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**Information technology – Small computer system interface (SCSI) –
Part 224: Fibre Channel Protocol for SCSI, fourth version (FCP-4)**

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INFORMATION TECHNOLOGY – SMALL COMPUTER SYSTEM INTERFACE (SCSI) – Part 224: Fibre Channel Protocol, fourth version (FCP-4)

FOREWORD

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International Standard ISO/IEC 14776-224 was prepared by subcommittee 25: Interconnection of information technology equipment, of ISO/IEC joint technical committee 1: Information technology.

The list of all currently available parts of the ISO/IEC 14776 series, under the general title *Information technology – Small computer system interface (SCSI)*, can be found on the IEC and ISO websites.

The text for this standard is based on the following document:

CDV	Report on voting
JTC1-SC25/2833/CDV	JTC1-SC25/2881/RVC

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2 except as indicated in 3.4.

A bilingual version of this publication may be issued at a later date.

INTRODUCTION

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-3 Exchanges and Information Units. Fibre Channel is a high speed serial architecture that allows either optical or electrical connections. 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 the following clauses:

Clause 1 is the scope of this standard.

Clause 2 enumerates the normative references that apply to this standard.

Clause 3 describes the terms, definitions, abbreviations, and conventions used in this standard.

Clause 4 provides an overview of the protocol for transmitting SCSI information over Fibre Channel.

Clause 5 describes the FC-FS-3 frame header.

Clause 6 describes the Basic Link Services and Extended Link Services used by the protocol for transmitting SCSI information over Fibre Channel.

Clause 7 describes the Name Server objects defined for FCP-4.

Clause 8 describes the FCP FC-4 Link Service definitions for the protocol for transmitting SCSI information over Fibre Channel.

Clause 9 describes the Information Units used to transfer SCSI commands, data, and status across a Fibre Channel connection.

Clause 10 defines the SCSI mode pages used by the protocol for transmitting SCSI information over Fibre Channel.

Clause 11 defines the timers used for FCP-4 operation and recovery.

Clause 12 defines the link error detection and error recovery procedures for FCP-4.

This standard has the following annexes:

Annex A is a normative description of the relationship between the services defined by SAM-5 and the corresponding functions defined by this standard.

Annex B is an informative annex that provides examples of the protocol for transmitting SCSI information over FCP.

Annex C is an informative annex providing examples of the FCP-4 error recovery mechanisms.

Annex D is an informative annex describing techniques for discovering FCP device capabilities.

Annex E is an informative annex providing examples of the content of ELSs used during FCP-4 recovery operations.

This standard is part of ISO/IEC 14776 (all parts) developed 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 14776-415, *Information technology - Small computer system interface (SCSI) - Part 415: SCSI architecture model - 5 (SAM-5)*.

**INFORMATION TECHNOLOGY –
SMALL COMPUTER SYSTEM INTERFACE (SCSI) –
Part 224: Fibre Channel Protocol, fourth version (FCP-4)**

1 Scope

This part of ISO/IEC 14776 defines a fourth version of the SCSI Fibre Channel Protocol (FCP). This standard is a mapping protocol for applying the SCSI command set to Fibre Channel. This standard defines how the Fibre Channel services and the defined Information Units (IUs) are used to perform the services defined by the SCSI Architecture Model - 5 (SAM-5). This fourth version includes additions and clarifications to the third version (ISO/IEC 14776-223:2008), 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 documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

ISO/IEC 14165-122, *Information technology - Fibre channel - Part 122: Arbitrated loop-2 (FC-AL-2)*

ISO/IEC 14776-415, *Information technology - Small computer system interface (SCSI) - Part 415: SCSI architecture model - 5 (SAM-5)*

ISO/IEC 14776-454, *Information technology - Small computer system interface (SCSI) - Part 454: SCSI Primary Commands - 4 (SPC-4)*

INCITS 463-2010, *Information Technology - Fibre Channel Generic Services - 6 (FC-GS-6)*

INCITS 470-2011, *Information Technology - Fibre Channel Framing and Signaling Interface - 3 (FC-FS-3)*

INCITS 477-2011, *Information Technology - Fibre Channel - Link Services - 2 (FC-LS-2)*

INCITS 540, *Information Technology - Fibre Channel - Non-Volatile Memory Express (FC-NVMe)*

INCITS 544, *Information technology - Fibre Channel - Single-Byte Command Code Sets Mapping Protocol - 6 (FC-SB-6)*

INCITS TR-49-2012, *INCITS Technical Report For Information Technology - Fibre Channel - Device Attach - 2 (FC-DA-2)*

SFF document SFF-8067, *40-pin SCA-2 Connector w/Bidirectional ESI* ¹

1. SFF specifications are available from the SNIA SFF Technology Affiliate (see <http://www.snia.org/sff>).