Broad Market Potential – Proposed Responses

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IEEE 802.3 400 Gb/s Ethernet Study Group

Applications Ad hoc

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Broad Market Potential

Each proposed IEEE 802 LMSC standard shall have broad market potential. At a minimum, address the following areas:

a) **Broad sets of applicability.**

b) **Multiple vendors and numerous users.**

c) **Balanced Costs (LAN versus attached stations) [Removed from IEEE 802 5 Criteria Nov 2012]**

Broad Market Potential (1 of 2)

- **Broad sets of applications**
- **Multiple vendors and numerous users**
- **Balanced cost (LAN versus attached stations)**

- **Bandwidth requirements for computing and core networking applications are growing at different rates, which necessitates the definition of two distinct data rates for the next generation of Ethernet networks in order to address these applications:**
  - Servers, high performance computing clusters, blade servers, storage area networks and network attached storage all currently make use of 1G and 10G Ethernet, with significant growth of 10G projected in '07 and '08. I/O bandwidth projections for server and computing applications, including server traffic aggregation, indicate that there will be a significant market potential for a 40 Gb/s Ethernet interface.
  - Core networking applications have demonstrated the need for bandwidth beyond existing capabilities and the projected bandwidth requirements for computing applications. Switching, routing, and aggregation in data centers, internet exchanges and service provider peering points, and high bandwidth applications, such as video on demand and high performance computing environments, have demonstrated the need for a 100 Gb/s Ethernet interface.

Modified by IEEE P802.3ba Task Force and approved by 802.3 at March 2008 Plenary

Broad Market Potential (2 of 2)

- **Broad sets of applications**
- **Multiple vendors and numerous users**
- **Balanced cost (LAN versus attached stations)**

- **There has been wide attendance and participation in the study group by end users, equipment manufacturers and component suppliers. It is anticipated that there will be sufficient participation to effectively complete the standardization process.**

- **Prior experience scaling IEEE 802.3 and contributions to the study group indicates:**
  - 40 Gb/s Ethernet will provide approximately the same cost balance between the LAN and the attached stations as 10 Gb/s Ethernet.
  - The cost distribution between routers, switches, and the infrastructure remains acceptably balanced for 100 Gb/s Ethernet.

- **Given the topologies of the networks and intended applications, early deployment will be driven by key aggregation & high-bandwidth interconnect points. This is unlike the higher volume end system application typical for 10/100/1000 Mb/s Ethernet, and as such, the initial volumes for 100 Gb/s Ethernet are anticipated to be more modest than the lower speeds. This does not imply a reduction in the need or value of 100 Gb/s Ethernet to address the stated applications.**

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Supporting Presentations

#	Filename	Objective	Broad Market Potential	Technical Feasibility	Economic Feasibility	
		Column1	BMP1	TF1	EF1	Other
1	diab_400_01b_0713.pdf	EEE	X	X	X	
2	song_400_01a_0713.pdf	2km / 10km SMF	x			
3	flatman_400_01_0713.pdf		x			PSM
4	wenyu_400_01_0713.pdf	500m, 2km, 10km, 40km SMF	x			
5	palkert_400_01_0713.pdf		x			Proposes need for multiple objectives
6	issenhuth_400_01_0713.pdf	Multiple	x			
7	palkert_400_01a_0913.pdf	Multiple	x			
8	anslow_400_01_0913.pdf	BER	x			
9	song_x_400_01_0913.pdf	2km / 10km / 40km SMF	x			
10	moorwood_400_01_1113.pdf	2km, 10km, 40km	x			
11	song_x_400_01a_1113.pdf	2km, 10km, 40km	x			
12	booth_400_01a_1113.pdf	500m, 2km, 10km, 40km SMF	x			
13	chang_400_01a_1113.pdf	2km, 10km, 40km	x			
14	jewell_400_01_1113.pdf	100m MMF	x	x	x	
15	palkert_400_01_1113.pdf	backplane / twinax	x	x	x	
16	palkert_400_02_1113.pdf	500m SMF	x	x	?	
17	carlson_400_01_1113.pdf		x			
18	nicholl_400_01_1113.pdf		x			
19	dambrosia_400_01a_1113.pdf	Breakout	x		x	
20	lyubomirsky_400_01_1113.pdf	SMF	x			

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Observations

- Concern regarding how the need for 400GbE for "Data Center" BMP is described.
- As noted in nicholl_400_01_1113.pdf:
  - 100G-LR4 – the dominant 100G PMD type to date.
  - Primary application is core IP networking, i.e. core router to core router and core router to DWDM transport, all within a building (< 500m).
  - Early market applications for 400 Gb/s Ethernet will be similar to those seen in early market 100 Gb/s Ethernet.
- Per booth_400_01a_1113.pdf
  - 100G: Missing components: low-cost 300-400m optics, switch silicon
  - 40G servers will increase the need to reduce over-subscription
  - Need to supply components that slowed 100G adoption
- Other presentations have focused on data center reaches as justification
- Data noted in dambrosia_app_01_14_0108 from murray_app_01a_1013.pdf
- Based on IEEE 802.3 BWA Forecast, it is assumed that 400GbE will be needed for data center, but not part of initial deployment, hence proposed response in this presentation.

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- c) **Balanced Costs (LAN versus attached stations) [Removed from IEEE 802 5 Criteria Nov 2012]**

- Bandwidth requirements, on average, for core networking applications are increasing by a factor of 10 every 5 years. The definition of 400 Gb/s Ethernet will address, but not limited to, these applications: data center, internet exchanges, co-location providers, wireless back haul, service providers, and video-on-demand delivery.

- There has been wide attendance and participation in the study group by end users, equipment manufacturers and component suppliers. It is anticipated that there will be sufficient participation to effectively complete the standardization process.

- Prior experience scaling IEEE 802.3 and contributions to the study group indicates the cost distribution between routers, switches, and the infrastructure remains acceptably balanced for 100 Gb/s Ethernet.

- Given the topologies of the networks and intended applications, early deployment will be driven by key aggregation & high-bandwidth interconnect points, such as co-location providers, wireless back haul, and service providers. Given anticipated bandwidth growth forecasts, deployment for data center applications will occur later. Thus, the initial deployment of 400Gb/s Ethernet for the stated applications will occur over a greater period of time.