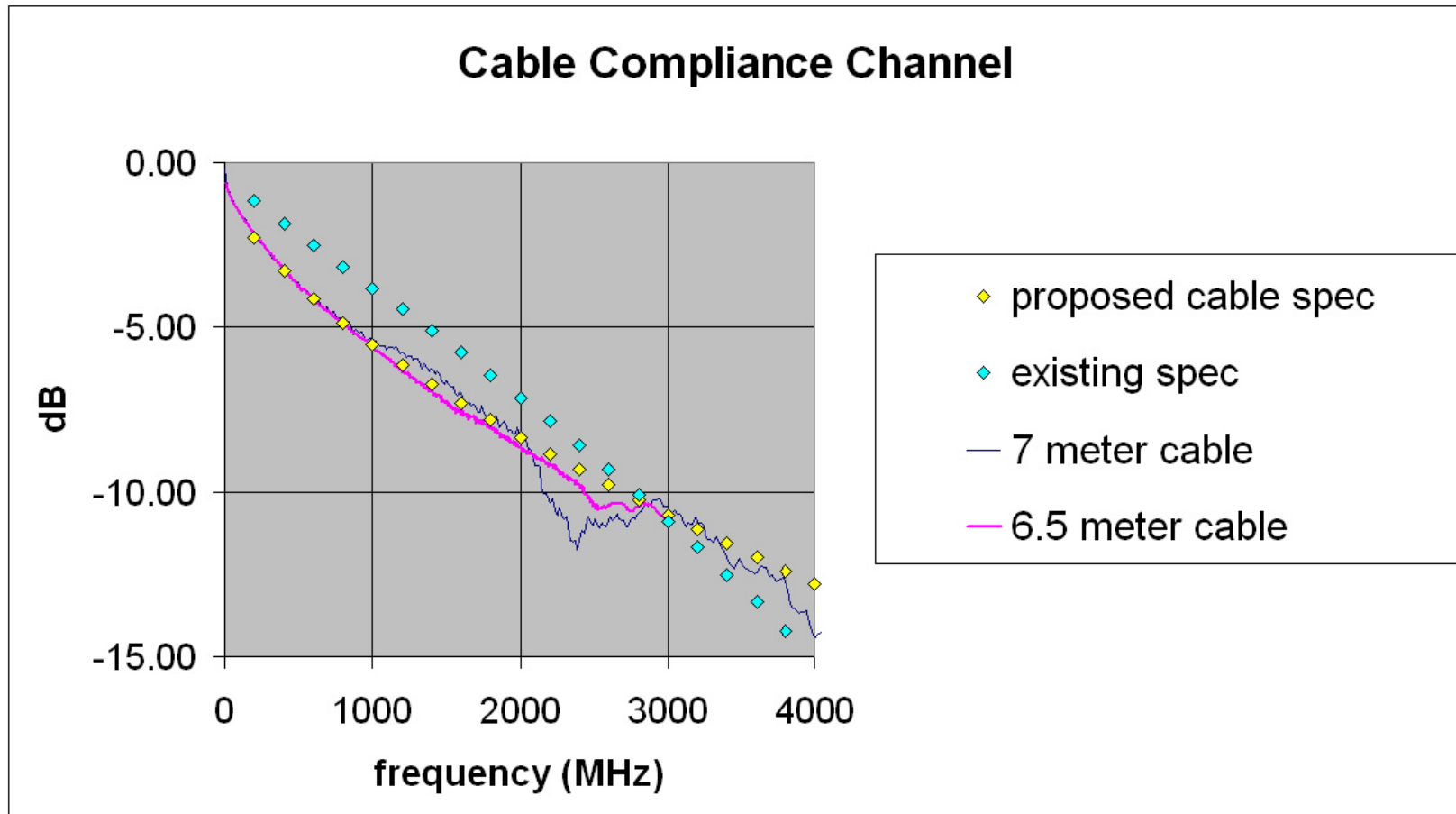# Proposed Inter-enclosure TCTF

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Background

- Existing TCTF ("Transmitter Compliance Transfer Function") models PCB trace loss characteristic

- Proposed TCTF models Infiniband Cable

- Proposed TCTF has been adopted for SATA2 Gen1x and Gen2x

- Proposed TCTF will be proposed for Fibre Channel 3.1875G 4-lane variant cable spec (FC-PI-2, section 11.4)

Proposed Inter-enclosure TCTF

Details of Proposed Change

5.3.11 Transmitter characteristics

For all inter-enclosure TxRx connections, the transmitter shall be A.C. coupled to the interconnect through a transmission network.

For intra-enclosure TxRx connections the expander transmitter shall be A.C. coupled to the interconnect. Other transmitters may be A.C. or D.C. coupled.

A combination of a zero-length test load and the transmitter compliance transfer function (TCTF) test load methodology is used for the specification of the inter-enclosure and intra-enclosure transmitter characteristics. This methodology specifies the transmitter signal at the test points on the required test loads. The transmitter shall use the same settings (e.g., pre-emphasis, voltage swing) with both the zero-length test load and the TCTF test load. The signal specifications at IR, CR, and XR shall be met under each of these loading conditions.

limiting

The TCTF is the mathematical statement of the transfer function through which the transmitter shall be capable of producing acceptable signals as defined by a receive mask. The transmission magnitude response of the TCTF in dB is given by the following equation for 1,5 Gbps:

$$|S_{21}| = -20 \times \log_{10}(e) \times ((6,5 \times 10^{-6} \times f^{0,5}) + (2,0 \times 10^{-10} \times f) + (3,3 \times 10^{-20} \times f^2)) \text{ dB} \quad \textbf{for IT and XT}$$

for 50 MHz < f < 1,5 GHz, and:

$-20 \times \log_{10}(e) \times ((1,7 \times 10^{-5} \times f^{0.5}) + (1,0 \times 10^{-10} \times f)) \text{ dB}$ **for CT**

$$|S_{21}| = -5,437 \text{ dB} \quad \textbf{for IT and XT}$$

for 1,5 GHz < f < 5,0 GHz,

-7.022 dB for CT

where:

    a)   f is the signal frequency in hertz.

The transmission magnitude response of the TCTF in dB is given by the following equation for 3,0 Gbps:

$$|S_{21}| = -20 \times \log_{10}(e) \times ((6,5 \times 10^{-6} \times f^{0,5}) + (2,0 \times 10^{-10} \times f) + (3,3 \times 10^{-20} \times f^2)) \text{ dB} \quad \textbf{for IT and XT}$$

for 50 MHz < f < 3,0 GHz, and:

$-20 \times \log_{10}(e) \times ((1,7 \times 10^{-5} \times f^{0.5}) + (1,0 \times 10^{-10} \times f)) \text{ dB}$ **for CT**

$$|S_{21}| = -10,884 \text{ dB} \quad \textbf{for IT and XT}$$

for 3,0 GHz < f < 5,0 GHz,

-10.694 dB for CT

Transmitters compliant to the CT requirements are also deemed compliant to the IT and XT requirements.
Fig 53 adds "5.4 dB for IT and XT (7.0 dB for CT)".   Fig 54 adds "10.9 dB for IT and XT (10.7 dB for CT)".

Conclusions

- The intent of this spec is to guarantee interoperability for most unequalized cables up to 5 meters and equalized cables up to at least 7 meters

- Propose to incorporate this change into the SAS spec, section 5.3.11