



The Next Rate for a Higher Speed Ethernet

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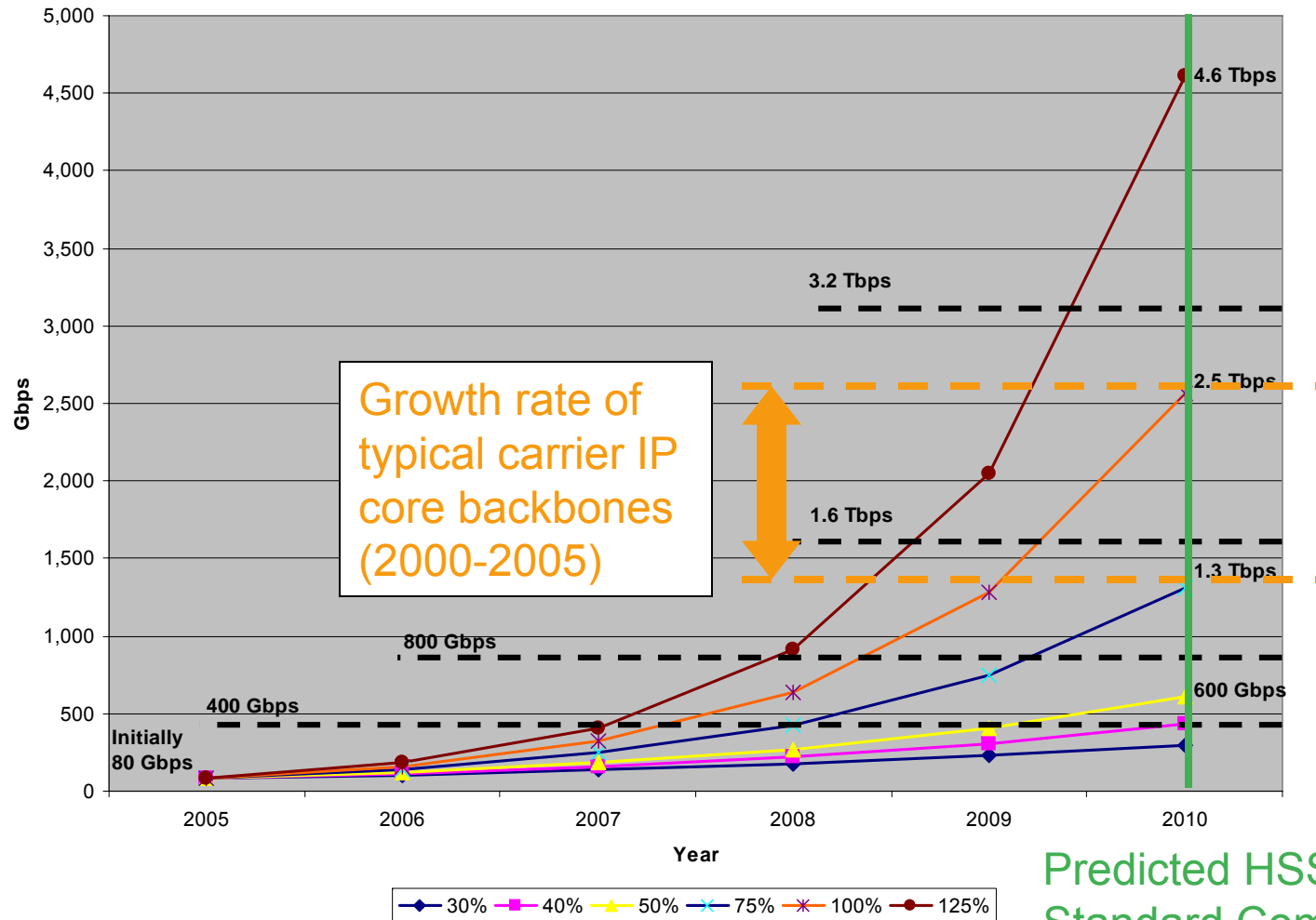
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Why Do We Need a Higher Speed Ethernet?

- 10G Services Drives Need for » 10G Core Networks
 - Service Providers' 10G service offerings are taking off!
 - E.g. OC-192/STM-64 POS and 10 GbE
 - Core network typically requires 4-10x bandwidth of highest-speed user service interface to provide adequate performance
- Bandwidth Demand Growing Exponentially
 - Suggests requirement for a mechanism to grow link over time
- Exponential growth in number of parallel links eventually becomes unmanageable
 - Single higher speed links required
- Also need to limit the number of PMDs to a small number in order to make product development affordable

How Much Bandwidth is Enough?

IP Network Link Bandwidth Growth



Predicted HSSG Standard Completion

Won't 802.3ad Link Aggregation (LAG) Solve the Scaling Problem?

- Nx 10G LAG and ECMP deployed today but rely on statistical flow distribution mechanisms
 - Unacceptable performance as individual flows reach Gb/s range
 - A single 10 Gb/s flow will exhaust one LAG member yielding 1/N blocking probability for all other flows
 - VPN and security technologies make all flows appear as one
- True deterministic $\geq 40G$ link technology required today
 - Deterministic packet/fragment/word/byte distribution mechanism

To aggregate all adjacent router-router traffic, 8-16x 100 GbE LAG required by time 100 GbE standard completed!

Conclusions

- Desirable outcome is to be able to grow link bandwidth over time similar to LAG but without statistical flow distribution problems
- Assuming 100%/year growth rates and 5 year deployment cycle, minimum $2^5 = 32x$ dynamic range desirable
- Starting point should be at least 10 Gb/s but larger atomic rates will be desirable over time



Thanks!

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