



SYSTEM ARCHITECTURES FOR 40GBE SERIAL

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System Vendor Requirements for 40G

- Systems vendors and end users would like to continue doing what they are doing – using SFP+ and duplex fiber for most applications
- While 40GbE QSFP+ has seen large deployments, shifting to 40GbE SFP40 will take 40GbE into even more environments at lower cost
- Switch-on-a-chip designs are expected to be the lowest cost solution and should be supported

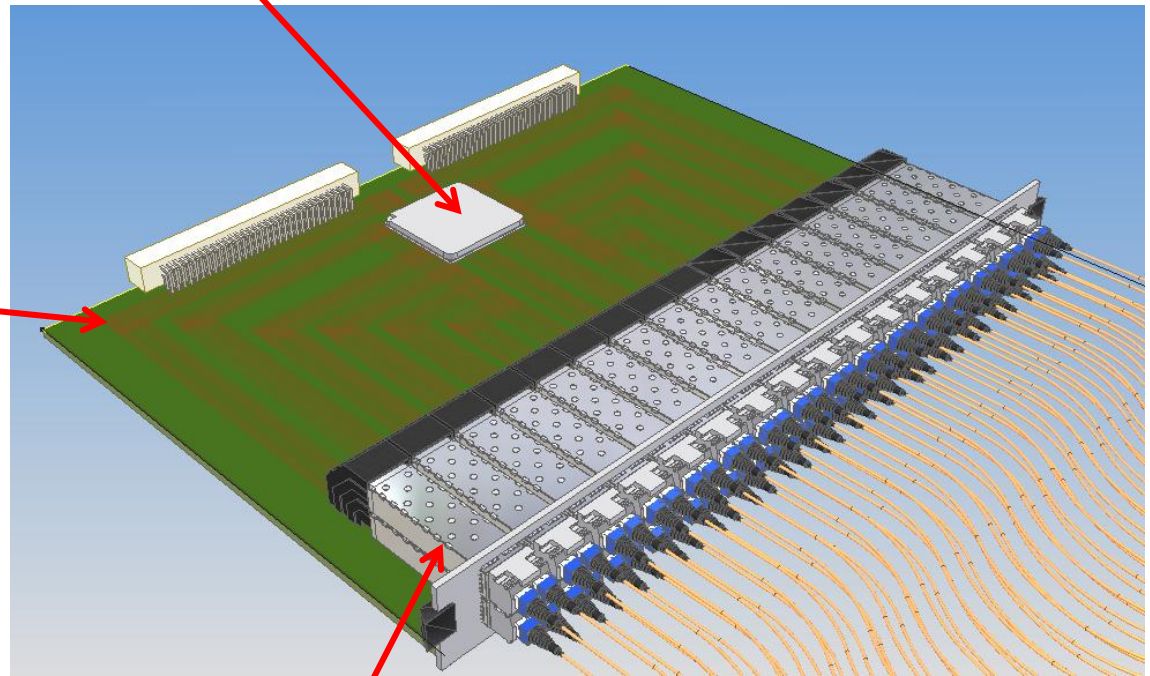


Switch on a Chip Design

Perfectly Matched QSFP+ to ASIC Port Count at 128X10GbE

128 Port ASIC at 10GbE
To 1.28Tb/s of throughput

Long Traces to Modules
at edges of boards -
some over 10"



32 QSFP+ shown with
40GBASE-LR4

CEI-28G-VSR vs 32GFC Insertion Loss

CEI-28G-VSR
10 dB

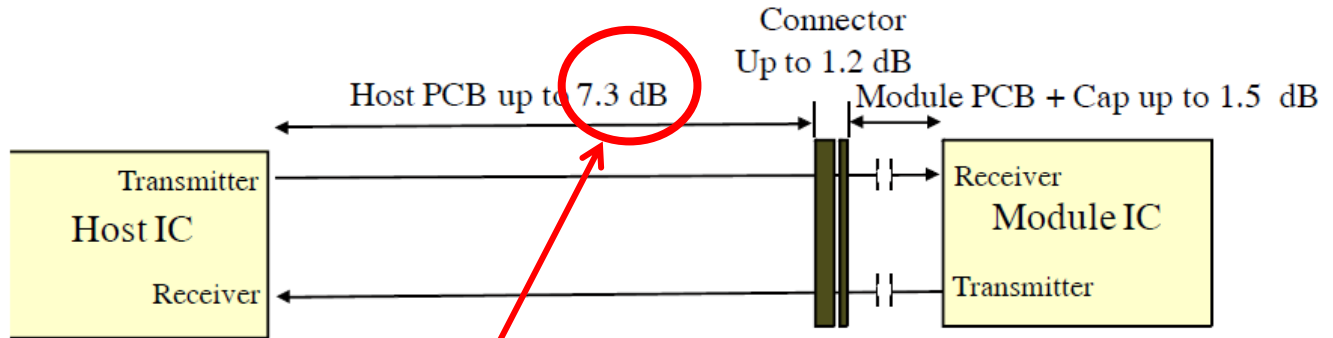
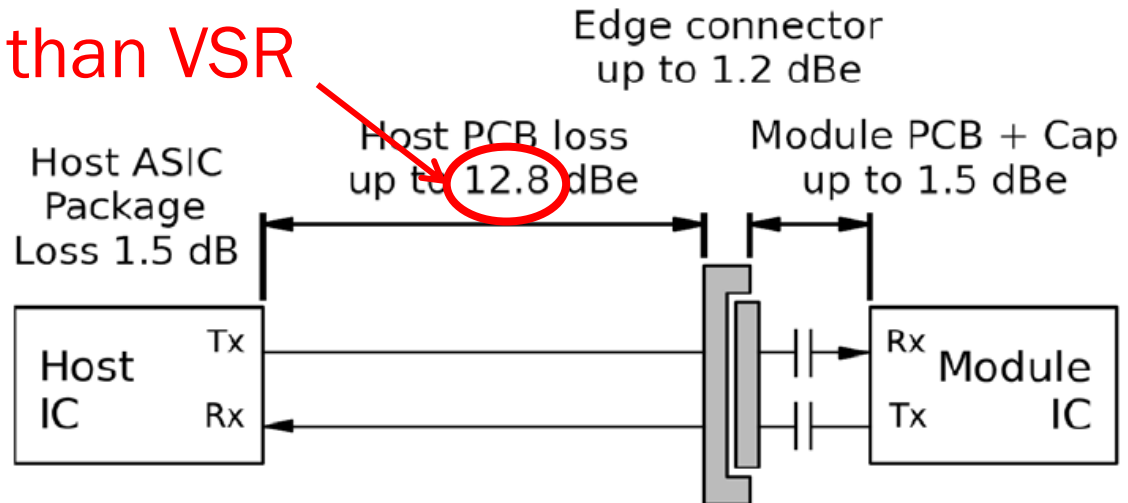


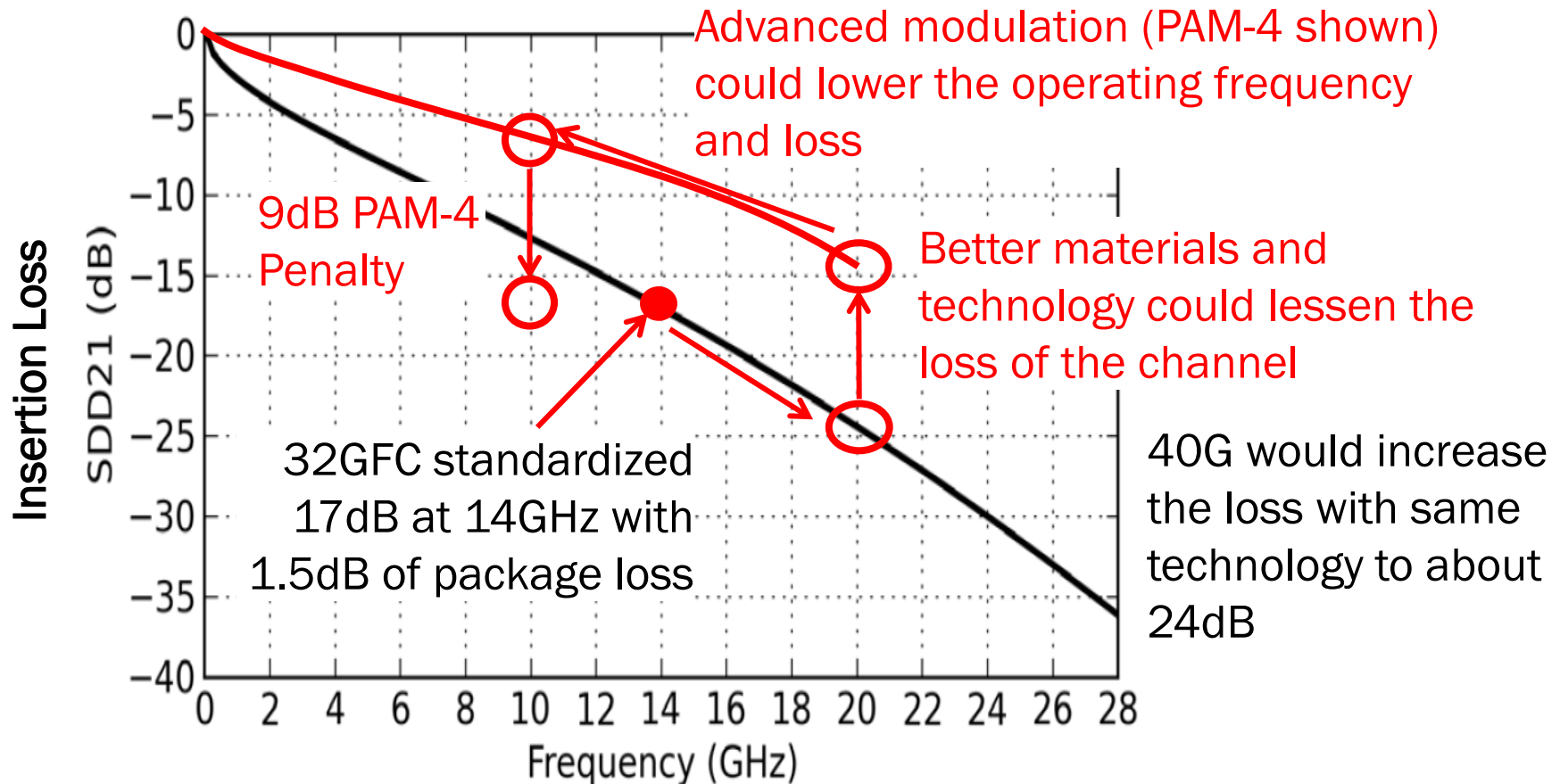
Figure 13-20. CEI-28G-VSR full Channel Reference Model

32GFC has 5.5dB more
PCB trace loss than VSR

32GFC
15.5dB



Insertion Loss from 32GFC to 40GbE Serial

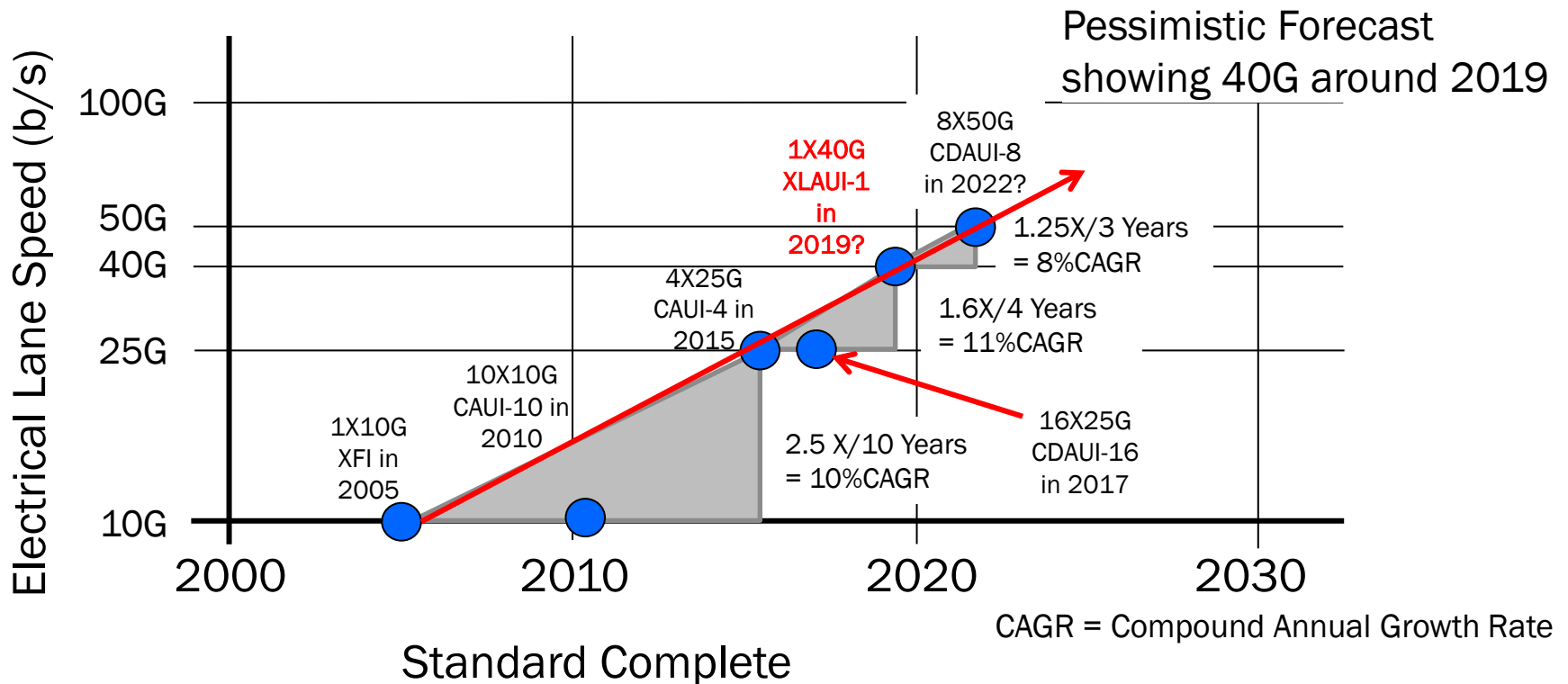


Source: FC-P1-6 Standard



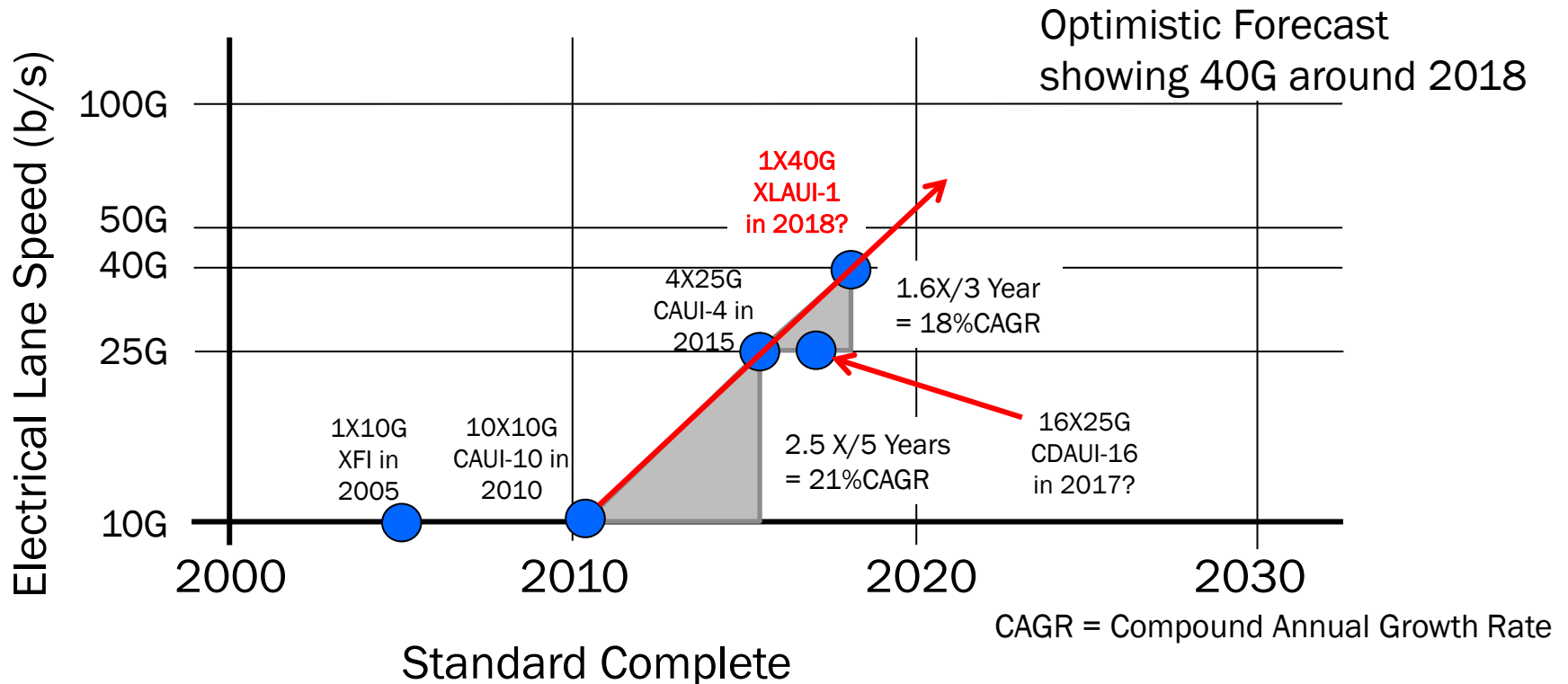
40GbE Serial This Decade

- Are you a pessimist?



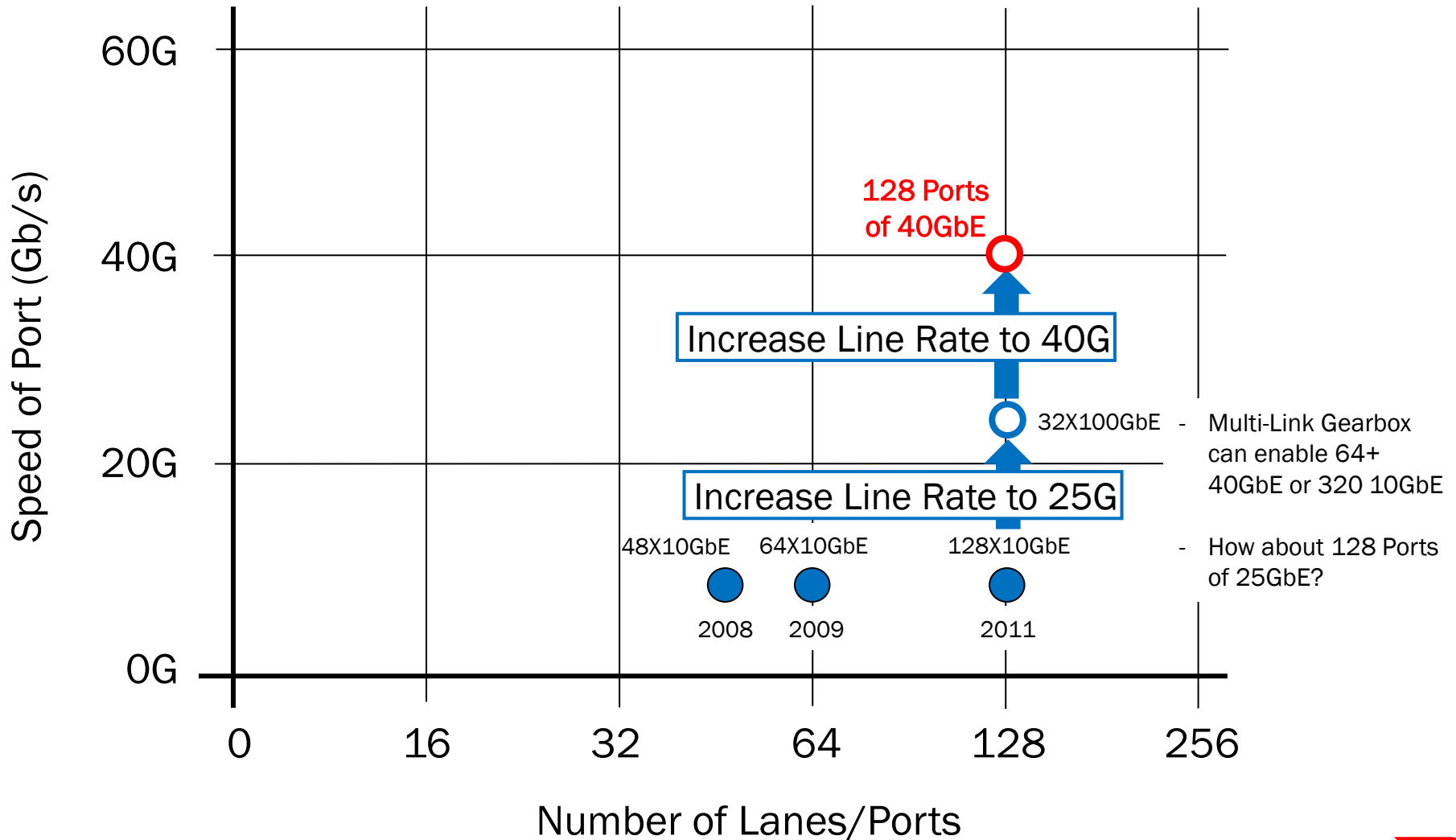
40GbE Serial This Decade

- Or an optimist?



Ethernet Switch ASICs

Exceeding Terabit Throughputs



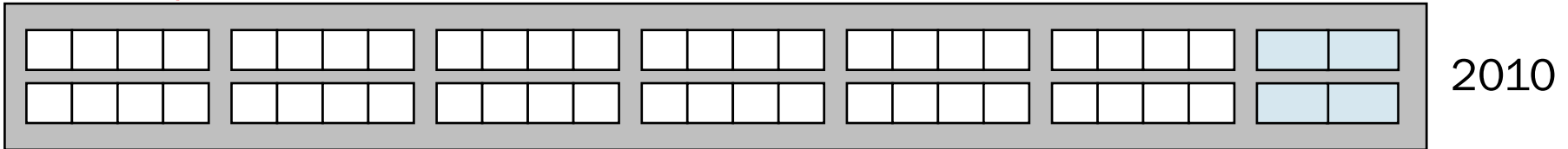
Increasing Switch Bandwidth

Exceeding 5 Tbps in 2020

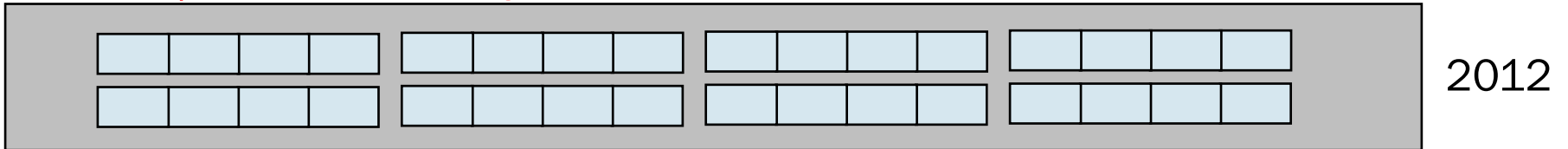
10GbE SFP+ QSFP+
↓ ↓
40GbE SFP40 QSFP40



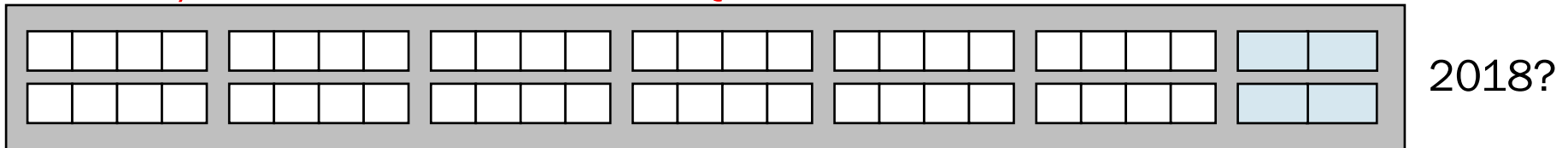
640 Gb/s = 48 10GbE SFP40 + 4 40GbE QSFP+



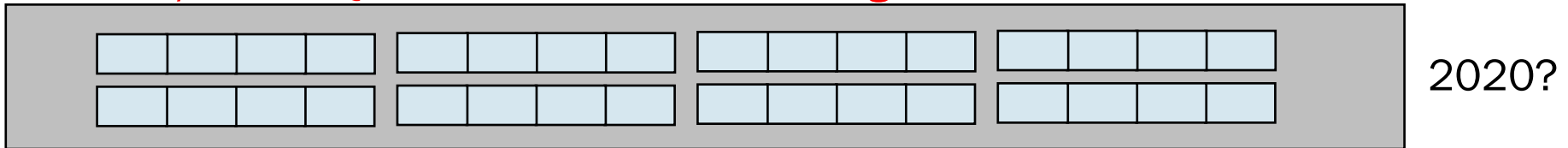
1.28 Tb/s = 32 40GbE QSFP+



2.56 Tb/s = 48 40GbE SFP40 + 4 QSFP40



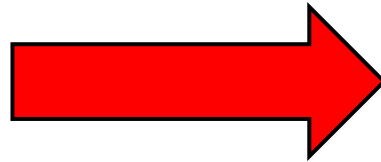
5.12 Tb/s = 32 QSFP40 - Each lane running at 40GbE Serial



The SFP and QSFP Dance

- 10GbE takes off with SFP+, but goes to QSFP+ for density

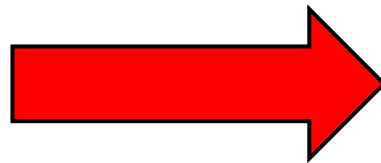
1X10G
10GbE SFP+



4X10G
4X10GbE QSFP+

- 40GbE takes off with QSFP+, but could shift to SFP+

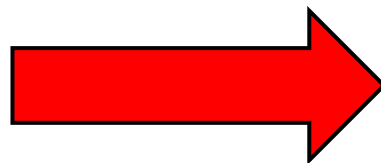
4X10G
40GbE QSFP+



1X40G
40GbE SFP+

- 100GbE takes off with QSFP+, but could shift to SFP+

4X25G
100GbE QSFP28

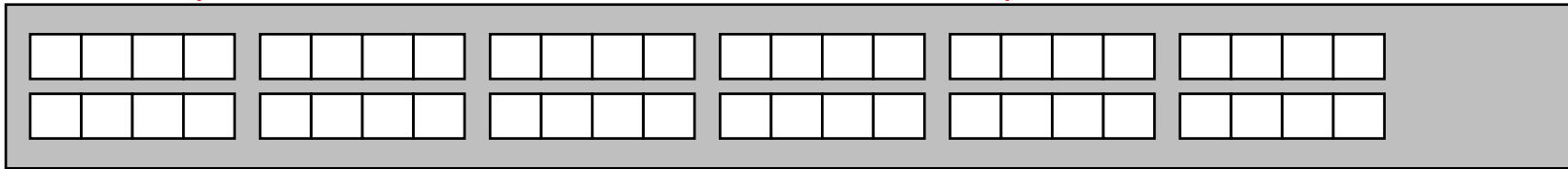


1X100G
100GbE SFP+

Summary of 480G of Throughput

Various ways to get to 480G

480 Gb/s = 48 10G SFP+, 24 Watts at 0.5W/ SR SFP+



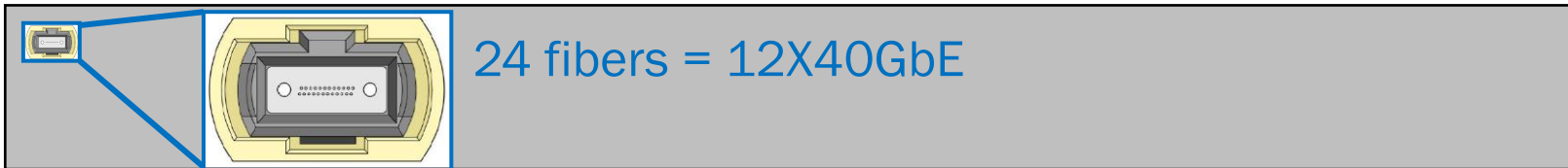
2009

480 Gb/s = 48 40G SFP40, 12 Watts at 1.0W/ SR SFP+



2018?

480G = 12 Embedded 40GbE ports, 10W/12 SR Ports



2020?

BROCADE 

THANK YOU

