

Impact of Optical Return Loss in 400GBASE-SR8 channel links

In support of comment # I-1

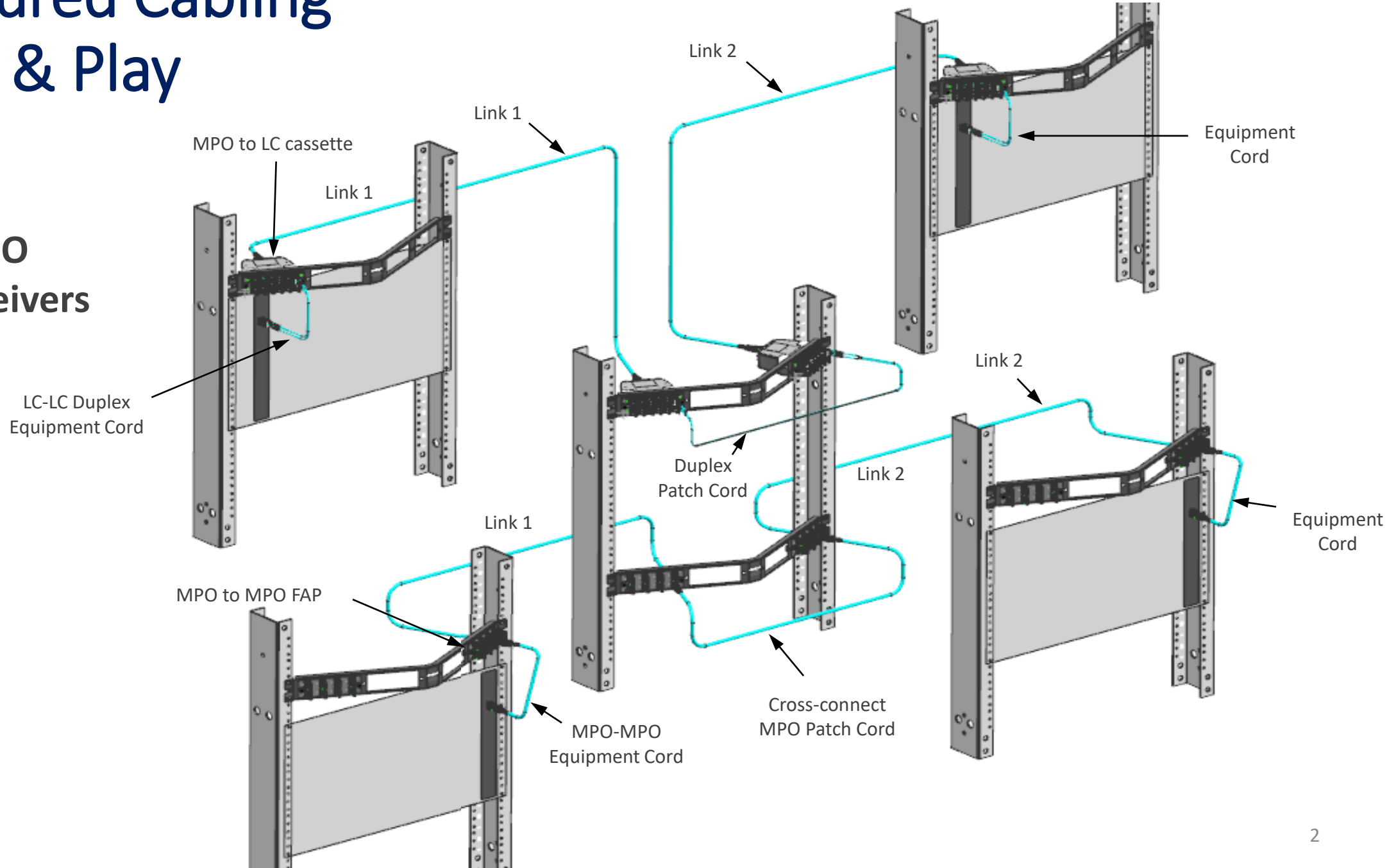
*Rick Pimpinella, Bulent Kose, Jose Castro
Panduit Labs, Panduit Corp.*

IEEE P802.3db 100 Gb/s, 200 Gb/s, and 400 Gb/s
Short Reach Fiber

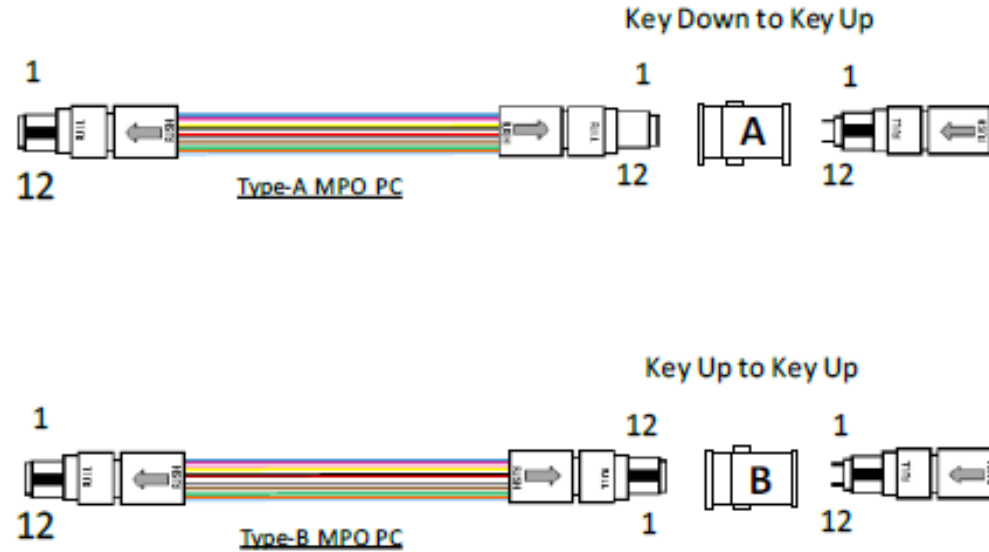
Ad hoc Telecon, April 14, 2022

Structured Cabling – Plug & Play

MPO Transceivers



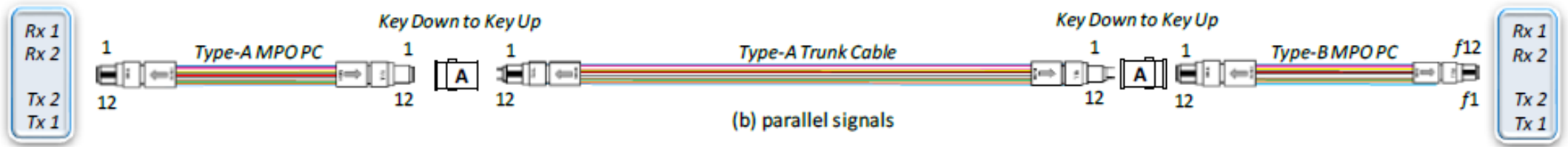
TIA 568, Structured Cabling Methods A & B



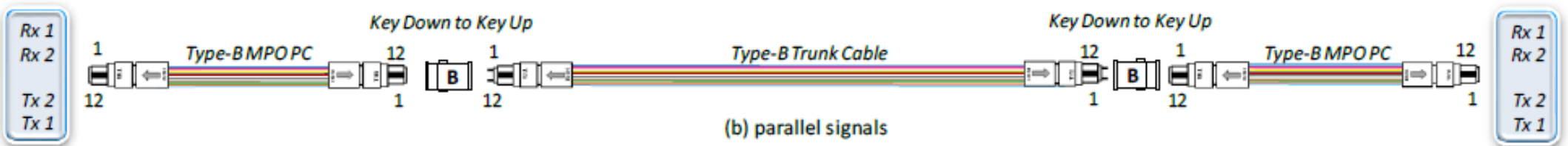
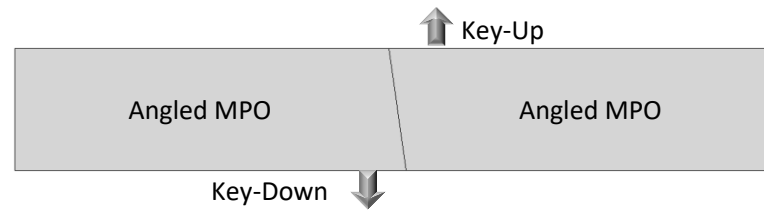
Summary of components used for parallel fiber structured cabling

Connectivity Method	Array connector Cable Type	Array adapter Type	Array patch cord type
A	A	A	One Type-A and one Type-B
B	B	B	Type-B

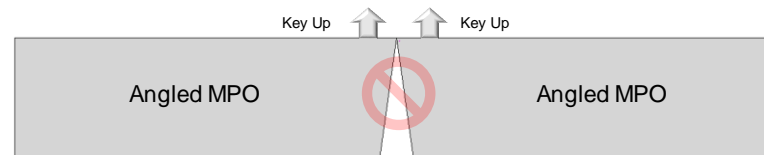
Issue – TIA 568, Structured Cabling Methods A & B



Method A connectivity for duplex and parallel fiber signaling.



Method B connectivity for duplex and parallel fiber signaling.



ANSI/TIA-568.3-D-2016

Approved: October 25, 2016

A.4.3 Return loss

Test procedure: TIA-455-107 or TIA-455-8

Sample size: 24 devices (i.e., pairs of mated connectors)

Details:

- Deviations: none
- Requirement: 20 dB minimum for multimode fiber, 35 dB minimum for single-mode fiber, 55 dB minimum for single-mode broadband analog video (CATV) applications.
- For all Annex A requirements, the minimum single-mode return loss for broadband analog video (CATV) applications is 55 dB.

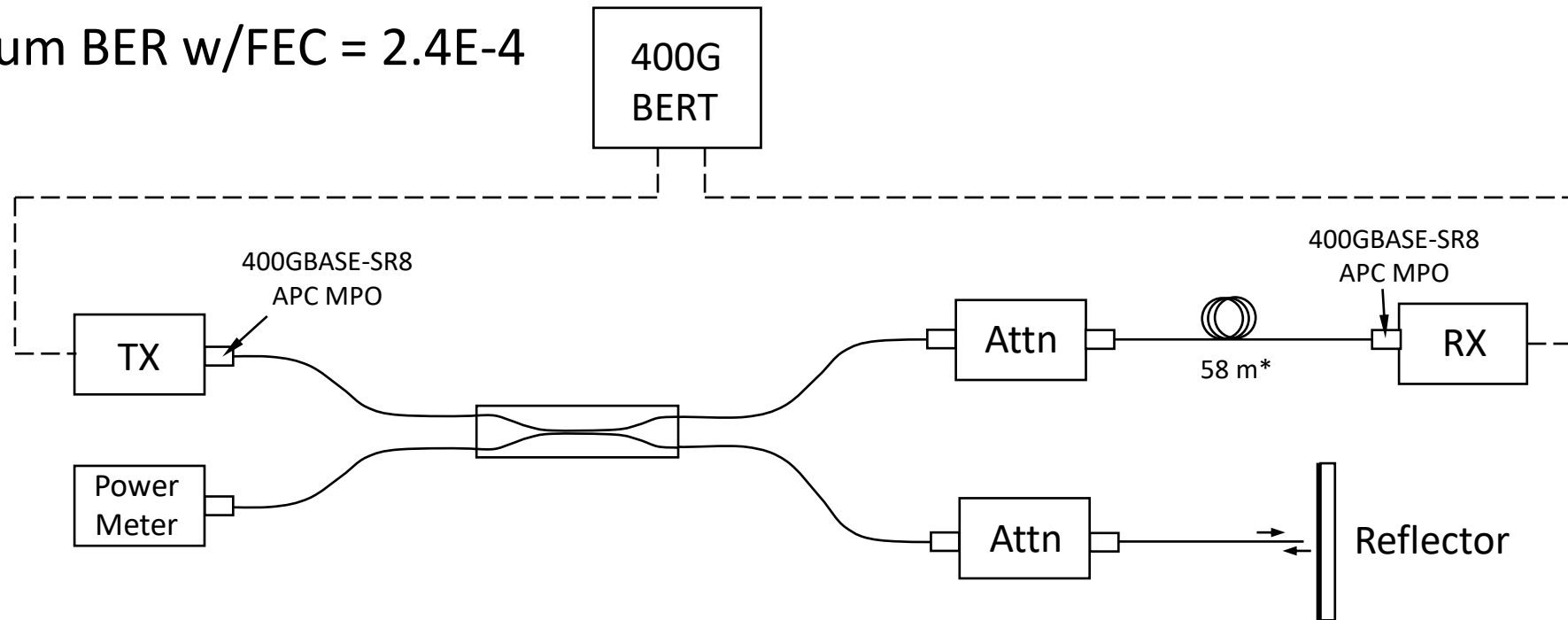
167.11.4.6 Characteristics of the fiber optic cabling and MDI

Item	Feature	Subclause	Value/Comment	Status	Support
OC1	Fiber optic cabling	167.10	Meets requirements specified in Table 167-14	INS:M	Yes [<input type="checkbox"/> N/A [<input type="checkbox"/>
OC2	Optical fiber characteristics	167.10.1	Per Table 167-15	INS:M	Yes [<input type="checkbox"/> N/A [<input type="checkbox"/>
OC3	Maximum discrete reflectance	167.10.2.2	Less than -20 dB	INS:M	Yes [<input type="checkbox"/> N/A [<input type="checkbox"/>



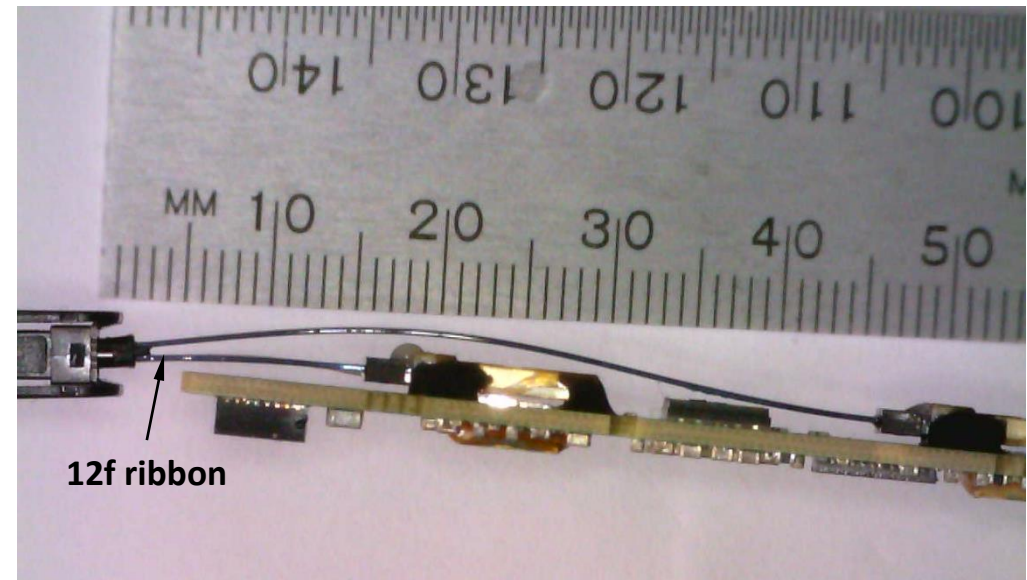
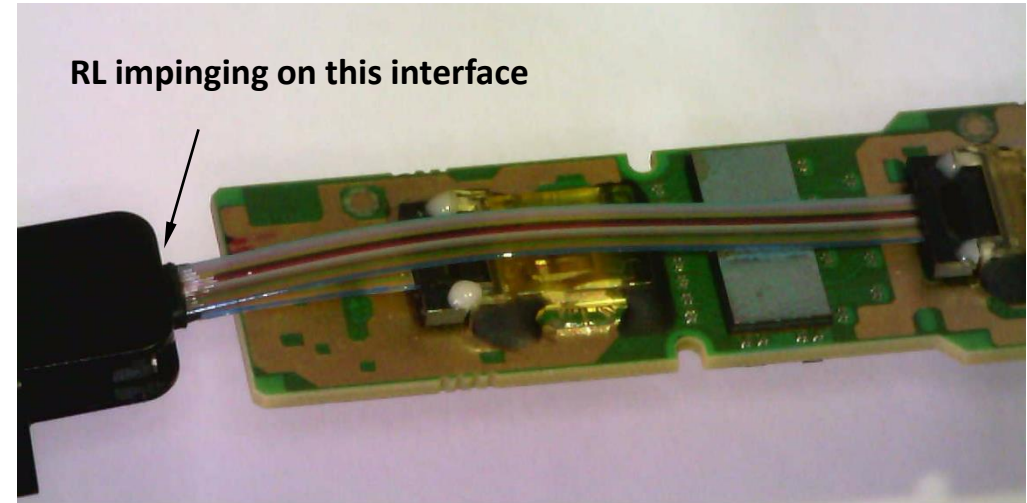
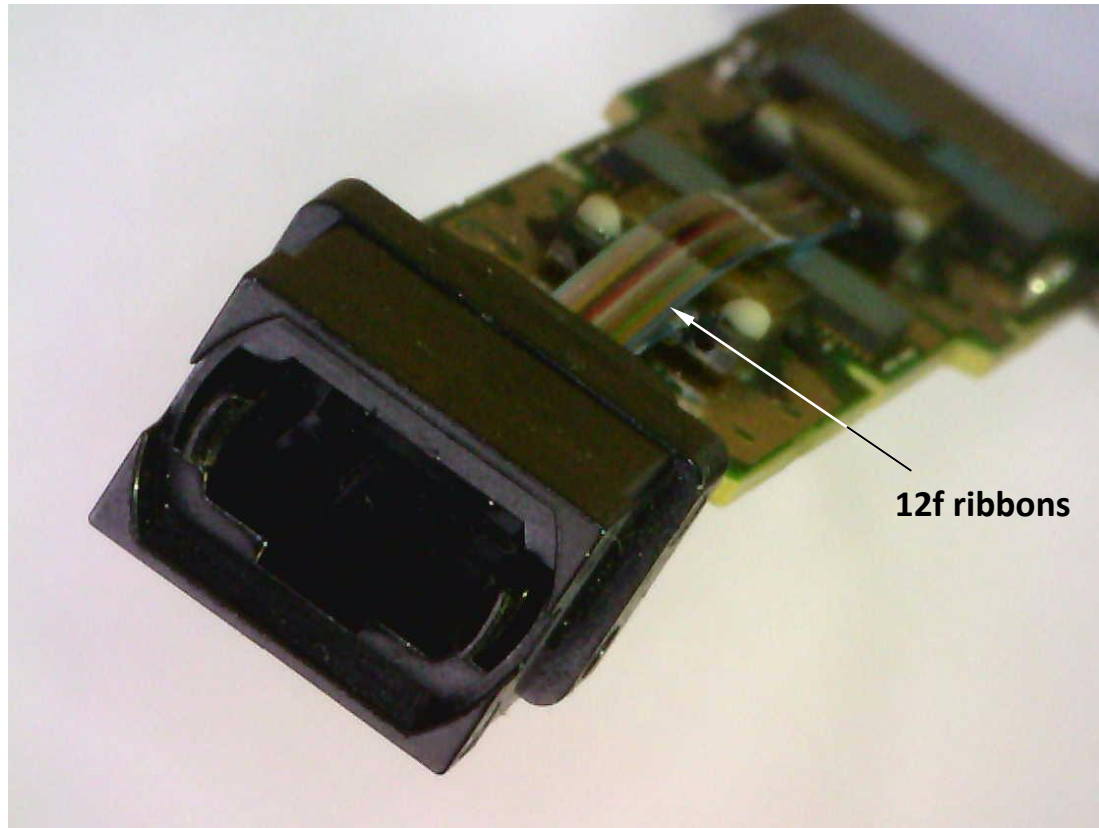
Experimental Setup

- 2 - 400GBASE-SR8 Manufacturers
- APC MPO connector interfaces (16 port MPOs)
- Tested multiple ports per transceiver
- Tested 3 cable lengths for each port – B2B, 58m, 94m
- Measured RL as seen by transceiver
- **NO FEC**
- Maximum BER w/FEC = $2.4E-4$



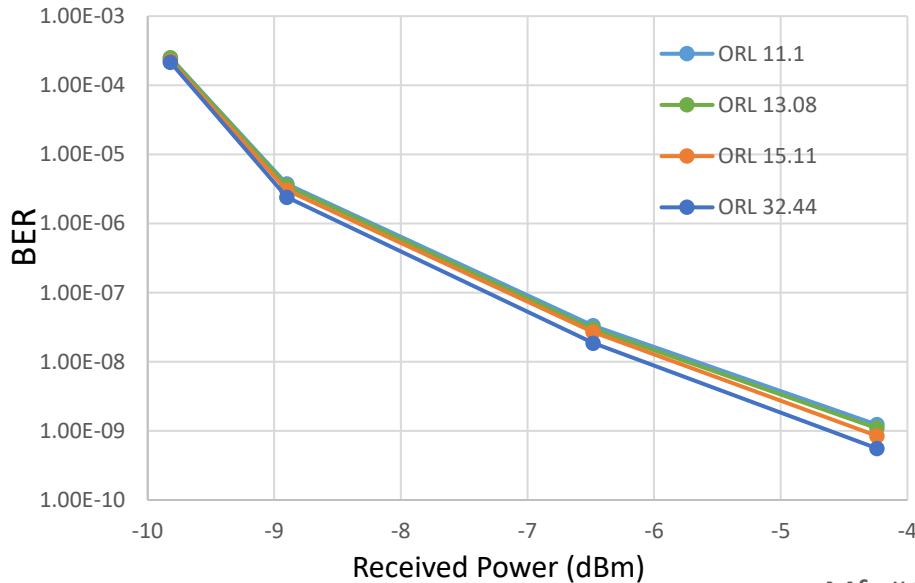
* Worst-case OM3 test fiber

400GBASE-SR8 Transceiver – internal fibers

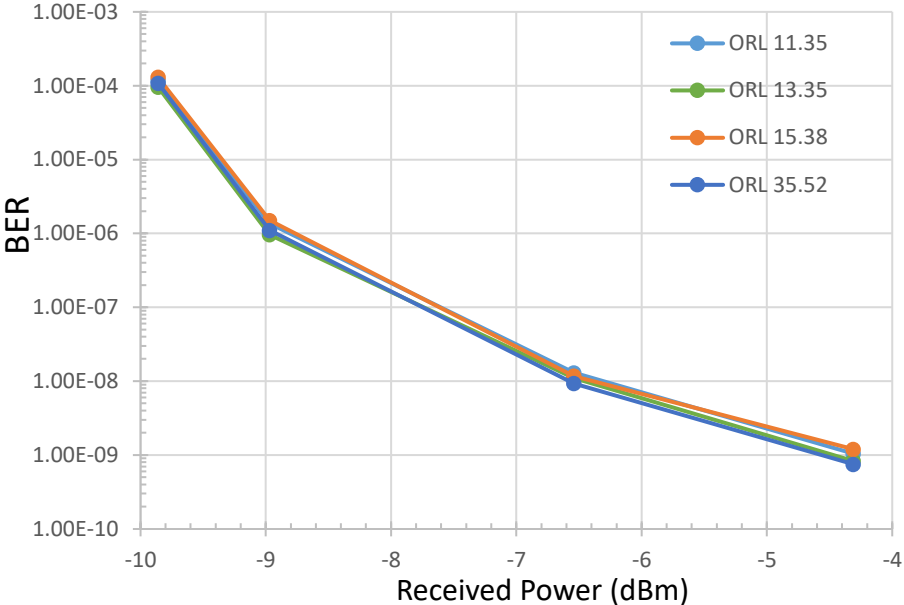


Test Results – Manufacturer #1

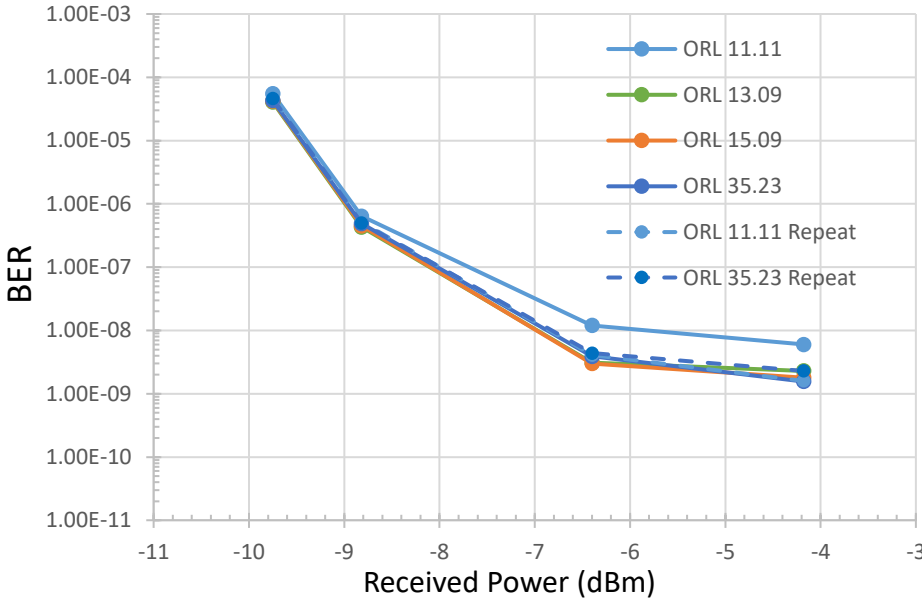
Mfr #1, TX1 P1 with 58 m A77



Mfr #1, TX1 P6 with 58 m A77

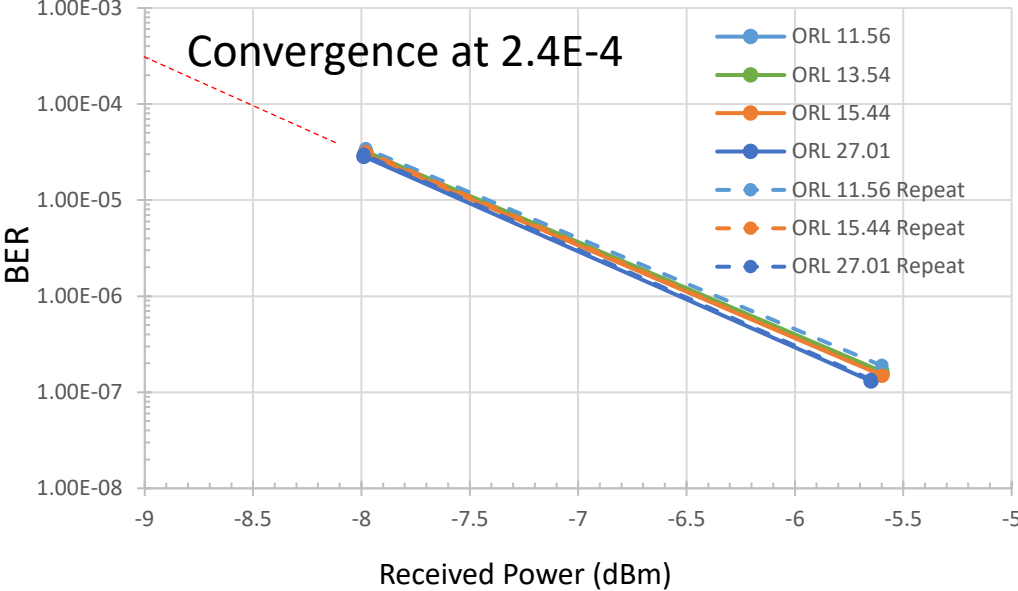


Mfr #1, TX1 P8 with 58 m A77

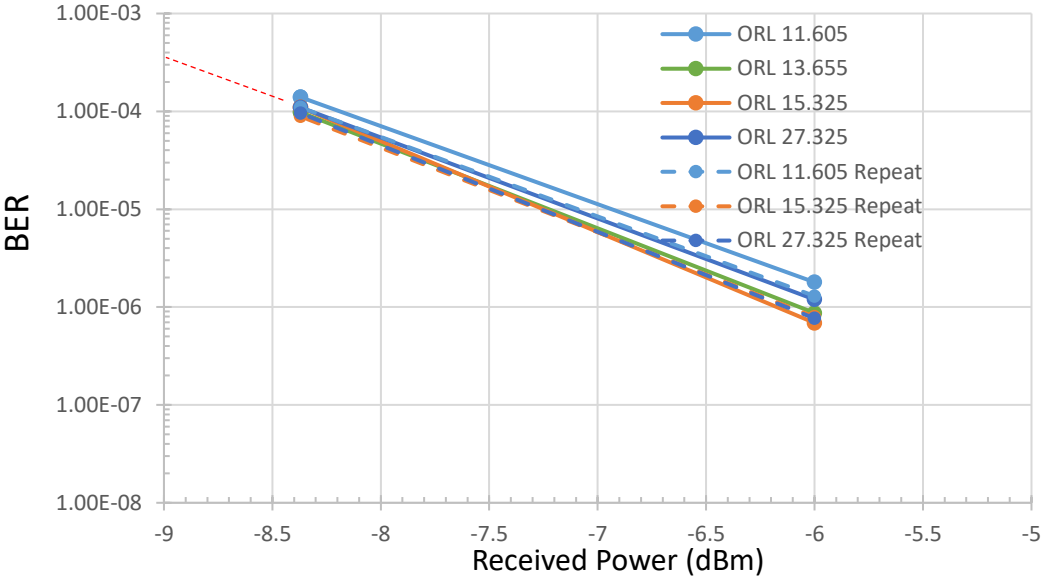


Test Results – Manufacturer #2

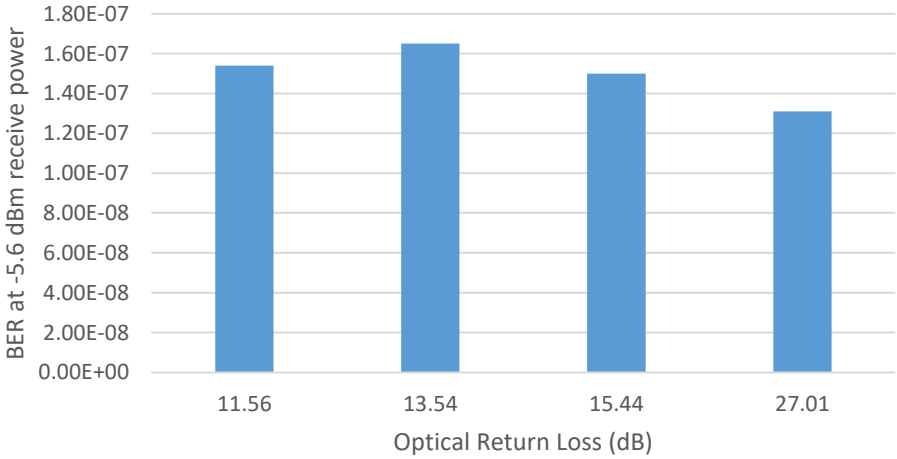
Mfr#2 P4 with 58 m A77



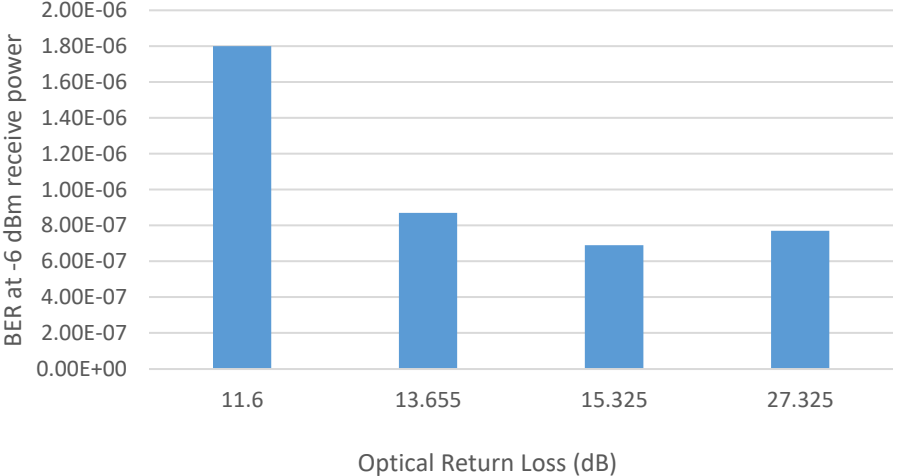
Manufacturer #2, P8 with 58 m A77



Mfr#2, P4



Mfr#2, P8



Conclusions

- APC MPO at the MDI has no impact on channel performance compared to PC
- Currently, there is no Standard for multimode APC MPO connectors
- Hybrid APC MPO patch cords will introduces inventory problems throughout industry
- APC only addresses the preference of a narrow (but deep) market
 - *APC does not meet the needs of the broad market*
- IEEE 802.3db should only specify PC MPO
 - *APC can be informative*