



HSSG Goals and Objectives

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System Vendors' Perspective

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IEEE 802.3 HSSG
Dallas Nov 13-17th, 2006

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* Acknowledgements to Mark Nowell for driving this proposal

Topics

- Need and Demand for 100GE
- Why 100GE now?
- Market Success
- Architecture Thoughts
- MAC Considerations
- PMD Considerations
- Comments on 5 Criteria
- Recommendations

Need for 100GE

- Internet bandwidth demand still growing rapidly
 - Driven by IP rich media applications, primarily video
 - Internet traffic grew ~190% between 2000 and 2005
 - Continual increase in per flow bandwidth
- 10G (and nx10G) customer interfaces being offered today
 - Core networks typically need 4-10x highest speed user interface
 - Internet Exchange Points (IXP) need 100 GE for SP Peering
- Bundling multiple lower speed interfaces (10G) does not scale:
 - Inefficiencies with current link bonding schemes (ECMP, LAG, etc)
 - Issues managing and troubleshooting multiple physical links
 - End users already bundling nx10G in backbones today (e.g. AMS-IX, Yahoo!, YahooBB, LLNL, LINX, NTT, Level3, Comcast, etc)

Demand for 100GE

Volume is not the only metric for demand.

Importance and value of 100GE is high amongst end-users

Why 100GE now?

- Network capacity and scalability require adoption of higher rate interfaces.
- Interim solutions already in use but not preferred. Need to show there is light at the end of the tunnel.
- 100GE technology needs focus now to drive to implementation.

FE vs. GE vs. 10GE vs. 100GE

- Demand for FE, GE and 10GE was clear at the outset of those efforts
 - Both volume and importance
- 100GE is not the same
 - Importance is still high
 - Volume potential is not the driving force (technology will take much longer to penetrate into higher volume areas of the network)
 - R&D investment (corporate or venture) is tighter.

Recommendations for (market) success

- Minimize options
- Minimize PMDs
- Focus early standard efforts to known early adopter applications to address bottlenecks
 - let's not bite off more than we can chew
- As technology and the market matures, prudently develop new solutions to address needs.

100GE Architecture

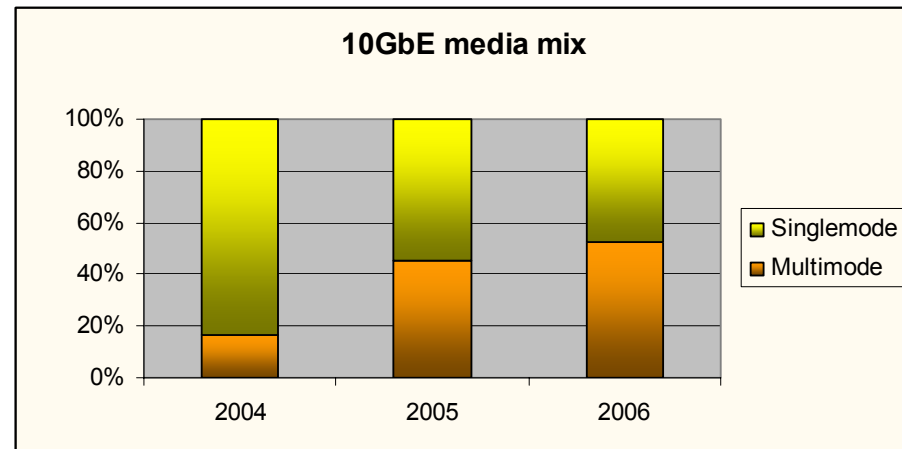
- Develop an architecture that enables future developments to simply leverage technology advances
 - Optical and electrical technology requires that a multi-channel PMD will be necessary initially
 - These lanes need to be bonded into one channel or flow
 - Bonding scheme should be adaptable to technology advances

MAC Considerations

- 40Gb/s is insufficient
 - traffic is already surpassing this today!
 - short term need met by nx10GE LAG or OC768 POS
- Scalable MAC is not desirable
 - simplicity, interoperability are key
 - Fragmentation and inconsistent application of industry R&D efforts
- Single MAC data rate is preferred

PMD Considerations

- Historical 10GE early adopter data shows that a SMF PMD is key
- Implies a multi-wavelength solution
- Electronics vs packaging tradeoff
- Common point of agreement by authors



Source: Cisco Systems

Observations

- Additional PMDs (Short distance ribbon or 40km SMF) may be needed to support additional early adopter applications
- Justification for these PMDs needs to be brought forward.

Need to take into account that:

- Early adopters less cost sensitive and may use single PMDs in multiple environments
- The more PMDs, the slower the standards development

Resiliency

Multi-lane or channel PMD raises the concept of resiliency to single channel failure

From a system perspective, this does not add significant value. Any system or network with a 100G interface will require some form of network/system level resiliency to guard against full failure (fiber/cable break, linecard failure).

Sub interface resiliency does not add any network value – unnecessary complication

Some comments on the 5 criteria

- Distinct identity - definitely
- Compatibility - absolutely
- Technical Feasibility
 - Proof of feasibility is anticipated
 - Multiple presentations showing technology that could be adopted

Broad Market Potential

Consider broad market potential to be met if:

- Multiple end users indicate need and willingness to deploy
- Multiple system vendors indicate willingness to build interoperable equipment
- Multiple component vendors indicate willingness to develop necessary component products

Economic feasibility

Does the value proposition of a new technology justify the cost of that new technology?

- YES = Economic feasibility
- NO = back to the drawing board...

Observations:

Early adopters are less cost sensitive with a range of reach needs

Don't standardize a near-term solution that complicates a later opportunity to cost reduce

Summary

- There is a market need for 100GE driven by the projected video and IP rich media BW demands.
- Must standardize 100GE now
 - lower rate solutions will not address the market need. Industry needs to prevent fragmentation of solutions.
- Recommendation:
 - Single 100G Rate MAC
 - SMF PMD should be a primary objective
 - Need an architecture that is tolerant of technology advances/maturity