



# Comparison of Cat7<sub>A</sub> / Class F<sub>A</sub> Channel and 802.3bq Link Segment Specification

Martin Rossbach, Nexans

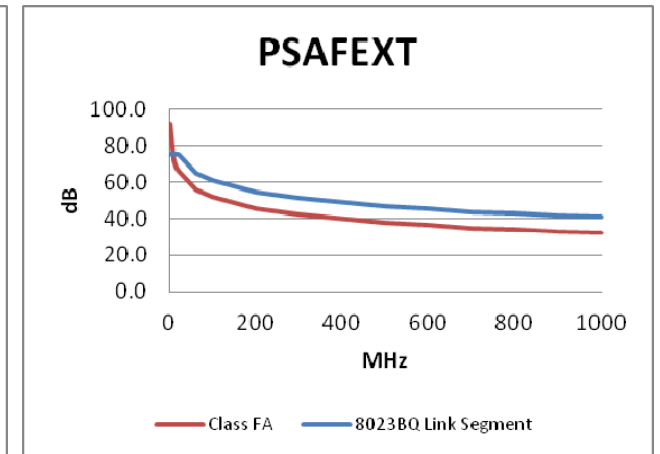
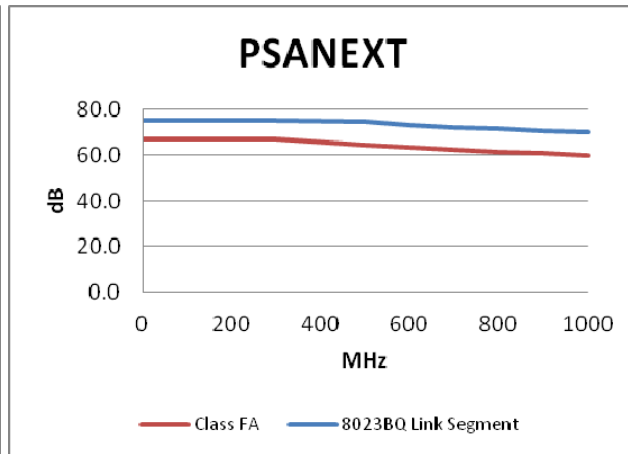
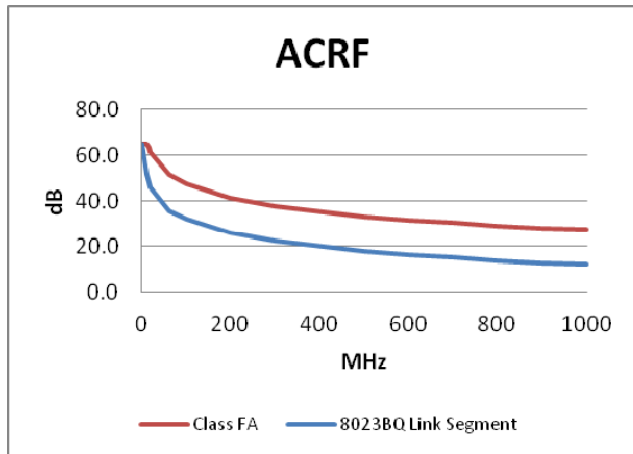
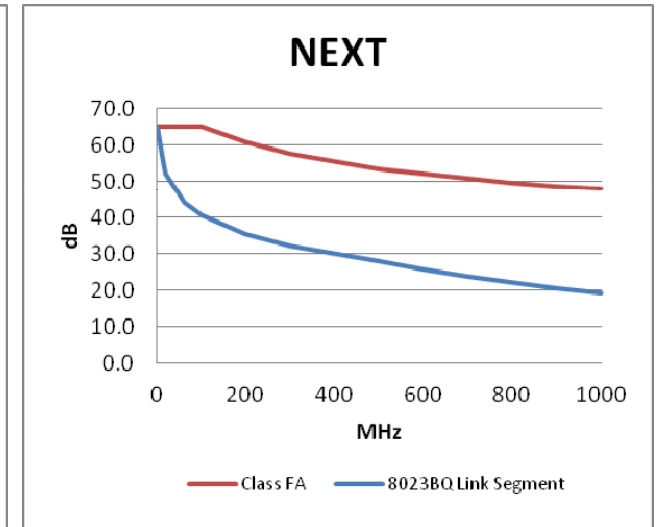
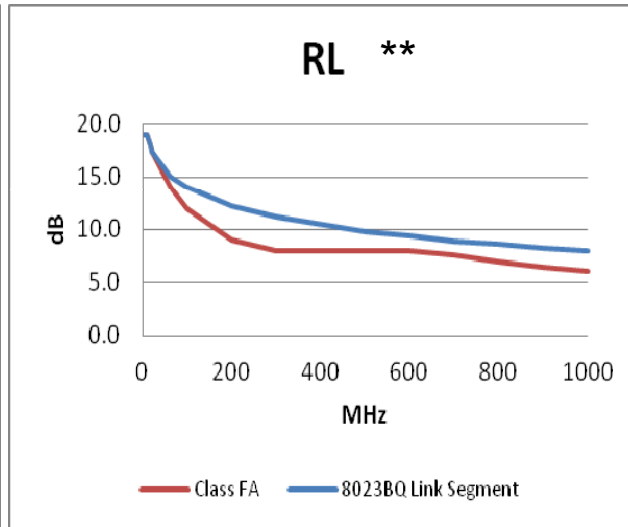
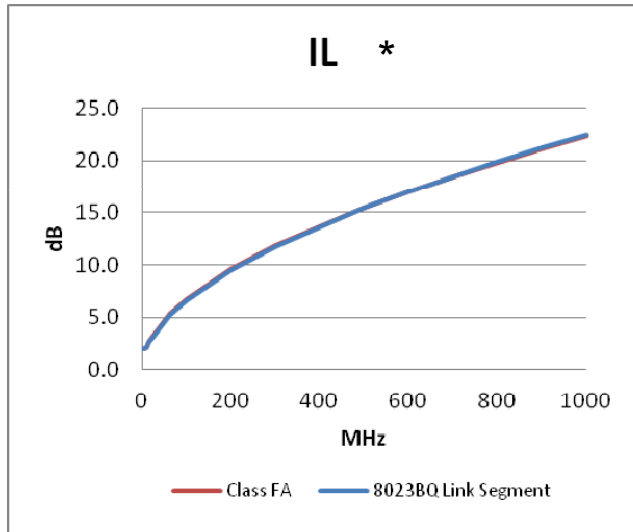
IEEE 802.3 25GBASE-T Study Group

Waikoloa, USA

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- Comparison of Class F<sub>A</sub> Channel specifications in ISO11801 with the current link segment characteristics in 802.3bq D2.0
  - Current Link Segment specifications developed for 40GBase-T, not 25GBase-T but can serve as good as starting point / “worst case”
  
- A closer look to the identified gaps
  - Test Data of installed base
  
- Summary and Recommendation

	802.3bq Link Segment	Cat7 <sub>A</sub> / CLASS F <sub>A</sub>
Upper Frequency	2000 MHz for 40GBase-T ? MHz for 25G	1 GHz
Length	30m	100m
IL	$0.0856/\text{SQRT}(A31)+0.6371*\text{SQRT}(A31)+0.0023*A31+1.0285*10^{-7}*A31^2$	$1.05(1.8\sqrt{f}+0.005f+0.25/\sqrt{f})+4*0,02\sqrt{f}$
RL	1<f<10 19dB 10<f<40 24-5*log(f) 40<f<130 16dB 130<f<1000 35-9*log(f) 1000<f<2000 8dB	1<f<10 19dB 10<f<40 24-5*log(f) 40<f<251.2 32-10dB 251.2<f<631 8,0 631<f<1000 36-10*log(f)
NEXT	1<f<440 : $45.3-15*\text{LOG}(f/100))/-20)+(2*10^{((54-20*\text{LOG}(f/100))/-20)}$ 440<f<1486 $45.3-15*\text{LOG}(f/100))/-20)+(2*10^{((39.12-36,14*\text{LOG}f/100))/-20}$	$-20*\text{LOG}(10^{(-0.05*(105.4-15*\text{LOG}(f)))})+2*10^{(-0.05*(116.3-20*\text{LOG}(f)))}$
ACRF	$-20*\text{LOG}((10^{((39-20*\text{LOG}(f/100))/-20)))+(2*10^{((43.1-20*\text{LOG}(f/100))/-20))})$	$-20*\text{LOG}(10^{(-0.05*(95.3-20*\text{LOG}(f)))})+4*10^{(-0.05*(103.9-20*\text{LOG}(f)))}$
ANEXT	1<f<100 85-10*log(f/100) 100<f<1000 85-15*log(f/100)	1<f<100 95-10*log(f) 100<f<1000 105-15*log(f)
AACRF	1<f<2000 61-20*log(f/100)	1<f<1000 92-20*log(f)



\*Class FA IL corrected to 30m

\*\*Class FA RL spec'ed for 4 connectors

- Question Mark (depends on coding not yet selected)

- Frequency

- GAPS

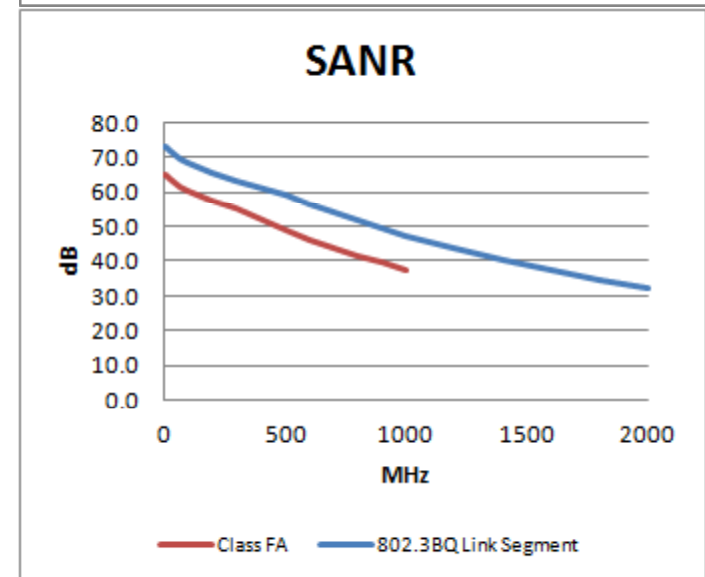
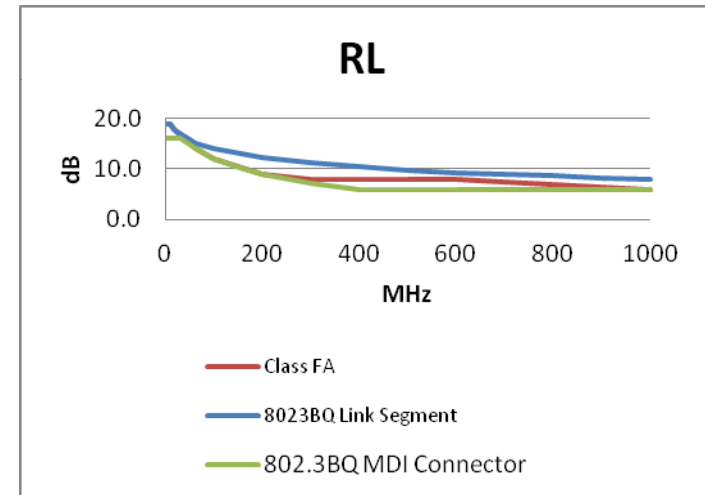
- RL

- Alien Noise

- Do GAPS represent major obstacles ?

w Class FA RL still better than current worst case element in End to End Channel

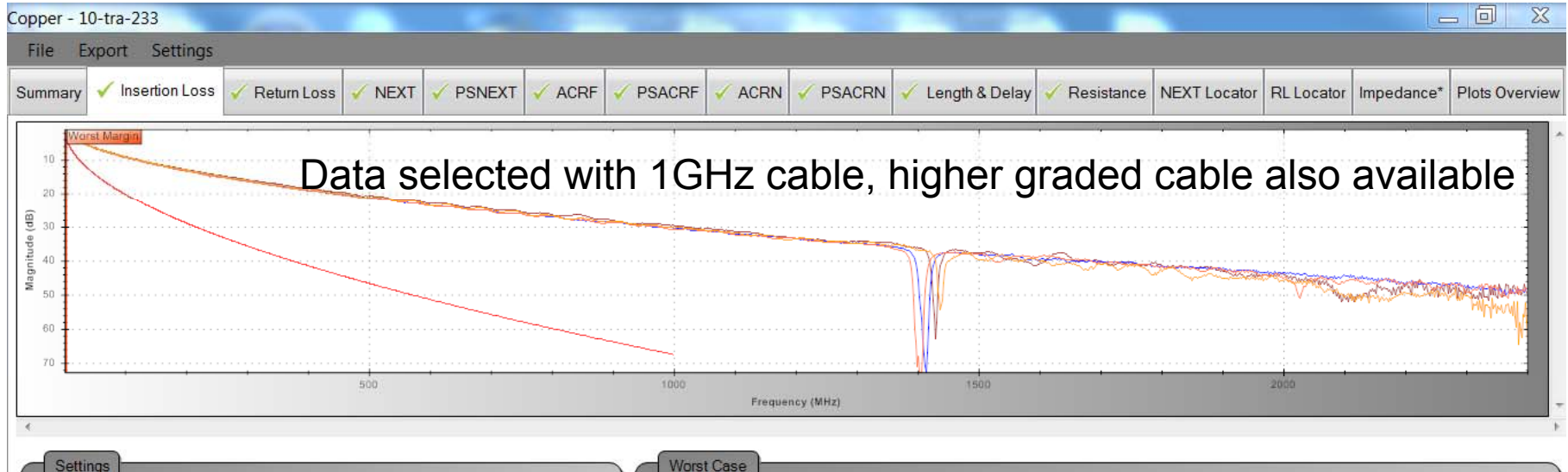
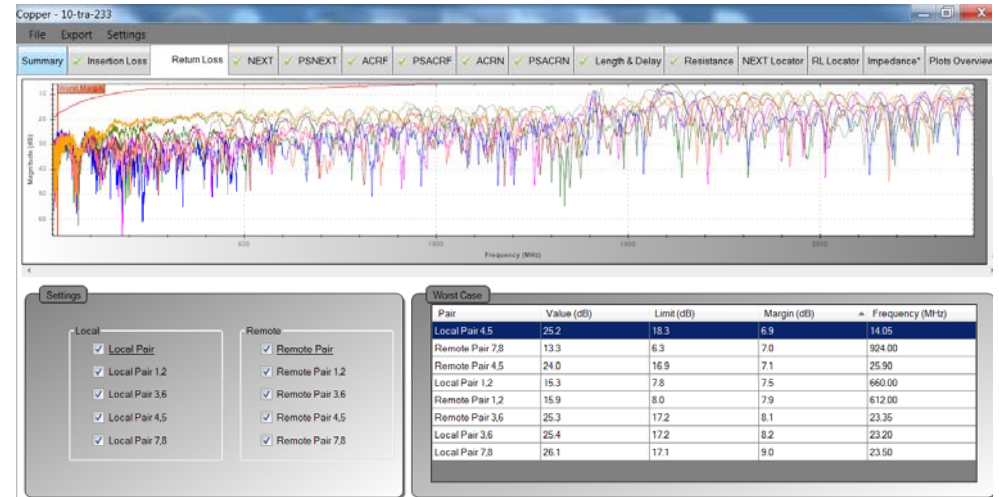
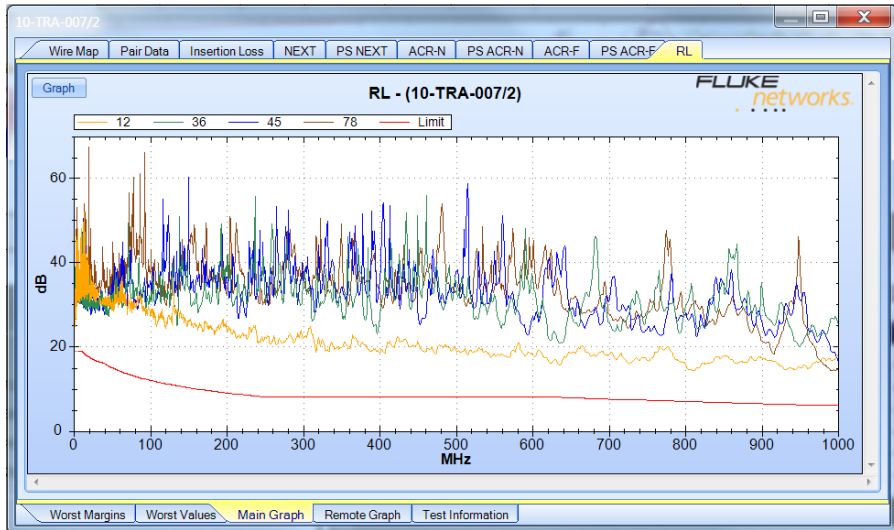
w Alien Noise: Signal to Alien Noise ratio@1200MHz identical to 40G@1600MHz



- Let's assume we need to close all Gaps and Potential Gaps (means frequency extension and RL and A-XT improvement) is this possible ?
- Next Slides provide test data of installed base from main players in Cat7A market
- Sources:
  - Available handheld tester data for Class FA installs
  - Data above 1GHz included if available
  - Independent testhouse reports
  - Earlier contributions to 802.3bq

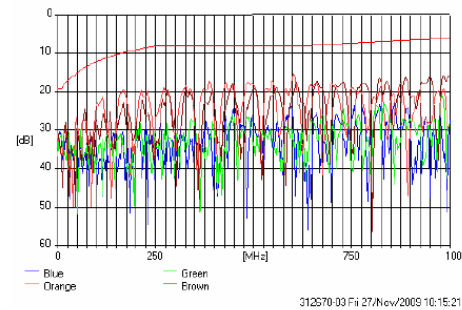


# IL/RL Data from Manufacturer 1



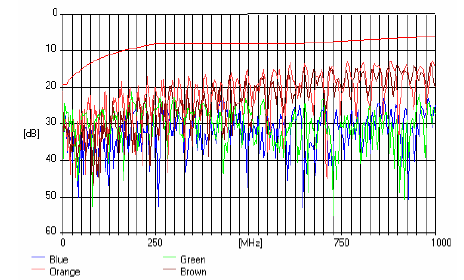
- Independent test data from Manufacturer 1, 2 different years
- w Long and short 4-Connector Channels

4.2 High frequency transmission test results. Channel #1, from equipment end  
RETURN LOSS  
Data series #1



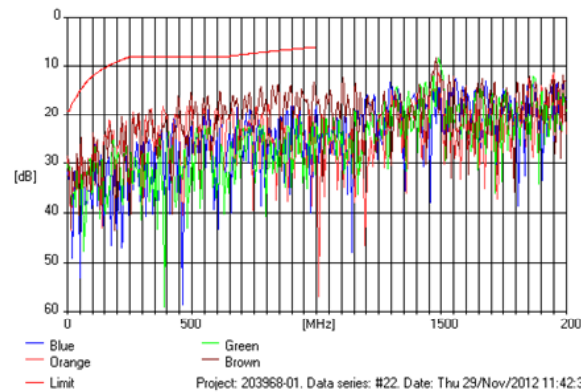
312670-03 Fri 27/Nov/2009 10:15:21

4.3 High frequency transmission test results. Channel #3 (15m hrzt), from terminal end  
RETURN LOSS  
Data series #12



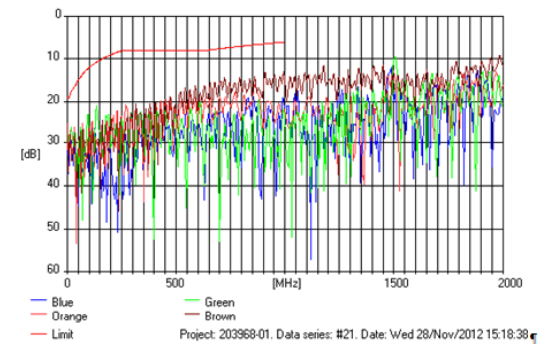
312670-03 Fri 27/Nov/2009 10:25:53

RETURNLOSS-Channel#1-From equipment end



Project: 203968-01. Data series: #22. Date: Thu 29/Nov/2012 11:42:37

RETURNLOSS-Channel#1-From terminal end



Project: 203968-01. Data series: #21. Date: Wed 28/Nov/2012 15:18:38

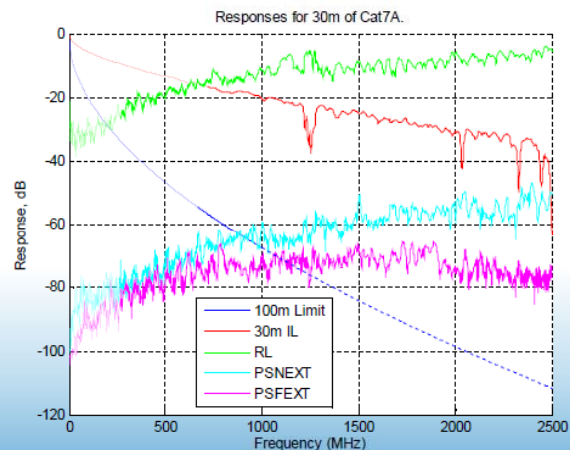
The channel consists of the following components:

Channel part	Cable type	Length	Connecting hardware
Terminal cord	Flexible cable	3 m	1 plug
Connection TO/CP	Flexible cable	5 m	1 socket, 1 plug
Floor cable	Horizontal cable	82.5 m	2 sockets
Floor cable channel #3, short	Horizontal cable	15 m	2 sockets
Patch cord	Flexible cable	5 m	1 plug, 1 socket
Equipment cord	Flexible cable	2 m	1 plug



- Has been presented earlier to this group
- [http://www.ieee802.org/3/NGBASET/public/jan13/bates\\_01a\\_0113\\_ngbt.pdf](http://www.ieee802.org/3/NGBASET/public/jan13/bates_01a_0113_ngbt.pdf)
- Data picked to be representative of worst case of installed base

### CHANNEL – 30M

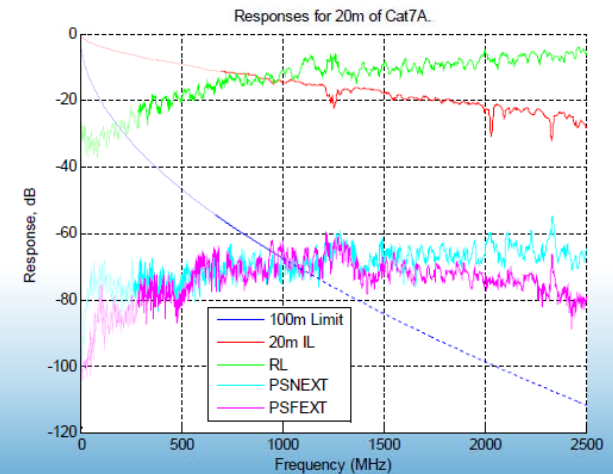


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### CHANNEL – 20M

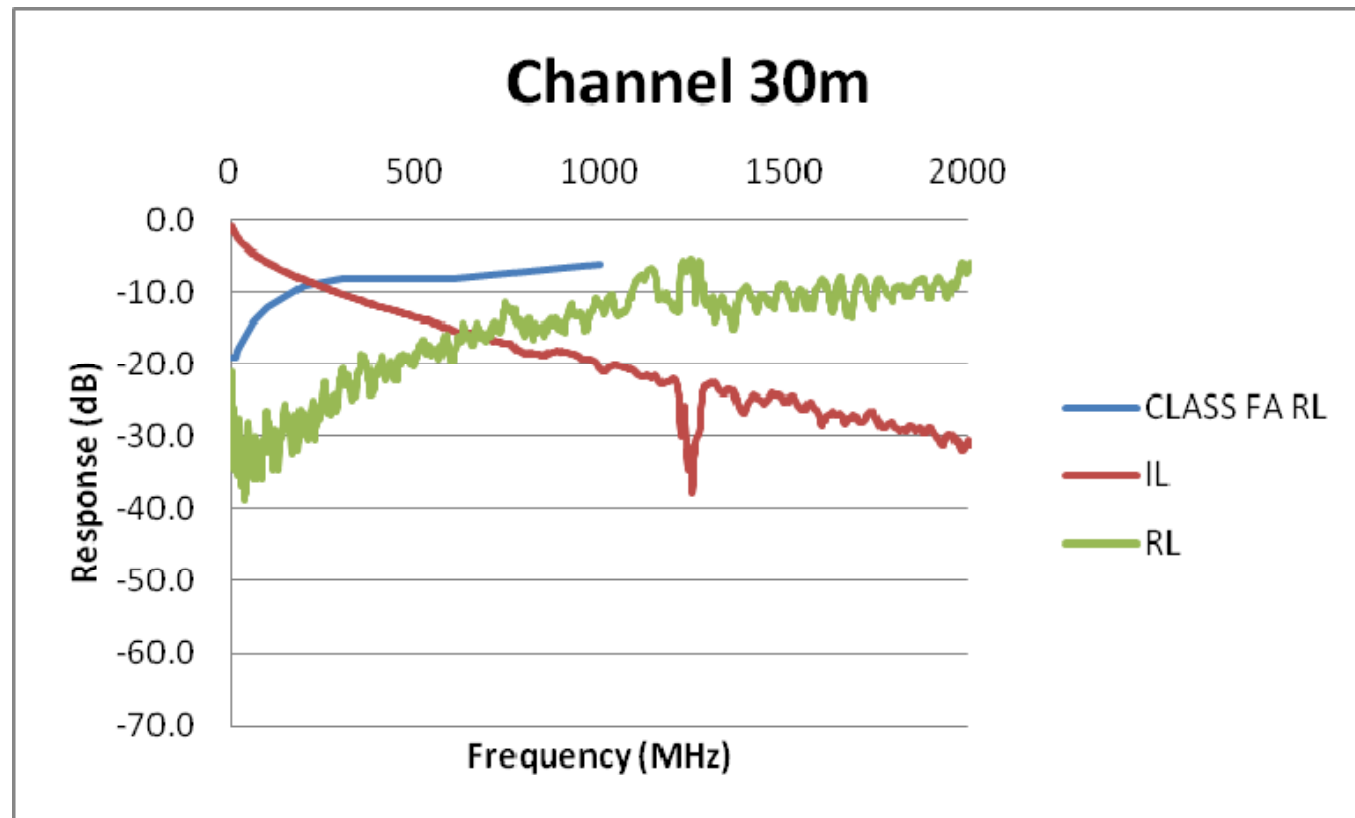


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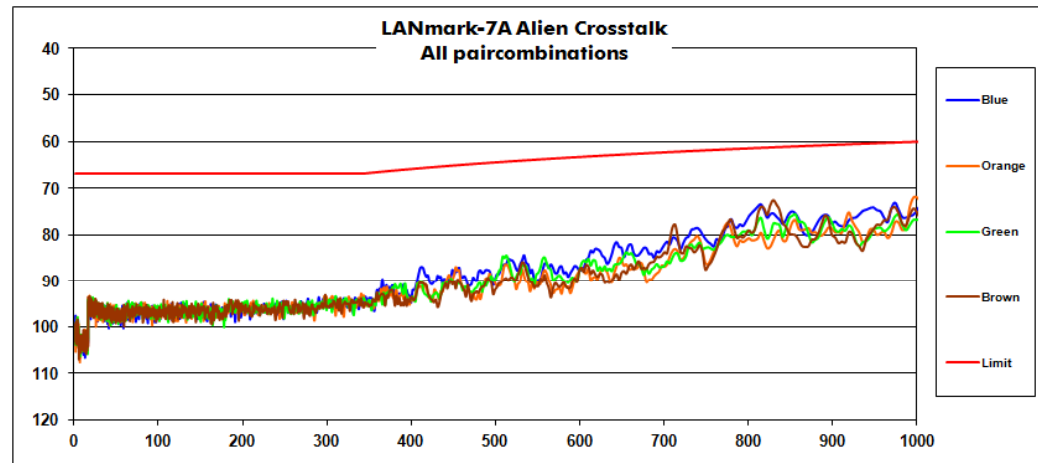
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- Data reworked with Class F<sub>A</sub> RL Limit



- ISO has only 5dB difference in Alien Crosstalk specs for Cat6<sub>A</sub> unscreened and Cat7<sub>A</sub>, not showing true performance of shielded systems
- Class F<sub>A</sub> has a severe Coupling Attenuation requirement (+25dB „Met by Design Rule“); this has been used by manufacturers to design products
- Installed Base is surely better then the Alien Crosstalk requirement of ISO



Class FA typical Alien Next

- Comparison of Class  $F_A$  specs and Current Link Segment Specification (for 40GBase-T, but only up to 1 GHz) shows that small gaps exist for A-XT and RL, other parameters are in line or better
- Selected Test data of Installed Base suggest that most of Class  $F_A$  installed base is good enough to meet additional requirements above Class  $F_A$  spec and frequency range can be slightly extended
- Identified Gaps can be accommodated in various ways, to be decided when upper frequency is defined and coding known.
- No Delay for project schedule expected.
- Move that 30m of category  $7_A$  cabling be incorporated into clause 113.7 of the next IEEE P802.3bq draft for support of 25GBASE-T