

# INTERNATIONAL STANDARD

# ISO/IEC 14776-222

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## Information technology – Small computer system interface (SCSI) – Part 222: Fibre Channel Protocol for SCSI, Second Version (FCP-2)

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**INFORMATION TECHNOLOGY –  
SMALL COMPUTER SYSTEM INTERFACE –  
PART 222: Fibre Channel Protocol for SCSI,  
Second Version (FCP-2)**

**FOREWORD**

- 1) ISO (International Organization for Standardization) and IEC (International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.
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International Standard ISO/IEC 14776-222 was prepared by subcommittee 25: Inter-connection of information technology equipment, of ISO/IEC joint technical committee 1: Information technology.

## INTRODUCTION

This International Standard defines a Fibre Channel mapping layer (FC-4) that uses the services defined by NCITS Project 1311D, Fibre Channel Framing and Signaling Interface (FC-FS) to transmit SCSI command, data and status information between a SCSI initiator and a SCSI target. The use of this standard enables the transmission of standard SCSI command formats, the transmission of standard SCSI data and parameter strings, and the receipt of SCSI status and sense information across the Fibre Channel using only the standard Fibre Channel frame and sequence formats. The Fibre Channel protocol operates with Fibre Channel Classes of Service 1, 2 and 3 and operates across Fibre Channel fabrics and arbitrated loops.

The Small Computer System Interface (SCSI) command set is widely used and applicable to a wide variety of device types. The transmission of SCSI command set information across Fibre Channel links allows the large body of SCSI application and driver software to be successfully used in the high performance Fibre Channel environment.

This standard describes the protocol for transmitting SCSI commands, data, and status using Fibre Channel FC-FS Exchanges and Information Units. Fibre Channel is a high speed serial architecture that allows either optical or electrical connections at data rates from 265 Mbits up to 4 Gbits per second. The topologies supported by Fibre Channel include point-to-point, fabric switched and arbitrated loop. All Fibre Channel connections use the same standard frame format and standard hierarchy of transmission units to transmit the Information Units that carry SCSI information.

This standard is divided into 12 clauses and comprises 6 Annexes:

| <b>Clause</b> | <b>Subject</b>  |
|---------------|---|
| 1             | Scope   |
| 2             | Normative references  |
| 3             | Definitions, abbreviations and conventions  |
| 4             | Overview of the protocol for transmitting SCSI information over Fibre Channel   |
| 5             | Information Units used to transfer SCSI commands, data and status across a Fibre Channel connection   |
| 6             | Basic Link Services and Extended Link Services used by the protocol for transmitting SCSI information over Fibre Channel                            |
| 7             | FC-GS-3 Name Server objects defined for FCP-2   |
| 8             | FCP FC-4 Link Service definitions for the protocol for transmitting SCSI information over Fibre Channel   |
| 9             | Details of the Information Unit formats   |
| 10            | SCSI management features for Fibre Channel, including the SCSI mode pages used by the protocol for transmitting SCSI information over Fibre Channel |
| 11            | Timers used for FCP-2 error recovery algorithms   |
| 12            | Error recovery algorithms for FCP-2   |
| Annex A       | Relationship between the services defined by SAM-2 and the corresponding functions defined by this standard   |
| Annex B       | Examples of the protocol for transmitting SCSI information over Fibre Channel   |
| Annex C       | Examples of the FCP-2 error recovery mechanisms   |
| Annex D       | Techniques for discovering SCSI device capabilities over Fibre Channel  |
| Annex E       | Examples of the content of ELs used during FCP-2 recovery operations  |
| Annex F       | Mechanism to support bidirectional SCSI data transfer using SCSI commands   |

Fibre channel Protocol-2 (FCP-2) is part of the SCSI family of standards developed by T10 to facilitate the use of the SCSI command sets for many different types of devices across many different types of physical interconnects. The architectural model for the family of standards is ISO/IEC 14776-412, Information technology – SCSI Architecture Model-2 (SAM-2).

**INFORMATION TECHNOLOGY –  
SMALL COMPUTER SYSTEM INTERFACE –  
PART 222: Fibre Channel Protocol for SCSI,  
Second Version (FCP-2)**

## **1 Scope**

This part of ISO/IEC 14776 defines a second version of the SCSI Fibre Channel Protocol (FCP). This part of ISO/IEC 14776 is a mapping protocol for applying the SCSI command set to Fibre Channel. It defines how the Fibre Channel services and the defined Information Units (IUs) are used to perform the services defined by the SCSI-3 Architecture Model – 2 (SAM-2). This second version includes additions and clarifications to the first version, removes information that is now contained in other standards, and describes additional error recovery capabilities for the Fibre Channel protocol.

## **2 Normative references**

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

### **2.1 International standards**

ISO/IEC 14165-122, Information technology – Fibre Channel – Part 122: Arbitrated loop-2 (FC-AL-2)<sup>1</sup>

ISO/IEC 14776-412, Information technology – Small Computer System Interface (SCSI) – Part 412: Architecture Model-2 (SAM-2)<sup>1</sup>

ISO/IEC 14776-452, Information technology – Small Computer System Interface (SCSI) – Part 452: Primary commands-2 (SPC-2)<sup>1</sup>

### **2.2 International Standards under development**

ISO/IEC 14776-221, Information technology – Small Computer System Interface (SCSI) – Part 221: Protocol for SCSI (FCP)

ISO/IEC 14776-312, Information technology – Small Computer System Interface (SCSI) – Part 312: Primary commands-2 (SPC-2)

### **2.3 Other references**

NOTE Copies of NCITS Technical Reports are available for purchase from Global Engineering Documents. For further information, contact Global Engineering Documents at ++1 800-854-7179 (telephone) or ++1 303-792-2181 (telephone) or by mail at 15 Inverness Way East, Englewood, CO 80122-5704, USA.

NCITS TR-19:1998, Fibre Channel Private Loop, SCSI Direct Attach (FC-PLDA) (Technical Report)

NCITS TR-20:1998, Fibre Channel Fabric Loop Attachment (FC-FLA) (Technical Report)

NCITS TR-24:1999, Fibre Channel – Tape Technical Report (FC-TAPE)

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<sup>1</sup> To be published.