

# Five Criteria Responses

10Gb/s PHY for EPON  
Study Group

# Broad Market Potential

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- a) Broad set of applications**
  - b) Multiple vendors, multiple users**
  - c) Balanced cost, LAN vs. attached stations**
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- 10G EPON is applicable in multiple environments to support bandwidth-intensive applications that will require fast, reliable, scalable, first-mile connections. Such applications include Broadcast TV (expanded HDTV content), IPTV, time-shifted TV, rich unicast based VOD content libraries, 3D Online Interactive Games, UltraHigh Speed Internet, Personal Video Casting, Business Ethernet Access, Distributed Network Attached Storage, Medical Imaging, HDTV Video Conferencing, Video Email, Virtualized Multimedia Network applications, Grid Computing Interconnect, Next Generation Wireless Access Backhaul, MDU backhaul, and BPL backhaul.
  - In an overwhelming response at the March, 2006, IEEE 802 LMSC meeting in Denver, attendees voted 52 to 2 to form a 10Gb/s EPON study group. Among those represented were 31 companies including optical component manufacturers and semiconductor manufacturers, equipment vendors, and service providers and 58 individuals who expressed interest in participating in the activities of 10GEPON study group and consequent task force.
  - 10G interfaces will eventually exhibit a similar cost balance as 1G 802.3ah for PON ports versus per attached stations.
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# Compatibility

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- a) **Conformance with 802 Overview and Architecture**
  - b) **Conformance with 802.1D, 802.1Q, 802.1f**
  - c) **Compatible managed object definitions**
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- The proposed standard will conform to the simplified full-duplex media access control defined in Annex 4A in IEEE Std. 802.3-2005.
  - The proposed standard will conform to the requirements of IEEE Std 802-2001. Conformance with 802.1D, 802.1Q, and 802.1f is provided by use of the existing overlying 802.3 MAC and MAC Control sublayer interfaces.
  - The Management Information Base (MIB) for 10Gb/s PHY for EPON will maintain compatibility with the current 802.3 MIB, allowing a consistent management model at all operating speeds.
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# Distinct Identity

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- a) Substantially different from other IEEE 802 standards**
  - b) One unique solution per problem (not two solutions to a problem)**
  - c) Easy for the document reader to select the relevant specification**
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- There is no existing 802 standard or approved project appropriate for wire line access using point-to-multipoint topology at 10Gb/s.
  - The proposed project is a 10Gb/s upgrade for users of Ethernet Passive Optical Networks specified in IEEE Std 802.3-2005. The solution may include more than one Physical Media Dependent sublayer specification to support different optical link budgets. The solution may include a 10Gbps symmetric solution and/or an asymmetric 10Gbps downstream/1Gbps upstream solution.
  - The proposed project will be formatted as a set of clauses in IEEE Std 802.3, making it easy for the document reader to select the relevant specification.
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# Technical Feasibility

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- a) Demonstrated system feasibility**
  - b) Proven technology, reasonable testing**
  - c) Confidence in reliability**
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- Presentations made to the 10Gb/s PHY for EPON Study Group illustrate the technical feasibility of 10Gb/s EPON system. The 10Gb/s EPON prototype system was implemented by adding the 10Gb/s EPON PHY to 802.3-compliant devices. Two options supporting 10Gb/s EPON PHY were studied: asymmetric (10Gb/s downstream/ 1Gb/s upstream) mode and symmetric (10Gb/s downstream/ 10Gb/s upstream) mode.
  - This project reuses the Ethernet point-to-multipoint and point-to-point technologies that proved to be stable and credible. The project will extend burst mode technology to 10Gb/s. The reasonable throughput and latency for the 10Gb/s burst mode interface was demonstrated by using the continuous mode optics available for 10Gb/s point-to-point Ethernet devices. This study group will develop the specifications of the 10Gb/s EPON PHY, considering the performance of the 10Gb/s burst mode interface and the compatibility with the 802.3 standards. The testing is expected to be straightforward, based on experience gained from testing of 1Gb/s EPON and 10Gb/s point-to-point products.
  - This study group has received contributions from PHY and system vendors; service providers; and industry/academic experts. The 1Gb/s point-to-multipoint and 10Gb/s point-to-point technologies are mature and reliability data exists which provides a high level of confidence in reliability of 10Gb/s EPON systems.
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# Economic Feasibility

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- a) **Known cost factors, reliable data**
  - b) **Reasonable cost for performance**
  - c) **Consideration of installation costs**
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- The cost factors for the components and systems are well known because 10Gb/s Ethernet and EPON architectures are massively deployed for commercial services.
  - Point-to-multipoint topology is optimal for broadcast services and IP-based TV, providing cost-efficient subscriber access architecture. Coupled with a reduction of the footprint and power consumption of CO equipment, reduction of trunk fiber count, and lower maintenance and repair costs, the introduction of 10Gb/s EPON results in the overall reduction of infrastructure cost and reasonable cost for performance ratio.
  - The installation costs of cable plant and maintenance costs are similar to 1Gb/s EPON.
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