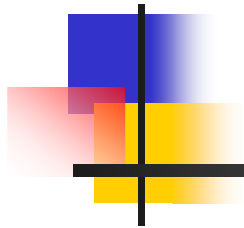


Reconsideration on 10Gb/s EPON Standardization



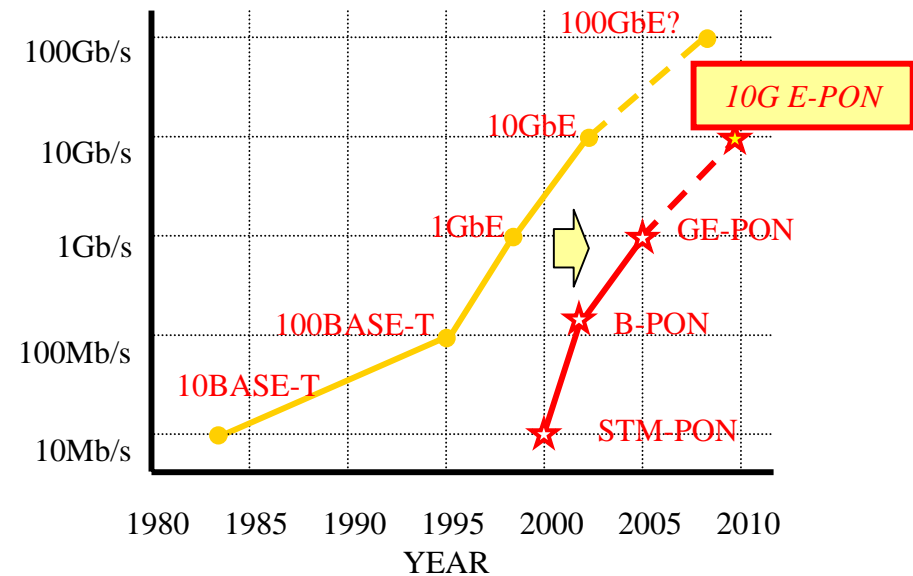
2006-05-24/25

**IEEE 802.3 Interim Meeting
Austin, Texas, U.S.A.**

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Market Feasibility

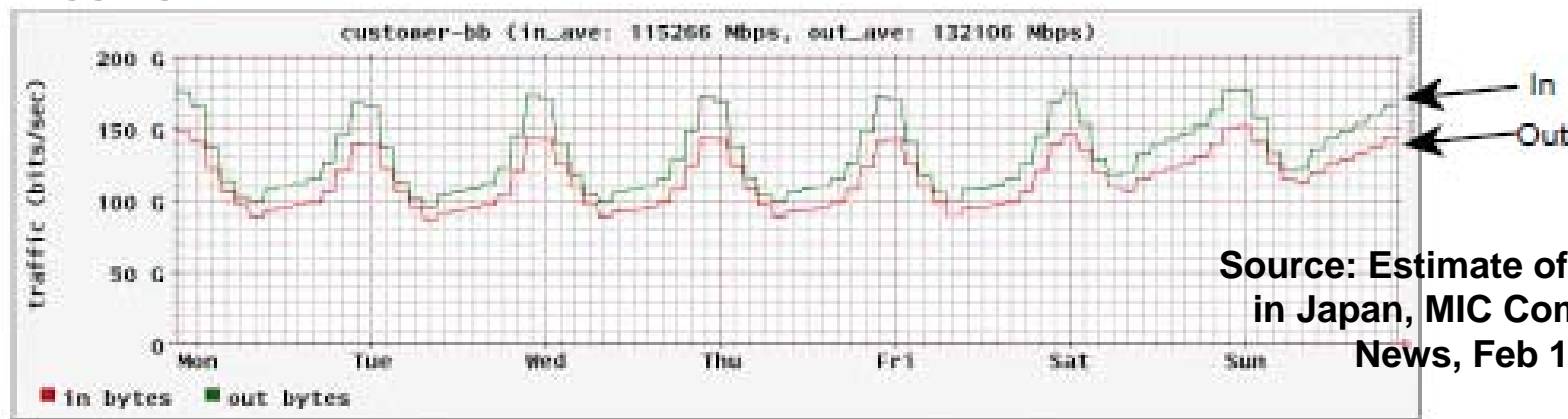
- Standardization target schedule?
 - PON's bit rate follows Ethernet with 8 to 9 years' delay.
10Gb/s Ethernet in 2002 → 10Gb/s PON in 2010
- User demands for 10Gb/s EPON?
 - nil at present
 - will emerge in 2010 or later
Today 1 Gb/s EPON is deployed.
Traffic is doubling every year.
→ 10 Gb/s EPON in 2010.



Market Feasibility (Cont.)

- Asymmetric downstream/upstream rates is not useful.
 - Traffic between ISPs and users is almost symmetrical.
- 10Gb/s EPON should offer integrated services.
 - Business users, various FTTx configurations
 - High reliability, TDM emulation
 - NGN Interwork → QoS, interoperability with the Home NWs
- **The CFI does not fully address these issues.**

Aggregated traffic between 7 ISPs and users in Japan, Nov 2004.



Source: Estimate of Internet Traffic
in Japan, MIC Communications
News, Feb 10, 2005.

PHY Issues - Optical -

- The following issues shall be solved considering costs and feasibility, which will take 3 to 4 years.
 - Specification of optical parameters optimized for the applied environment.
 - Optical devices
 - Wavelength allocation
 - High-power laser integrated with external modulator (EA/LD)
 - Semiconductor optical amplifier (SOA)
 - Highly sensitive optical detector
 - Integrated Circuits
 - Burst receive pre-amplifier, limiting amplifier
 - Burst receive CDR-LSI
 - Burst LD driver
 - OLT/ONU optical transmitter/receiver

PHY Issues - Burst Multiplexing -

- The following essential issues shall be discussed.
 - Burst bit synchronization
 - Low overhead and fast synchronization
 - Format of burst multiplexing overhead
 - Specification of jitter transfer/jitter generation
 - Upstream data pulse masking (pulse distortion allowance)
 - Coding
 - 64B66B+scrambling vs. 8B10B vs. Scrambling
 - FEC
 - Targeted performance and bandwidth efficiency
 - Correction algorithm
 - In-band or Out-band

MAC and System Issues

- The current CFI deals with PHY only.
 - Many MAC and system architecture issues (next page), which must also be solved together with PHY.
- Standardization of PHY, MAC and the system needs no less than 3 years, because it is a serial process:
 - selection of appropriate procedures
 - performance evaluation
 - economic feasibility study
- Extend the scope to include MAC and the system;
- Allocate enough time for technical discussion.

MAC and System Issues (Cont.)

- Discussion Subjects:
 - PON access method (MPCP revision for performance improvement and scalability with increased LLs)
 - DBA control scheme for quick response to 10Gb/s transmission
 - OAM overhead reduction/response improvement
 - High reliability by protection
 - Multicast support
 - Clarification of relationship with IEEE 802.1 (ah and others)
 - Multi-service support: TDM emulation and residential Ethernet
 - Interoperability (PICS and test suites)

Summary

- Standardization only dealing with PHY is not feasible.
 - Many issues with MAC and the system architecture.
 - Needs a solution addressing all issues.
- Standardization scope shall be revised to include MAC and the system architecture.

- 10Gb/s EPON's market will not materialize until 2010.
- 3 to 4 years are necessary to solve technical issues.
- Standardization process shall be scheduled so that enough time is allocated for technical discussion.