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Part 326: Reduced block commands (RBC)

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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.

2) In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

3) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

International Standard ISO/IEC 14776-326 was prepared by subcommittee 25: Interconnection of information technology equipment, of ISO/IEC joint technical committee 1: Information technology.

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

INTRODUCTION

This part of ISO/IEC 14776 specifies the functional requirements for the SCSI Reduced Block Command set (RBC). RBC permits SCSI block logical units, such as flexible disks, rigid disks, optical disks, etc., to be attached to computers, and it provides the definition for their use.

The Reduced Block Command set is designed to provide very efficient initiator-to-device operation of input/output logical units by an operating system.

Annex A contains an implementation guide for RBC devices using SBP-2.

INFORMATION TECHNOLOGY – SMALL COMPUTER SYSTEM INTERFACE (SCSI) –

Part 326: Reduced Block Commands (RBC)

1 Scope

This part of ISO/IEC 14776 defines a Reduced Block Command set for logical block devices. The Reduced Block Commands, along with the required SPC-2 commands and their restrictions described in this standard, fully specify the complete command set for RBC logical block devices.

The purpose of this standard is to provide a command set of reduced requirements and options from SCSI Block Commands (SBC) for block devices (see ISO/IEC 14776-321). The reduced command set is intended to more closely match the functionality required for simple block logical units. The specified commands place no restrictions on device performance. The basic focus of this command set is to enable the command and control of rigid disks and removable media devices attached to Serial Bus and utilizing SCSI Serial Bus Protocol 2 (SBP-2) (ISO/IEC 14776-232).

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.

ISO/IEC 13213:1994, *Information technology – Microprocessor systems – Control and status register (CSR) architecture for microcomputer buses*

ISO/IEC 14776-232:2001, *Information technology – Small Computer System Interface (SCSI) – Part 232: Serial Bus Protocol 2 (SBP-2)*

ISO/IEC 14776-312,– *Information technology – Small Computer System Interface (SCSI) – Part 312: Primary commands 2 (SPC-2)*[1)]

ISO/IEC 14776-321,– *Information technology – Small Computer System Interface (SCSI-3) – Part 321: Block commands (SBC)*[2)]

ISO/IEC 14776-362,– *Information technology – Small Computer System Interface (SCSI) – Part 362: Multimedia commands 2 (MMC-2)*[2)]

ISO/IEC 14776-412,– *Information technology – Small Computer System Interface (SCSI) – Part 412: Architecture model 2 (SAM-2)*[1)]

ANSI X3.301:1997, *Information technology – SCSI-3 Primary Commands 2 (SPC)*

ANSI/IEEE 1394:1995, *High Performance Serial Bus*

IEEE 1394a:2000, *High Performance Serial Bus (Supplement to ANSI/IEEE 1394)*

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1) Under consideration.

2) To be published.

3 Definitions, acronyms, keywords and conventions

3.1 Definitions

For the purpose of this document the following terms and definitions apply.

3.1.1
additional sense code
field in the sense data (see definition in ISO/IEC 14776-312)

3.1.2
additional sense code qualifier
field in the sense data (see definition in ISO/IEC 14776-312)

3.1.3
byte
eight bits of data

3.1.4
command descriptor block
structure of up to 16 bytes in length used to communicate a command from an initiator to a device

3.1.5
event field
byte 0 of the sense data INFORMATION field (see Table 24 for the Event Status INFORMATION field format) when the sense code indicates EVENT STATUS NOTIFICATION (38h)

3.1.6
logical unit
part of the target that is an instance of a device model, for example, mass storage, CD-ROM or printer. In devices that implement one or more logical units, the device type of the logical units may differ

3.1.7
sense data
data describing an error or exceptional device condition that a device delivers to an initiator (see definition in ISO/IEC 14776-312)

3.1.8
sense key
field in the sense data (see definition in ISO/IEC 14776-312)

3.1.9
status
response information sent from a device to an initiator upon completion of each command

3.1.10
unit attention condition
state that a logical unit maintains while it has asynchronous status information to report to one or more initiators

3.1.11
vendor-specific
an item (for example, a bit, field, code value, etc.) which is not defined by this standard and may be vendor defined

3.2 Acronyms

The following abbreviations are used in this standard:

ASC Additional Sense Code

ASCQ Additional Sense Code Qualifier

CDB Command Descriptor Block

RBC Reduced Block Commands (this standard)

SPC-2 SCSI Primary Commands 2

3.3 Keywords

Several keywords are used to differentiate levels of requirements and options, as follows:

3.3.1
expected
keyword used to describe the behavior of the hardware or software in the design models assumed by this standard. Other hardware and software design models may also be implemented

3.3.2
ignored
keyword that describes bits, bytes, quadlets, or fields whose values are not checked by the recipient

3.3.3
mandatory
keyword that indicates items required to be implemented as defined by this standard

3.3.4
may
keyword that indicates flexibility of choice with no implied preference

3.3.5
optional
keyword that describes features which are not required to be implemented by this standard. However, if any optional feature defined by this standard is implemented, it shall be implemented as defined

3.3.6
reserved
keyword used to describe objects – bits, bytes and fields – or the code values assigned to these objects in cases where either the object or the code value is set aside for future standardization. Usage and interpretation may be specified by future extensions to this or other standards. A reserved object shall be zeroed or, upon development of a future standard, set to a value specified by such a standard. The recipient of a reserved object shall not check its value. The recipient of a defined object shall check its value and reject reserved code values

3.3.7
shall
keyword that indicates a mandatory requirement. Designers are required to implement all such mandatory requirements to assure interoperability with other products conforming to this standard

3.4 Conventions

The following conventions are used.

3.4.1 Non-numeric values

Lowercase is used for words having the normal English meaning. Certain words and terms used in this standard have a specific meaning beyond the normal English meaning. These words and terms are defined either in Clause 3 or in the text where they first appear.

Listed items in RBC do not represent any priority. Any priority is explicitly indicated. Formal lists (for example, (a) red; (b) blue; (c) green) connoted by letters are in an arbitrary order. Formal lists (for example, (1) red; (2) blue; (3) green) connoted by numbers are in a required sequential order.

If a conflict arises between text, tables or figures, the order of precedence is as follows: text; tables; figures. Not all the tables or figures are fully described in the text. Tables show data format and values. Notes and IMPLEMENTATION notes do not constitute any requirements for implementations.

a) The names of abbreviations, commands and acronyms are in all uppercase, for example TEST UNIT READY command.

b) Fields containing only one bit are usually referred to as the "NAME" bit instead of the "NAME" field.

c) Fields are shown in capital letters, for example LOGICAL BLOCK ADDRESS.

3.4.2 Numeric values

The ISO/IEC convention of numbering is used (i.e., the thousands and higher multiples are separated by a space, and a comma is used as the decimal point, as in 65 536 or 0,5).

a) Decimal numbers are represented by Arabic numerals without subscripts or by their English names, for example 42, or twelve.

b) Hexadecimal numbers are represented by digits from the character set 0 – 9 and A – F followed by lower-case h, for example 2Ah.

c) Binary numbers are represented by digits from the character set 0 and 1, followed by lower-case b, for example 0010 1010b.

d) The most significant bit of a binary quantity is shown on the left side and represents the highest algebraic value position in the quantity.

e) For the sake of legibility, binary and hexadecimal numbers are separated into groups of four digits separated by spaces.

4 RBC device model

4.0 General

RBC logical units store blocks of data for later retrieval. Each block of data is stored at a unique location. Initiators issue WRITE commands to store the blocks of data (write operations) and READ commands to retrieve the blocks of data (read operations). Other commands issued by the initiator may also cause write and read operations to occur. A write operation causes one or more blocks of data to be written on the medium. A read operation causes one or more blocks of data to be read from the medium. A verify operation confirms that one or more blocks of data were correctly written and may be read without error from the medium.

Blocks of data are stored by a process that causes localized changes or transitions within the medium. The changes made to the medium to store the blocks of data may be volatile (i.e. not retained through off/on power cycles) or non-volatile (retained through off/on power cycles). The medium may be divided in parts that are used for data blocks, parts that are reserved for

defect management, and parts that are reserved for use by the target for the management of the logical unit.

4.1 Removable medium device

The medium in a RBC device may be removable (for example, used in a floppy disk drive) or non-removable (for example, used in a fixed disk drive). Typically, removable medium is contained within a cartridge (or jacket) to prevent damage to the recording surfaces.

A removable medium has an attribute of being mounted or de-mounted on a suitable transport mechanism. A removable medium is mounted when the device/media combination is capable of performing write or read operations and the initiator is informed of this status. A removable medium is de-mounted at any other time (for example, during loading, unloading, or storage).

Initiators may determine whether a RBC removable medium device is capable of performing read or write operations by one of three methods:

a) Enabling AERC in the device and examining the event information transmitted from the device.

b) Issuing a TEST UNIT READY command and examining the returned status information.

c) Issuing a MODE SENSE command for Mode Page 06h (see 5.8.3) and examining the state of the READD or WRITED bits in byte 11. If the READD bit is set to one, then the media is not readable. If the WRITED bit is set to one, then the media is not writable.

Until the RBC removable medium device and media are ready to be accessed, a READ(10) command shall cause the device to return status of CHECK CONDITION (02h), sense key of NOT READY (02h), and an ASC of LOGICAL UNIT NOT READY (04h). The ASCQ shall reflect the current state of the device/media.

When the device becomes ready, a unit attention condition shall be established. The sense key field shall be set to UNIT ATTENTION (06h), and the ASC/ASCQ to EVENT STATUS NOTIFICATION/MEDIA CLASS EVENT (38h/04h). The EVENT field contained within the SENSE DATA INFORMATION field shall be set to NEW MEDIA READY FOR ACCESS (02h). When the unit attention condition is delivered to the initiator, the status field shall be set to CHECK CONDITION(02h).

4.2 Command usage

4.2.0 General

RBC devices are not required to support the REQUEST SENSE command or the SEND DIAGNOSTIC command. Devices which do not provide the Auto Sense function, Asynchronous Event Reporting, or the GET EVENT STATUS NOTIFICATION (see MMC-2 for definition) command shall implement the REQUEST SENSE command.

All SENSE KEY, ADDITIONAL SENSE CODE and ADDITIONAL SENSE CODE QUALIFIER names and values contained in this standard are defined in ISO/IEC 14776-312. No additional or alternative meaning is intended by the use of such names and values in this standard.

4.2.1 Using the INQUIRY command

The INQUIRY command may be used by an initiator to determine the configuration of a logical unit. RBC devices return information that includes type and standard version. The device may also return the vendor identification number, model number and other vendor specific information. It is recommended that devices provide the capability to return this information upon completing power-on initialization. A device may take more time to return certain portions of this information, especially if the information must be retrieved from the medium.