

100G EPON Standard Development Timeline and Work Plan Objective

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Supporters

- Marek Hajduczenia, BHN
- Kevin Noll, TWC
- Ryan Tucker, Charter
- Eugene Dai, Cox

Contribution Objectives

- Reiterate time-to-market need from SG
 - Based on past experience and forecast
- Review Objectives and timeline to date
 - We worked very effectively towards a schedule
- Example of timeline for 802.3by project
 - Not the same case, but applicable take-away
- Propose timeline for 802.3ca

Nielsen's Internet Use Growth Rate: 50% YoY

Nielsen's Law of Internet Bandwidth

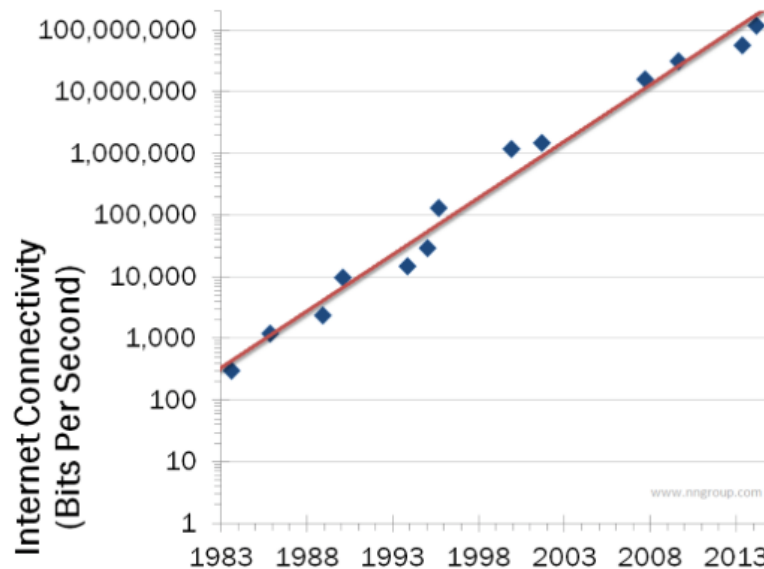
by **JAKOB NIELSEN** on April 5, 1998
Topics: [Technology](#) [Web Usability](#)

Summary: Users' bandwidth grows by 50% per year (10% less than Moore's Law for computer speed). The new law fits data from 1983 to 2014.

Nielsen's Law of Internet bandwidth states that:

- a high-end user's connection speed **grows by 50% per year**

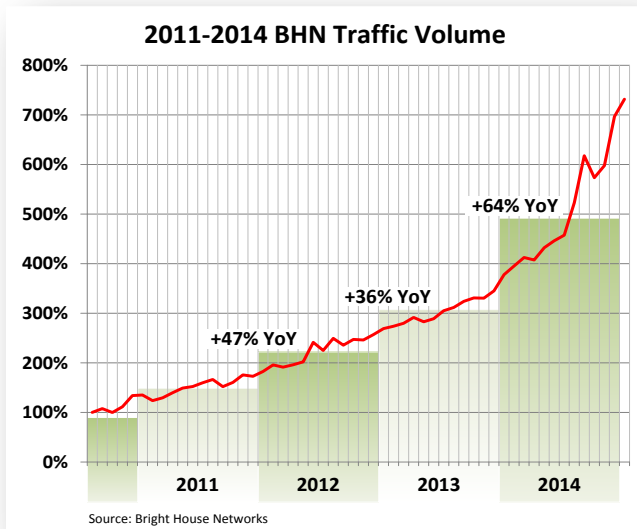
The dots in the diagram show the various speeds with which I have connected to the Net, from an early acoustic 300 bps modem in 1984 to an ISDN line when I first wrote this article (and updated to show the 120 Mbps upgrade I got in 2014). It is amazing how closely the empirical data fits the exponential growth curve for the 50% annualized growth stated by Nielsen's Law. (The y-axis has a logarithmic scale: thus, a straight line in the diagram represents exponential growth by a constant percentage every year).



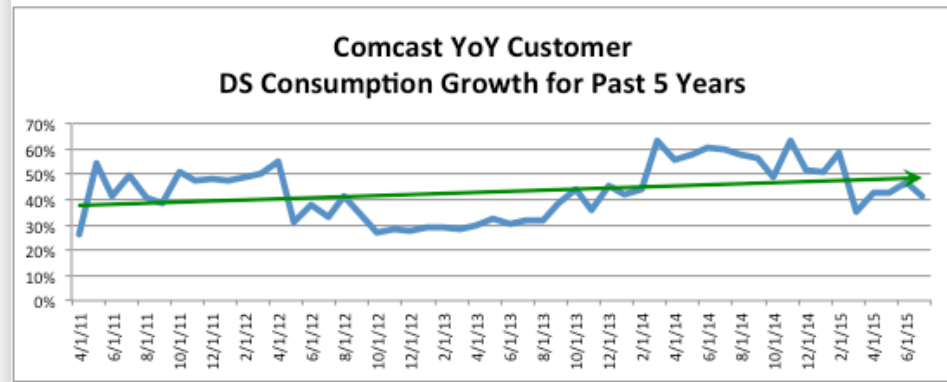
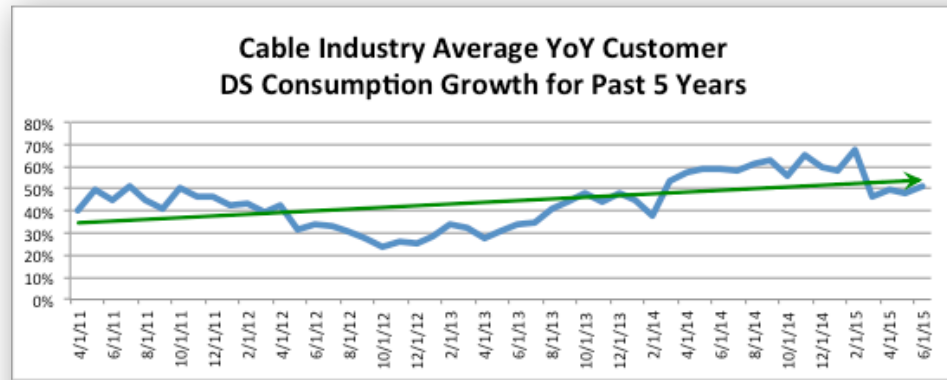
Source: Nielsen Norman Group

Empirical data from almost 20 years has very well tracked this theory. However, it does not clearly differentiate peak speed growth from usage growth rate.

Observed Usage Growth Rate: 40-60% YoY

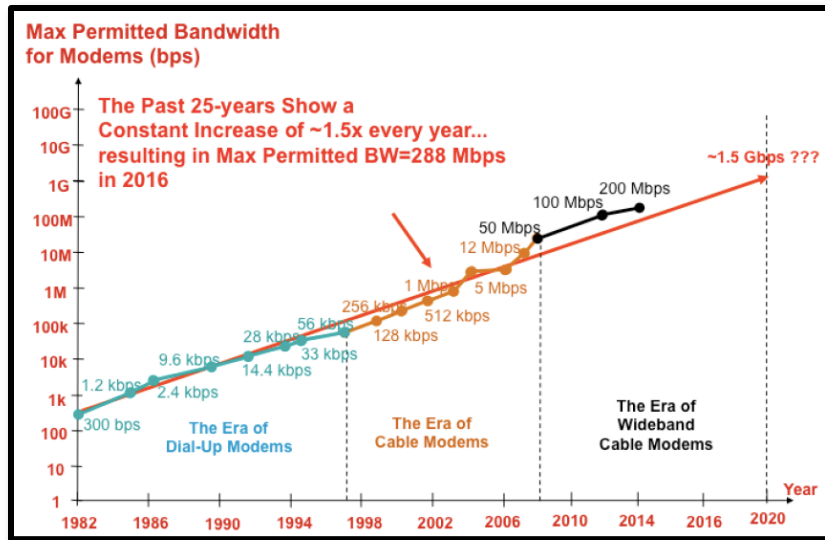


NG-EPON CFI Presentation
(ngepon_cfi_R19 - Slide 17)

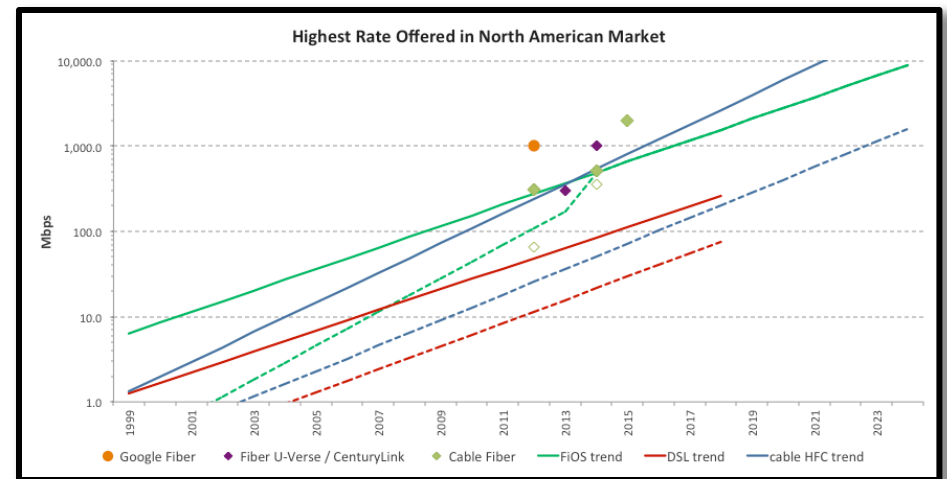


NG-EPON SG Presentation
(ngepon-1509-salinger-1 – Slide 5)

Offered Peak Speed Growth Rate: 50% YoY



NG-EPON ICAD Report
(ng_epon_report – Figure 17)



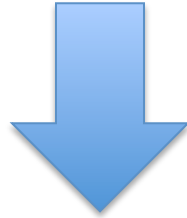
NG-EPON SG Presentation
(ngepon-1509-salinger-1 – Slide 8)

Peak Speed Growth YoY Projection

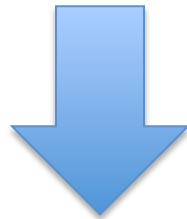
Year	Peak Speed Projection
2014	1 Gbps (Actual)
2015	2 Gbps (Actual)
2016	3 Gbps
2017	5 Gbps
2018	7 Gbps
2019	10 Gbps
2020	15 Gbps
2021	22 Gbps
2022	33 Gbps
2023	50 Gbps
2024	75 Gbps
2025	>100 Gbps

10G EPON Capacity
No Longer Effective

Need to deploy 100G EPON by 2019



Trials should target 2018



Standard should be ratified by deployment

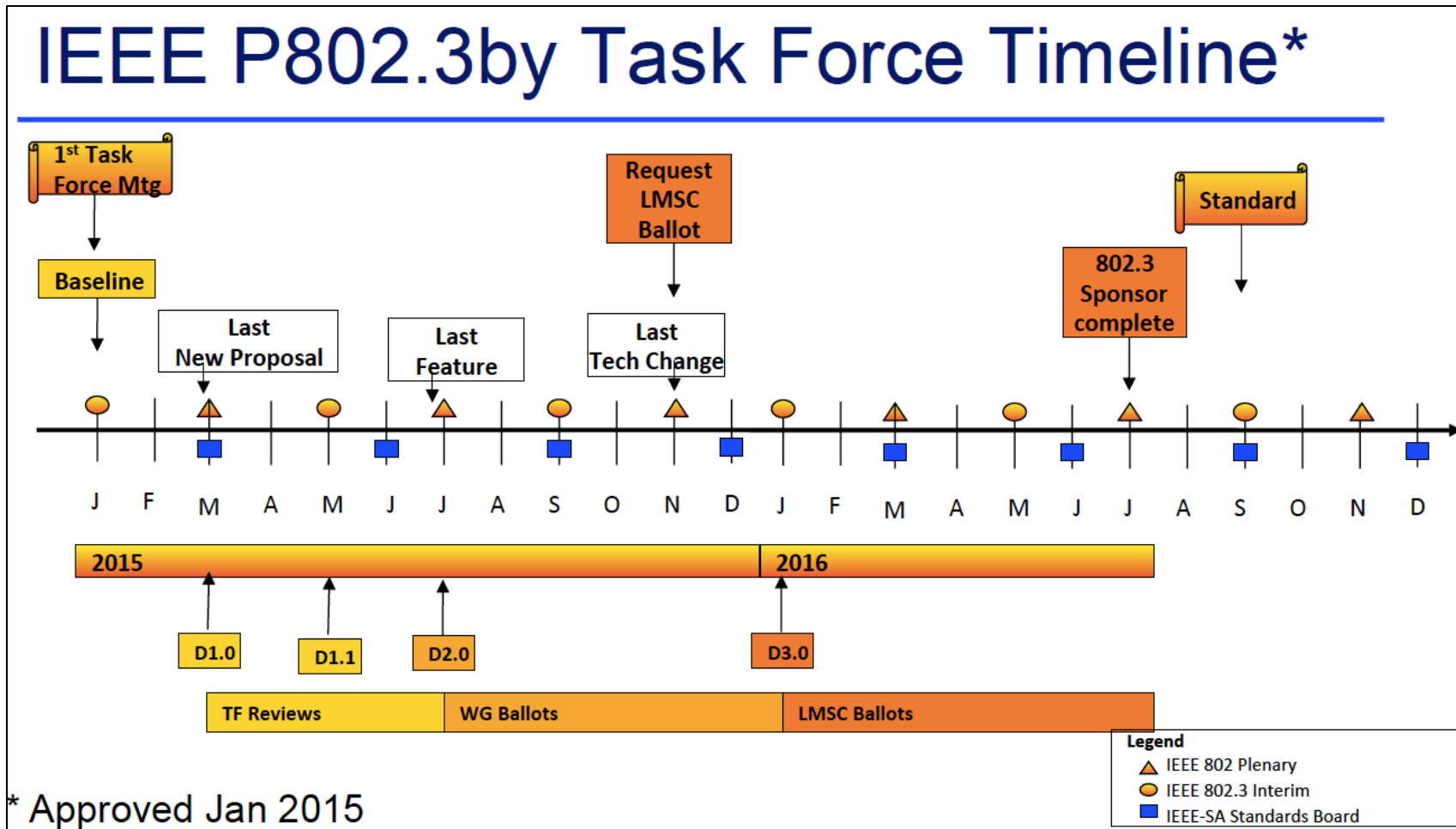
Back to the Objectives and Process

- We don't need 100G to start in 2019
- Everyone agreed that we should develop a scalable technology
- The above objectives present significant challenges for the TF to tackle
- As a team, we worked through Call For Interest and Study Group with a timeline in mind
 - We targeted CFI presentation and SG Objectives, Criteria and PAR to meeting dates

IEEE P802.3ca 100G-EPON Objectives

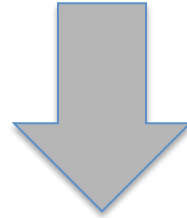
- ❑ Support subscriber access networks using point to multipoint topologies on optical fiber
- ❑ Provide specifications for physical layers operating over a single SMF strand and supporting symmetric and/or asymmetric the MAC data rates of:
 - 25 Gb/s in downstream and less than or equal to 25 Gb/s in upstream
 - 50 Gb/s in downstream and less than or equal to 50 Gb/s in upstream
 - 100 Gb/s in downstream and less than or equal to 100 Gb/s in upstream
- ❑ PHY(s) to have a BER better than or equal to 10⁻¹² at the MAC/PLS service interface (or the frame loss ratio equivalent)
- ❑ Support coexistence with 10G-EPON
 - Optical power budgets to accommodate channel insertion losses equivalent to those supported by the 10G-EPON standard
 - Wavelength allocation allowing concurrent operation with 10G-EPON PHYs

Example of Targeting Work to Timeline

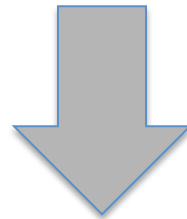


18 months from Baseline to Standard

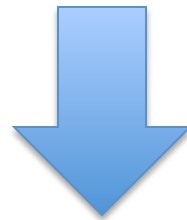
Need to deploy 100G EPON by 2019



Trials should target 2018



Standard should be ratified by deployment

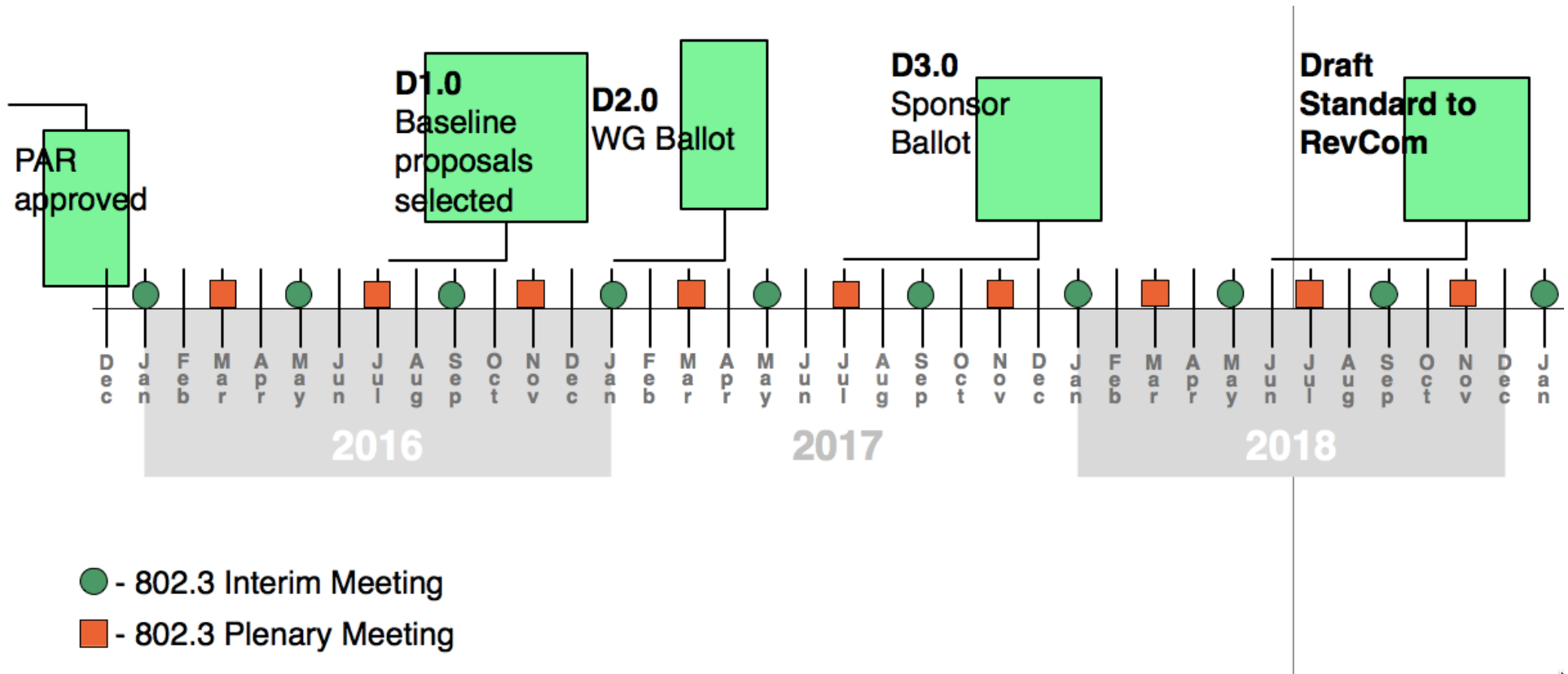


Should try to target baseline by 3Q2016

Conclusions

- YoY growth drives capacity requirements
- Need an appropriate 100G EPON timeline
- Let's plan the work to meet the timeline
- Can we commit to drive decisions to complete the work to achieve the timeline?

Proposed 802.3ca Timeline



Thank You for allowing a late submission to the meeting

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