10GBASE-CX4

5 Criteria
Broad Market Potential

Broad set(s) of applications
Multiple vendors, multiple users
Balanced cost, LAN Vs. attached stations

• As customers move to 1000BASE-T attached desktops, the demand for a very low-cost 10Gbps link to interconnect switches gains demand. 10GBASE-CX4 meets that demand.
• A 10 Gb/s 802.3 copper PMD solution extends Ethernet capabilities providing higher bandwidth for multimedia, distributed processing, imaging, medical, CAD/CAM, and pre-press applications by lowering the cost of high performance 10Gbps network links for:
  – LAN Backbone, server and gateways in Data Centers
  – Switch aggregation
  – Storage Area Network (SAN)
• average of 35 participants per meeting from more than 30 companies have attended 3 10-Gigabit Copper study group meetings and indicate that they plan to participate in the standardization of 10GBASE-CX4
• This level of commitment indicates that a standard will be supported by a large group of vendors. This in turn will ensure that there will be a wide variety of equipment supporting a multitude of applications.
• 10GBASE-CX4 helps bring a cost sensitive solution to this performance space.
• 10GBASE-CX4 improves the cost balance for short-reach attached stations at 10Gbps.
Compatibility with IEEE Std 802.3

Conformance with CSMA/ CD MAC, PLS
Conformance with 802.2
Conformance with 802

• The proposed standard will conform to the full-duplex operating mode of the 802.3 MAC, at 10 Gb/s operation.
• As was the case in previous 802.3 standards, a new physical layer will be defined for 10 Gb/s operation.
• The proposed standard will conform to the 802.3 MAC Client Interface, which supports 802.2 LLC.
• The proposed standard will conform to the 802.1 Architecture, Management and Interworking.
• The proposed standard will define systems management which is compatible with OSI and SNMP system management standards.
Compatibility with IEEE Std 802.3

10GBASE-CX4

OSI REFERENCE MODEL LAYERS

APPLICATION
PRESENTATION
SESSION
TRANSPORT
NETWORK
DATA LINK
PHYSICAL

LAN CSMA/CD LAYERS

HIGHER LAYERS

LLC—LOGICAL LINK CONTROL
MAC CONTROL (OPTIONAL)
MAC—MEDIA ACCESS CONTROL
RS—RECONCILIATION SUBLAYER

XGMII (OPTIONAL)

10GBASE-X PCS
10GBASE-X PMA

PMD

MEDIUM

To 10GBASE-X PHY

10GBASE-LX4 (PCS, PMA, and PMD)

10GBASE-CX4

MDI=MEDIUM DEPENDENT INTERFACE
PCS=PHYSICAL CODING SUBLAYER
PHY=PHYSICAL LAYER DEVICE
PMA=PHYSICAL MEDIUM ATTACHMENT
PMD=PHYSICAL MEDIUM DEPENDENT
XGMII=10GIGABIT MEDIA INDEPENDENT INTERFACE
Distinct Identity

Substantially different from other 802.3 specs/solutions
Unique solution for problem (not two alternatives/problem)
Easy for document reader to select relevant spec

• The current 802.3 10Gb/s specification includes only fiber-optic media types for interconnection of devices. There are no copper media types.
• The specification will be done in a format consistent with the IEEE document requirements thus making it easy for implementers to understand and design to.
• The proposed specification will use copper media similar to other high speed networking technologies (FibreChannel, IB4X) but does so with the IEEE 802.3 MAC as the over-riding layer which will result in higher compatibility and lower cost for 10Gbps Ethernet systems.
Technical Feasibility

Demonstrated feasibility; simulations, reports - - working models
Proven technology, reasonable testing
Confidence in reliability

• Technical presentations, given to 802.3, have demonstrated the feasibility of using the copper media in useful network topologies at a rate of 10 Gb/s.
Other technologies like IB-4X and 10GFC are deployed with similar media and baud rates.
• The principle of extending higher speeds to copper media has been well established by previous work within 802.3. The 10 Gb/s work will build on this experience.
• Vendors of XAUI components and systems are building reliable products which operate at 10 Gb/s on copper media, and meet worldwide regulatory and operational requirements.
• Component vendors have presented research on the feasibility of physical layer signaling at a rate of 10 Gb/s on copper media using a wide variety of innovative low cost technologies.
Economic Feasibility

Cost factors known, reliable data
Reasonable cost for performance expected
Total Installation costs considered

- Cost factors are extrapolated from the XAUI component supplier base and technology curves.
- Cost for a copper 10GBASE-CX4 implementation is expected to be 1/20 to 1/10 that of 10GBASE-optical solutions.
- Costs for assemblies based on established standards (IB4X,10GFC) are well known and reasonable.
- Network design, installation and maintenance costs are minimized by preserving network architecture, management, and software.