

Demonstrating Economic
Feasibility of 400G Ethernet
for the 5 Criteria Presentation

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Work Ahead of us

Economic Feasibility

- Known cost factors, reliable data
 - Reasonable cost for performance
 - Consideration of installation costs
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- The cost factors for Ethernet components and systems are well known. The proposed project may introduce new cost factors which can be quantified.
 - Presentations indicate that for the server market and computing applications, including server traffic aggregation, the optimized rate to provide the best balance of performance and cost is 40 Gb/s. For the network aggregation market and core networking applications, the optimized rate offering the best balance of performance and cost is 100 Gb/s.
 - In consideration of installation costs, the project is expected to use proven and familiar media, including optical fiber, backplanes, and copper cabling technology.
 - Network design, installation and maintenance costs are minimized by preserving network architecture, management, and software.

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

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Economic Feasibility

Each proposed IEEE 802 LMSC standard shall provide evidence of economic feasibility. Demonstrate, as far as can reasonably be estimated, the economic feasibility of the proposed project for its intended applications. Among the areas that may be addressed in the cost for performance analysis are the following:

- a) Balanced costs (Infrastructure versus attached stations).
- b) Known cost factors.
- c) Consideration of installation costs.
- d) Consideration of operational costs (e.g. energy consumption).
- e) Other areas, as appropriate.

Version 2.3

IEEE 802.3 Ethernet Working Group - CSD

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Economic Feasibility Responses

To 5C Questions, HSSG/P802.3ba TF

http://www.ieee802.org/3/ba/PAR/P802.3ba_5C_0908.pdf

Anticipated Requirements

Source file: 802d3_CSD_V2p4.pdf

Objective of discussion today: What material do we need to demonstrate feasibility versus what do we have ?

Current presentation to criteria mapping may be found in: dambrosia_400_01a_1213

Economic Criteria: Supporting Presentations and Gaps (1)

- ▶ **Balanced costs (infrastructure versus attached stations)**
 - Several alternatives have proposed using multiple parallel lanes of media vs a single duplex pair
 - Extensive analysis of tradeoffs between media and module costs presented in the .bm task force, can we leverage this ?

Presentation	Comments
welch_400_01_1113.pdf	Infrastructure trade off between module and multi lane SMF cabling approaches
palkert_400_01_1113.pdf	Copper connector tradeoffs
	<i>Presenters Note: Add references from bm ?</i>

Economic Criteria: Supporting Presentations and Gaps (2)

▶ Known cost factors

- Widespread presumption there will be extensive re-use of 100G PMDs “just use 4 of them” but:
 - What is the impact of the BER objective ?
 - Are there significant yield impacts upon 16 wide laser arrays cf to 10 or 4 wide arrays?
- When supporting a 10km PMD, an approach that can use a single duplex fiber pair versus multiple pairs will likely be optimal (balanced costs)
 - Do we understand the cost of such an approach relative to widely known costs e.g. 100G SR10, LR4 or ER4 ?
- 400G MAC and PCS functions are considered technically feasible (there are presentations supporting this)
 - However do such potential implementations necessitate the use of the largest FPGAs or smallest available ASIC processes, such that the cost factor is significantly larger than 4x 100 ?

Presentation	Comments
jewell_400_01_1113.pdf	MMF, 400G is equivalent to 4x100, then improves <i>Presenters Note: No discussion of “by 16 laser array yield”</i>
tanaka_400_01a_0913.pdf	10km PMD <i>Presenters Note: Additional info available in takahara_01_0513_optx but relative cost is hard to determine</i>
welch_400_01_1113.pdf	500m, 2km SMF module relative cost factors
	<i>Presenters Note: Need to address the impact of the BER objective?</i>
	<i>Presenters Note: MAC /PCS material?</i>

Economic Criteria: Supporting Presentations and Gaps (3)

- ▶ Consideration of installation costs
 - Using established practices and methods helps answer these questions
 - A new capability likely to be needed is support for 16/32 fiber connectors
 - Work is underway (outside of IEEE) and presentations provided
 - Is there understanding of relative costs versus 12/24 fiber connectors ?

Presentation	Comments
	<i>Presenters Note: I think we have a gap here</i>

Economic Criteria: Supporting Presentations and Gaps (4)

- ▶ Consideration of operational costs (e.g. energy consumption)
 - SG has adopted and energy efficient objective

Presentation	Comments
diab_400_01b_0713.pdf	Proposes adding EEE into list of objectives <i>Presenters Note: Adequate response?</i>

Economic Criteria: Supporting Presentations and Gaps (5)

- ▶ Other areas (as appropriate)
 - Do we have any

Presentation	Comments
	<i>Presenters Note: None come to mind at present</i>

Thank You