Project Proposal For A New INCITS Standard
Fibre Channel Physical Interface
(FC-PI-3)

1. Source of the Proposed Project

1.1. Title
Fibre Channel – Physical Interface – 3 (FC-PI-3)

1.2. Date
4/10/2003

1.3. Proposer
INCITS TG T11.2, with a current membership of ??

2. Process Description for Proposed Project

2.1. Project Type (Development or Revision)
Type D (Development done within INCITS T11.2)

2.2. Type of Document
Standard

2.3. Definition of Concepts and Special Terms
None

2.4. Expected Relationship with Approved Reference Models, Frameworks, Architectures, etc.
All Fibre Channel standards are intended for use in closed systems.

2.5. Recommended INCITS Development Technical Committee (Existing or New)
It is recommended that this project be assigned to TG T11.2. It is expected that this project will impose no new requirements on other Fibre Channel groups or standards.

2.6. Anticipated Frequency and Duration of Meetings
This project will make use of the regularly-scheduled bimonthly T11.2 plenary meetings. Informal Working Groups will be organized on an ad-hoc basis.

2.7. Target Date for Initial Public Review (Milestone 4)
April 2004

2.8. Estimated Useful Life of Standard or Technical Report
It is anticipated that this standard will have a useful life of over 10 years.

3. Business Case for Developing the Proposed Standard

3.1. Description
The FC-PI-3 standard will define the requirements for new physical layer variants used by the FC Protocol transport layer and the command sets above it, while maintaining a high degree of compatibility with the requirements in the FC-PI, FC-PI-2, and 10GFC standards.

There are currently four candidates for inclusion in the FC-PI-3 standard:

1. 1310 nm 10G link - a cost effective, 10 Gb/s, 1310 nm optical, mid-distance single-mode link based on Fabry Perot (FP) and/or future VCSEL laser technology.
2. Serial 10G electrical link - a differential serial electrical channel with connector for 10 Gb/s support external transceivers or internal device connections.

3. 1310 nm and 1550 nm long-haul links - ultra-long distance PMDs for 1.0625, 2.125 and 4.25 Gb/s rates using single mode fiber and DFB transmitter technology. Target link distances are 35 km (1310 nm) and 80 km (1550 nm).
4. Bi-directional optical links – bi-directional physical implementations for 1G, 2G, 4G, and 10G Fibre Channel data rates.

Additional sub-projects may be proposed within the scope of this project.

Each will include appropriate specifications, including penalties and jitter, and methodologies required to measure the signal parameters.

This proposed standard is not intended to address areas above the physical level (such as protocol and command sets).

3.2. Existing Practice and the Need for a Standard

1310 nm 10G link

Current 10G optical standards can support distances of 82 meters with conventional multimode fiber, 300 meters with enhanced bandwidth multimode technology and up to 10km using Distributed Feedback (DFB) single-mode laser technology. However, there are numerous applications that need to span up to ~1 km, less than 10 km, and most importantly with lower cost.

FP lasers use much simpler less expensive structures than DFB lasers, require no special launch conditions or optical isolation, use conventional fiber, and provide excellent distance flexibility. The result would be a variant that can span all but a very small percentage of distance applications but at an attractive level of complexity and cost. This standard is expected to find application in other similar market segments, which should further promote larger volumes and lower costs.

An objective is to leverage definitions, test methods, receiver specifications, and single mode cable and connector specifications in or referenced by the current 10 km standard in 10GFC. This will shorten the development effort and ensure interoperability between the two standards.

Serial 10G electrical link

There are currently no standards within Fiber Channel to support 10G serial electrical transmission. However, such technology is under development within industry multi-source agreements (MSAs). It is important to incorporate this technology into Fibre Channel because:

- For stable, long-term interoperability, it is important that a standards body (vs. an industry MSA) take control of the specifications.
- Serial interfaces support and promote a common platform with other standards or other industry bodies, which should promote larger volumes and lower costs.
- Serial interfaces support lowest cost and highest port density designs.
- Electrical specifications are required to interface with serial modules for external media.
- The technology will provide a growth path for other applications of serial electrical transmission, such as 10G interconnections within a cabinet.

1310 nm and 1550 nm long-haul links

There are non-standardized links being used for Fibre Channel applications implemented now with 35-40 km distance capability based on industry ad-hoc specifications, with plans for 70-80 km distance capability on the horizon. These products have been made available in the market from multiple suppliers addressing long distance 1310 nm and 1550 nm links (Fibre Channel, Ethernet or both), with no two links being specified identically. This lack of appropriate standardization has made interoperability and multiple vendor procurement difficult.

The intent of standardizing these Fibre Channel links is to bring convergence in these ad-hoc

specifications and add rigor to justifying link specifications required to achieve target performance.

Bi-directional optical links
Current Fibre Channel infrastructures and architectures are physically limited by the size of duplex links. It is clear system vendors want higher bandwidths, either through port density within a box or in bandwidth per port. The current method for increasing bandwidth within the existing dimensions of Fibre Channel switches and directors is to increase duplex data rates at the optical interface (e.g. 10GFC). The option proposed here is to create a standard for bi-directional optical interfaces that could effectively double port density for existing switch geometries. As port density will continue to be an issue, independent of data rate, the bi-directional standard should include variants to cover 1G, 2G, 4G, and 10G Fibre Channel.

Other
Other projects may be defined and justified during this standards development.

3.3. Implementation Impacts of the Proposed Standard

3.3.1. Development Costs

This standard will be developed through the voluntary and cooperative efforts of T11.2 Task Committee members. No significant development costs are anticipated.

3.3.2. Impact on Existing or Potential Markets

The proposed standard will provide an upward growth path that complements and enhances existing supplier products and support schemes and protects backward compatibility wherever possible. The proposed standard will result in expanded applications for existing and conceived products in both the channel and network markets. It is likely that isolated adverse effects would occur in any case through non-standard evolution or revolution.

3.3.3. Costs and Methods for Conformity Assessment

The committee will consider the results of testing provided to the committee through the voluntary efforts of the participants in T11.2. With this method, all costs are borne by the organizations of the various participants and have for the most part been mainly an adjunct of their normal development costs.

3.3.4. Return on Investment

The return on investment for this development is expected to be high, due to the commonality of effort directed to a singular method of providing the services covered by the proposed standard. Additionally, the investment made in products developed under FC-PI-3 will be preserved by providing services within the existing infrastructure (what does this mean)?

3.4. Legal Considerations

3.4.1. Patent Assertions

Calls will be made to identify assertions of patent rights in accordance with the relevant INCITS, ANSI and ISO/IEC policies and procedures. T11.2 is not aware of any patent assertions that may be made.

3.4.2. Dissemination of the Standard or Technical Report

Drafts of this document will be disseminated electronically. Dissemination of the final standard will be restricted as the document becomes the property of INCITS, ANSI, or ISO/IEC.

4. Related Standards Activities

4.1. Existing Standards

- NCITS 352:2002 Fibre Channel - Physical Interface (FC-PI)

4.2. Related Standards Activity

- Project 1506-D, Fibre Channel - Physical Interfaces - 2 (FC-PI-2)

- Project 1413-D, Fibre Channel - 10 Gigabit (10GFC)
- Project 1316-DT, Methodology for Jitter and Signal Quality Specification (FC-MJSQ)
- SFF Committee document INF-8077i, XFP Specification, Revision 3.0, 10 Gigabit Small Form Factor Pluggable Module

The development of the FC-PI-3 will build on the work in any related standards and will be guided, as appropriate, by standards outside the suite of Fibre Channel standards.

4.3. Recommendations for Coordinating Liaison

None

4.4. Recommendations for Close Liaison

Distributed Management Task Force (DMTF)

5. Units of Measurement used in the Standard

This standard will use the International System of Units (SI).