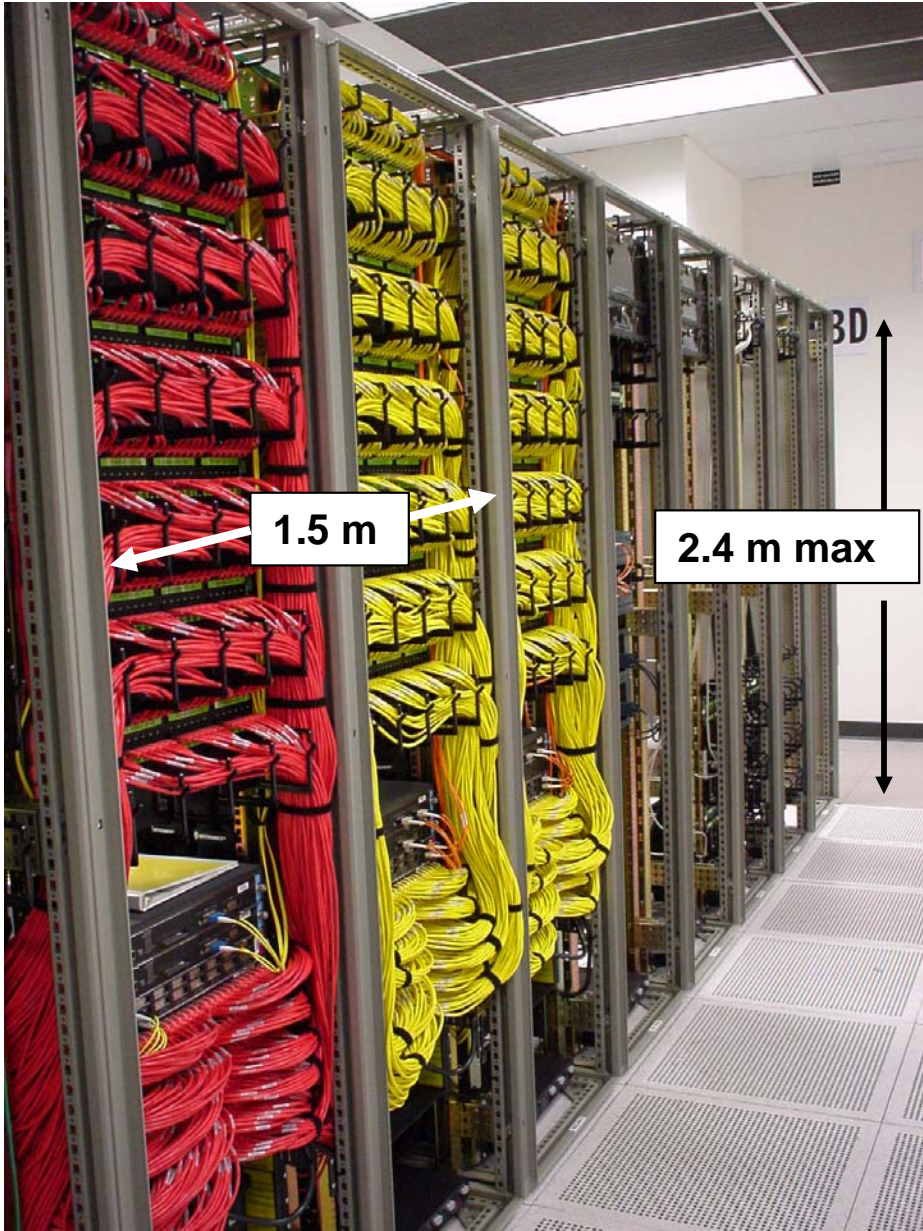

Feasibility of a 100 Gb/s copper interconnect

**Chris DiMinico
MC Communications**

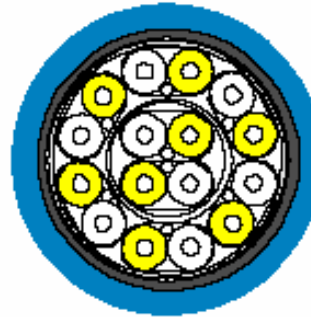
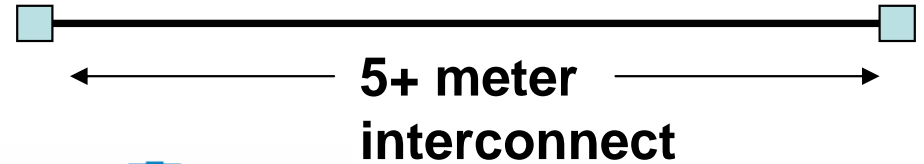
Contributors

- **George Zimmerman – Solarflare Communications**
- **Larry Cohen – Independent**
- **Henning Hansen – Leoni High Speed Cables**
- **Chris DiMinico – MC Communications**

Proposal: High Speed Copper Interconnect:



Intra/Inter rack/cabinet applications



100 ohm 8 pairs
28 AWG - 5.6mm (0.220 in)

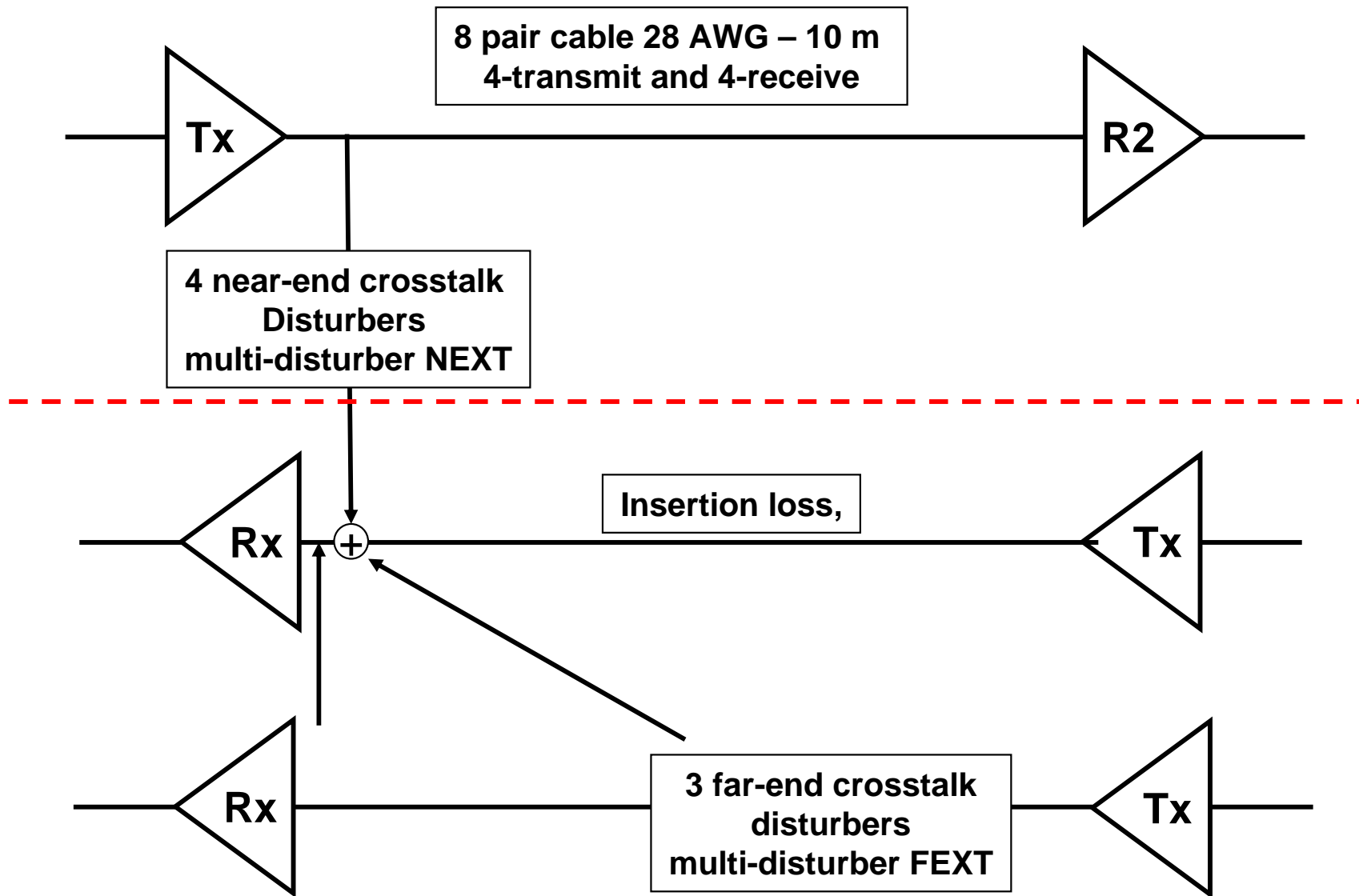
TIA-942 - Cabinet and rack height

- The maximum rack and cabinet height shall be 2.4 m (8 ft).
- Preferably no taller than 2.1 m (7 ft) for easier access to the equipment or connecting hardware installed at the top.

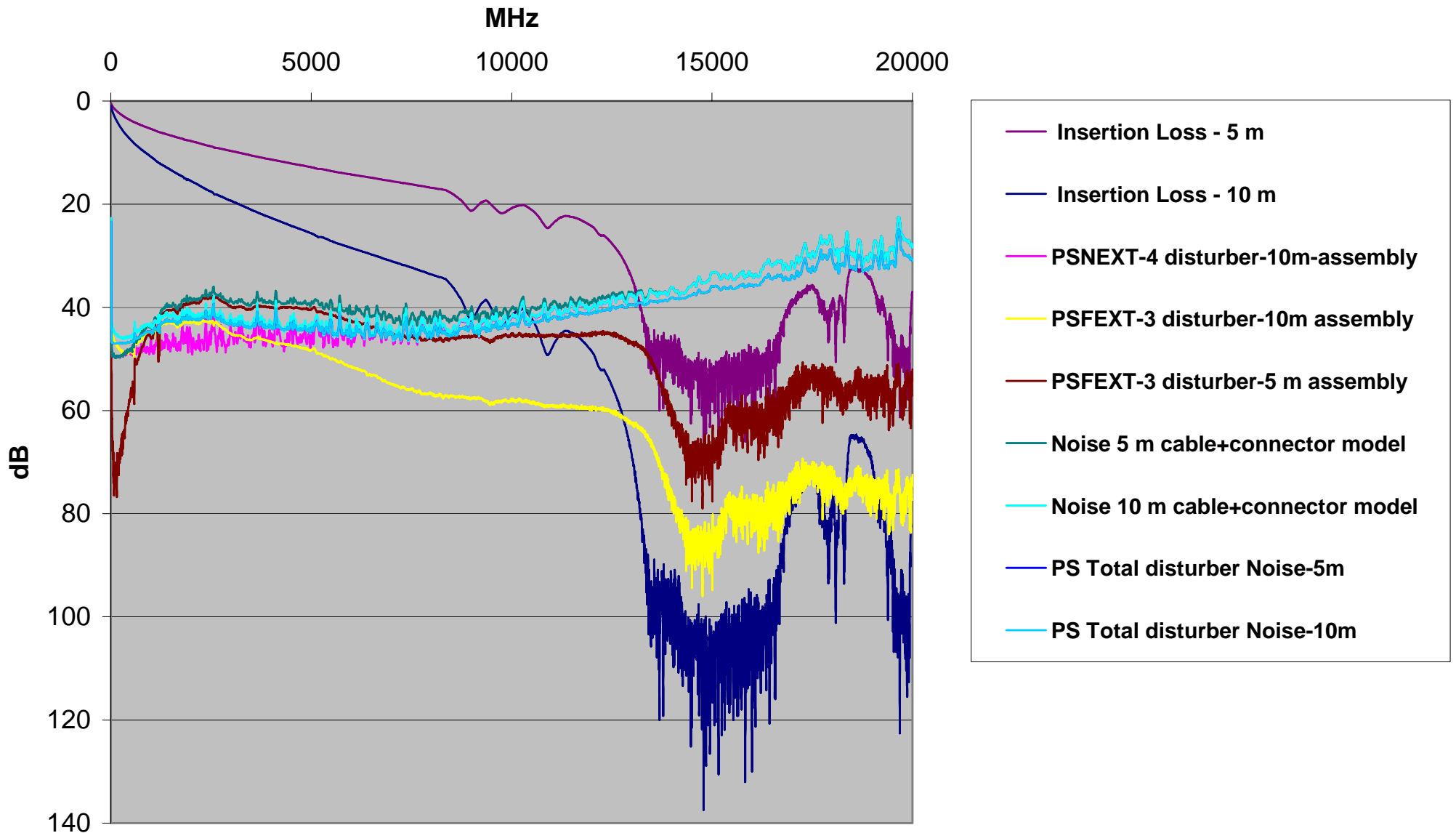
High Speed Copper Interconnect: Length Reference

Fibre Channel Protocol	Signaling (Gbd)	Length (m)
serial	1.0625	30
serial	2.125	15
serial	4.25	7
parallel	4 x 3.1875	10
Ethernet Protocol	Signaling (Gbd)	Specified length (m)
10GBASE-CX4	4 x 3.125	15
InfiniBand Protocol	Signaling (Gbd)	Length (m) (loss based)
serial	1 x 2.5	17
parallel	4 x 2.5	10
parallel	12 x 2.5	10
Serial Attaced SCSI (SAS) and Serial AT attached (SATA)	Signaling (Gbd)	length (m) (loss based)
	1.5	6
	3	6
PCI Express	Signaling (Gbd)	length (m) (loss based)
parallel	x1, x4 ,x8, x16 -2.5	7
parallel	x1 ,x4 ,x8 , x16- 5	7 (TBD)

Analysis: Copper Interconnect S-parameters

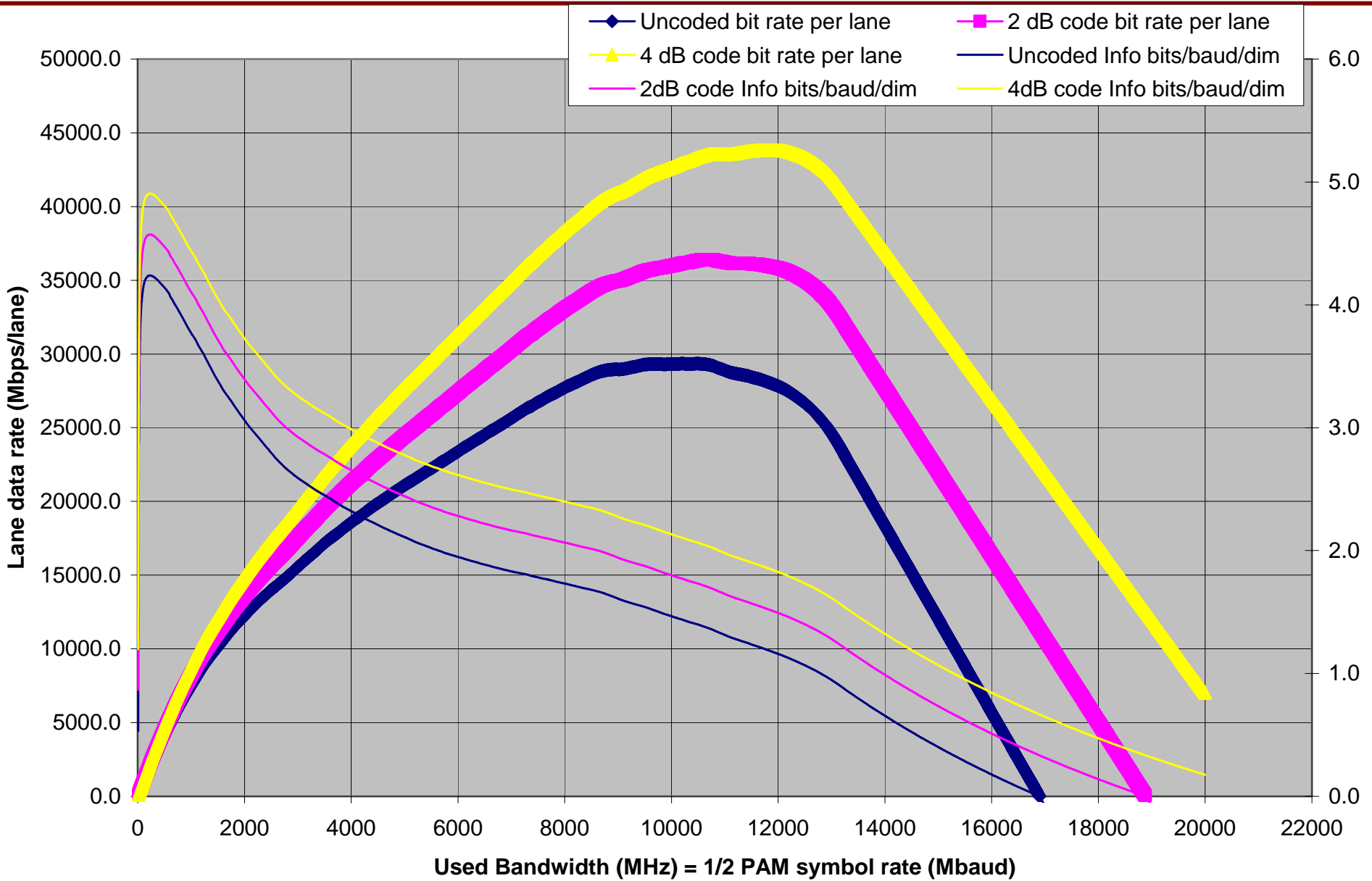


Interconnect Transmission Characteristics



Lane Rate vs. 1/2 PAM symbol rate

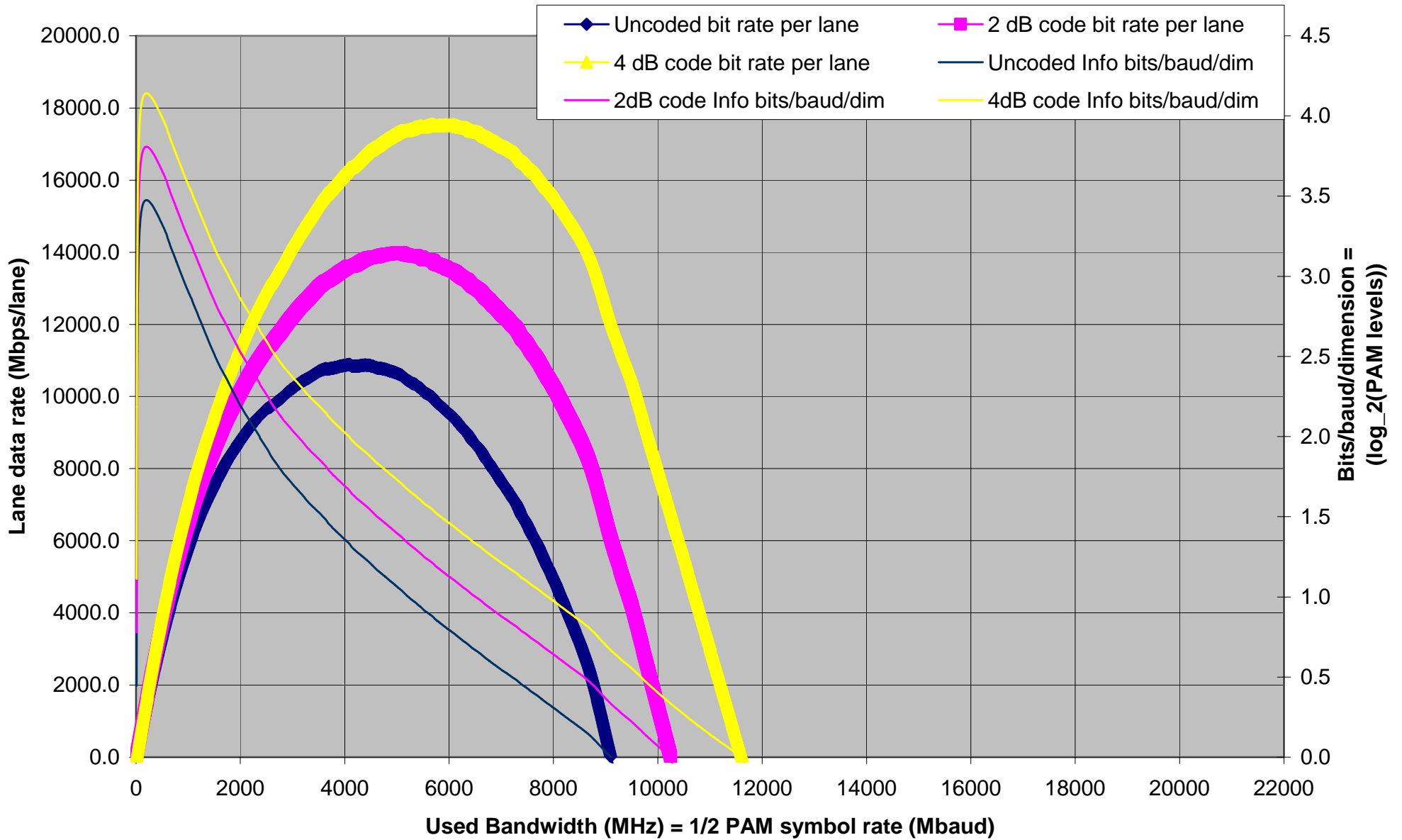
6 dB Margin, 5m cable + connectors



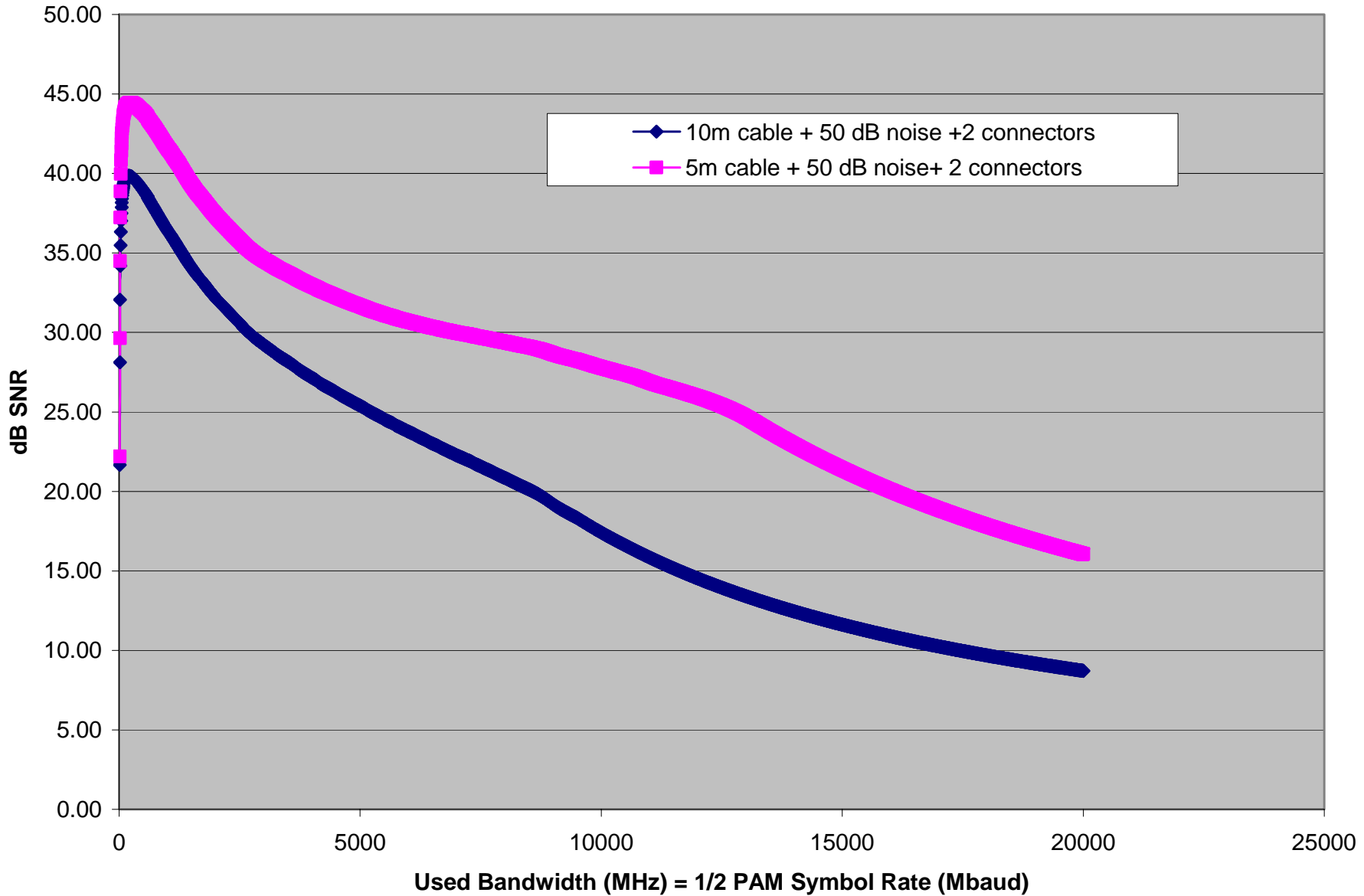
IEEE 802.3 HSSG

Lane Rate vs. 1/2 PAM symbol rate

6 dB Margin, 10m cable+connectors



Cable Salz SNR - 0 folds



Conclusions

- **Feasibility of 100 Gb/s copper interconnect demonstrated**
- **5+ meter reach consistent with intra/inter rack application distances**
- **High speed study group should consider high speed copper interconnect to address intra/inter rack applications**