HOST TO MODULE APPLICATIONS AND HOST OPTIONS FOR LINEAR I/O

IEEE P802.3DB 100 GB/S, 200 GB/S, AND 400 GB/S

SHORT REACH FIBER TASK FORCE

AD HOC TELECONFERENCE, 15 OCTOBER 2020

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OVERVIEW

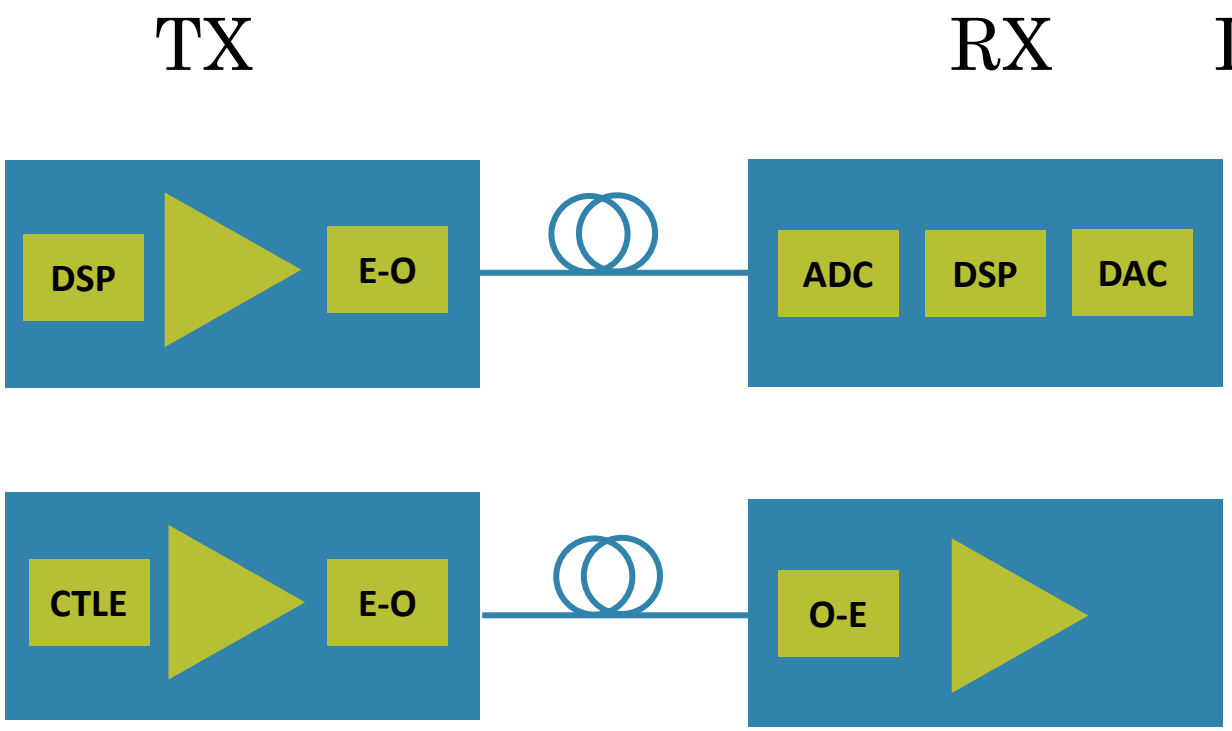
- Applications that will benefit from a linear interface
  - Latency comparison
  - Power comparison
- Host Interface Options for 100G I/O ports
  - ASIC to On package Optics
  - ASIC to Optical Engine Echip
  - ASIC to COBO
  - ASIC to front panel
- Switch Design Example

WHAT APPLICATIONS WILL USE LINEAR?

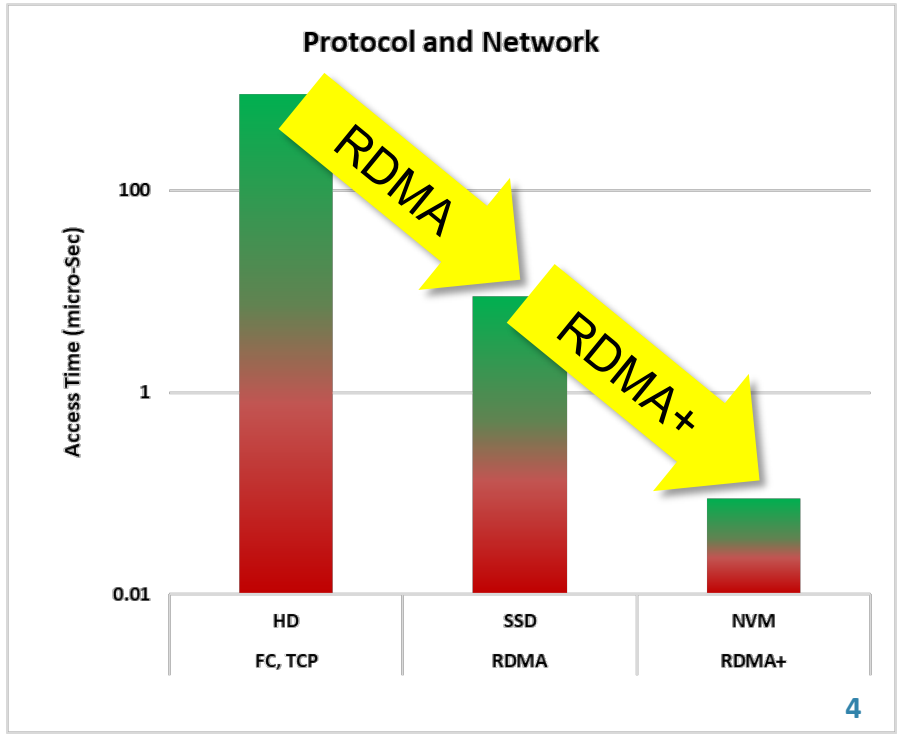
- Networking:
  - Reduced cost and power
- High performance compute:
  - reduced latency, lower cost/power
- AI cluster:
  - reduced latency, lower cost/power
- 5G/telecom:
  - Solves synchronization problems (ppp, IEEE 1588)

  - Good info: https://www.lightwaveonline.com/webcasts .

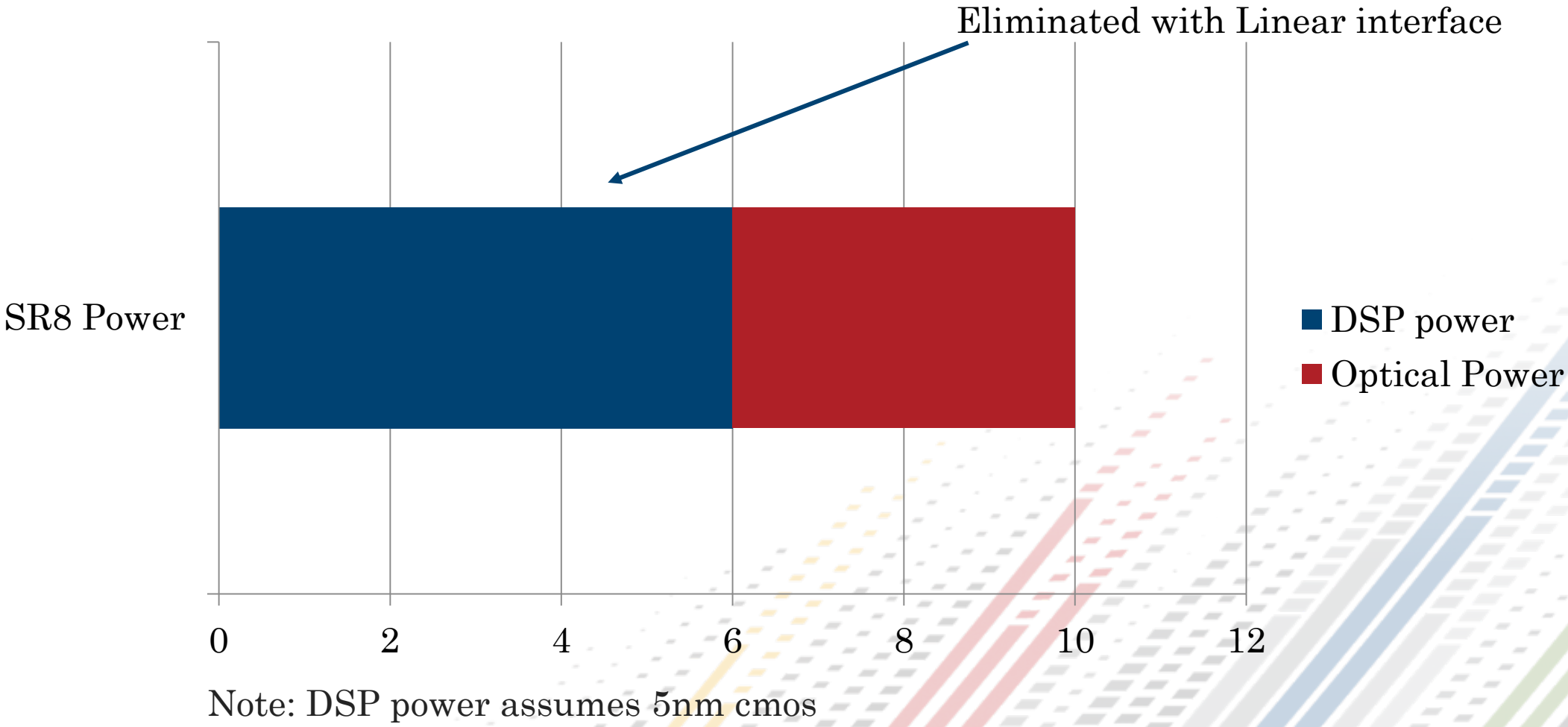
TYPICAL LATENCY OF OPTICAL LINK ARCHITECTURES



* Excluding the flight time of light



800G-SR8 POWER DISSIPATION



Note: DSP power assumes 5nm cmos

WHAT ARE THE OPTIONS FOR A 100G HOST INTERFACE?

1: 5 dB ASIC to On package Optics

2: 8-10 dB ASIC to Optical Engine Echip with Socket as specified in OIF CEI-112G-XSR

3: 8-10 dB ASIC to On Package Optical as specified in CPO JDF and OIF CEI-112G-XSR

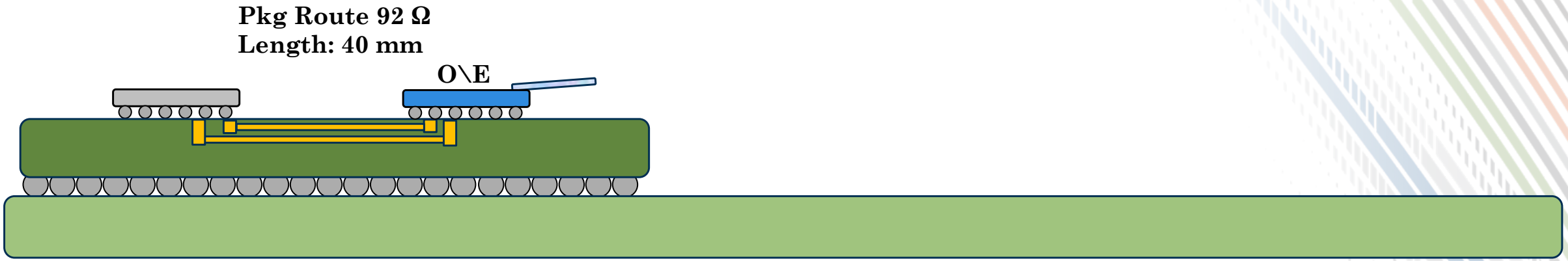
4: ASIC to COBO as shown in COBO MSA

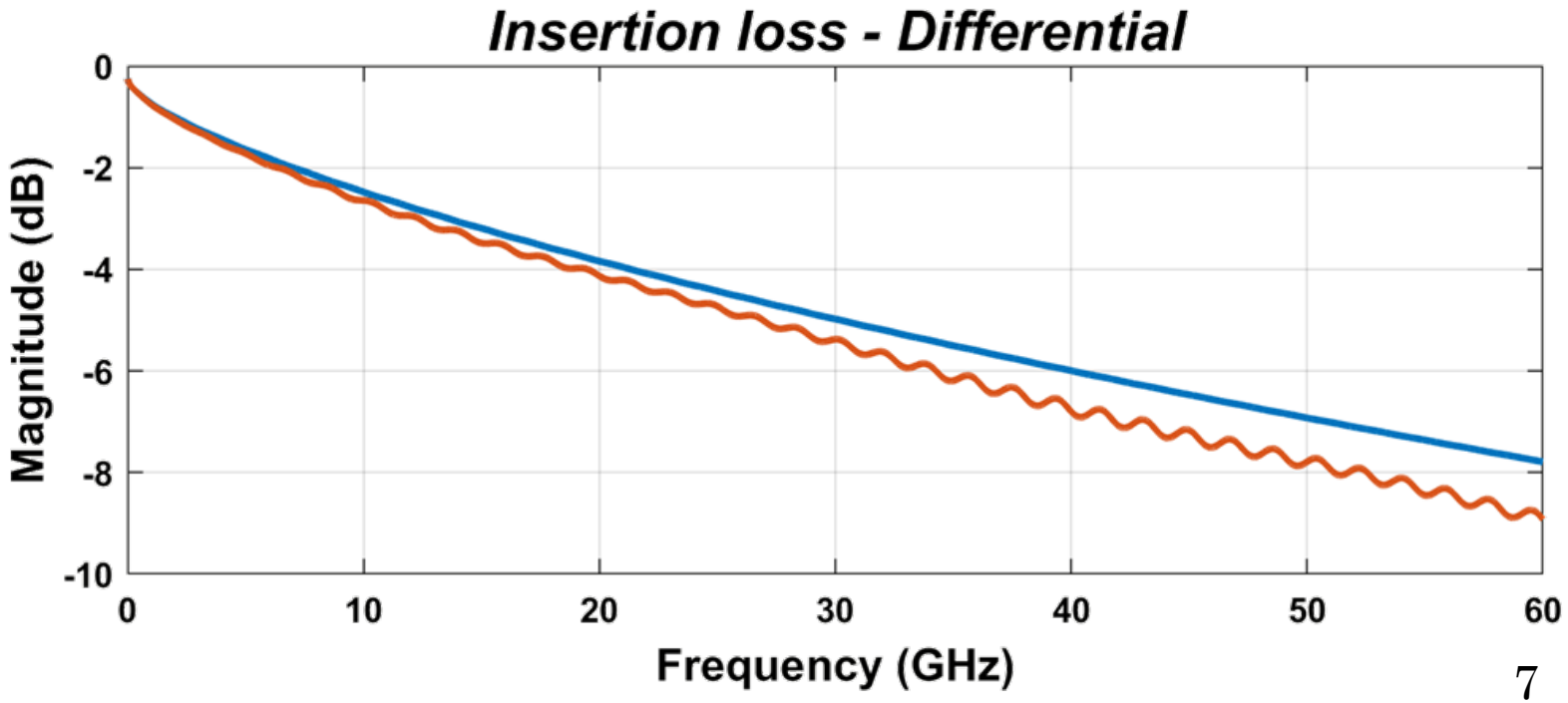
5: 11 dB ASIC to front panel socket as specified in 802.3ck Clause 162

- Note: 100G Server NIC will comply with Clause 162 channel

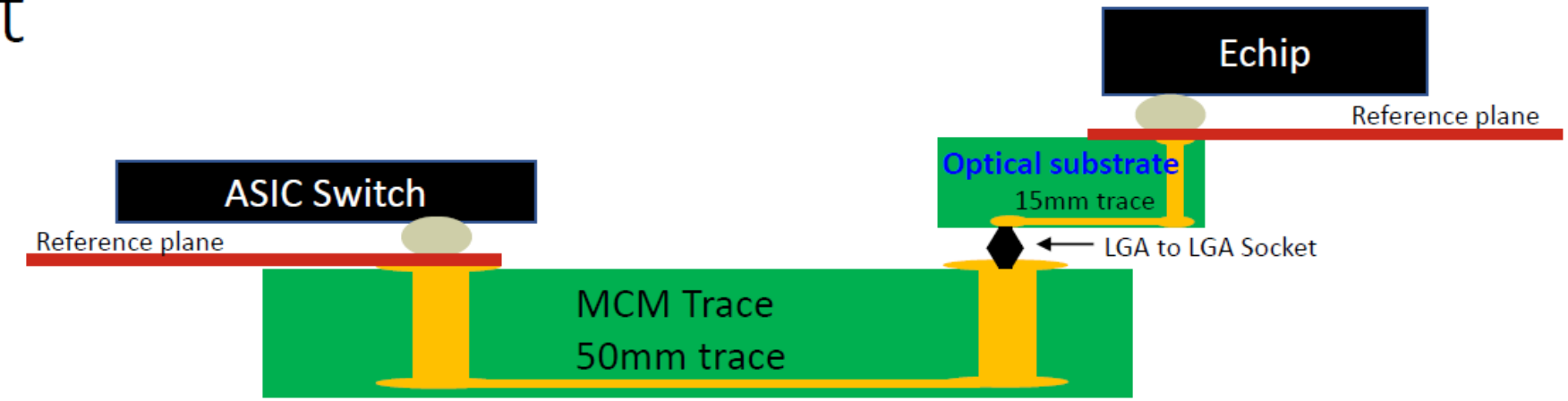
6: 16 dB ASIC to front panel socket as specified in 802.3ck Annex 120G

DIRECT CONNECT TO OPTICS



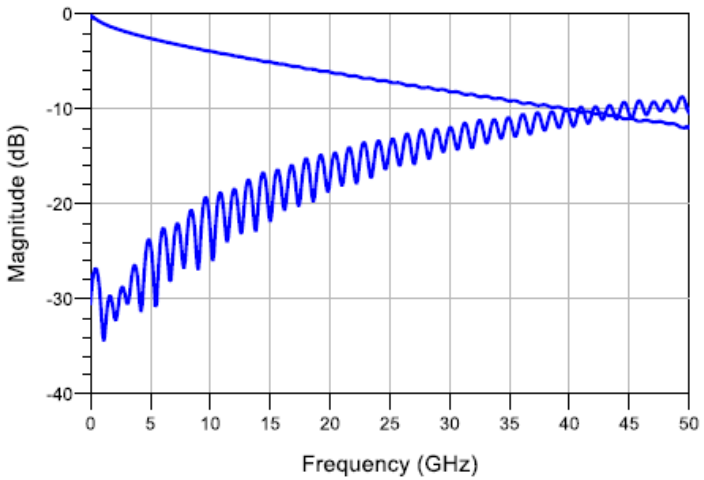


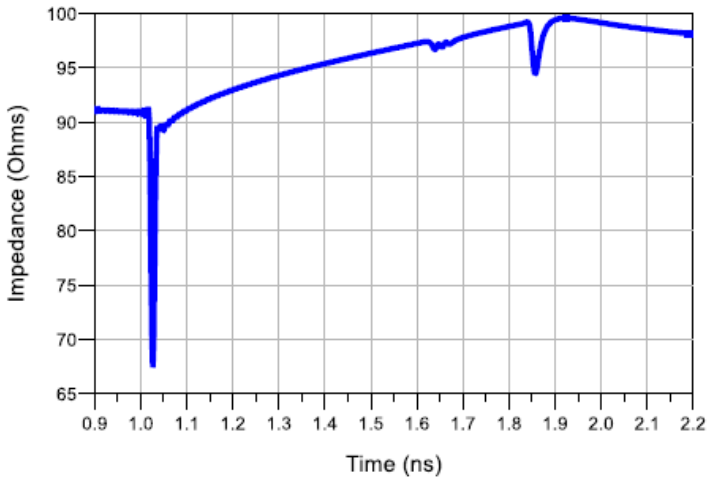
112G Channel: ASIC to Optical Engine Echip With Socket



Assumptions:

- 92 Ohms
- Width: 28um
- Spacing 80um
- Surface roughness: 0.1um
- Dielectric: 3.3
- Loss tangent: 0.0044
- Via Hole: 60/50um
- Pad size is 100um / 200um

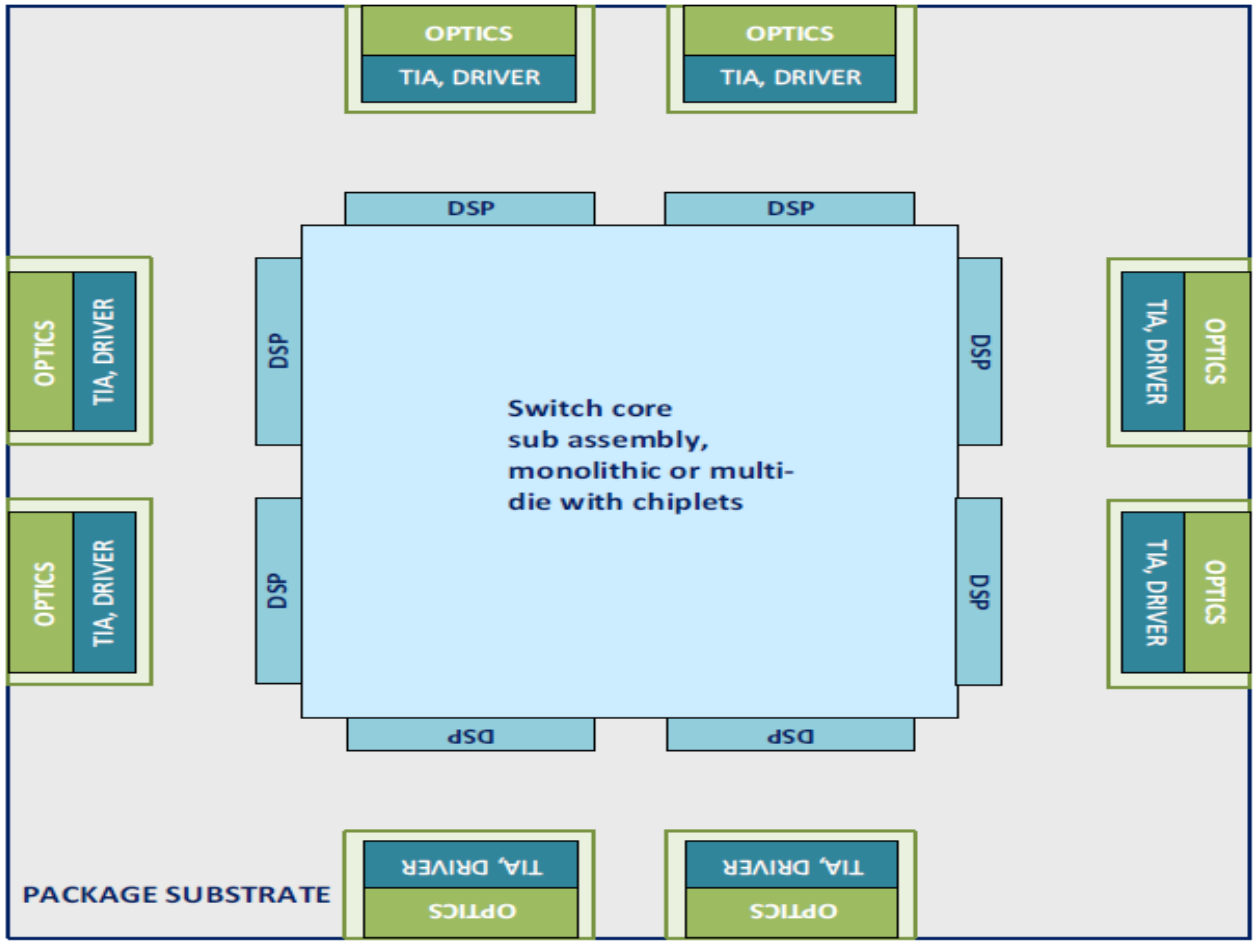




@29GHz
IL: -8.0dB
RL: -12.3dB

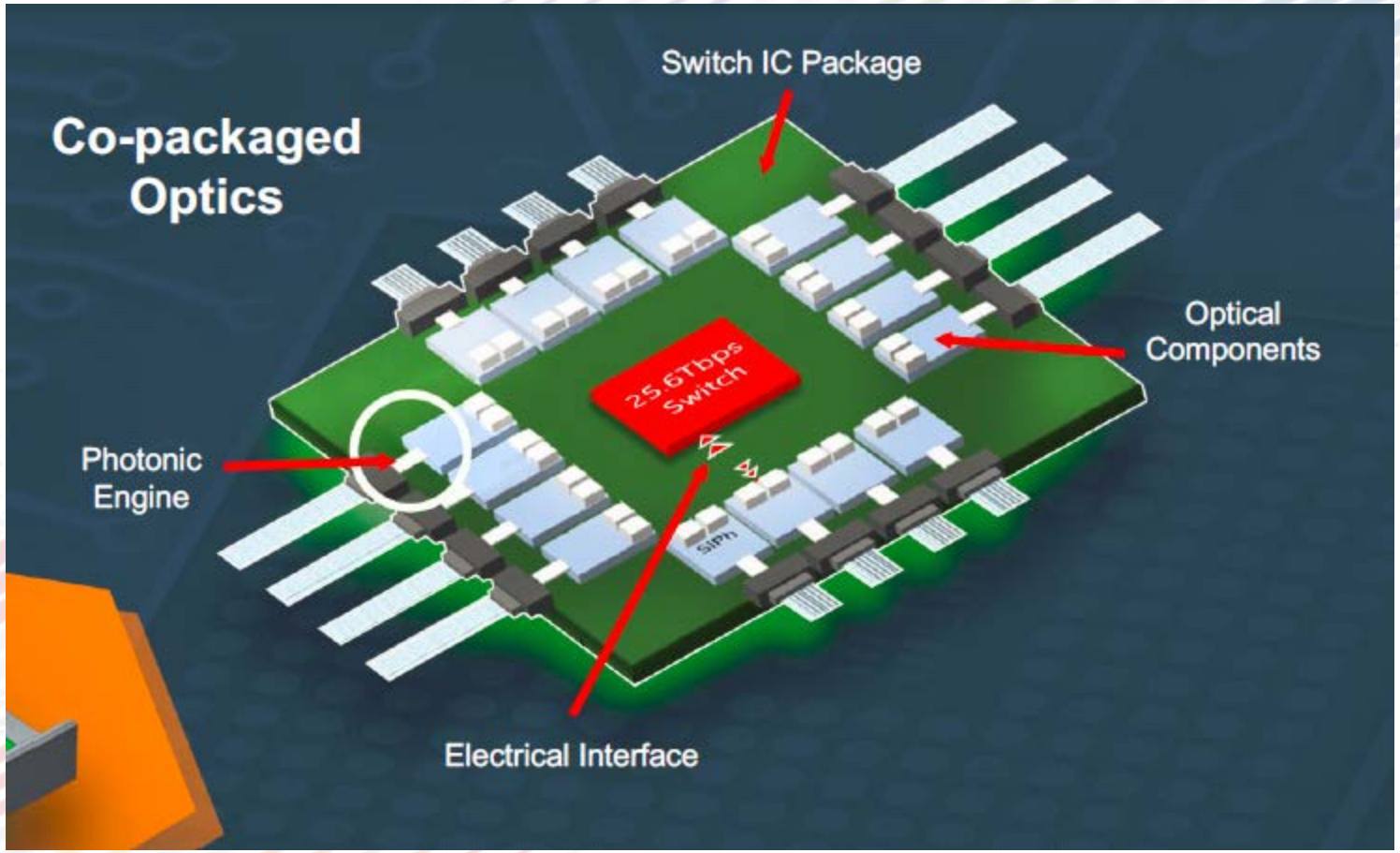
Courtesy of TE

DIRECT DRIVE CO-PACKAGED

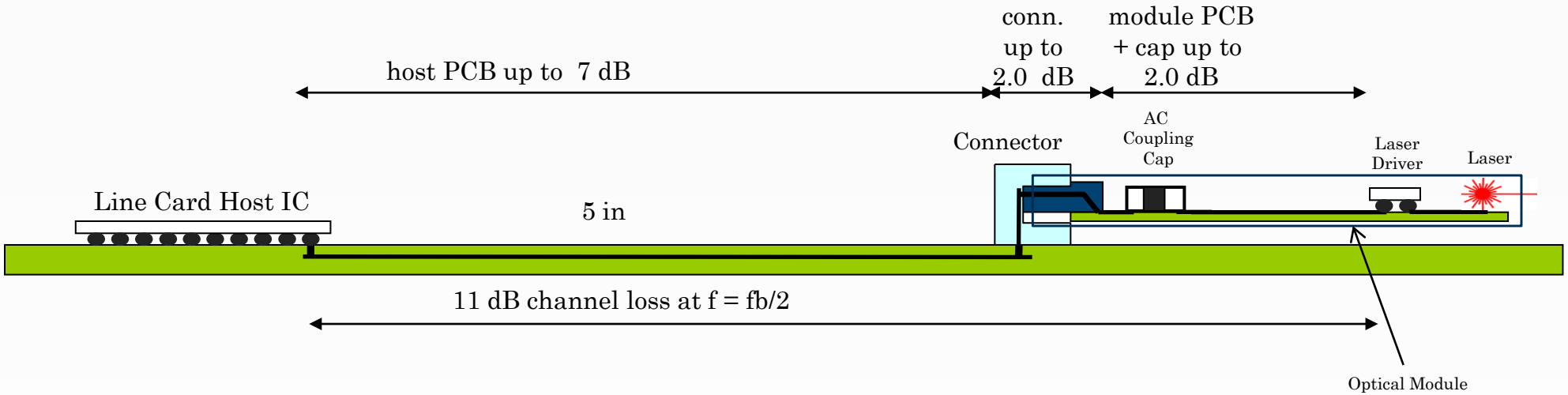


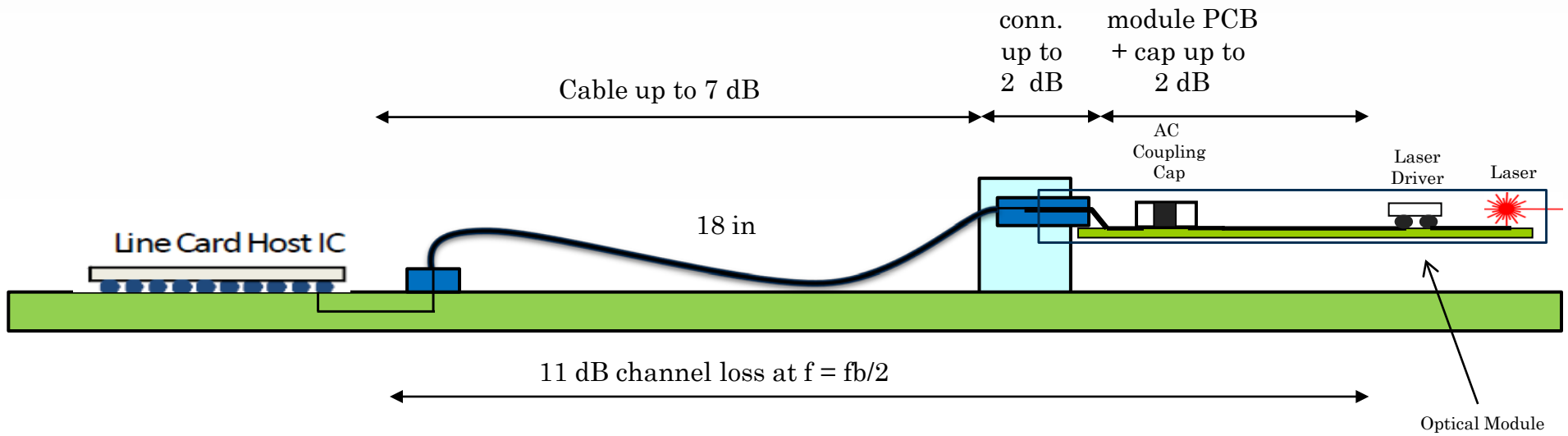
Courtesy of Facebook

ASIC TO COBO AS SHOWN IN COBO MSA

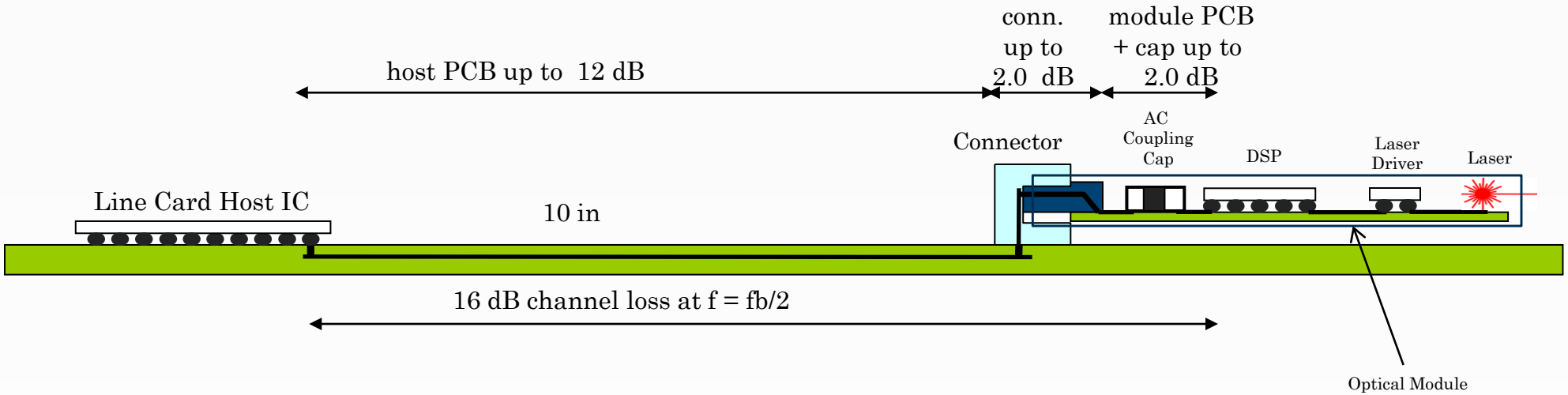


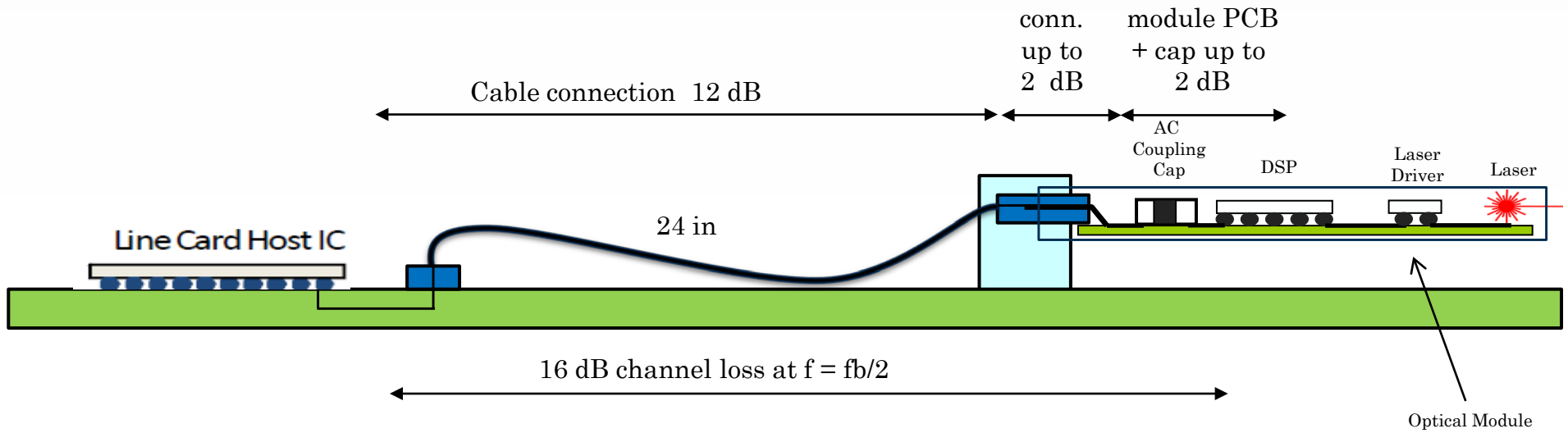
11 dB ASIC to front panel socket as specified in 802.3ck Clause 162





16 dB ASIC to front panel socket as specified in 802.3ck Annex 120G





WHAT IS OIF-112G-XSR?

Spec is written for low latency (minimal FEC) channels with no connector

BER = 10^{-9} for 8 dB channel

BER = 10^{-8} for 10 dB channel

WHAT INTERFACES WILL USE A LINEAR SPEC?

5 dB ASIC to On Package Optics:

Yes, Shortest channels, no connectors

8-10 dB ASIC to Optical Engine Echip with Socket

Yes: Low Insertion loss, Socket shows good Signal integrity

8-10 dB ASIC to On Package Optical as specified in CPO JDF

Yes: Low Insertion Loss, good Signal Integrity

ASIC to COBO as shown in COBO MSA

Probably: COBO has not specified 100G channels

11 dB ASIC to front panel socket as specified in 802.3ck Clause 162

Yes: Channel simulations show good results

16 dB ASIC to front panel socket as specified in 802.3ck Annex 120G:

- Probably too much loss

Switch design supporting re-timed, linear, copper and backplane channels