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INFORMATION TECHNOLOGY – SMALL COMPUTER SYSTEM INTERFACE (SCSI) –

Part 454: SCSI Primary Commands - 4 (SPC-4)

FOREWORD

- 1) ISO (the International Organization for Standardization) and IEC (the 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. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.
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International Standard ISO/IEC 14776-454 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 web site.

This International Standard has been approved by vote of the member bodies and the voting results may be obtained from the address given on the second title page.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2 except as described in 3.4 and 3.5.

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

IMPORTANT - The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

The SCSI command set is designed to provide efficient peer-to-peer operation of SCSI devices (e.g., disks, tapes, media changers) by an operating system. The SCSI command set assumes an underlying command-response protocol.

The SCSI command set provides multiple operating systems concurrent control over one or more SCSI devices. However, proper coordination of activities between the multiple operating systems is critical to avoid data corruption. Commands that assist with coordination between multiple operating systems are described in this standard. However, details of the coordination are beyond the scope of the SCSI command set.

This standard defines the device model for all SCSI devices. This standard defines the SCSI commands that are basic to every device model and the SCSI commands that may apply to any device model.

With any technical document there may arise questions of interpretation as new products are implemented. INCITS has established procedures to issue technical opinions concerning the standards developed by INCITS. These procedures may result in SCSI Technical Information Bulletins being published by INCITS.

Figure 1 shows the relationship of this standard to the other standards and related projects in the SCSI family of standards as of the publication of this standard.

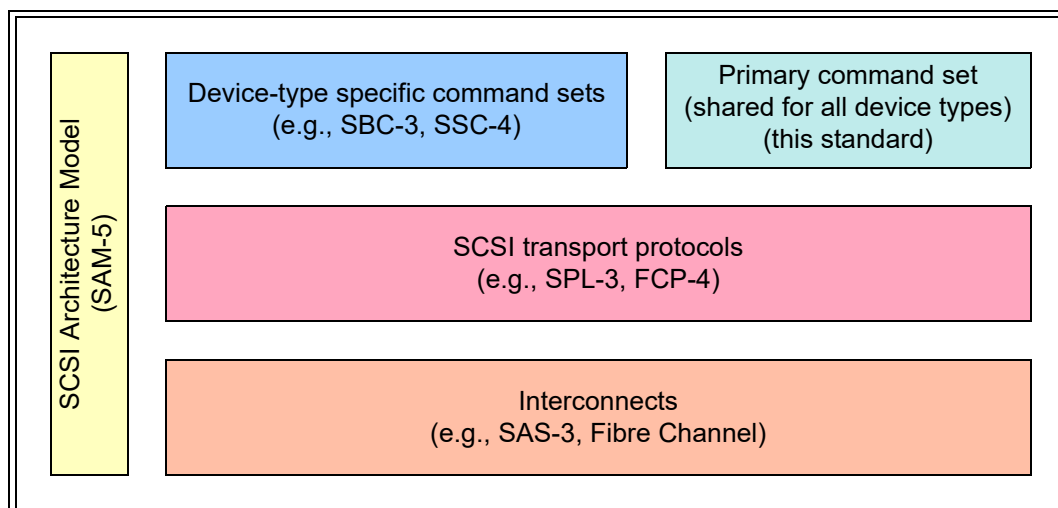


Figure 1 — SCSI document structure

The SCSI document structure in figure 1 is intended to show the general applicability of the documents to one another. Figure 1 is not intended to imply a relationship such as a hierarchy, protocol stack, or system architecture.

SCSI Architecture Model: Defines the SCSI systems model, the functional partitioning of the SCSI standard set and requirements applicable to all SCSI implementations and implementation standards.

Device-Type Specific Command Sets: Implementation standards that define specific device types including a device model for each device type. These standards specify the required commands and behaviors that are specific to a given device type and prescribe the requirements to be followed by a SCSI initiator device when sending commands to a SCSI target device having the specific device type. The commands and behaviors for a specific device type may include by reference commands and behaviors that are shared by all SCSI devices.

Shared Command Set: An implementation standard that defines a model for all SCSI device types. This standard specifies the required commands and behavior that is common to all SCSI devices, regardless of

device type, and prescribes the requirements to be followed by a SCSI initiator device when sending commands to any SCSI target device.

SCSI Transport Protocols: Implementation standards that define the requirements for exchanging information so that different SCSI devices are capable of communicating.

Interconnects: Implementation standards that define the communications mechanism employed by the SCSI transport protocols. These standards may describe the electrical and signaling requirements essential for SCSI devices to interoperate over a given interconnect. Interconnect standards may allow the interconnection of devices other than SCSI devices in ways that are outside the scope of this standard.

The term SCSI is used to refer to ISO/IEC 14776 (all parts).

These standards specify the interfaces, functions and operations necessary to ensure interoperability between conforming implementations. This standard is a functional description. Conforming implementations may employ any design technique that does not violate interoperability.

INFORMATION TECHNOLOGY – SMALL COMPUTER SYSTEM INTERFACE (SCSI) –

Part 454: SCSI Primary Commands - 4 (SPC-4)

1 Scope

ISO/IEC 14776 (all parts) provides for many different types of SCSI devices (e.g., disks, tapes, media changers). This standard defines a device model that is applicable to all SCSI devices. Other command standards expand on the general SCSI device model in ways appropriate to specific types of SCSI devices.

ISO/IEC 14776 (all parts) specifies the interfaces, functions, and operations necessary to ensure interoperability between conforming SCSI implementations. This standard is a functional description. Conforming implementations employ any design technique that does not violate interoperability.

This standard defines the SCSI commands that are mandatory and optional for all SCSI devices. Support for any feature defined in this standard is optional unless otherwise stated. This standard also defines the SCSI commands that may apply to any device model.

The following commands, parameter data, and features defined in previous versions of the SPC standard are made obsolete by this standard:

- a) the TARGET RESET supported (TRS) bit and the WAKEUP supported (WAKES) bit in the REPORT SUPPORTED TASK MANAGEMENT FUNCTIONS parameter data;
- b) code value 10b (i.e., Per initiator port) in the MODE PAGE POLICY field in the mode page policy descriptor in the Mode Page Policy VPD page;
- c) the removable medium devices with an attached medium changer model, MCHNGR bit in the standard INQUIRY data, the MOVE MEDIUM ATTACHED command in disks and tapes, and the READ ELEMENT STATUS ATTACHED command in disks and tapes;
- d) linked commands;
- e) the PPC bit in the LOG SENSE command;
- f) the NUL bit in EXTENDED COPY command target descriptors (i.e., CSCD descriptors in this standard);
- g) EXTENDED COPY support for the processing of setmarks by sequential-access devices;
- h) READ BUFFER commands with the MODE field set to 00h and 1Ah; and
- i) WRITE BUFFER commands with the MODE field set to 00h, 1Ah, and 1Bh.

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 14776-115, *Information technology - Small Computer System Interface (SCSI) - Part 115: Parallel Interface - 5 (SPI-5)*

ISO/IEC 14776-153, *Information technology - Small Computer System Interface (SCSI) - Part 153: Serial Attached SCSI - 2.1 (SAS-2.1)*

ISO/IEC 14776-322, *Information technology - Small Computer System Interface (SCSI) - Part 322: SCSI Block Commands - 2 (SBC-2)*

ISO/IEC 14776-323, *Information technology - Small Computer System Interface (SCSI) - Part 323: SCSI Block Commands - 3 (SBC-3)*

ISO/IEC 14776-331, *Information technology - Small Computer System Interface (SCSI) - Part 331: Stream Commands (SSC)*

ISO/IEC 14776-414, *Information technology - Small Computer System Interface (SCSI) - Part 414: SCSI Architecture Model - 4 (SAM-4)*

ISO/IEC 14776-452, *Information technology - Small Computer System Interface (SCSI) - Part 452: SCSI Primary Commands - 2 (SPC-2)*

ISO/IEC 14776-453, *Information technology - Small Computer System Interface (SCSI) - Part 453: SCSI Primary Commands - 3 (SPC-3)*

ISO 5807:1985, *Information processing - Documentation symbols and conventions for data, program and system flowcharts, program network charts and system resources charts*

INCITS 318-1998, *SCSI Controller Commands - 2 (SCC-2)*

INCITS 365, *Information technology SCSI RDMA Protocol (SRP)*

INCITS 375-2004, *Information technology - Serial Bus Protocol 3 (SBP-3)*

INCITS 457, *Information technology - Serial Attached SCSI - 2 (SAS-2)*¹⁾

INCITS 468-2010, *Information technology - Multi-Media Command Set - 6 (MMC-6)*

INCITS 468-2010/AM 1-2012, *Information technology - Multi-Media Command Set 6 - Amendment 1 (MMC 6 AM1)*

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 481-2011, *Information technology - Fibre Channel Protocol for SCSI - 4 (FCP-4)* (planned as ISO/IEC 14776-224)

INCITS 484-2012, *Information technology SCSI Media Changer Commands 3 (SMC-3)*

INCITS 489, *Information technology - SCSI Over PCI Express[®] (SOP)*

INCITS 492, *Information technology - SAS Protocol Layer - 3 (SPL-3)* (planned as ISO/IEC 14776-263)

INCITS 496-2012, *Information technology - Fibre Channel - Security Protocols - 2 (FC-SP-2)*

INCITS 496-2012/AM 1-2015, *Information technology - Fibre Channel - Security Protocols - 2/Amendment 1 - (FC-SP-2/AM1)*

INCITS 515, *Information technology - Small Computer System Interface (SCSI) - SCSI Architecture Model - 5 (SAM-5)* (planned as ISO/IEC 14776-415)

INCITS 516, *Information technology - SCSI Stream Commands - 4 (SSC-4)*

1) SAS-2.1 supersedes SAS-2 but does not contain the information that this standard references normatively in 7.5.13.

INCITS 517, *Information technology - SCSI / ATA Translation - 3 (SAT-3)*

ANSI/IEEE 1394a-2000, *High Performance Serial Bus (supplement to ANSI/IEEE 1394-1995)*

ANSI/IEEE 1619.1-2007, *Standard for Authenticated Encryption with Length Expansion for Storage Devices*

ANSI/IEEE 1667:2009, *Standard Protocol for Authentication in Host Attachments of Transient Storage Devices*

INCITS 4-1986 (R2002), *Information Systems - Coded Character Sets - 7-Bit American National Standard Code for Information Interchange (7-Bit ASCII)*

ISO/IEC 13213, *Information technology - Microprocessor systems - Control and Status Registers (CSR) Architecture for microcomputer buses*

ISO/IEC 646:1991, *Information technology - ISO 7-bit coded character set for information interchange*

ISO/IEC 8859-1:1998, *Information technology - 8-bit single-byte coded graphic character sets - Part 1: Latin alphabet No. 1*

ISO/IEC 8859-2:1999, *Information technology - 8-bit single-byte coded graphic character sets - Part 2: Latin alphabet No. 2*

ISO/IEC 8859-3:1999, *Information technology - 8-bit single-byte coded graphic character sets - Part 3: Latin alphabet No. 3*

ISO/IEC 8859-4:1998, *Information technology - 8-bit single-byte coded graphic character sets - Part 4: Latin alphabet No. 4*

ISO/IEC 8859-5:1999, *Information technology - 8-bit single-byte coded graphic character sets - Part 5: Latin/Cyrillic alphabet*

ISO/IEC 8859-6:1999, *Information technology - 8-bit single-byte coded graphic character sets - Part 6: Latin/Arabic alphabet*

ISO/IEC 8859-7:2003, *Information technology - 8-bit single-byte coded graphic character sets - Part 7: Latin/Greek alphabet*

ISO/IEC 8859-8:1999, *Information technology - 8-bit single-byte coded graphic character sets - Part 8: Latin/Hebrew alphabet*

ISO/IEC 8859-9:1999, *Information technology - 8-bit single-byte coded graphic character sets - Part 9: Latin alphabet No. 5*

ISO/IEC 8859-10:1998, *Information technology - 8-bit single-byte coded graphic character sets - Part 10: Latin alphabet No. 6*

ISO/IEC 10646:2017, *Information technology - Universal Coded Character Set (UCS)*

Video Performance Guarantee Profile 1 Revision 1.0 (VPG1), May 24, 2011

NOTE 1 - For more information about documents published by the CFA, see <http://www.compactflash.org/>.

RFC 791, *Internet Protocol - DARPA Internet Program - Protocol Specification*

RFC 1321, *The MD5 Message-Digest Algorithm*

RFC 2104, *HMAC: Keyed-Hashing for Message Authentication*

RFC 2279, *UTF-8, a transformation format of ISO 10646*

RFC 2410, *The NULL Encryption Algorithm and Its Use With IPsec*

RFC 2437, *PKCS #1: RSA Cryptography Specifications Version 2.0*

RFC 2616, *Hypertext Transfer Protocol - HTTP/1.1*

RFC 3526, *More Modular Exponential (MODP) Diffie-Hellman groups for Internet Key Exchange (IKE)*

RFC 3566, *The AES-XCBC-MAC-96 Algorithm and Its Use With IPsec*

RFC 3602, *The AES-CBC Cipher Algorithm and Its Use with IPsec*

RFC 3766, *Determining Strengths For Public Keys Used For Exchanging Symmetric Keys*

RFC 4086, *Randomness Requirements for Security*

RFC 4106, *The Use of Galois/Counter Mode (GCM) in IPsec Encapsulating Security Payload*

RFC 4291, *IP Version 6 Addressing Architecture*

RFC 4303, *IP Encapsulating Security Payload (ESP)*

RFC 4306, *Internet Key Exchange (IKEv2) Protocol*

RFC 4309, *Using Advanced Encryption Standard (AES) CCM Mode with IPsec Encapsulating Security Payload*

RFC 4434, *The AES-XCBC-PRF-128 Algorithm for the Internet Key Exchange Protocol (IKE)*

RFC 4595, *Use of IKEv2 in the Fibre Channel Security Association Management Protocol*

RFC 4718, *IKEv2 Clarifications and Implementation Guidelines*

RFC 4753, *ECP Groups for IKE and IKEv2*

RFC Errata for RFC 4753, http://rfc-editor.org/errata_search.php?rfc=4753

RFC 4754, *IKE and IKEv2 Authentication Using the Elliptic Curve Digital Signature Algorithm (ECDSA)*

RFC 4868, *Using HMAC-SHA-256, HMAC-SHA-384, and HMAC-SHA-512 with IPsec*

RFC 5280, *Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile*

RFC 5282, *Using Authenticated Encryption Algorithms with the Encrypted Payload of the Internet Key Exchange version 2 (IKEv2) Protocol*

RFC 5755, *An Internet Attribute Certificate Profile for Authorization*

RFC 6818, *Updates to the Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile*

RFC 7143, *iSCSI Protocol (Consolidated)*

RFC 7144, *Internet Small Computer Systems Interface (iSCSI) SCSI Features Update*

NOTE 2 - For more information on the RFCs and standards published by the Internet Engineering Task Force (IETF), see <http://www.ietf.org/>.

NIST SP (Special Publication) 800-38D, *Recommendation for Block Cipher Modes of Operation: Galois/Counter (GCM) Mode for Confidentiality and Authentication and GMAC*

NIST SP 800-90 A, *Recommendation for Random Number Generation Using Deterministic Random Bit Generators*

FIPS 140-2, *Security Requirements for Cryptographic Modules*

FIPS 140-2, *Annex C: Approved Random Number Generators*

FIPS 140-3, *Security Requirements for Cryptographic Modules (in development)*

FIPS 180-4, *Secure Hash Standard*

FIPS 198-1, *The Keyed-Hash Message Authentication Code (HMAC)*

NOTE 3 - For more information on NIST and FIPS standards published by the National Institute of Standards and Technology, see <http://csrc.nist.gov/publications/>.

Universal Serial Bus 3.0 Specification Revision 1.0 (USB-3), November 12, 2008

NOTE 4 - For more information on publications by the USB Implementers Forum, see <http://www.usb.org/>.