InterNational Committee for Information Technology Standards (INCITS)
Secretariat: Information Technology Industry Council (ITI)
700 K Street NW, Suite 600, Washington, DC 20001
www.INCITS.org

INCITS Annual Report

Annual Report for: INCITS/T11 - Fibre Channel Interfaces

Covering the Period from May 2020 to April 2021

1. *Executive Summary*

This reporting period is marked by the completion of several Fibre Channel standards. The newly published standards are FC-LS-4, FC-NVMe-2, and FC-PI-7P. FC-LS-4 specifies the latest enhancements and improvements to the base Fibre Channel link services. FC-NVMe-2 specifies improvements to the NVMe over Fibre Channel environment that include new error recovery mechanisms. FC-PI-7P specifies 4 lane 256GFC which provides very fast speeds for high bandwidth, low latency applications.

There are seven new Fibre Channels standards/technical reports that are under development for this reporting period. This includes the 128 GFC serial FC-PI-8 standard, standards that define Switch and Fabric services, and standards that define enhancements and improvements to Fibre Channel functions and operational environments.

T11 maintains active liaison with a number of standards organizations and provides liaison for some organizations publishing standards through INCITS. International processing of standards developed by T11 is handled by the INCITS SC25/WG4 US TAG.

2. *Accomplishments*

The committee has published three new standards during the reporting period. In addition, several hundred documents and presentations were prepared supporting the technical and administrative activities of the committee in the period this report covers. Here are the details:

Extended capability of the core standards: The core standards of Fibre Channel continue to be refined by clarifying implementation requirements and adding new capabilities. FC-LS-4 was published. New projects FC-FS-6, FC-SW-8, FC-GS-9, and FC-LS-5 will further enhance the base Fibre Channel architecture.

Physical layer: The physical layer technologies continue to improve the performance and cost-effectiveness of FC. FC-PI-7P which specifies 4 lane 256GFC was published. FC-PI-7P provides very fast speeds for high bandwidth, low latency applications. The FC-PI-8 project defines the 128GFC serial data rate for Fibre Channel. FC-PI-8 has recently gained momentum as the technologies required to support this environment are being developed in the industry.

Security: T11 understands the importance for considering security whenever new standards are defined. As new FC standards are developed, T11 ensures that the impact of new security policies and technologies are addressed during their development.

FICON: To support the large system FICON environment, the FC-SB series of standards are a potential source of new work for the committee. T11 periodically considers new enhancements and improvements to these standards.

NVMe: Work continues to improve the NVMe functionality as it relates to Fibre Channel. The newly published FC-NVMe-2 standard defines enhanced error recovery enhancements for the mapping of NVMe to Fibre Channel.

This work was completed in concert with the Fibre Channel over Fabrics work being done in the NVM Express group.

New Work: T11 is looking at new areas of work which will ensure Fibre Channel's prevalence in the storage marketplace. New work in the area of extreme low latency transports and persistent memory is being investigated by the committee. The FC-PM project serves as the point project to investigate these new areas of work.

As a result of these activities, the total program of work of T11 during the period of this annual report is summarized as follows:

Family	Projects in Development	Projects in FC-TC or INCITS Approval	Published Standards	Total
FC-TC T11	0	0	0	0
FC Physical T11.2	2	0	1	3
FC Protocol T11.3	5	0	2	7
TOTAL	7	0	3	10

3. Challenges

The most significant challenges are the consolidation of the FC industry and the maturing nature of the FC technologies. The consolidation of the FC industry has resulted in fewer member companies participating in T11. T11's goal is to spawn new FC work items that will hopefully add new member companies and offset the impact of consolidation. T11 is working with existing member companies and potential new companies to ensure continued participation in the T11 activities.

COVID-19 continues to be a major challenge for T11 during this reporting period. In 2020 T11 meetings were held virtually from April through the end of the year. So far in 2021 T11 meetings continue to be held virtually but the committee is pushing to return to face to face and/or hybrid meetings as soon as possible.

During the February 2021 plenary meeting the T11 committee discussed how to move forward with the return to face to face T11 meetings in 2021. There was general consensus that virtual meetings were fine in the interim while COVID-19 was rampant and travel restrictions were in place. However, several deficiencies were also identified for virtual meetings that include the lack of collaboration, the lack of efficiency, and lack of effectiveness.

The committee discussed a hybrid approach, (face-to-face with virtual capabilities) as we begin to return to face to face meetings. The committee understands that there are challenges with the hybrid approach. These include:

- Member companies have different travel policies and timetables;
- The lack of quality conferencing facilities at contracted hotels;
- Sensitivity to personal choices;
- Flexibility for contracted room night commitments (attrition).

Recently INCITS established a more flexible face to face/hybrid policy so that TC's have the option to hold meetings at least partially in person in 2021. T11's goal is to attempt a hybrid meeting in August 2021.

4. Future Trends and Related Technical Activities

The work of T11 continues to be very important because of existing and emerging storage applications that require very high bandwidth, low latency, flexible connectivity, security, and management capabilities.

As computing resources grow more powerful and are distributed across more processors, Fibre Channel is the principal technology capable of meeting the performance and connectivity requirements for storage devices in large enterprise data processing environments. Virtualization and new computing environments continues to drive the need for very high bandwidth and transmission efficiency.

The management of storage environments continues to be an important activity. While it is likely that significant parts of the work will be carried forward within T11, other parts of the work may be carried forward in other standards organizations or industry consortia, including T10 and SNIA. Much of the work specific to Fibre Channel for these broader organizations will be carried on using the T11 liaison relationships.

As previously discussed the goal of T11 is to create new FC work based on low latency transports that will enable new storage and memory applications. The enthusiasm around the FC-PM project is evidence of these new applications.

5. Liaison Activities

T11 and its task groups maintain formal liaison with the following organizations. Most liaison representatives are member organizations with representatives in both T11 and the liaison organization. Liaison relationships vary during the life of relevant projects and are strongest during the development and T11 review periods.

INCITS T10: Liaison is maintained with INCITS TC T10 (Technical Committee on SCSI Interfaces). The SCSI command set and protocols are carried across the majority of Fibre Channel connections. The breadth of the work requires multiple liaison representatives. For more information about T10 see www.t10.org/.

FCIA: Liaison is maintained with the Fibre Channel Industry Association (FCIA). The FCIA is a trade and marketing organization whose members represent the manufacturers of products compliant with T11 standards. For T11 one of the most important activities provided by the FCIA are recommendations based on the existing and emerging storage markets. For more information about FCIA, see www.fibrechannel.org/.

SNIA: Liaison is maintained with Storage Networking Industry Association (SNIA). SNIA is a trade and technical organization that addresses the use of Fibre Channel and other technologies for the creation of large storage area networks (SANs). SNIA's technical committees provide many inputs into the T11 activities, especially with respect to SAN management functions and the security of SANs. For more information about SNIA, see www.snia.org/.

IEEE 802.3: Liaison is maintained with IEEE 802.3. Relevant projects include the definitions of the new Ethernet speeds and interfaces which impact Fibre Channel. See www.ieee802.org/3/.

INCITS CS1: Liaison is maintained with the INCITS CS1 security TC. For more information about CS1 see www.incits.org/committees/cs1.

NVM Express: Liaison is maintained with the NVM Express group to assist in the development of the NVMe over Fabrics specification and the FC-NVMe standards. An official MOU exists between ITI/INCITS and NVM Express. For more information about NVMe see www.nvmexpress.org/.

OIF: Liaison is maintained with the OIF (Optical Internetworking Forum). For more information on OIF see http://www.oiforum.com/.

SFF TA: Liaison is maintained with the SNIA SFF Technical Affiliate, formerly named the "Small Form Factor" committee. The SFF addresses technical areas as optical transceiver modules used by Fibre Channel, mechanical standards for Fibre Channel and SCSI storage devices, and connectors for Fibre Channel. For more information about SFF, see https://ta.snia.org/.

6. *Other Administrative Information*

Public access policy:

T11 makes use of the INCITS public access process in Section 3.11 in the procedures.

Web-based procedures:

T11 uses the INCITS Committee Management System (ICMS) to conduct business. This includes document data bases, balloting, meeting notification and scheduling, attendance, and committee membership. Great care was given during the migration to ICMS such that the public notification policy is still maintained.

Plenary meeting documents are distributed during meetings by Wi-Fi network access to the ICMS document database.

To enable virtual meetings during 2020 and 2021, T11 has used the Zoom services.

7. *Does your committee collect funds?*

T11 meeting activities are financed and hosted by volunteer organizations. The individual participants and their member organizations finance all travel, room, and related business expenses. T11 has no direct financial activities.

8. *Committee membership and officer information (will be added by the Secretariat)*