10GBASE-LRM Five Criteria as

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10Gb/s on FDDI-grade MMF Cable

Five Criteria

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Broad Market Potential 1

- Broad sets of applicability
- Multiple vendors and numerous users
- Balanced costs (LAN versus 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 (desktops, servers, switches, routers and storage modules) located in enterprise networks and data centers increases, so will the demand for higher speeds at data aggregation points. A critical aggregation point is represented by the interconnection of distribution equipment within the building backbone cabling subsystem. Clearly there is a need for a low cost 10Gb/s solution that will utilize the installed base multimode fiber infrastructure.

Broad Market Potential 2

Interest in 10Gb/s on FDDI-grade multimode fiber has been demonstrated by the attendance of more than 156 vendor and user representatives at CFI meeting at the November 2003 Plenary, and by the attendance & 30 contributions received towards advancing a technical solution at the subsequent January Interim meeting. Forty (40) companies have indicated they will participate in the technical development of a standard for 10Gb/s on FDDI-grade multimode fiber. 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 multimode fiber links.

The cost balance is no different from any other point-to-point Ethernet link.

Compatibility with IEEE Standard 802

- IEEE 802 defines a family of standards. All standards shall be in conformance with the IEEE 802.1 Architecture, Management and Interworking documents as follows: 802. Overview and Architecture, 802.1D, 802.1Q and parts of 802.1f. If any variances in conformance emerge, they shall be thoroughly disclosed and reviewed with 802.
- Each standard in the IEEE 802 family of standards shall include a definition of managed objects which are compatible with systems management standards.

The proposed standard will conform to the full-duplex operating mode of the 802.3 MAC. In a manner similar to the 10GBASE fiber standards, a Physical layer will be defined for operation at 10Gb/s over structured fiber cabling.

The proposed standard will conform to the requirements of IEEE Std 802-2001. Conformance with 802.1 and 802.2 is provided by use of the overlying 802.3 MAC sub-layer.

The Management Information Base (MIB) for the 10Gb/s on FDDI-grade multimode fiber PHY will maintain compatibility with the current 802.3 MIB, allowing a consistent management model at all operating speeds.

Distinct Identity (as amended by WG and approved by WG)

- Substantially different from other IEEE 802 & 802.3 standards
- One unique solution per problem (not two solutions to a problem)
- Easy for the document reader to select the relevant specification

The proposed standard is a 10Gb/s upgrade for 802.3 users based on the 802.3 CSMA/CD MAC.

Currently the industry is moving towards smaller form factor serial solutions, and it is expected that with time these will become dominant. This serial multimode PHY will be the only one that supports a link distance of at least 220m over installed FDDI-grade multimode fiber and that supports compatibility with the 10GBASE-R PMA.

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

Technical Feasibility 1

- Demonstrated system feasibility
- Proven technology, reasonable testing
- Confidence in reliability

Presentations made to the 10Gb/s on FDDI-grade multimode fiber Study Group illustrate the technical feasibility of 10Gb/s signaling using structured fiber cabling as defined by IEC 60793-2. These presentations included several different technical approaches, covered numerous aspects of feasibility including simulation and theoretical analysis based on known technology, specified cabling technology, and state of the art process technology; and demonstrated that there is sufficient channel capacity for the transmission of 10Gb/s.

Technical Feasibility 2

The technology to be utilized in the realization of the 10Gb/s on FDDI-grade multimode fiber PHY will rely on the work of previous 802.3 standards and activities; both extension to the multimode efforts of 1000BASE-SX/LX, and the PHY is expected to leverage available 10GBASE-R technology. It is recognized that the relevant technologies have greatly advanced at every level since the inception of work on the 1000BASE-SX/LX standard over six years ago and the original 802.3ae work from 3 years ago.

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

Economic Feasibility

- Known cost factors, reliable data
- Reasonable cost for performance
- Consideration of installation costs

The implementation cost of the 10Gb/s on FDDI-grade multimode fiber PHY device is estimated to be lower than that of 10GBASE-LR devices. The experience curve of the industry ensures the future reduction of the size and the cost of implementations. With production volume and anticipated relaxation of optical component requirements, the 10Gb/s on FDDI-grade multimode fiber PHY device is projected to meet the 3x-4x cost versus 10x performance guidelines applied to comparable previous advanced Ethernet standards. Additionally, it is expected that serial solutions will have the highest volumes and this standard will therefore have economies of scale.

The continued use of the installed multimode structured fiber cabling systems supports economic feasibility with regards to total cost of upgrades to 10Gb/s and takes into considerations the constraints of industry IT budgets.