Proposal: PHY Noise-Signal for the Industrial Link Segment

IEEE P802.3cg Task Force Meeting
New Orleans, May 2017

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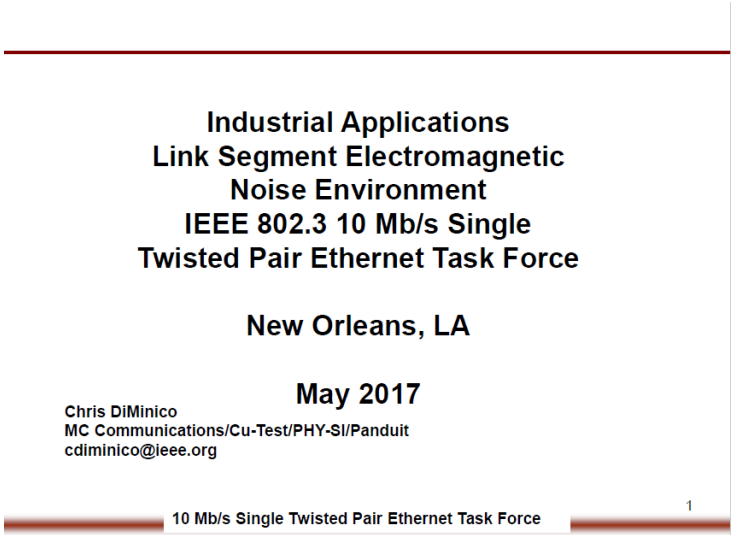
Noise Related presentation 1/3:

- Chris DiMinico

  May 2017

- Steffen Graber

  May 2017



Industrial Applications
Link Segment Electromagnetic
Noise Environment
IEEE 802.3 10 Mb/s Single
Twisted Pair Ethernet Task Force

New Orleans, LA

May 2017

Chris DiMinico
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10 Mb/s Single Twisted Pair Ethernet Task Force 1

10 Mb/s Single Twisted Pair Ethernet
Noise Measurements Update

Steffen Graber
Pepperl+Fuchs

IEEE P802.3cg 10 Mb/s Single Twisted Pair Ethernet Task Force 5/17/2017 1

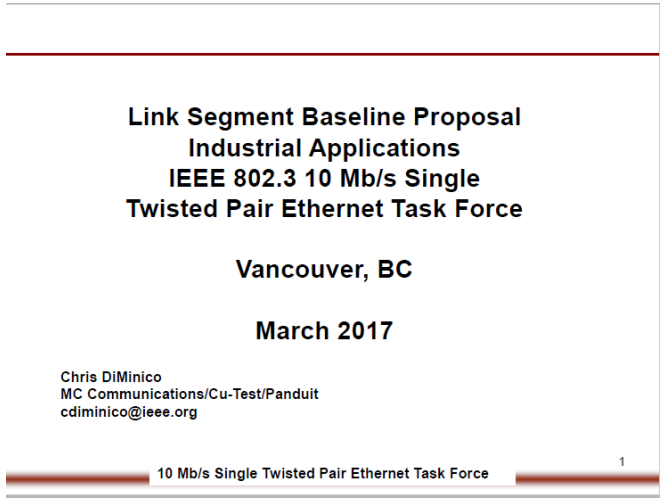
Noise Related presentation 2/3:

- Chris DiMinico,

  March 2017

  Link Segment Alien

  Crosstalk



Link Segment Baseline Proposal
Industrial Applications
IEEE 802.3 10 Mb/s Single
Twisted Pair Ethernet Task Force

Vancouver, BC

March 2017

Chris DiMinico
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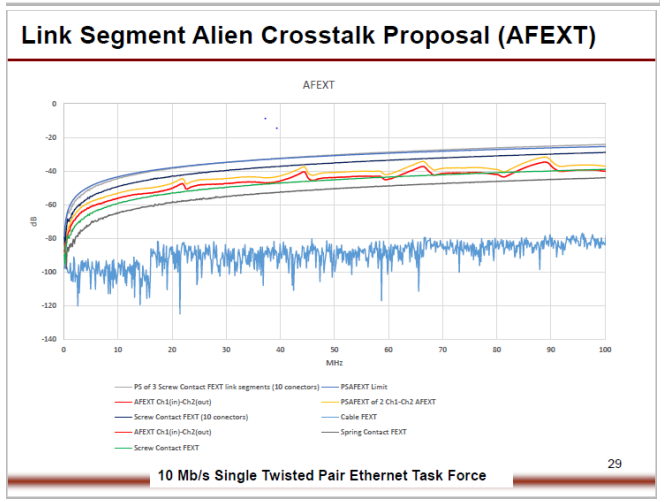

Summarize : Alien Crosstalk ~ 10mV

Noise Related presentation 3/3:

- Markus Wucher,
  May 2017

- Steffen Graber,
  March 2017

- **etc.**

Considerations and Measurements of Noise for the Industrial Link Segment

IEEE P802.3cg Task Force Meeting
New Orleans, May 2017

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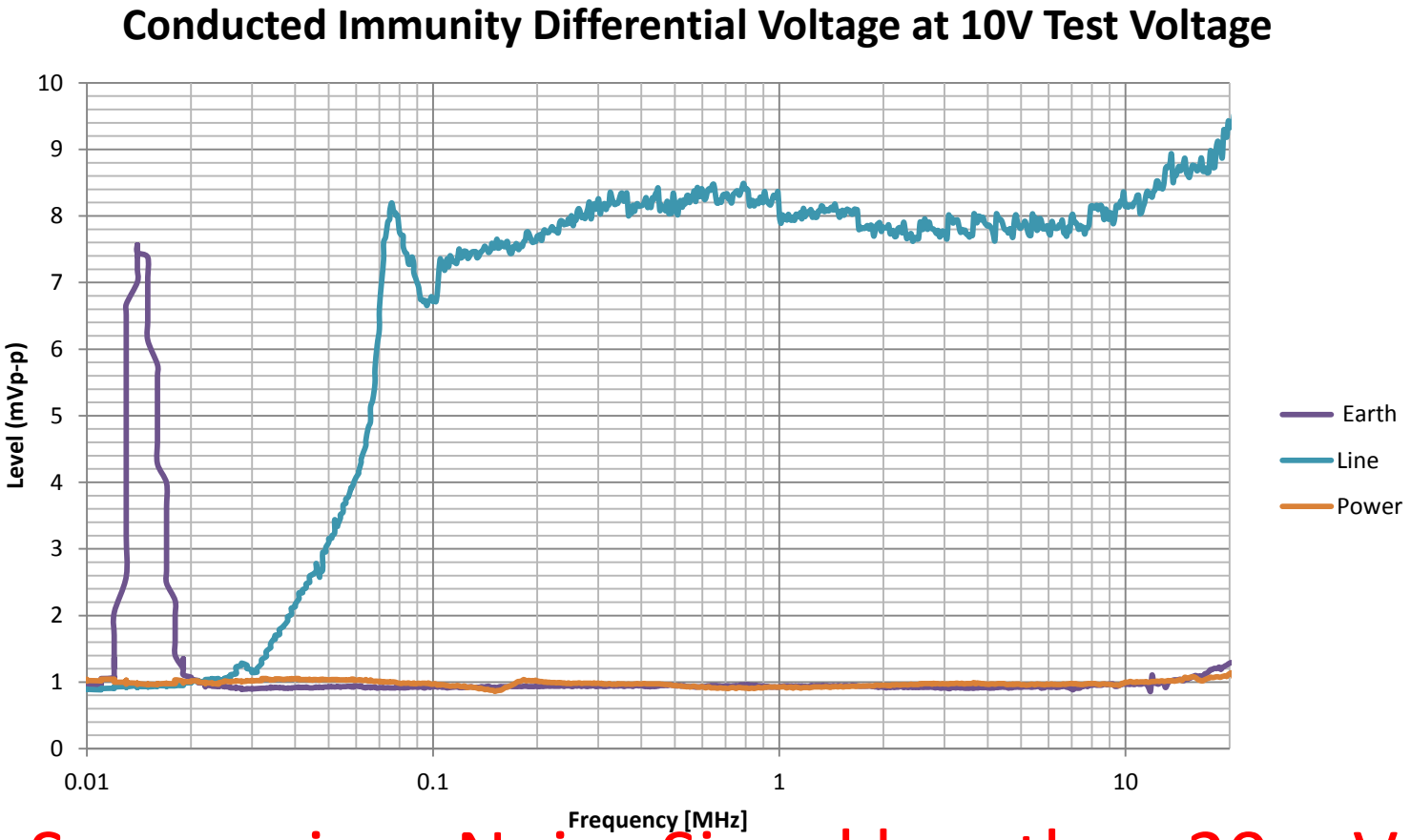
IEEE P802.3cg Task Force 5/24/2017 1

10 Mb/s Single Twisted Pair Ethernet
Noise Environment for PHY Proposal Evaluation

Steffen Graber
Pepperl+Fuchs

IEEE P802.3cg 10 Mb/s Single Twisted Pair Ethernet Task Force 3/7/2017 1

Wucher, May 2017: Test Results – RF Immunity



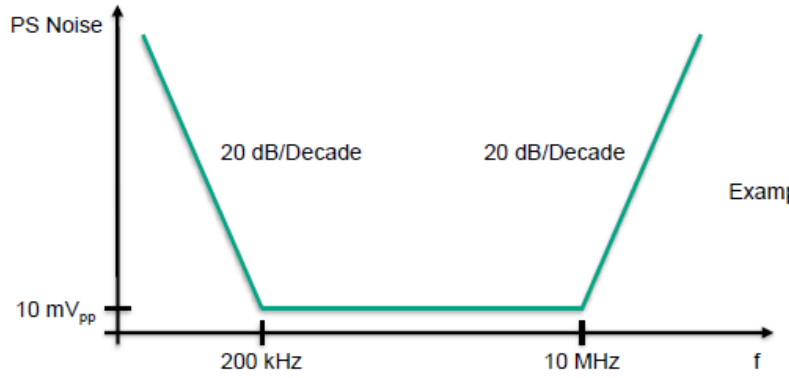
Summarize : Noise Signal less than 20 mVpp

Tone swept 10kHz …80 MHz

Steffen Graber March 2017 Power Supply Noise

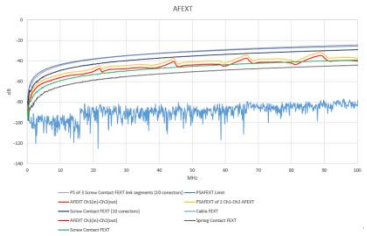
Power Supply Noise Sources

- One significant source of noise, especially in higher complexity devices like a field switch, is noise coming from the main power supply and several auxiliary power supplies.
- The main power supply typically operates between 40 and 150 kHz, while the point of load regulators typically work with switching frequencies between 200 kHz and above 1 MHz.
- All these power supplies produce some kind of ripple and also high frequency harmonics.
- To allow to have power and communication on the same two wires some kind of limit curve for the power supply noise needs to be defined, so that the communication on the link segment is not being disturbed by the injected power supply noise:

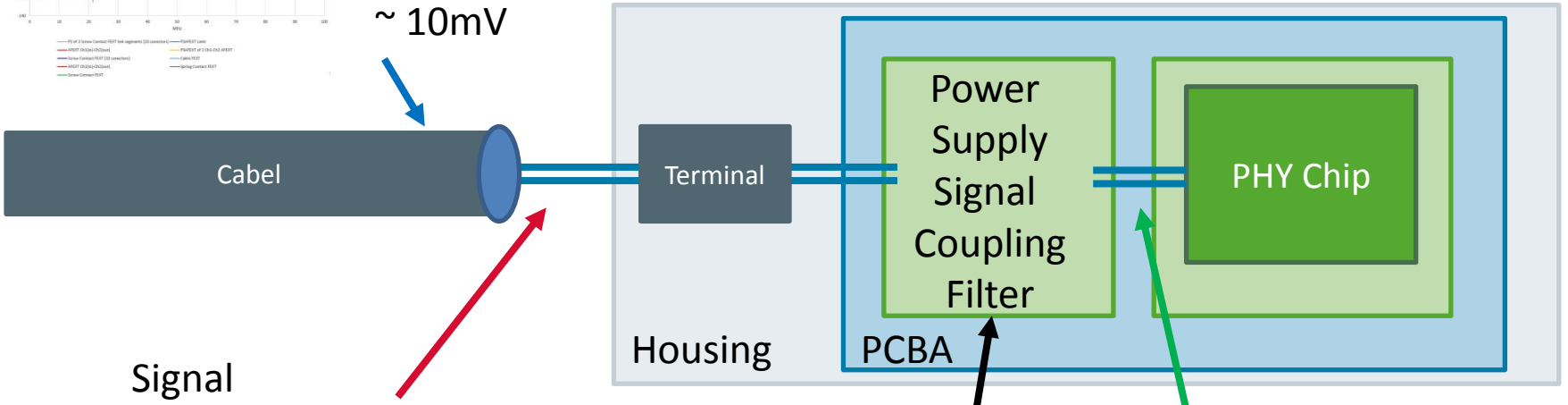


Example for a power supply noise limit curve.

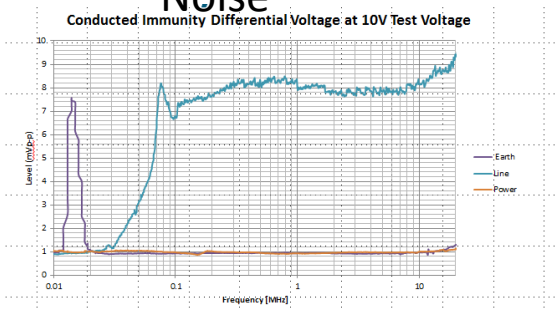
Proposal for PHY Noise Signal



Alien
Crosstalk
~ 10mV

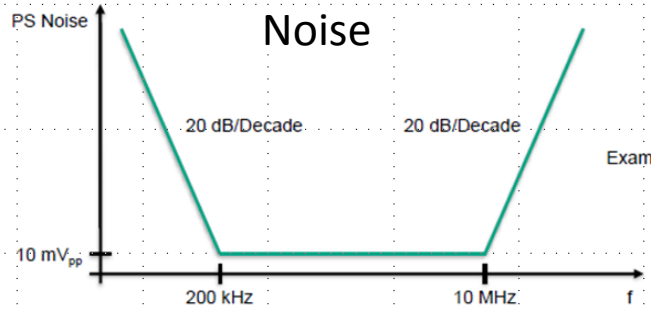


Signal
Noise



Summarize : Noise Signal less than 20 mVpp

Power Supply
Noise



PHY Chip
- Input Noise

Actual Status Noise Signal

- **Alien Crosstalk -> use adopted ANEXT + AFEXT from March Meeting (Chris DiMinico)**
- **EMI:**
  - **Tone swept 10 kHz to 80 MHz -> 20 mV pp**
  - **Broadband AWGN to 80 MHz (>10kHz..20MHz):**
    - **Action to do:**
    - **PHY vendors report max. level at 10^-9 BER**
    - **Continue Noise Measurements on environments to determine actual level**
    - **Determine what impulse model should be used based and measure**

Thank You