

10GBASE-T 5 Criteria

1. Broad Market Potential

- Broad set of applications
- Multiple vendors, multiple users
- Balanced cost, LAN vs. attached stations

Current trends suggest the steady migration of LAN speeds from 100 Mb/s (100BASE-TX) today toward 1000 Mb/s (1000BASE-T). In particular, as the density of computer devices (servers, switches, routers and storage modules) located in data centers and enterprise networks increases, so will the demand for higher speeds at data aggregation points. Additionally, there is an increasing demand for high performance servers to support bandwidth intensive applications such as CAD/CAM, digital animation, storage and cluster computing. Clearly there is a need for a low cost 10Gb/s solution that will utilize twisted pair copper infrastructure.

Interest in 10GBASE-T has been demonstrated by the attendance of more than 69 vendor and user representatives at technical meetings at the November 2002 Plenary, attendance at subsequent Interim meetings, and by participation in an email forum devoted to facilitating technical development in this area. 34 companies have indicated they will participate in the technical development of a standard for 10GBASE-T. This level of commitment indicates that the standard will be supported by multiple vendors, and that there will be a wide variety of equipment available to support 10 gigabit speed applications on twisted pair copper links.

2. Compatibility with IEEE Standard 802.3

- Conformance with CSMA/CD MAC, PLS
 - Conformance with 802.2
 - Conformance with 802 FR
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The proposed standard will conform to the full-duplex operating mode of the 802.3ae MAC.

In a manner similar to the 100BASE-TX and 1000BASE-T standards, a new Physical Layer (PHY) will be defined for operation at 10Gb/s over structured copper cabling.

The Management Information Base (MIB) for 10GBASE-T will maintain compatibility with the current 802.3 MIB, allowing a consistent management model at all operating speeds.

Conformance with 802.2 is provided by the overlying 802.3ae MAC sub-layer.

The proposed standard will conform to the 802 Functional Requirements Document, with the possible exception of the Hamming distance.

The proposed standard will not support the OAM unidirectional mode specified in P802.3ah. The proposed standard will support co-existence with 802.3af.

3. Distinct Identity

- Substantially different from other 802.3 specs/solutions
 - Unique solution for problem
 - Easy for document reader to select relevant spec
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The proposed standard is a 10Gb/s upgrade for 802.3 users based on the 802.3 CSMA/CD MAC.

It is the only standard that will use horizontal structured twisted pair cabling as defined in ISO/IEC 11801, offering upgrade paths to 10Gb/s for present Ethernet users connected with copper.

The proposed standard will be formatted as a new clause to the 802.3 standard.

4. Technical Feasibility

- Demonstrated Feasibility
 - Proven Technology
 - Confidence in Reliability
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Presentations made to the 10GBASE-T Study Group illustrate the technical feasibility of 10Gb/s signaling using structured twisted pair cabling as defined by ISO/IEC 11801. These presentations covered all aspects of feasibility including simulation and theoretical analysis based on proven technology of 1000BASE-T, known cabling technology, and state of the art process technology; and demonstrated that there is sufficient channel capacity for the transmission of 10Gb/s.

The study group acknowledges that 10Gb/s operation is achievable on Class D and Class E cabling and augmentation of their specifications is required to higher frequencies for performance parameters such as insertion loss and the addition of alien crosstalk characterization. The study group also agrees that the 10Gb/s operation is achievable on Class F cabling. The channel models are supported by the measurement of the properties of cables and network hardware in both laboratory and field installations.

The technology to be utilized in the realization of the 10GBASE-T PHY will rely heavily on previous 802.3 standards; 100BASE-TX and 1000BASE-T. It is recognized that the relevant technologies have greatly advanced at every level since the inception of work on the 1000BASE-T standard approximately six years ago.

This study group has received contributions from PHY, system and cabling vendors; end users; and industry/academic experts.

5. Economic Feasibility

- Cost factors known, reliable data
 - Reasonable cost for performance expected
 - Total installation costs considered
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The implementation of a single 10GBASE-T PHY device is estimated to require an approximate complexity level of 1.5 times the currently available quad 1000BASE-T chip. The experience curve of the semiconductor industry ensures the future reduction of the size, and hence the cost, of implementation. In production, the 10GBASE-T PHY device is projected to meet the 3x cost versus 10x performance guidelines applied to previous advanced Ethernet standards.

The widespread use and low cost of installation of structured twisted pair cabling systems supports economic feasibility with regards to total cost of installation.