in ad hoc on getting cabling data
- Kicked off Sedarat_3ch_01_0517.pdf (5/30/17)
- Advised getting wideband measurements to include out-of-band effects and allow exploration of PHY options
- Presented measurements vary, some limited to 3GHz which could hide significant features

VARIOUS BANDWIDTHS IN CABLE DATA REPORTS

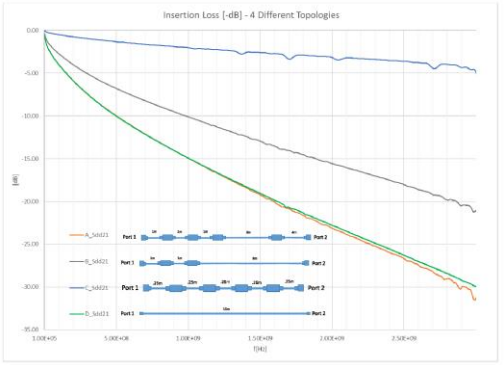
VNA test setup

- Vector Network Analyzer model
  - Agilent N5230C 300 kHz - 20 GHz PNA-L
- Port Calibration
  - M-Cal calibration was used.
- Frequency range
  - Start Frequency: 300kHz
  - Stop Frequency: 3GHz
- Port selection
  - Tx Ports: 1&3
  - Rx Ports: 2&4



Gardner

Insertion Loss



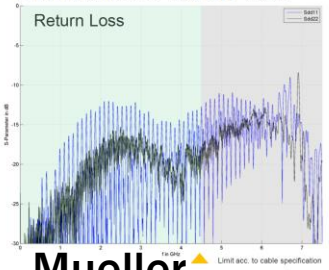
DiBiaso

802.3ch channel measurement results

Rosenberger

H-MTD STP 15 m with 4 inlines

H-MTD connector and STP cable

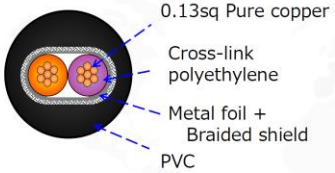


Mueller

- With new generations of connectors, the usable frequency range can be expanded

3. STP cable : Structure and transmission characteristics more than 1GHz

Cable structure



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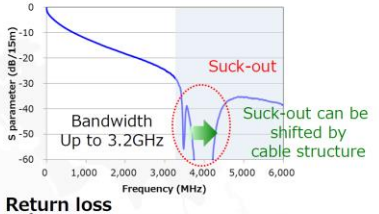
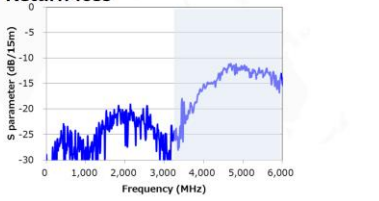


Return loss



Kumada

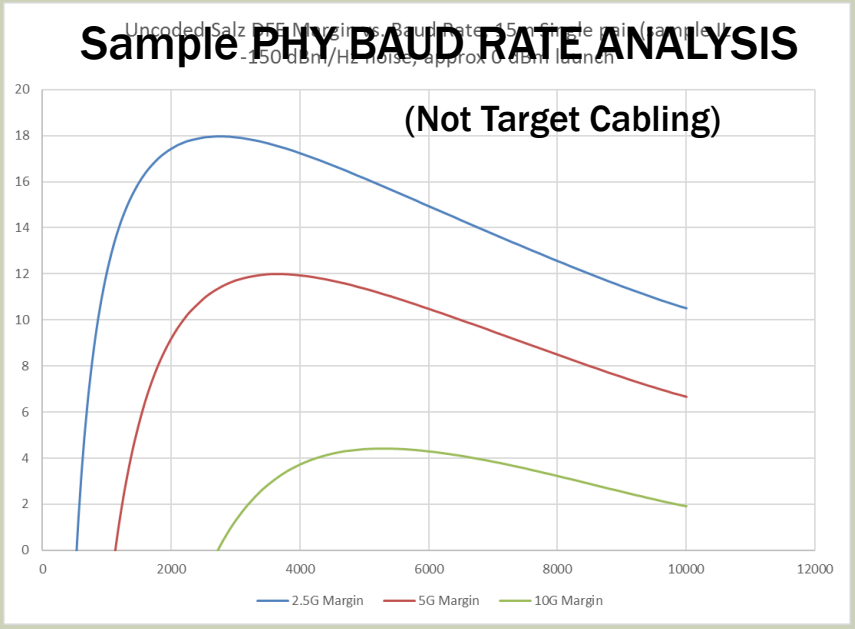
HOW MUCH EXCESS BANDWIDTH?

- BASE-T PHY projects which allocate 25% excess bandwidth
  - 10GBASE-T, 5GBASE-T, 25GBASE-T, 40GBASE-T
- Exceptions allocate 60% excess BW:
  - 1000BASE-T1, 1000BASE-T, 100BASE-TX
    - (750 MBd/600MHz, 125 MBd/100 MHz)
- Very few allocate 0% excess BW:
  - 2.5GBASE-T (200MBd/100 MHz)
    - Controversial but because of strong market pull and proven oversampled front ends
- Recommend specifications at least 25% over baud rate

WHY DOES IT MATTER?

- Consistent measurement bandwidth leads to consistent results
- Limiting measurement bandwidth limits PHY studies

- Modeling echo & noise ingress when there are suckouts requires excess bandwidth (25% greater than Nyquist)
- Low bandwidth edge of the trades falls off a cliff



RECOMMENDATION

- Gather cabling data up to at LEAST 6 GHz, even if there are suckouts
  - ESPECIALLY if there are suckouts
    - To allow PHY studies & simulations with known impairments
- Focus on impairment studies
  - These will drive PHY work
- Get EMC results
  - Need these in terms of PHY impact, not cabling parameters!
- Gather more data than we will specify ultimately

Ad Hoc Schedule

- Every 2 weeks
- Wednesday, 7-9AM Pacific Time
  - Ad hoc possibilities:
    - 11/15, 11/29, 12/13, 12/27, 1/10
  - Recommend: 11/29, 12/13, 1/10

THANK YOU!

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Consensus
WE BUILD IT.

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