

Update on ISO/IEC 11801-99-1 Guidance on 40GBASE-T Cabling

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Content

1. **status report of ISO/IEC 11801-99-1**
2. **update on Class I & Class II cabling**
3. **comparison with TIA Cat 8 cabling**
4. **plan for completion and next steps**

ISO/IEC 11801-99-1 40GBASE-T Cabling Guidelines

- **ISO/IEC TR 11801-99-1 2nd PDTR vote was positive**
- **350 national comments received, mostly technical**
- **all comments resolved at SC25 WG3 Oct 2013 meeting**
- **resolutions being implemented in new draft to be issued in Dec 2013, hopefully as a DTR (final draft)**
- **significant technical change, with *reduced differences* between Class I, Class II and TIA Cat 8 specifications**

ISO/IEC 11801-99-1 Deliverables

Performance Requirements
for 30m, 2-conductor Channel

Legacy Cat 6 _A Components to 500 MHz	Legacy Cat 7 _A Components to 1000 MHz
Legacy Cat 6 _A Components to 1,600 MHz*	Legacy Cat 7 _A Components to 1,600 MHz*
Enhanced Cat 6 _A Components to 1,600 MHz*	Enhanced Cat 7 _A Components to 1,600 MHz*
Tutorial on Channel Capacity, Assumptions, other PHY-related	

* Upper Frequency of 2 GHz For Further Study

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Category 8.1 Components to 1,600 MHz*	Category 8.2 Components to 1,600 MHz*
Tutorial on Channel Capacity, Assumptions, other PHY-related	

Next Generation
Cabling for 40G

* Upper Frequency of 2 GHz For Further Study

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Legacy Cat 6 _A Components to 500 MHz	Legacy Cat 7 _A Components to 1000 MHz
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Class I Channel to 1,600 MHz*	Class II Channel to 1,600 MHz*
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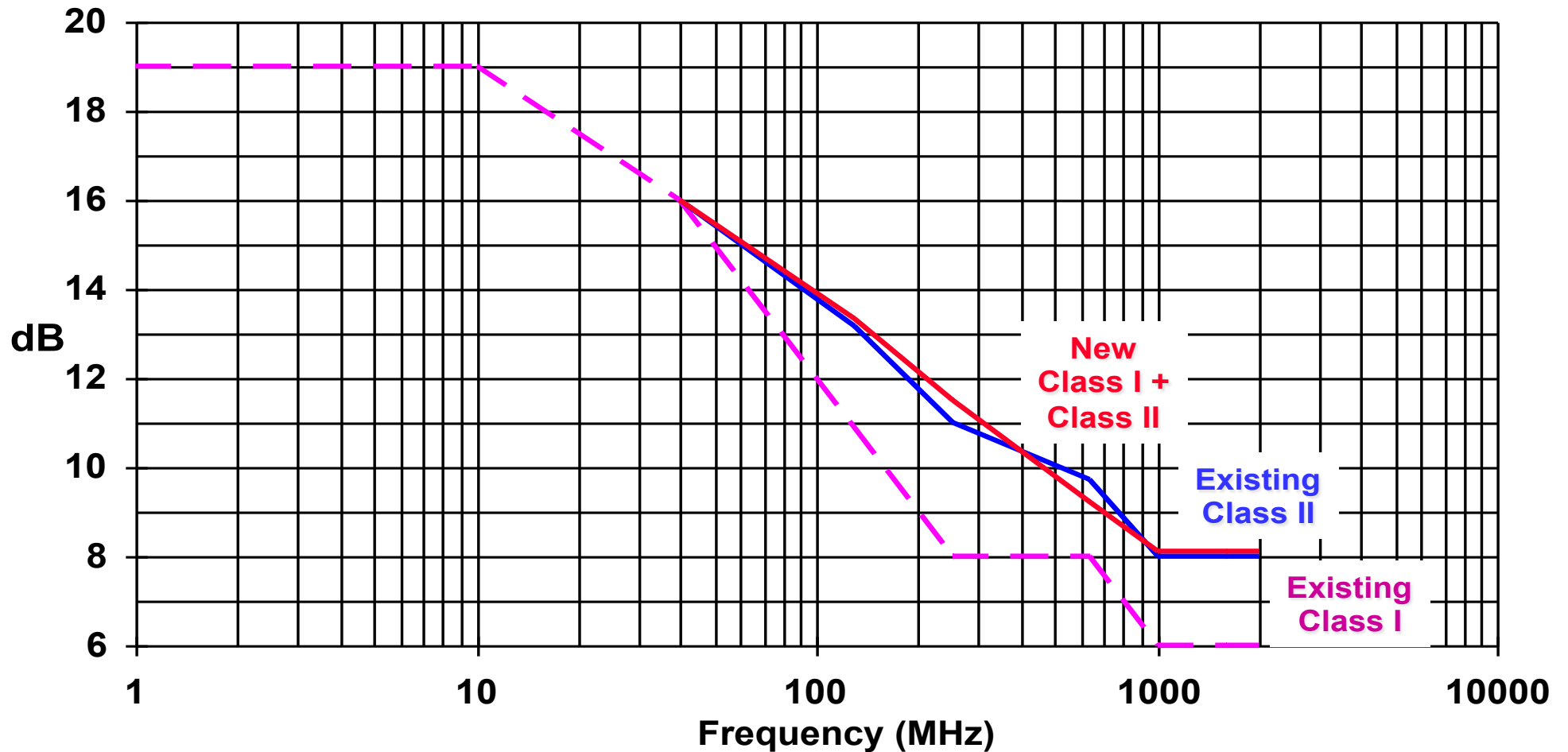
Next Generation
Cabling for 40G

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Comparison of TIA & ISO/IEC Next Gen Cabling

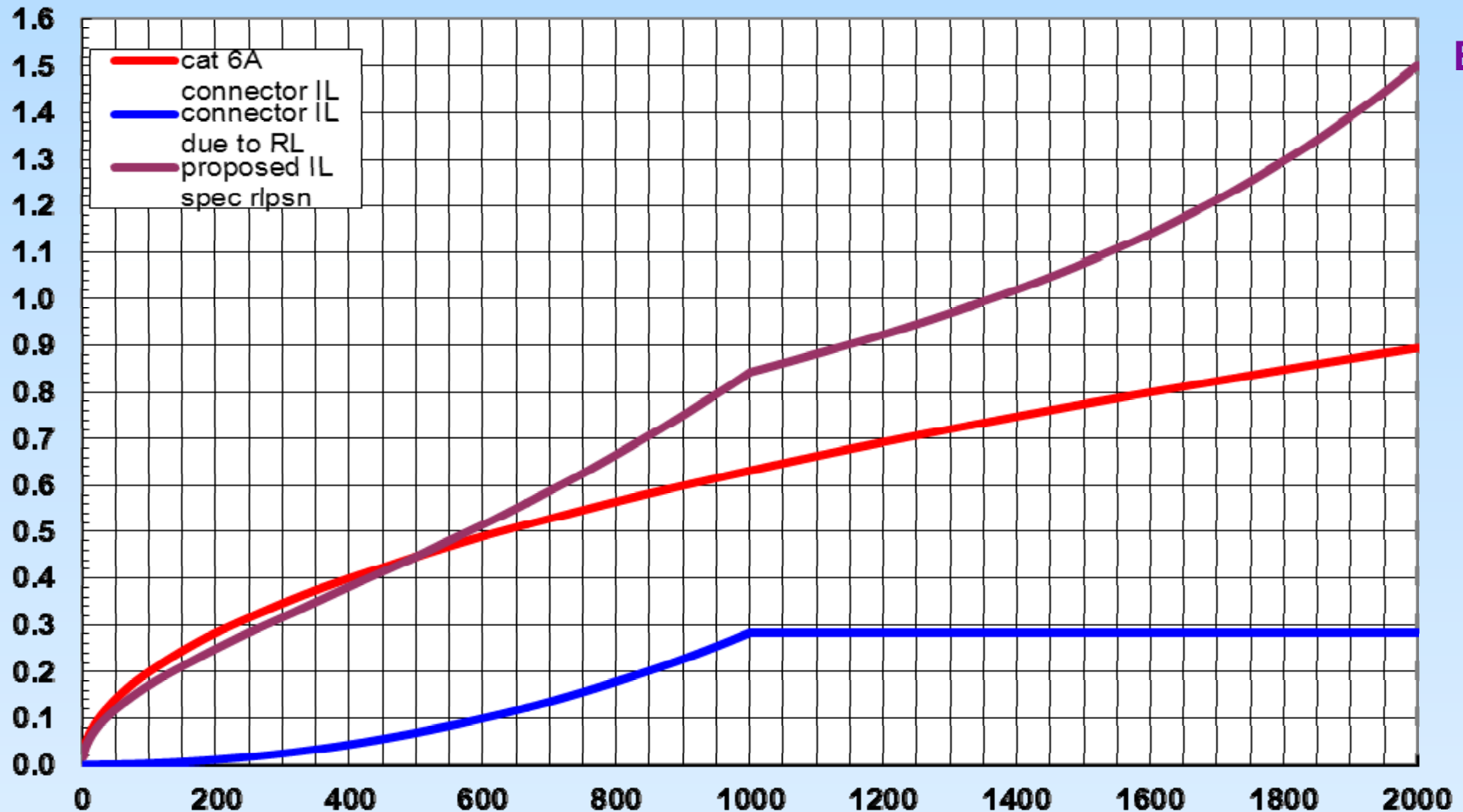
* DTR to be confirmed	TIA-568-C.2.1 D0.9 Cat 8 Channel	ISO/IEC 11801-99-1 DTR * Class I Channel	ISO/IEC 11801-99-1 DTR * Class II Channel
RL	$1 < f < 10$ 19dB $10 < f < 40$ $24 - 5 * \log(f)$ $40 < f < 130$ 16dB $130 < f < 1000$ $35 - 9 * \log(f)$ $1000 < f < 2000$ 8dB	$1 < f < 10$ 19dB $10 < f < 100$ $24 - 5 * \log(f)$ $100 < f < 1000$ $26 - 6 * \log(f)$ $1000 < f < 2000$ 8dB	$1 < f < 10$ 19dB $10 < f < 100$ $24 - 5 * \log(f)$ $100 < f < 1000$ $26 - 6 * \log(f)$ $1000 < f < 2000$ 8dB
IL	$0.312(1.8\sqrt{f} + 0.005f + 0.25/\sqrt{f})$ $+ 2 * B + 0.0324\sqrt{f}$ (ILD) $B = 0.02\sqrt{f} < 500\text{MHz}; > 500\text{MHz}$ $(0.008\sqrt{f} + 0.00029 * f + 0.5 * 10^{-6} * f^2)$	$0.32(1.8\sqrt{f} + 0.005f + 0.25/\sqrt{f})$ $+ 2 * B + 0.0324\sqrt{f}$ (ILD) where B = connector IL	$0.32(1.8\sqrt{f} + 0.005f + 0.25/\sqrt{f})$ $+ 2 * 0.02\sqrt{f}$
TCL	$1 - 2000$ $60 - 17 * \log(f)$	$1 - 2000$ $60 - 17 * \log(f)$ <i>(for U/UTP or F/UTP cable)</i>	$1 - 2000$ $50 - 17 * \log(f)$ <i>(for S/FTP or PIMF cable)</i>
ELTCTL	$1 < f < 170$ $46.8 - 20 * \log(f)$	$1 < f < 170$ $44.6 - 20 * \log(f)$ <i>(for U/UTP or F/UTP cable)</i>	$1 < f < 170$ $34.6 - 20 * \log(f)$ <i>(for S/FTP or PIMF cable)</i>
CA	$100 < f < 2000$ $90 - 20 * \log(f)$	$30 < f < 100$ 50dB $100 < f < 2000$ $90 - 20 * \log(f)$	$30 < f < 100$ 50dB $100 < f < 2000$ $90 - 20 * \log(f)$
PSANEXT	$1 < f < 100$ $105 - 10 * \log(f)$ $100 < f < 2000$ $115 - 15 * \log(f)$	$1 < f < 100$ $105 - 10 * \log(f)$ $100 < f < 2000$ $115 - 15 * \log(f)$	$1 < f < 100$ $105 - 10 * \log(f)$ $100 < f < 2000$ $115 - 15 * \log(f)$
PSAACRF	$1 - 2000$ $61 - 20 * \log(f/100)$	$61 - 20 * \log(f/100)$	$61 - 20 * \log(f/100)$

ISO/IEC 11801-99-1 Channel RL Change



Cat 8.1 Connector IL

Higher frequency contributions due to RL & PSNEXT taken into account:



Contribution to IEEE 802.3bq Task Force; 11-14 Nov 2013; Dallas, TX

Comparison of TIA & ISO/IEC Next Gen Cabling

performance
differences

* DTR to be confirmed	TIA-568-C.2.1 D0.9 Cat 8 Channel @ 1GHz	ISO/IEC 11801-99-1 DTR * Class I Channel @ 1GHz	ISO/IEC 11801-99-1 DTR * Class II Channel @ 1GHz
RL	8.0dB	8.0dB	8.0dB
IL	22.4dB	22.4dB	21.1dB
NEXT	18.9dB	19.6dB	47.9dB
ACR-F	12.0dB	12.0dB	33.1dB
CA	30.0dB	30.0dB	30.0dB
PSANEXT	70.0dB	70.0dB	70.0dB
PSAACRF	41.0dB	41.0dB	41.0dB
Upper Freq	2GHz	1.6GHz (2GHz <i>ffs</i>)	1.6GHz (2GHz <i>ffs</i>)

Cable Standardisation in IEC SC46

- **NWIPs approved for cables for 40G Class I & II channels**
- **CDs for IEC 61156-9/10 for Cat 8.1/Cat 8.2 cables to 2GHz**
- **data being gathered to support field testing up to 2GHz :**
 1. **channel and PL configurations**
 2. **supported connector types**
 3. **pass/fail limits**
 4. **test accuracy requirements**

Connector Standardisation in IEC SC48B

- **NWIP approved to define Cat 8.1 RJ45 connector with upper freq. of 2GHz (IEC 60607-3-81 CD circulated)**
- **NWIP circulated to define Cat 8.2 GG45 connector with upper freq. of 2GHz (to be IEC 60607-3-82)**
- **IEC 61076-3-104 Ed.3 (*Tera*) connector being revised with upper freq. increased to 2GHz**
- **NWIP being prepared to revise IEC 61076-3-110 (ARJ45) connector to increased upper freq. to *at least* 2GHz**
- **IEC 60512-28-100 Measurement & Test Procedures upper freq. being increased from 1GHz to 2GHz**

Interrelationship of Connectors

Category	Frequency	U/UTP	F/UTP	U or S or F/FTP
CAT 8+	2000+ MHz	TBD	TBD	61076-3-110
CAT 8: 8.1, 8.2	2000 MHz	60603-7-81	60603-7-81	60603-7-82
CAT 7A	1000 MHz	(60603-7-61)	(60603-7-61)	60603-7-71
CAT 6A, CAT 7	500 MHz / 600 MHz	60603-7-41	60603-7-51	60603-7-7
CAT 6	250 MHz	60603-7-4	60603-7-5	
CAT 5, CAT 5e	100 MHz	60603-7-2	60603-7-3	
CAT 3	10 MHz	60603-7	60603-7-1	

What Next?

- **ISO/IEC 11801-99-1 new draft to be issued 01 Dec 2013**
- **SC25 WG3 sec. to judge whether to issue DTR by 15 Dec**
- **IEEE 802.3bq also invited to participate in next review**
- **response to be addressed @ Feb 2014 SC25 WG3 meeting**
- **NWIP is being circulated for ISO/IEC 11801 3rd Edition**
- **Next Gen Classes to be included in ISO/IEC 11801 Ed.3**
- **Next Gen Category components being specified by IEC**
- **SC25 WG3 will liaise closely with 802.3bq to completion**