

The Roadmap to a “Beyond 400GbE CFI”

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Introduction

- The IEEE 802.3 Ethernet Bandwidth Assessment, Part 2, is anticipating approval at the Mar 2020 Plenary.
- As highlighted in Nov Presentation – “Industry Consensus Beyond 4000 GbE? (http://www.ieee802.org/3/ad_hoc/ngrates/public/19_11/dambrosia_nea_01a_1119.pdf), industry discussions regarding next speed are already underway.
- As noted in BWA Summary Chart an 800 GbE solution in 2025 would be the lowest bandwidth growth rate for the various growth rates considered.
- This presentation looks at the roadmap to developing consensus to begin a new next speed.

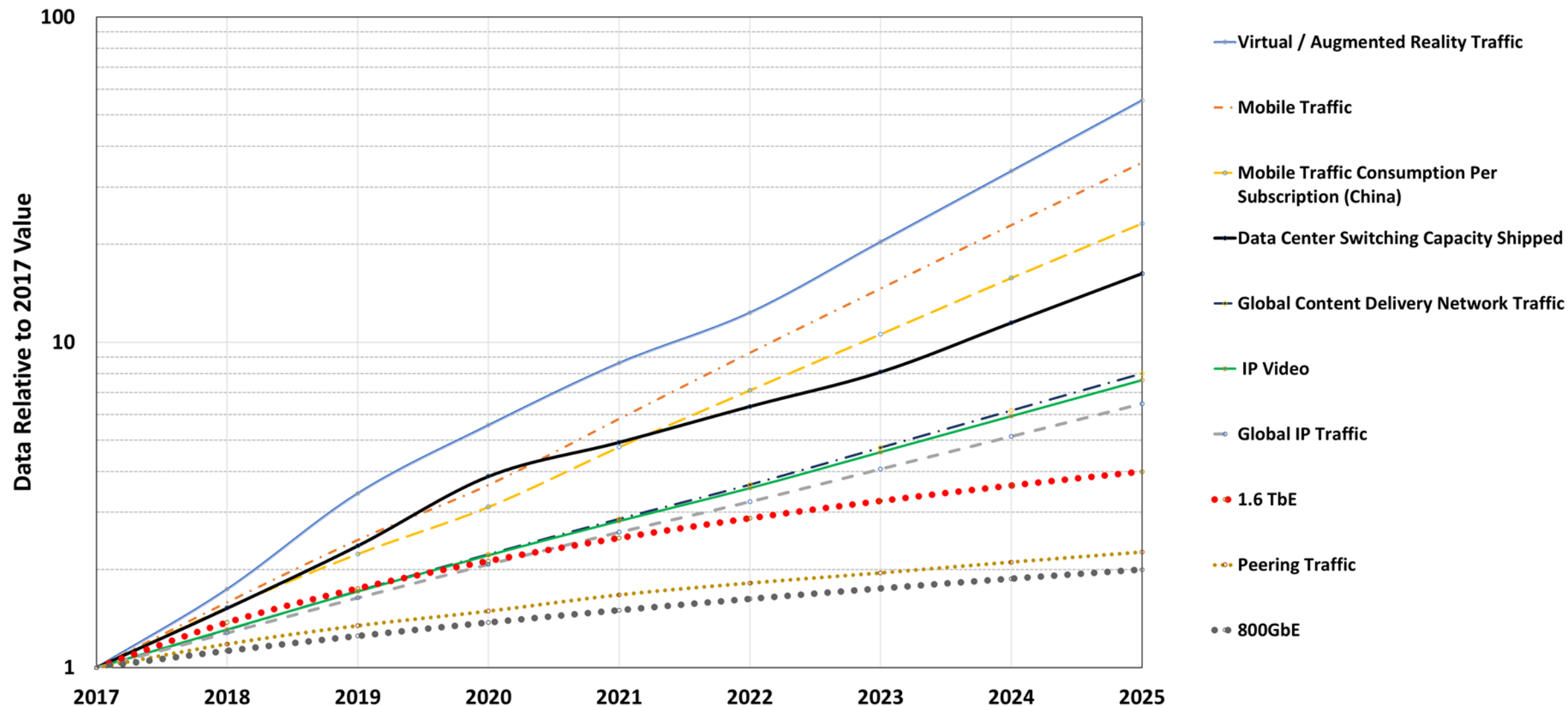
For CFI Consensus meeting

- **For a CFI Consensus Meeting:**
 - To measure the interest in starting a study group to address:
 - Beyond 400 GbE
 - We don't need to
 - Fully explore the problem
 - Debate strengths and weaknesses of solutions
 - Choose any one solution
 - Create PAR or five criteria
 - Create a standard or specification
- **Consensus building starts before the CFI Consensus Meeting.**

Main Agenda Items on a CFI Consensus Presentation

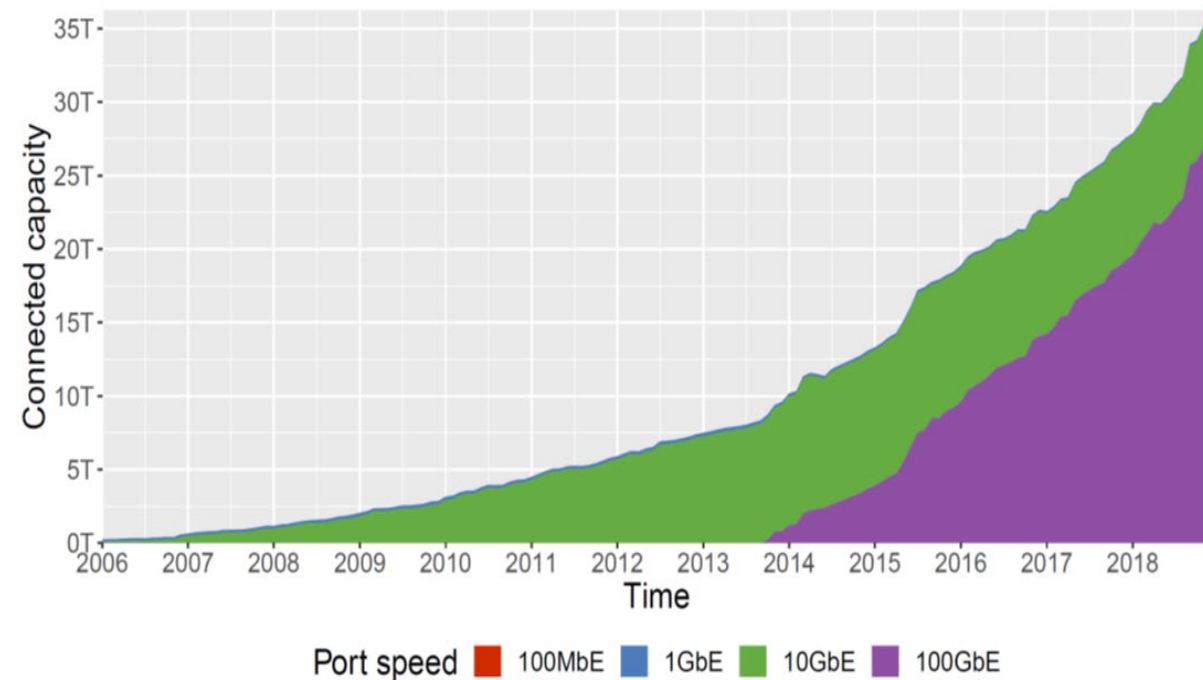
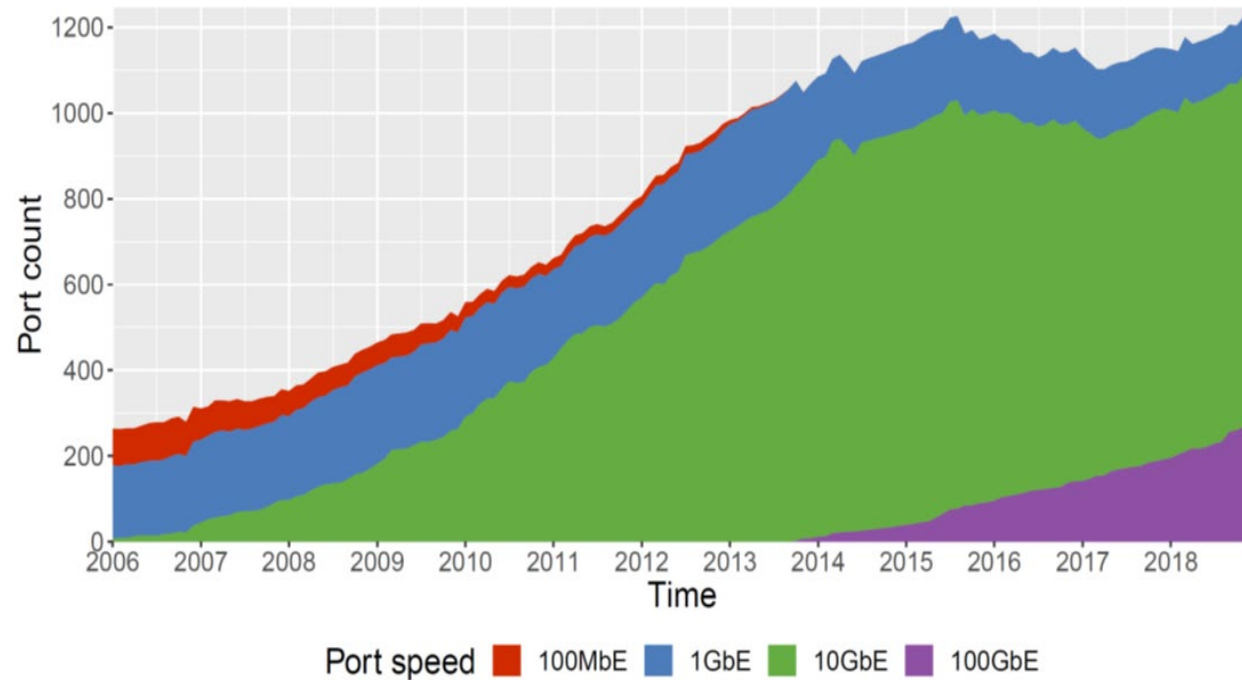
- Market Need
- Technical Section
- Why Now?

The Ethernet BWA, Part II



Bandwidth Growth Caused by Higher Speeds

DE-CIX Port Speed Mix & Bandwidth



Small # of 100 GbE Ports greatly grows the connected capacity to be supported

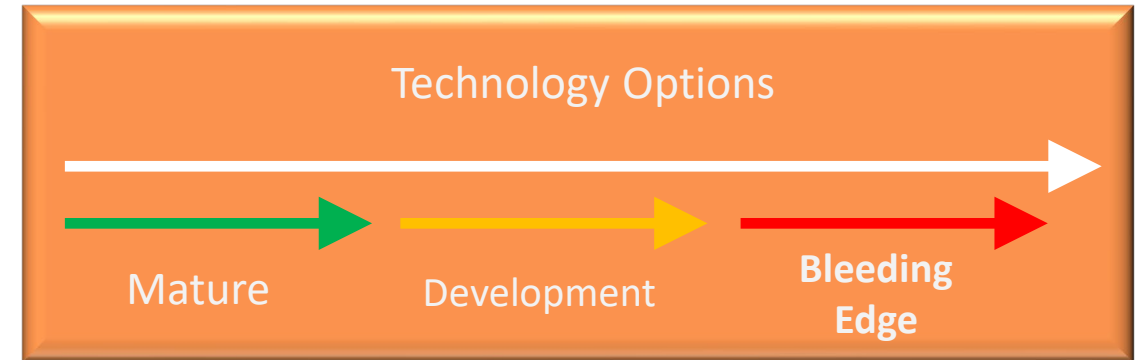
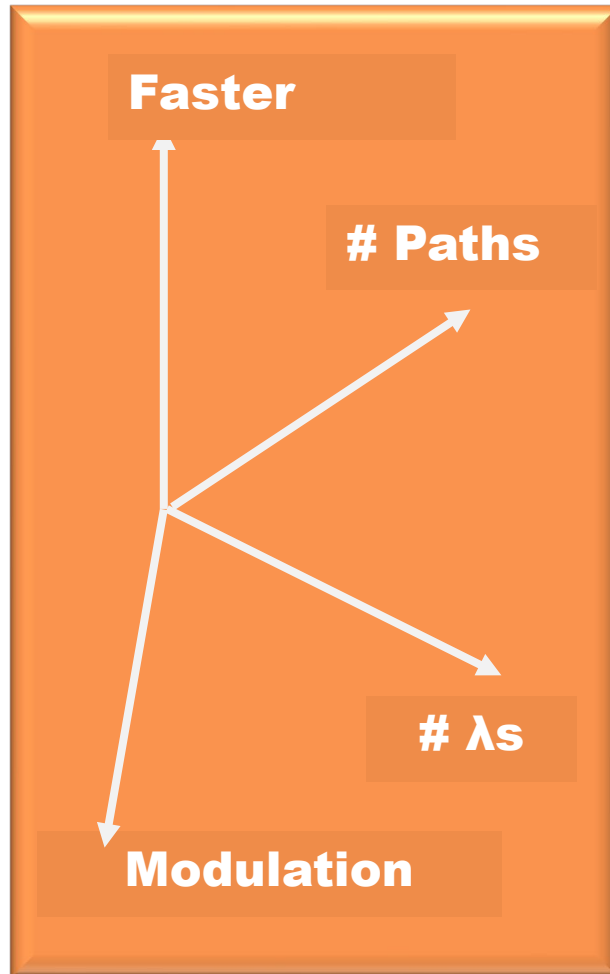
Source: Dietzel, "The European IXP Scene",

http://www.ieee802.org/3/ad_hoc/bwa2/public/calls/19_0709/dietzel_bwa_01b_190709.pdf.

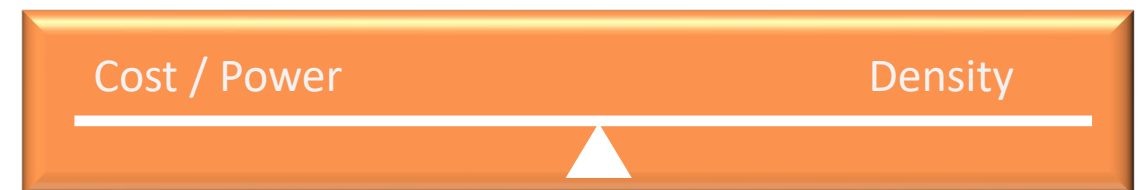
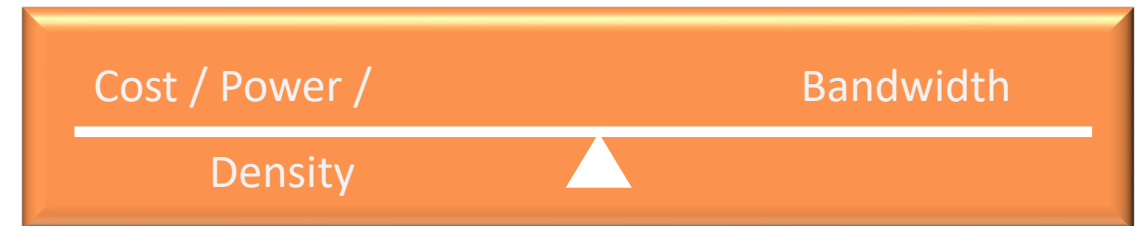
From Ethernet BWA, Part II

- Leading Bandwidth Growth Curves
 - Mobile
 - Data Center
 - What will they look like 2027 to 2028?
- What PHYs are we talking about?

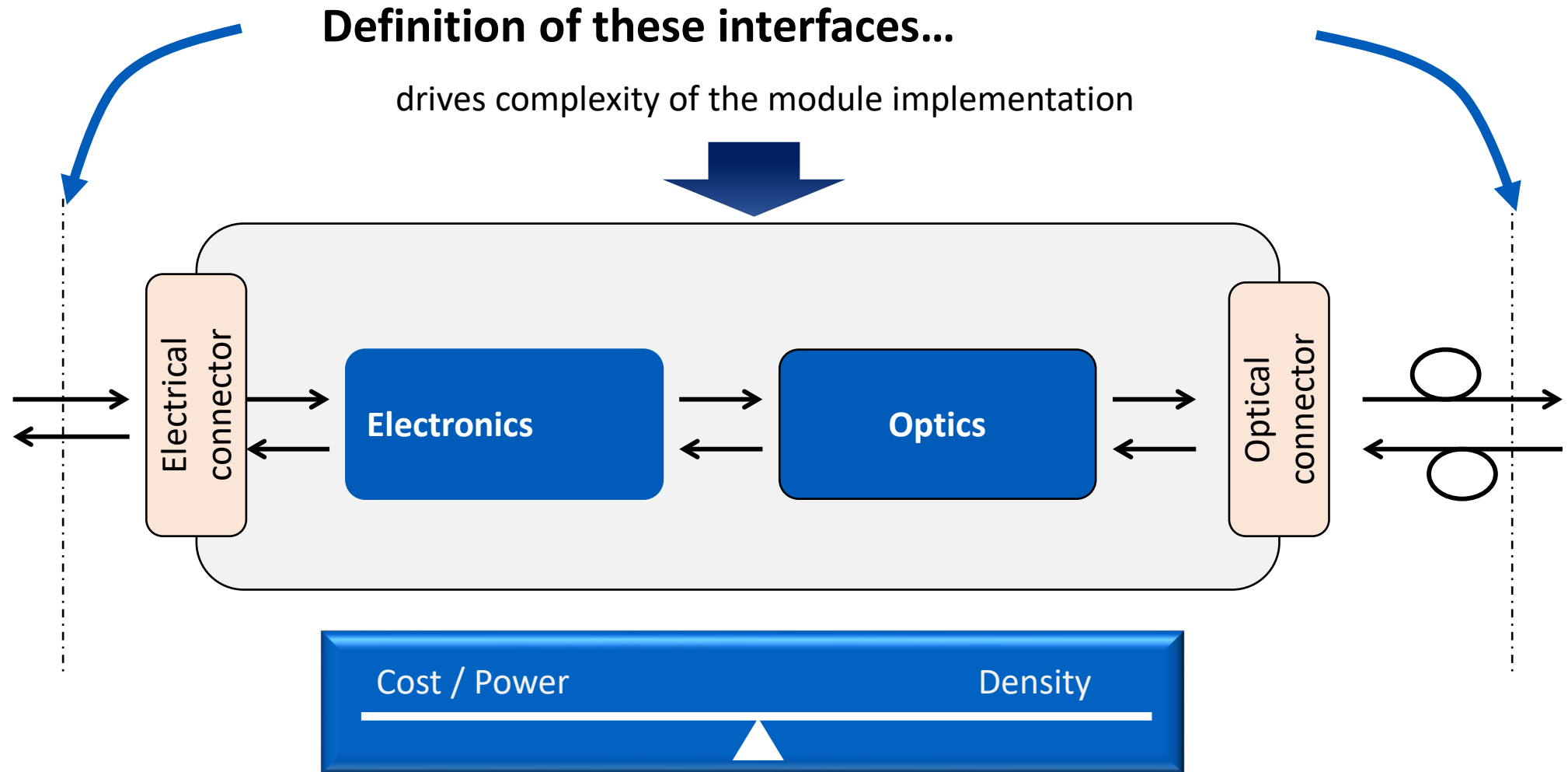
The Path to Higher Speeds



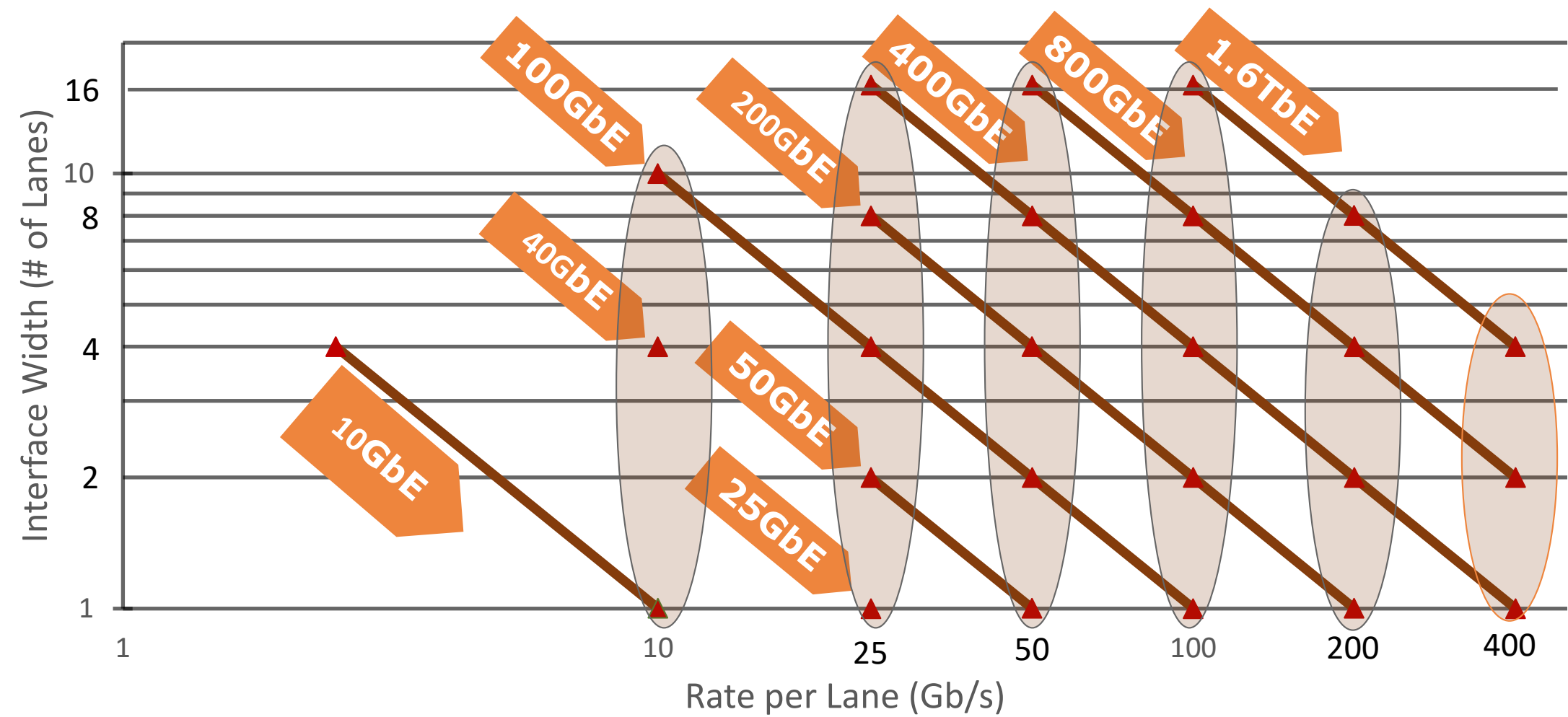
The never-ending balancing acts!



Optical Module Implementation



The Basic Math of Ethernet



Why Now?

Historical Perspective – Ethernet Ports

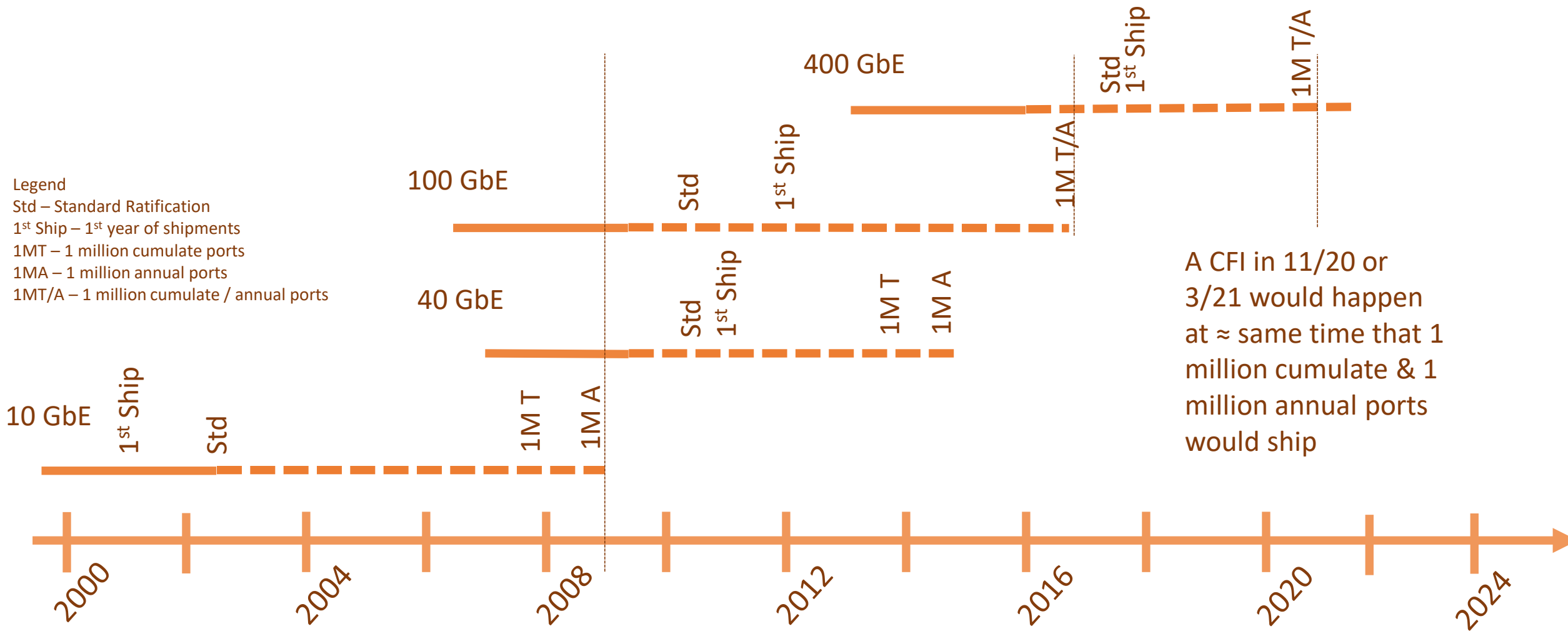
Ethernet Rate	Standard Completion	First year of Shipment	Time to cumulate 1M Port Shipments	1 st Year 1M Ports shipped
10	2002	2001	7 years	2008
40	2010	2011	3 years	2014
100	2010	2012	5 years	2016
400 *	2017	2018	3 years	2020

* This data is based on actual / forecasted data.

Data Courtesy of Sameh Boujelbene of
Dell'Oro Group



Comparing Study Group Starts to “1 Million Ports”



A CFI in 11/20 or 3/21 would happen at ≈ same time that 1 million cumulate & 1 million annual ports would ship

Next Steps

- As noted a CFI in Nov 20 or Mar 21 would be \approx at the time of 1M 400GbE cumulate / annual ports.
 - Bandwidth growth acceleration
 - Relatively late compared to other projects
- Leverage NEA for all of the following –
 - Explore market need for 800GbE / 1.6TbE / both
 - Explore technical / economic issues (see backup slide)
 - Other
 - Develop consensus presentation for CFI on target speed(s)

BACKUP

Potential Topics for Discussion

- Thoughts on needing new speed?
- Timing – start / completion?
- 800 GbE versus 1.6 TbE versus both? (Good question for a study group!!!!)
- Target application spaces and PHYs?
- Technology – 100 Gb/s versus 200 Gb/s signaling?
 - 100 Gb/s signaling
 - In development now
 - Impact on speed choice? 16x100G interface? Optical Mux loses impact reach?
 - 200 Gb/s signaling
 - Optics –
 - PAM4?
 - Coherent up to 400 Gb/s already being standardized / developed – building block?
 - Electrical – significant paradigm shift?
 - Technical / economic feasibility?
 - Direct detect vs coherent