



# ERL Comment Proposal Overview (r02-19 - r02-26)

Richard Mellitz, Samtec

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IEEE 802.3 50 Gb/s, 100 Gb/s, and 200 Gb/s Ethernet Task Force

# Supporters

- ❑ Howard Heck, Intel
- ❑ Erdem Matoglu, Amphenol
- ❑ Toshiaki Sakai, Socionext

# Toc

- ❑ ERL and parameter value proposal
- ❑ Supporting data recap
- ❑ Tx host false pass/fail review
- ❑ Summary and meeting actions

# Overview of minimum ERL proposal

Recommend changes in the last term of Grr (93A-61) plus:

Clause	ERL Min (dB) D3.2	$\rho_x$ D3.2	$\beta_x$ D3.2	N D3.2	ERL Min (dB) D3.2 comment	When COM (dB) is <	$\rho_x$ D3.2 comment	$\beta_x$ D3.2 comment	N D3.2 comment
136 Tx Host	8 $-40 \log_{10} \left( \frac{P_{max}}{V_f} \right)$	0.44	10.7	300	<b>Propose 12 other options possible</b>	<b>NA</b>	<b>.3</b>	<b>1.7</b>	<b>300</b>
136 Rx Host	14.5	0.44	10.7	300	<b>12</b>	<b>NA</b>	<b>.3</b>	<b>1.7</b>	<b>300</b>
136 Cable Assembly	11	0.44	10.7	1000	<b>10.5</b>	<b>4</b>	<b>.25</b>	<b>1.7</b>	<b>1000</b>
137 Tx Device	16.1	0.44	10.7	100	<b>15</b>	<b>NA</b>	<b>.32</b>	<b>1.7</b>	<b>100</b>
137 Rx Device	16.1	0.44	10.7	100	<b>15</b>	<b>NA</b>	<b>0.32</b>	<b>1.7</b>	<b>100</b>
137 Channel	10	0.44	10.7	300	<b>10</b>	<b>4</b>	<b>0.18</b>	<b>1.7</b>	<b>1000</b>

# Quick Recap of Latest Minimum ERL Reports

- ❑ Toshiaki Sakai - Socionext: “ ‘15dB’ number is good enough with reasonable margin for clause 137 Tx/Rx.”
- ❑ Howard Heck - Intel: “good with 10dB for clause 137 channels” and “idea of ERL only being applicable for COM <4”
- ❑ Richard Mellitz - Samtec: prior work suggests that ERL min should be 10.5 dB for cable assemblies and only applicable when COM is between 3 dB and 4 dB
  - Notwithstanding results from DAC cable folks and other data presented/discussed at this interim
- ❑ CL137 Tx/Rx host false pass/false results suggests 12 dB for CL 136 Hosts.
  - Notwithstanding results from Mike Dudek and other options presented/discussed at this interim
  - New data on false pass/fail in following slides

# ERL limit of 12 dB is suggested by experiment

- ❑ Representing a wide range of design and manufacturing permutations
- ❑ Wide range of packages
  - 12 mm to 120 mm
  - Die pad capacitance up to 300 fF
  - Package differential impedance between 85 and 120 ohms
- ❑ Wide range of board and intra-cable configurations
  - Up to 70 mm of host trace with up to 500 mm of cable
  - Board impedance between 80 and 100 ohms
- ❑ QSFP connectors and mounting
- ❑ 2 DAC cables
  - 3 meter cable which just barely passes COM
  - 2 meter cable fabricated with reflections and barely passes COM
    - 270 fF added to QSFP assembly

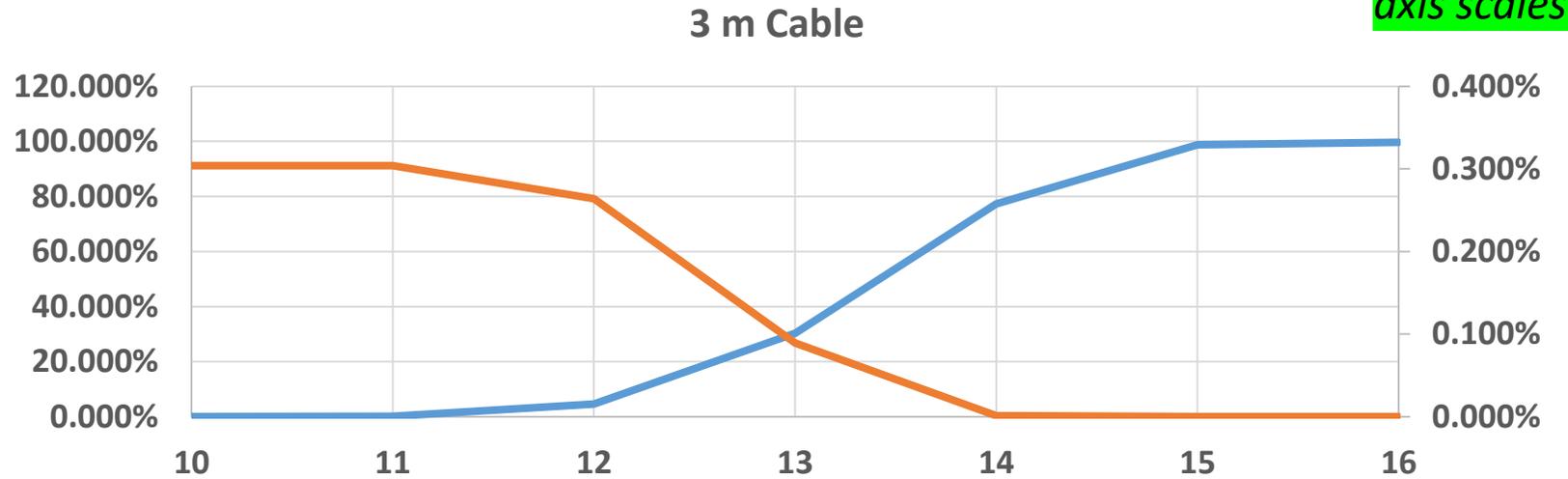
# Evaluation of the Population of Host Designs

- ❑ Given: A host must pass all the requirements such as
  - SNDR
  - $V_{\text{peak}}/V_f$  limitations
  - ERL
- ❑ A Tx host attached to cable should pass COM if the Cable Assembly alone passes COM.
  - Assuming the receiver host is the reference host used in COM
- ❑ Only Tx hosts which pass the  $V_{\text{peak}}/V_f$  limit considered
- ❑  $V_{\text{peak}}/V_f$  in most cases appears to be a good performance discriminator
- ❑ ERL will catch the remainder
- ❑ The goal is to determine a limit for ERL
  - Which balances false ERL false fails vs. false ERL false passes

# Recommend minimum ERL limit 12 dB

Note:  
different  
axis scales!

3 m cable		
ERL	false fail	false pass
10	0.001%	0.304%
11	0.175%	0.304%
12	4.569%	0.264%
13	30.265%	0.089%
14	77.336%	0.001%
15	98.754%	0.000%
16	99.696%	0.000%

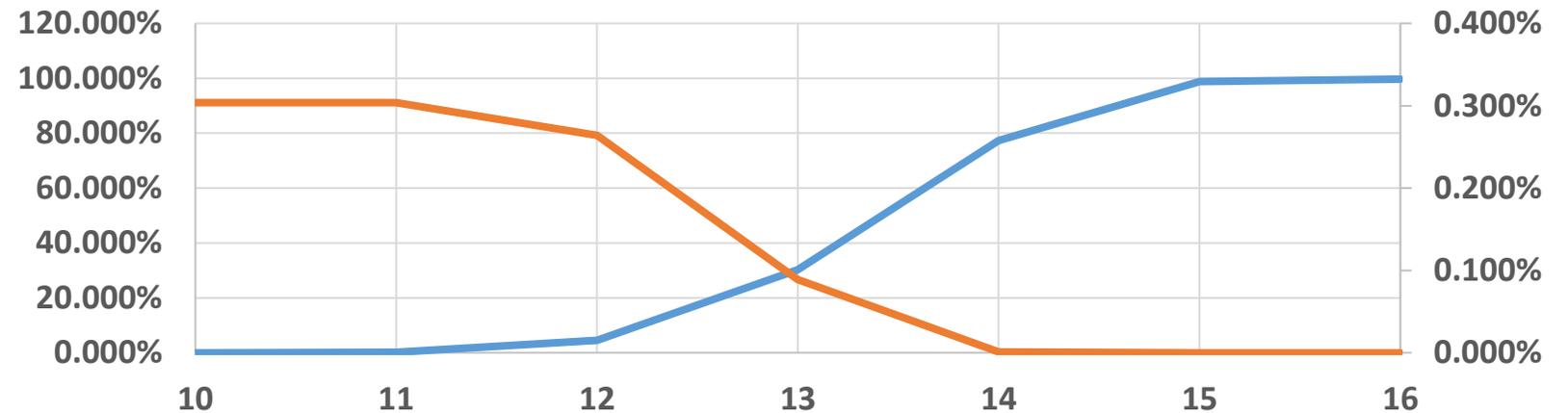


## False Fail

— false fail — false pass  
3 m Cable

## False Pass

2 m reflective cable		
ERL	false fail	false pass
10	0.000%	0.035%
11	0.174%	0.034%
12	4.592%	0.001%
13	30.446%	0.000%
14	77.605%	0.000%
15	99.023%	0.000%
16	99.965%	0.000%



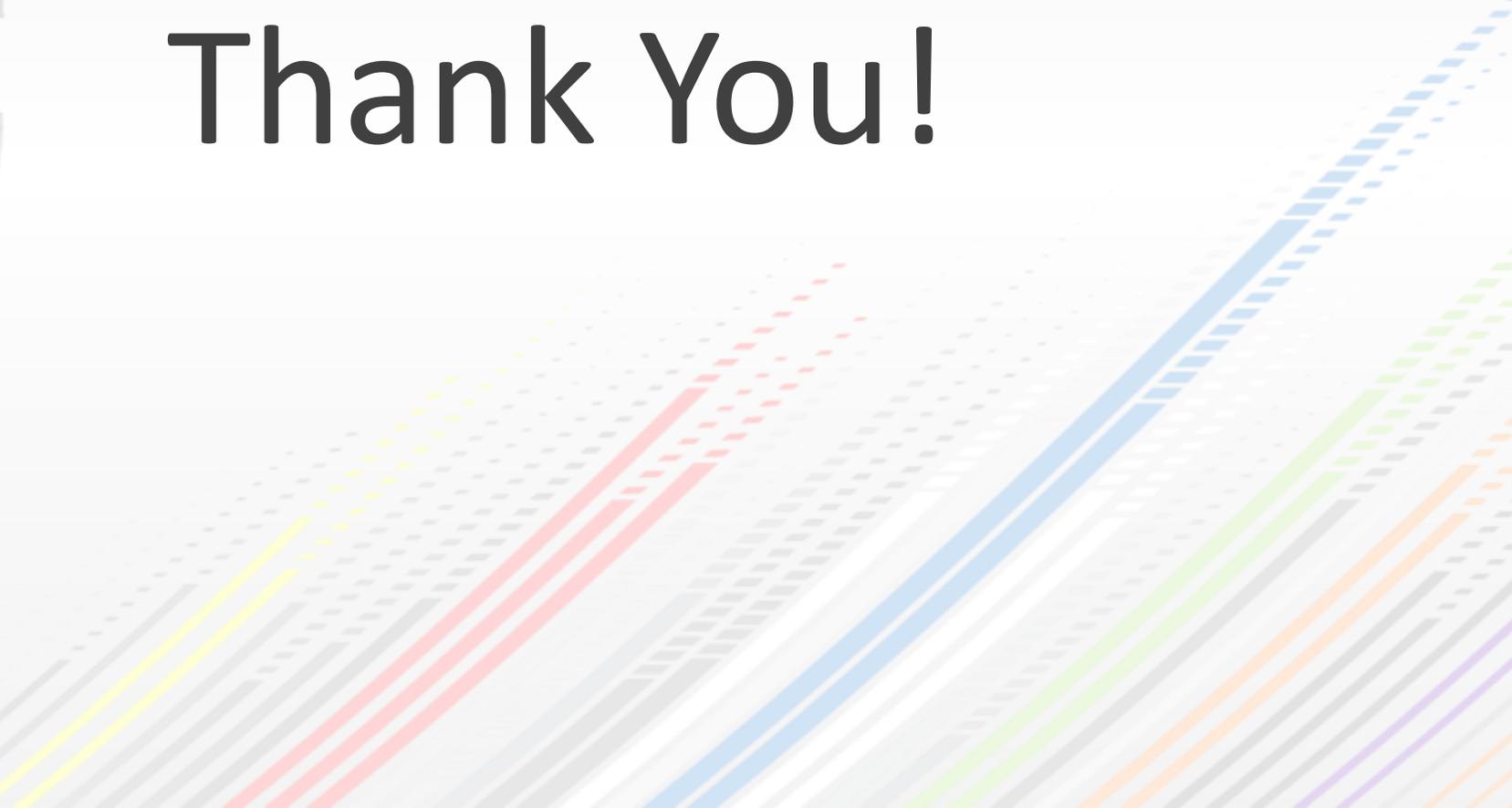
— false fail — false pass

# Summary

- ❑ Recommend minimum ERL values with associated parameters in slide 4
- ❑ Utilize straw ballot
  - For values which generate much discussion

A stylized, grey-toned illustration of a tiger's face, showing its eyes, whiskers, and stripes. It is positioned on the left side of the slide.

Thank You!

A series of colorful, parallel lines (yellow, red, blue, green, orange, purple) that curve upwards from the bottom right towards the center of the slide. The lines are composed of solid and dashed segments.