The Next Rate for a Higher Speed Ethernet

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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?

Growth rate of typical carrier IP core backbones (2000-2005)

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 ≥ 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 $2^5 = 32$x 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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