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Information technology –
Small computer system interface (SCSI) –

Part 381:
Optical Memory Card Device Commands (OMC)

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FOREWORD

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. 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.

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 14776-381 was prepared by subcommittee 25: Interconnection of information technology equipment, of ISO/IEC joint technical committee 1: Information technology.

International Standards are drafted in accordance with ISO/IEC Directives, Part 3.

INTRODUCTION

The SCSI-3 Optical Memory Card (OMC) command set specifies the commands for a device that declares itself as an optical memory card device in the device type field of the INQUIRY command. The OMC command set is specified independently of any service delivery subsystem, an underlying command-response protocol is assumed.

The optical memory card is a Write Once media in that a written area cannot be overwritten. Information stored on an optical memory card is non-volatile. The media is preformatted during manufacture and cannot be formatted by the user. The specification for the preformatted area is defined in ISO/IEC 11694, part 4. Data written to the optical memory card cannot be updated. Therefore the update commands are not defined for optical memory card devices.

This standard defines the device model for the optical memory card devices.

This standard is divided into six clauses:

Clause 1   is the scope.

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

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

Clause 4   describes models for optical memory card devices.

Clause 5   provides the definitions of all commands unique to optical memory card devices. This clause also provides references to the ISO/IEC 14776-311 SCSI-3 SPC standard for primary commands and the ISO/IEC 14776-321 SCSI-3 SBC standard for block commands used with optical memory card device class.

Clause 6   provides the definition of all parameters unique to optical memory card devices.

INFORMATION TECHNOLOGY –
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Part 381: Optical Memory Card Device Commands (OMC)

1   Scope

This standard defines the command set extensions to facilitate operation of optical memory card devices. The clause(s) of this standard pertaining to optical memory card device class, implemented in conjunction with the applicable clauses of the ISO/IEC 14776-311 SCSI-3 Primary Commands (SPC) and the ISO/IEC 14776-321 SCSI-3 Block Commands (SBC), fully specify the standard command set for optical memory card devices.

2   Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO/IEC 14776. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO/IEC 14776 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO/IEC 7810:1995, *Identification cards – Physical characteristics*

ISO/IEC 9316:1995, *Information technology – Small Computer System Interface-2*

ISO/IEC 11694-4:1996, *Identification cards – Optical memory cards – Linear recording method – Part 4: Logical data structures*

ISO/IEC CD 14776-311, *Information technology – Small Computer System Interface – Part 311: Primary Commands (SCSI-3 SPC)* [1]

ISO/IEC CD 14776-321, *Information technology – Small Computer System Interface – Part 321: Block Commands (SCSI-3 SBC)* [1]

3   Definitions, symbols and conventions

3.1   Definitions

For purposes of this standard, the following definitions apply.

3.1.1
address type
addressing methods for optical memory card devices, see 4.2

3.1.2
device-specific
Something (e.g., a bit, field, code value, etc.) that is not defined by this standard and may be defined differently for each device.

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[1] Under consideration.

3.1.3
ID-1 card
card whose size is defined in ISO/IEC 7810

3.1.4
invalid
illegal or unsupported bit, byte, word, field or code value

3.1.5
mandatory
The referenced item is required to claim compliance with this International Standard.

3.1.6
obsolete
The referenced item was defined in prior SCSI standards but has been removed from this International Standard.

3.1.7
optional
The referenced item is not required to claim compliance with this International Standard. Implementation of an optional item must be as defined in this International Standard.

3.1.8
partition
the entire usable region for recording and reading in a recording medium or in a portion of a recording medium. If there is more than one partition, they shall be numbered starting with zero

3.1.9
reserved
identifies bits, bytes, words, fields and code values that are set aside for future standardisation

3.1.10
sector
the minimum unit of data that can be accessed on a recording medium for any read and/or write commands

3.1.11
type of sector
an identifier which distinguishes the kind of sectors defined in ISO/IEC 11694-4

3.1.12
vendor-specific
Something (e.g. a bit, field, code value, etc.) that is not defined by this standard and may be used differently in various implementations by each vendor.

3.2   References to SCSI Standards

The term SCSI is used wherever it is not necessary to distinguish between the versions of SCSI. The Small Computer System Interface-2 (ISO/IEC 9316) is referred to herein as SCSI-2. The set of SCSI-3 standards are collectively referred to as SCSI-3.

3.3   Symbols and abbreviations

SBC: SCSI-3 Block Commands standard

SCSI: Either SCSI-2 or SCSI-3

SCSI-2: Small Computer System Interface-2

SCSI-3: Small Computer System Interface-3

SPC: SCSI-3 Primary Commands standard

3.4   Numerical conventions

Digits 0 to 9 in the text of this standard that are not immediately followed by lower-case "h" are decimal values. Digits 0 to 9 and upper case letter "A" to "F" immediately followed by lower-case "h" are hexadecimal values.

4   Optical memory card devices

4.1   Model for optical memory card devices

An optical memory card device is a device that returns 0Fh in the PERIPHERAL DEVICE TYPE field of the INQUIRY command response data.

An optical memory card device is a device that supports an ID-1 card size removable optical recording medium. In several respects, an optical memory card device is similar to a direct-access device and an optical memory device.

A sector is the minimum data recording/reproduction unit for optical memory card devices. Optical memory card devices use variable size sectors to optimize storage performance on the medium.

4.2   Address type

There are two address types for optical memory card devices. Address type specifies the value in the logical block address field of the medium access commands and the sense data information field.

If the device supports both address types, the address types can be selected using the MODE SELECT command by setting the address type (AT) bit of the optical memory card device mode parameter header (see SCSI-3 SPC). If the device supports only one address type, the AT bit is a read-only bit and cannot be changed by the MODE SELECT command. In this case, the device specific default address type will be used. The current operating address type of the device can be obtained using the MODE SENSE command.

If the AT bit of mode parameter header is set to zero, the value in the logical block address field of the medium access commands and the sense data information field consist of the partition number and the logical block address in the partition as shown in Table 1.

Table 1 – Logical block address field and information field (AT = 0)

Bit / Byte	7	6	5	4	3	2	1	0
n	Partition number							
n+1	(MSB)	Logical block address in the partition						
n+2								
n+3								(LSB)

If the AT bit is set to one, the value in the logical block address field of the medium access commands and the sense data information field consist of the type of sector, the track address and the sector address as shown in Table 2.

Table 2 – Logical block address field and information field (AT = 1)

Bit Byte	7	6	5	4	3	2	1	0
n	Type of sector							
n+1	(MSB)			Track address				
n+2								(LSB)
n+3	Sector address							

NOTE   The commands using the logical block address field for optical memory card devices are the following commands: READ(10), SEEK(10), WRITE(10), WRITE AND VERIFY, and READ CARD CAPACITY command.

4.3 Ready state

The conditions to determine logical unit ready is vendor specific. However, ready state means that the logical unit would accept an appropriate medium access command without returning CHECK CONDITION status, and at least both of the following two conditions shall be satisfied:

1) medium in accordance with a logical unit shall be loaded in a logical unit;

2) basic information (e.g. specific track) in a medium shall be sensed.

4.4 Initialisation

The command for medium initialisation is not defined for optical memory card devices.

4.5 Medium defects

The raw defect rate is typically higher for optical medium than magnetic medium. Data is usually recovered though the use of sophisticated error correction algorithms. The level of error correction used for data recovery can be selected. Control of the error correction algorithms and level of correction depends on the type of sector.

4.6 Error reporting

If any of the following conditions occur during the execution of a command the target shall return CHECK CONDITION status. The appropriate sense key and additional sense code should be set. The following list illustrates some error conditions and the applicable sense keys. The list does not provide an exhaustive enumeration of all conditions that may cause the CHECK CONDITION status.

Condition	Sense key
Invalid address	ILLEGAL REQUEST
Unsupported option requested	ILLEGAL REQUEST
Target reset or medium change since last command from this initiator	UNIT ATTENTION
Self diagnostic failed	HARDWARE ERROR
Unrecovered read error	MEDIUM ERROR or HARDWARE ERROR
Recovered read error	RECOVERED ERROR
Overrun or other error that might be resolved by repeating the command	ABORTED COMMAND
Attempt to read a blank or previously unwritten block	BLANK CHECK
Attempt to write a previously written block and blank block checking is enabled	BLANK CHECK
Attempt to write on write protected medium	DATA PROTECT

In the case of an invalid address, the sense data information field shall be set to the first invalid address.

In the case of an attempt to read a blank or previously unwritten block, the sense data information field shall be set to the address of the first blank encountered. The data read up to that block shall be transferred.

In the case of an attempt to write a previously written block and blank block checking is enabled, the sense data information field shall be set to the address of the first non-blank block encountered.

5   Commands for optical memory card devices

The commands for optical memory card devices shall be as shown in Table 3.