

NANOG 40 Panel: The Future of a Higher Speed Ethernet 40GbE, 100GbE, or Something Else?

Richard Steenbergen, nLayer Communications

Greg Hankins, Force10 Networks

Drew Perkins, Infinera

Igor Gashinsky, Yahoo!

Lane Patterson, Equinix

Where do we stand today

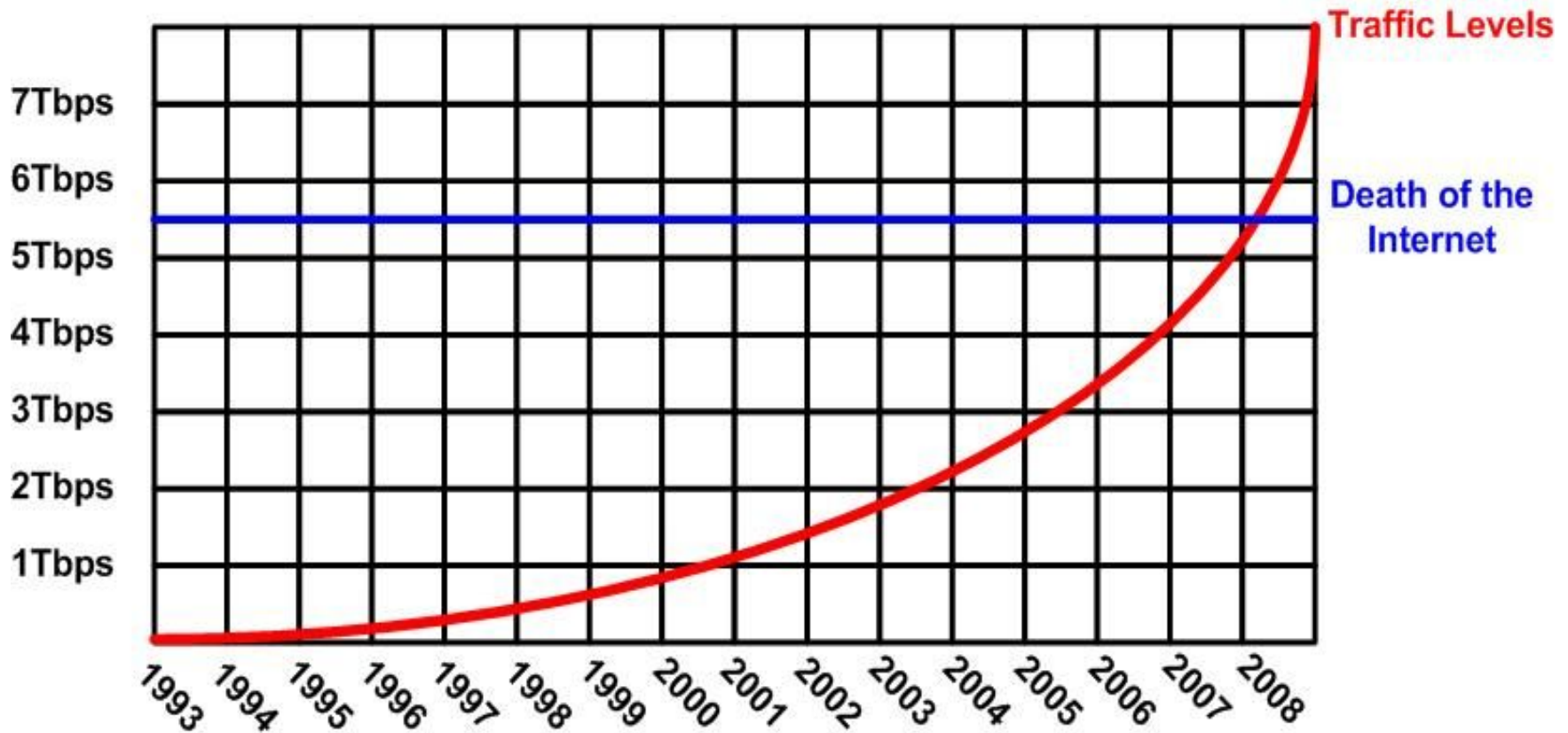
- Today's unit of measure is the 10Gbps Interface
 - OC-192 PoS has been available on routers for 7+ years
 - Most major long-haul and metro DWDM systems upgraded from 2.5G to native 10G signaling at around the same time.
 - Modern DWDM systems can deliver 25GHz 160x10Gbps
- 10GbE deployment rates are growing rapidly
 - WAN PHY allows transport over OC-192 infrastructure
 - 10GbE on very capable routers costs \$4,000-25,000/port
 - Availability of cheap DWDM 100GHz tuned XENPAK/XFPs
 - Availability of cheap long-reach optics (80km)
 - Many large networks are moving to 10GbE in the core

So what's the problem?

- The “over-building” glut of the dot-com years has finally been completely exhausted by traffic growth.
- 10G has not only become the unit of measure for the core, it is the unit of measure for many customers.
- Large networks must use multiple 10G bundles
 - Many Tier 1's admit to needing 8x10G+ between US cities
 - IXs like LINX / AMS-IX are operating 8x10G rings today
 - And can't build in parallel due to their flat layer 2 architecture
 - Parallel paths and 8x10G bundles increases complexity
- Traffic levels continue to rise at an alarming rate

Why do we need a faster Ethernet?

- Impending Doom – Too Much BitTorrent



The Evolution of Optical Technology

- The last great migration was from 2.5G to 10G
 - Significant investment into 10G during the dot-com years
 - Leveraging that investment has lead to widespread commodity 10G components at low low prices.
- The next leap forward is 40G optical technology
 - Optical challenges scale exponentially with the bit-rate
 - Chromatic Dispersion (CD), Polarization Mode Dispersion (PMD)
 - Spectrum is break even (4x25GHz 10G or 1x100GHz 40G)
 - But it actually exists today, and its shipping
 - OC-768c router interfaces available from Cisco and Juniper
 - Using standardized 40G 300-pin MSA optics with 2km reach
 - Still costs more than 4xOC192, but not outrageously more

The 40GbE vs 100GbE Debate

- The 100GbE camp advocates skipping over 40GbE
 - Increased data rate could benefit end users
 - A 100G serial optical signal is not yet possible
 - So a 100GbE solution would involve parallel paths
 - 4x25G and 10x10G are the most common proposals
- The 40GbE camp advocates more obtainable goals
 - 40GbE could come to market significantly faster
 - 40GbE would be interoperable with 4x10G or 40G systems
 - Allows use of existing 10G infrastructure, or native 40G signaling
- Some camps advocate work on both technologies
 - While others feel this would only slow the adoption of both